

Drawing and blurring boundaries between species: an etho-ethnography of human-chimpanzee social relations at the Primate research institute of Kyoto university

Gabriela Bezerra de Melo Daly

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THÈSE DE DOCTORAT

de l'Université de recherche Paris Sciences et Lettres PSL Research University

Préparée à l'École Normale Supérieure

Drawing and blurring boundaries between species An etho-ethnography of human-chimpanzee social relations at the Primate Research Institute of Kyoto University

Définir et brouiller les frontières entre espèces Une étho-ethnographie des relations sociales entre humains et chimpanzés Menée à l'Institut de la Recherche sur les Primates de l'Université de Kyoto

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Abstract

How do humans and chimpanzees set and blur boundaries between species when interacting with each other? This is the *leitmotif* of this etho-ethnography at the intersection of social anthropology, social studies of science and primatology. This endeavor is based on long-term fieldwork conducted in a cognitive sciences laboratory in Japan, which teaches chimpanzees language-like skills as means to understand their perceptual world. However, in this laboratory setting, the human-chimpanzee relationship is a vital part of the research philosophy and both species constitute a hybrid community of affections, social relationships, and scientific partnering. As a comparative effort, a short-term multi-sited ethnography was conducted following the theme across institutions in Japan of zoo, sanctuary and field-site type, in addition to the Japanese field station for the study of chimpanzee culture, in Bossou, Africa. Moreover, this work draws on the experience of becoming, at the same time, an experimenter in the targeted laboratory. The result is multifold. We shall explore first, the history as well as the caretaking and research practices in chimpanzee studies at the Primate Research Institute of Kyoto University (KUPRI). Then, we shall investigate the dynamics of physical boundaries in dangerous interspecies social interactions; the experimental boundaries of testing and being tested by chimpanzees; and the symbolic boundaries concerning human and nonhuman personhood. As a result, four major points are brought to light in a renewed perspective, namely (a) interspecies socialization (b) the embodiment of interspecies social relations in space (c) interspecies social relations in scientific settings (d) animalcentric perspectives on personhood. We conclude with the hopes and prospects for a fruitful dialogue across disciplines. Overall, the differential endeavor of this work consists in mobilizing concepts and tools from both primatology and social sciences to propose a more symmetric analysis of the human-animal relationship.

Keywords

Etho-ethnography, interspecies social relations, chimpanzee research, symmetrical anthropology, Japanese primatology, hybrid communities

Résumé

Comment humains et chimpanzés définissent et brouillent les frontières entre leurs espèces lors de leurs interactions ? Tel sera le leitmotiv de notre étho-ethnographie, à l'intersection de l'anthropologie sociale, des études des sciences, et de la primatologie. Au fondement de cette recherche se trouve un travail de terrain de longue durée mené dans un laboratoire de sciences cognitives situé au Japon, au sein duquel sont enseignées aux chimpanzés des compétences langagières dans le but de caractériser leur monde perceptuel. Cependant, au cœur même du contexte de ce laboratoire, la nature des relations entre humains et chimpanzés est un aspect crucial de ce type de recherche ; les deux espèces y forment une communauté hybride faite d'affects, de relations sociales et de collaboration scientifique. Afin de fournir une étude comparative, nous avons également mené une série d'ethnographies plus brèves - sur le modèle de la méthodologie multi-site - en observant cette même problématique à l'œuvre au sein de diverses institutions au Japon - zoo, sanctuaires et réserves - ainsi qu'au sein de la station japonaise pour l'étude de la culture des chimpanzés qui se trouve à Bossou, en République de Guinée. En outre, ce travail narre l'expérience que nous avons faite de devenir expérimentatrice au sein du laboratoire étudié. Le résultat en est multiple. Nous commencerons par explorer l'histoire des études sur les chimpanzés menées à l'Institut de Recherche sur les Primates de l'Université de Kyoto (KUPRI) ainsi que les pratiques de soin et de recherche qui s'y sont mises en place. Ensuite, nous étudierons les dynamiques qui caractérisent (1) les frontières physiques, lors d'interactions sociales entre deux espèces qui peuvent s'avérer dangereuses, (2) les frontières expérimentales, lorsque le chimpanzé n'est pas seulement celui qui fait l'objet d'une expérience mais qui met également à l'épreuve son expérimentateur, (3) et les frontières symboliques, lorsqu'est interrogée la définition de la « personne » humaine et non humaine. Ainsi, quatre points principaux sont examinés à nouveaux frais, en particulier (a) la socialisation interspécifique (b) l'incarnation des relations inter-espèces dans un espace donné (c) les relations inter-espèces dans un contexte scientifique (d) l'examen de perspectives zoocentrées sur la « personne ». Nous conclurons avec l'évocation de nos espoirs et de nos attentes quant à un dialogue fructueux entre les différentes disciplines en jeu. L'apport de ce travail consistera en effet à mobiliser des concepts et des outils de la primatologie et des sciences sociales afin de proposer une analyse plus symétrique des relations entre humains et animaux.

Mots Clés

Étho-ethnographie, relations sociales interspécifiques, recherche sur les chimpanzés, anthropologie symétrique, primatologie Japonaise, communautés hybrides

Doctoral Dissertation

Drawing and blurring boundaries between species

An etho-ethnography of human-chimpanzee social relations at the Primate Research Institute of Kyoto University

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To chimpanzees, who taught me simple and grand things

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Prefatory Note

JAPANESE LANGUAGE: This manuscript employs modified Hepburn romanization style for Japanese. Macrons indicate elongated vowels (e.g., \bar{e} or \bar{o}). As it is standard in Japanese studies, Japanese names to refer to interlocutors appear in the native order with the surname preceding the first name, however, when referencing, name order appears as standard Chicago full note and APA style.

CITATION STYLE: This manuscript follows Chicago style full note as it is standard in humanities. However, the extended report of quantitative studies follows APA style due to its better adequacy and precision for numerical information. The citation for photographic and audiovisual material has been adapted based on Chicago style. As it is standard in linguistics, double quotes ("") indicate direct quote regardless of whether the original is in English or in another language whereas single quotes ('') indicate translation. Block citations are always direct quotes. Moreover, double quotes might be used to emphasize words or terms, or when a word is not being used in its original sense.

AUDIOVISUAL MATERIAL: This manuscript accompanies a DVD/USB with videos and audio material. All videos cited were subjected to a systematic frame capture referred to as "videoframe". Videoframes summarize important pieces of information in a video for the purpose of description and analysis. However, some specific analyses, such as gestural communication, are better visualized through videos. Thus, although videos are not required for the understanding of the ideas discussed in this manuscript, they provide detailed information of case studies. Videos are signaled by the clapperboard symbol (**¹⁶**).

ETHICS STATEMENT: The experiment conducted by the author with chimpanzees has been approved by the Animal Welfare and Animal Care Committee of the Primate Research Institute, Kyoto University. Observational studies in Bossou, the Republic of Guinea, have been approved by the Direction Nationale de la Recherche Scientifique et de l'Innovation Technologique. Videos of human-chimpanzee interaction at KUPRI were recorded after interlocutors' consent.

Introduction

How do humans and chimpanzees set and blur boundaries between species when interacting with each other? This is the *leitmotif* of this etho-ethnography at the intersection of social anthropology, social studies of science and primatology (Figure 1). The question of boundaries is crucial because the frontiers between human and nonhuman do not stop at the species level, as comparative social anthropology emphasizes.¹ The demarcation and trespassing of such boundaries, that is, the "boundary work"² between species, reveals how parties make sense of the radical otherness in a flexible manner and how they constitute the realm of a plural "us"; an anthropological object *per se*. In particular, this movement is notorious in societies in which the traditional divide between nature/culture and humans/nonhumans does not hold ground, like the Japanese.³

Japanese relations to nonhuman primates are, therefore, comparatively much more contextual than a priori sets of rules for interactions. Therefore, Japanese primatology becomes a privileged object in this query. In addition, chimpanzees, as our closest evolutionary relatives, become of special interest given this species can be considered to be at the very borders of humanity. Finally, since captive settings require enhance human-chimpanzee contact, this is where such boundary work is likely to be observed in its most extreme expression. Yet, here a challenge must be added. Instead of focusing on how keepers and chimpanzees build relationships, we redirect the attention to how scientists and chimpanzees sustain interactions and relationships in a scientific setting. Now, not only are we able to address human-chimpanzee relationship, but we are able to inspect the makings of science about chimpanzees and with them, thus, hitting the core of hegemonic and epistemic discourses. In sum, in this work intends to address the utmost liminal cases.

Currently, humanities have witnessed the wake of the "animal turn" in which disciplines have re-conceptualized the place of nonhuman animals in their scholarship. ⁴ Conversely, primatology has increasingly addressed topics that traditionally fell in the realm of social sciences, in particular, ever since the co-joint effort of primatologists to make a strong case for chimpanzee cultures.^{5,6} Therefore,



Figure 1 Fields of interdisciplinary research

disciplines are leaning toward the creation of "boundary objects", that is, objects adaptable to disciplinary nuances but robust enough to maintain identity across them.⁷ However, if boundary work between species is a delicate practice as we shall see in this work, so is the creation of such boundary objects because each disciplinary view has claims on how they object should be structured, and on how practices are best standardized or whether they should be at any rate. Therefore, if at the empirical level, this work deals with the movement of setting and blurring boundaries between species, at an epistemological and methodological level it addresses, in a very concrete manner, boundaries between disciplines.

Before addressing the existing literature on the topic, we shall first make clear issues that belong to a conceptual treatment of the object rather than a methodological one, which is explored in a separate section. The first point refers to the concept of etho-ethnography. Etho-ethnography is a term used in the context of the complementarity of etho-ethnology and the ethno-ethology advanced by Lestel, Brunois and Gaunet.⁸ Whereas the ethno-ethology focuses on how human phenomena are used in our interaction with animals, the etho-ethnography intends to problematize the traditional mechanicist view of animals in cognitive ethology, which explicitly or implicitly conceives animals as computing machines.⁹ Along with ethno-ethology, both put forward relationships as the center of the analysis. Yet, the etho-ethnographical approach draws more heavily on how humans and other species create shared meanings, affections and interests, in other words, how they form "hybrid communities".¹⁰

There is, however, a subtler nuance to the concept of etho-ethnography. Ultimately, to the social scientist conducting it, the concept invites researchers to consider, in practice, not only humans but also other species as "natives". In sociocultural anthropology, natives are no one other than the population, the community or the group of people whose perceptions, beliefs, modes of living (so on and so forth) the anthropologist strives to understand in a particular manner. This effort is guided by the ideal of understanding natives "in their own terms", meaning that even though each ethnographic research is an intersubjective practice, the ethnographer strives to understand what are the lenses through which the natives make sense of the world, instead of privileging the ethnographer's departure points to make sense of the natives' world.

Nonetheless, when nonhuman animals become natives, social scientists are kept at bay, because traditional conceptual and methodological tools in humanities rely on resources more adapted to investigate our species, or as a primatologist puts it, how do we study meaning if one cannot even interview the monkey?¹¹ Thus, this endeavor requires social scientists to venture into other conceptual and, *surtout*, other methodological tools to move beyond human representations of animals and "nativize" animals. While, in a statement about primatologists, an anthropologist of science may boldly affirm that "my monkeys are you",¹² a symmetrical endeavor should aim at making all primates, humans and nonhumans, subjects of attention; along with the participant observer's inclusion in this relationship. As Descola identifies, anthropology is "all too human (still)".¹³

Now, when analyzing the status that captive settings possess in terms of which type of knowledge they can provide, we must point out another nuance, that is, their re-signification. Whereas primatologists consider captive settings as a locale for conducting either laboratory or observational studies of primates, anthropologists of primatology and researchers in social studies of science grant such environments another status, namely, they are considered as a place in which one is able to study how interspecies relations unfold. Perhaps, the picture that comes to mind to primatologists is "naturalistic observations" in the laboratory, except that the "naturalistic" here fully conceptualizes human presence. Alternatively, we can say etho-ethnographers study the laboratory "in the wild", borrowing Hutchins' connotation of the term.¹⁴ Claiming the wilderness of the laboratory is key to understand how we make science of primates and with primates, and how both us and them emerge profoundly changed from these relationships.

At last, a quick remark should be made regarding the use of the words "relationship" and "interaction". Here, we understand the first in a broader sense of a history of interactions, affections and other relevant social features, while the term interaction *per se* more closely describes a micro level of analysis in which social relations unfold in minutes, seconds, or even microseconds. The same can be applied to the word "activity" (*sensu* macro) and "behavior" (*sensu* interactional instances), although it should be noted that in primatology the term behavior may connote patterns of activity.

Now, we shall address the specificity of the object based on the existing literature and the ways in which it can be addressed. On the most macro level, Japanese society is considered to have entertained other forms of relationship with what in the West has been defined as culture and as nature. In fact, Berque remarks how, historically speaking, Japanese language did not even possess a word for nature in general, which nowadays is conveyed by the word *shizen* (自然); nature and culture have always defined themselves reciprocally and a nature which is independent of human

beings and bastion of causal laws has been, instead, conceived as a constructed nature where humans play an important role.¹⁵

Furthermore, the structure of Japanese language is revealing; Japanese put emphasis on the predicate and, unlike Indo-European languages, it does not require a definition of the subject.¹⁶ An interlocutor may utter a verb without any subject, for example, "eat"; but then, who eats? One must turn to the concrete situation to sort this information out. Another point interesting point is the clear importance given to nonverbal communication.¹⁷ In sum, Japanese language and society give considerable attention to the context, a fact that complexifies greatly any boundary work. As Kalland and Asquith stress there is "an absence of clear boundaries between the 'natural' and the 'artificial'".¹⁸

Yet, the fluidity of boundaries may pose some risks in the eyes of Western observers, as in the case of anthropomorphism, a vital problem in primatology. Indeed, regarding Japanese primatology of monkeys, the most seminal work in anthropology of scientific practices is Asquith's research on the differential role that anthropomorphism gains in this national tradition.¹⁹ Anthropomorphism is conventionally regarded as the ascription of human mental experiences to animals, however, as Asquith's argue, Japanese have used anthropomorphism strategically in order to recognize similarities between humans and nonhuman primates and gain a contextual understanding of their lives.^{20,21} Thus, far from a hindrance, strategic anthropomorphism resignifies the reading of animal behavior. According to Asquith, traditionally, Japanese primatology (a) puts forward the explanation of behavior and social structure as sets of interacting factors (b) places considerable importance on the context of behaviors and (c) is committed to a holistic view.²²

It is under this framework that this tradition is regarded as having been the first to be able to conceptualize cultural behaviors in monkeys. The journey of Japanese primatology would start in December 1948 when Imanishi Kinji, Kawamura Shunzo and Jun'ichiro Itani visited Koshima island to envisage a field study of the Japanese macaques.^{23,24} After



Photo 1 Kawamura, Imanishi and Itani (From left to right), Tokuda (top). © Itani Junichiro Archives.

having provisioned the site, in September 1953, one individual, a female called Imo (i.e., sweet potato in Japanese) was first observed to process food by washing the sand off with water, what became iconically referred to as sweet potato washing.²⁵ Over two years, the behavior had spread to nearly 73% of the population, and due to its social learning origins, researchers employed the terms "preculture", "prehuman culture" and "subculture" to label the novelty.^{26,27} Variations of sweet potato washing (e.g., washing in salty sea water) and other food processing forms were also observed, such as wheat placer mining, which makes grains float in order to separate them from the sand.²⁸ Yet, as Hirata and colleagues emphasize, authors refrained from the full use of the word culture as to avoid its connotation of non-comparable features such as poetry, literature and so on.²⁹

In 1996, McGrew would fully claim the word culture in the book "Chimpanzee material culture". ³⁰ Nonetheless, the adjective "material" somehow delimited the aspects of culture scrutinized and, perhaps, softened backlashes from the sociocultural anthropological community, which seems to have initially received the idea with skepticism.^{31,32} In 1999, a consortium of researchers would publish in the journal Nature, an article entitled "Cultures in chimpanzees", reporting thirty-nine different behavior patterns present in some sites but absent in others.³³ From then on, models under which culture is conceptualized in primatology have changed and been enriched over time, an example of this being an increment to the group contrast model through a redirected attention to social learning.^{34,35}

Indeed, cultural primatology has increasingly complexified the way it approaches culture, including mobilizing gene-culture coevolution frameworks which move beyond the geneticenvironmental determinism of nature and the cultural relativism of nurture.^{36,37} Nonetheless, the challenge of a fruitful dialogue across disciplines is real, or as McGrew puts it: "[i]t might seem obvious to say that cultural primatologists have more to learn from cultural anthropologists than from anyone else. However, one suspects that most sociocultural anthropologists are not only uninterested in primatology, but also are resistant actively to such engagement". ³⁸

Still, primatology has increasingly addressed topics considered crucial to humanities, which have become a constant source of criticism for being perceived as marginalized in primatology, such as the role researchers play for their object (or subjects). More recently, in this regard, while investigating hunting preferences of two adjacent chimpanzee communities in the wild, Hobaiter and colleagues found that habituation to researchers has likely impacted and

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produced behavioral differences in these communities.³⁹ If it exists an increased attention of primatology toward anthropological sensibilities, the reverse holds true as well.

As a general movement in the re-evaluation of the epistemological status of animals in humanities, we may point out the framework of anthropology of nature, which has brought to light plural modes of conceptualizing our relationship to nonhuman entities.^{40,41} In a relatable effort, anthropology of life has dealt with the human understanding of life processes, and the process of bringing entities to life, by considering human interconnectedness with the nonhuman world.^{42,43}

When turning to social studies of science (or STS, i.e., science and technology studies), the symmetric anthropology inscribed in this tradition has sought to shed light on how hybrid networks are created and purified into distinct poles of explanation and how asymmetries emerge.^{44,45} In other words, it refrains from privileging social explanations of nature, which is best exemplified by radical constructivism, and it rejects the authority of natural explanations of the social, which appears as a naïve objectivism. In such way, this endeavor opens up the possibility of addressing both humans and nonhuman primates in a symmetric fashion, in order to uncover similarities and differences, and of being mindful of conflicting disciplinary worldviews.

In addition, one of the main contributions of STS, which are relevant to the object of this work is the fact that STS carries out research in sites of production of scientific knowledge, in particular, in laboratories. Such studies unfold the existence of different epistemic cultures (or true laboratory cultures) which vary across major disciplines, as Knorr-Cetina's investigation of a biology and a physics laboratory supports.⁴⁶ In the same tradition, Houdart conducted an ethnography of a Japanese laboratory in biology, contrasting it to a French partner.⁴⁷ However, its ethnological analysis highlights an important point; it dismisses the culturalist reading of Japanese scientific practices and focuses, instead, on how actors mobilize culture *in locu*.⁴⁸ Here, too, we are invited to borrow such perspectives and understand the relationship between humans and nonhuman primates as part of an underlying and unfolding laboratory culture (or rather nature-culture!).

Next, when exploring philosophies and anthropologies of primatology, Haraway's seminal work "Primate visions" provides a highly critical approach regarding the dangers of using primates as mirrors for discourses on human nature, especially masculinized ones.⁴⁹ Moreover, although less common, collaborations between anthropologists and primatologists (or biological anthropologists working in primatology) can be observed, such as Latour and Strum's work.^{50,51}

Nonetheless, the grand majority of emerging anthropologies of primatology consists of individual efforts, employing paradigms and methodological tools of humanities.

This is the case for Langlitz' short-term investigation in Matsuzawa's laboratory on the history of the Ai Project, which explored the intellectual heritages of chimpanzee research in the broader context of Japanese primatology. ⁵² *Mutatis mutandis*, Stevens investigated human-chimpanzee entanglements in a Catalonian sanctuary, how keepers make "selves out of others", ⁵³ and, in addition, she explored researchers' sensory experiences in the wild. ⁵⁴ In fact, such works are in consonance with multispecies ethnography put forward by Kirksey and Helmreich. ⁵⁵

Notwithstanding, whereas these studies are enlightening, much is still left to discover regarding chimpanzees' perspectives in these relationships. From a different methodological perspective, for instance, Palmer and colleagues tackle the issue of how to assess orangutans' perspective in a zoo, by confronting keepers' view about these animals and orangutan-orangutan interaction through short-term ethnographic fieldwork and ethological observations (*cf.* Louchart's approach on orangutans). ^{56,57,58} Here is when we make the move from anthropologies of primatology to ethno-primatological endeavors *per se.* Ethnoprimatology as a movement in primatology, puts humans and nonhuman primates as the unit of analysis, and, as Fuentes points out it emerges as "a hybrid field of study and is influenced via at least four lineages: field primatology and primate conservation, animal studies in sociocultural anthropology, anthrozoology and aspects of the animal welfare movement's critique and engagement with primatology".⁵⁹

The first point of "the ethnoprimatological manifesto" states that "[m]uch of what we consider "normative" behaviors for primates may be stimulated by specific anthropogenic contexts", ⁶⁰ which is in alignment with critiques of primatology from humanities. Indeed, ethnoprimatology draws heavily on multispecies ethnography.⁶¹ While relying on traditional tools from humanities but approaching the problems of interdisciplinarity between anthropology and field primatology, Leblan considers the ethnoprimatological approach to be unsatisfactory, in the sense that ethnology seems to be mobilized mainly as a means to argue for primate conservation, being imbued by simplistic culturalist approaches.⁶²

While disagreeing with this least charitable reading of the ethnoprimatological endeavor, it should be noticed that most ethnoprimatologists do seem to have a stronger background in biology-oriented sciences than in humanities. Moreover, captivity is still hardly ever conceptualized in ethnoprimatology and a much smoother conceptual work could be achieved. This last remark, however, stands for both sides of the spectrum, which still seem to remain somewhat polarized, likely as a symptom of the worldwide lack of common institutional programs to groom researchers in two different traditions at the same time.⁶³

At last, we may not depart without a word on how primate cognition is studied in laboratories in the context of ape research. In the aftermath of the mostly abandoned ape language programs of the seventies,⁶⁴ which will be addressed later on, some observational studies have made use of the microanalysis of interactions in order to take into account for how cognition unfold in social interactions, as for instance, King's,⁶⁵ and Johnson's approach,⁶⁶ to name just a few. Yet, such studies focus on intraspecific interactions in captivity but outside the laboratory world. Moreover, research on human-chimpanzee interaction in captivity is mostly concerned with welfare issues of how human rearing history affects chimpanzee behaviors toward conspecifics,⁶⁷ or interaction with zoo visitors.⁶⁸ Even the creation of a "Chimpanzee-Human Interaction Index" is intended primarily for welfare studies, aiming to measure the exposure to humans in comparison to time spent with conspecifics.⁶⁹ Despite being an important field of investigation, this is but one among many other potential topics in this area.

With modesty, some experimental studies use humans as stimuli; for instance, to test through video presentations contagious yawning as a measure of empathy with familiar and unfamiliar human and conspecifics. ⁷⁰ Yet, overall, when looking at human-chimpanzee interactions, the status of laboratories as places for producing knowledge on chimpanzee cognition remains restricted to experimental research only. In cognitive studies, the laboratory is not conceived as an ecological setting in which both human and chimpanzee cognition unfold. A notorious exception is Takada's treatment of human-chimpanzee interaction, which draws on tools from conversation analysis to make sense of interactions as they occur without experimental manipulation in a Japanese institution.⁷¹

At this point, a word of caution should be added. Cognitive anthropology in the vein of Hutchins' tradition of distributed cognition attributes knowledge not to individuals but the coordination of individuals and media of several types, such as apparatuses and so on, so that, here, distribution means interaction.⁷² Although it seems reasonable that the entourage of the world may functionally act as an extension of the mind (e.g., cognitive artifacts for remembering),⁷³ which is a claim of the extended mind approach,⁷⁴ it might be perhaps too hasty to undermine the notion of

internal representations altogether, thus, underplaying the epistemic agency of individuals; a position shared by Giere.⁷⁵

This issue leads Hutchins to conclude, apropos of chimpanzees' symbolic learning, that "[t]he cognitive outcome, performing conceptual match-to-sample, is still not a capacity that belongs to the chimpanzee. If conceptual match- to-sample exists in this case, it belongs to the experiment as a complex system of cultural practices".⁷⁶ True, to the author, the same applies to humans; however, we must not ignore the fact that experiments foresee the testing of several conditions in such way that if one reasons with apparatuses and objects, one may well reason beyond. The point here is that, as we shall see, chimpanzees flexibly learn beyond the itemspecificity of experimental settings, the reason why we must infer that the material world serves as scaffolding for cognition to unfold, yet, it does not seem to be a prison outside which an agent cannot "think".

Along the lines of comparative efforts, this time, from within primatology, very recently in an article entitled "The mismeasure of ape social cognition", Leavens and colleagues addressed how comparative experimental research designs have systematically privileged humans, in particular, human children, and how such settings presuppose considerable exposure to Western and industrialized patterns of education.⁷⁷ Yet, instead of throwing the baby with the bathwater and conclude the inutility of experimental research, the authors call for a reconceptualization in the ways experimental research is conducted, to account for the unequal conditions to which apes are subjected when being compared to humans.⁷⁸

From within philosophy of animal experimentation, this point has been insisted upon by Despret, who advances the idea that researchers might not have been posing the right questions to animals all along.⁷⁹ In this sense, she contends, how can an experiment be of interest to the animal? If the animal responds according to his or her own usages, this is categorized as trickery, and instead of denoting an animal's talent, the result becomes largely ignored because of a greater issue, namely, that the animal needs to solve problems in terms of what is of interest to researchers.⁸⁰ The ways other in which an animal is interested at solving a problem become meaningless.⁸¹ This brings us to the fundamental problem of how truly capturing an animal point of view. Nonetheless, Despret has pointed out that there are, indeed, cases in which an animal's perspective takes center stage for researchers.⁸² As we shall see, researchers' and chimpanzees'

crossed perspectives take a center stage in the human-chimpanzee community at the Primate Research Institute.

As it has been argued, there is currently a research desideratum not only on humanchimpanzee interaction at a microlevel, but also on a macro aspect, that is, of how we bring to light in a more symmetric fashion, the interspecies dynamics of building up shared affections and meanings. In order to address both interspecies and disciplinary boundary work, we investigate the liminal case of chimpanzee research in Japanese primatology. As a result, we will encounter four major topics dealt across chapter, namely, interspecies socialization, the embodiment of interspecies relations in space, interspecies social relations in scientific settings and animalcentric perspectives on personhood. ⁷ Susan Leigh Star and James R. Griesemer, "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39.," *Social Studies of Science* 19 (1989): 393, doi:10.1177/030631289019003001.

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⁷⁹ Vinciane Despret, *Que Diraient Les Animaux, Si... on Leur Posait Les Bonnes Questions?* (Paris: La Découverte, 2014).

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Vinciane Despret, "The Becomings of Subjectivity in Animal Worlds," *Subjectivity* 23, no. 1 (2008): 123–39, doi:10.1057/sub.2008.15.

Study Site and Methodology

The present work was based on a fourteen-month long-term fieldwork at the Primate Research Institute of Kyoto University (KUPRI), which spanned from October 1st, 2014 until December 15th, 2015.^I KUPRI is located in the city of Inuyama in Aichi prefecture. The study focuses on the daily life of the laboratory led by professor Matsuzawa Tetsurō, key figure for chimpanzee research in Japan and worldwide. Moreover, as a comparative endeavor, the study relies on multi-sited ethnography, in which specific issues are followed through several sites on the basis of varying short-term visits. First, all other active laboratories of PRI's chimpanzee research have been visited during this ethnography.

Secondly, other sites for chimpanzee and monkey research have been visited (see Figure 1), namely: KUPRI's Onobora breeding center and semi-free ranging area for Japanese macaques; KUPRI's horse stable for cognitive research; Kumamoto Sanctuary in Kumamoto prefecture (chimpanzees and bonobos); Japan Monkey Centre in Inuyama, Aichi prefecture (several species); Kyoto City Zoo, in Kyoto prefecture (several species); Higashiyama Zoo in Nagoya, Aichi prefecture (several species); Kōjima/Koshima island in Miyazaki prefecture (Japanese macaques); Cape Toi in Miyazaki prefecture (free ranging horses); Shōdoshima in Kagawa prefecture (provisioned Japanese macaques); Yakushima in Kagoshima prefecture (Japanese macaques and sika deer). In Kyoto and Higashiyama Zoos, the same automated computer setting existing in PRI was replicated in order to test chimpanzees and other primate species. This is also valid for KUPRI's stable and computer experiments with horses.

At last, a three-week short-term fieldwork in the Republic of Guinea, Africa, was conducted during June/July 2016. The Japanese field station in Bossou has been one of the traditional sites for the study of chimpanzee culture in the wild. Its long-term activities initiated with professor Sugiyama Yukimaru and were continued by professor Matsuzawa, reason why this site was chosen as part of the multi-sited ethnographic endeavor. In addition, highly enriching of the ethnographic experience were the attendance to the decennial gathering "Chimpanzees in Context" (Understanding Chimpanzees IV) and the participation in the biannual meeting of the International Primatological Society in 2016, in the United States. In particular, the host institution,

^I There has been a thirteen-day interruption abroad Japan in this period.

Lincoln Park Zoo, holds a computer automated setting akin to PRI's to test great apes as well as Japanese macaques, providing experimental sessions open to the public.



Figure 1 Visited research sites in Japan.^{II}

Standard practice in ethnology, this work made use of questionnaires, semi-structured interviews, personal communications and long-term participant observation in a single research site. This has been coupled with the more recent approach of multi-sited ethnography in various fields, which applies similar methods but with the goal of grounding an in-depth analysis of how selected topics emerging from the long-term ethnography appear in other field sites. Another methodological resource that enriched this work was the use of some elements of actor-network theory of science and technology studies (STS) such as the mapping of controversies.

In addition, consonant with standard practices in conversation analysis and ethnomethodological studies, as well as with ethological studies, microanalysis of behavior based on videos was employed as means to analyze interactions either frame by frame (30 frames per

^{II} Map adapted from <u>https://en.wikipedia.org/wiki/Prefectures of Japan</u>. Retrieved, October 8, 2017.

second) or every two seconds (© Solomon Coder; © ImageGrab). Regarding the description of interactions, the time-length has been adjusted in order not to burden readers and only a summary of important points was discussed. In the case of video coding, where categories are assigned to a full video, the time scale is adjusted for two seconds. In the rare cases necessary to discuss action on a millisecond level, the frame system is used.

The notation of conversation analysis has not been employed due to the significant amount of training it requires to be read, which would prevent readers to easily understand what occurs in interactions. Regarding ethological practices, a compromise was found among three traditional types of description, namely, in terms of structure (i.e., posture and movements), of consequences (outcomes in categories) and of spatial relation (orientation to something or someone). Whenever the meaning of a behavior was unclear, a structural or spatial description was privileged. However, the videos provided along with the manuscript open up the possibility for readers' supplementary or contrasting readings of behavior.

Furthermore, all the studies to which the design allowed statistical treatment were analyzed with ©SPSS 24. Given that this manuscript is composed not only of ethnographical writings and analyses but also of several subsets of quantitative studies, their design and data collection methods are described in detail when these studies are introduced. Thus, here, we address only general methodological remarks.

At last, a final methodological tool employed throughout the manuscript was first-person based accounts of the particular experience of becoming an experimenter where the anthropologist would carry out the study of human-chimpanzee relations. In other words, "becoming a native" has been mobilized as a fruitful methodological tool. As consequence, it not only allowed full immersion in a field where security level is high and requires training to trespass, but it also provoked a reflection on the commonalities and idiosyncrasies of different disciplines involved and a possible common research program.

As concluding a remark, it should be noted that this manuscript strived for clarity and simplicity in its language and has avoided, as much as possible, the use of jargon-loaded writing. This is due to the fact that the target readers belong to several disciplines and do not share the same academic background. Thus, for specialists, some passages might appear repetitive, overexplained or simplified, while perhaps others might require more attentive reading. Bridging academic styles from literary to scientific has also been a major tool in the effort of achieving a more pedagogical
reading for practitioners of all disciplines concerned. Moreover, this manuscript privileged, as much as possible, the space for fresh etho-ethnographic material in contrast to weaving elongated theoretical considerations. In other words, the theoretical level has been mobilized in an instrumental way in order to open up the debate to wider issues; not as end *per se*.

Because the goal of this work was, at a larger scale, to discuss ideas that can circulate across disciplines in contrast to discussing authors, readers should expect that some disciplinary canons might be given less attention than deserved. However, if true bridges between disciplines are to be construed to address issues that fall outside the realm of what a discipline is willing or capable to assess, then, we must find mechanisms that reveal a robust concept or core idea in a plurality of ways; a task curiously akin to how multimodality in communication scaffolds meaning for idiosyncratic minds (or disciplines!).

IN MEMORIAM	Reiko ♀ ≈ 1966 Africa † 2013	Pico 4 2003 (Puchi + Reo) PRI † 2005	Puchi ♀ The second sec
	Pendesa 4 1977 JMC		
	Mari Q \sim 1976 West Africa	Pan Q Internet of the second s	
	Akira δ ≈ 1976 West Africa	Reo J I I 1982 PRI (Reiko + Gon)	Pal (Paru) Ş İman Aları PRI (Pan + Akira)
LIVING MEMBERS	Ai Q ≈ 1976 West Africa	Popo 4 Fore the second	Cleo (Kureo) 4 2000 PRI (Chloe + Reo)
	Gon \mathcal{J} ≈ 1966 West Africa	Chloe (Kuroe) Q	Ayumu 3 2000 PRI (Ai + Akira)
GENERATION	1 st	2 nd	3rd

THE CHIMPANZEE COMMUNITY PRIMATE RESEARCH INSTITUTE, KYOTO UNIVERSITY

Chapter 1 Chimpanzee Studies at the Primate Research Institute of Kyoto University

1.1 The "Prehistory" of the Ai Project A Comparison of Husbandry Practices and Research Philosophy



Photo 1 Reiko and the view of Inuyama. Courtesy of Sakuraba Yoko. Credit: Kumazaki Kiyonori.

At Kyoto University, studies using chimpanzees as a model to understand biological phenomena start with PRI's first chimpanzee, a female named Reiko. Her name is rather revealing, as it was composed of the phonetic units in the words 'primate' (**rei**chōrui 霊長類) and 'child' (ko 子). Matsuzawa

Tetsurō, founder of the Ai Project, remarks the isolated *kanji* \equiv "rei" means spirit, departed soul, so it seems unusual to name someone after it.¹ Yet, for him, this somehow relates to the meaning of the word primate, because the character \notin "chō" indicates superiority. In fact, primates, including humans, would be perceived as "the spiritually highest" of the animal kingdom.

Matsuzawa reminisces about Reiko's arrival during his last teachings as a Kyoto University professor.² Reiko was brought to the Institute by morphologists to be a subject in studies on the evolution of bipedal locomotion, which mainly required her to walk on a treadmill; thus, unlike latter chimpanzees, she did not initially come to PRI for cognitive studies, and the famous Ai Project had yet to begin. Her arrival in 1968 coincides with the construction of the Institute, which was founded in the previous year (Photo 1 and Photo 2), and it marks what Matsuzawa characterizes as the "prehistory of PRI", which spans from 1968 to 1976. Only with the arrival of three other chimpanzees in 1977 to 1978 would the Ai Project be set in motion.

At only one year and seven months old, Reiko was the Institute's firstcomer; she was also the first fully grown chimpanzee to pass away in the PRI community.¹ At the estimated age of forty-seven years old in 2013, she left behind a son, Reo, and a granddaughter, Cleo.³ Although by the time of this ethnography Reiko had already passed away, her life continues to be fondly celebrated. This can be witnessed through an informal memorial on a board next to the chimpanzee section's mandatory passage to the testing area. A four-page document retraces Reiko's life, a handful of pictures depict her early and late life in company of her group and offspring, and an illustrated sheet reads "arigatou Reiko-san", or 'thank you, Ms. Reiko'.



Photo 2 Reiko and PRI building site. Courtesy of Sakuraba Yoko. Credit: Kumazaki Kiyonori.

Reiko's public profile in the Japanese ape-database introduces her character: "Reiko is gentle and she likes children. She is strict about the rules of the group and she gets angry when anyone doesn't follow the rules".⁴ These features can be seen condensed into a short clip of footage in which the older Reiko seems to comfort the five-year-old

juvenile Pal after Pal's half-brother, Ayumu, who is the same age, hits her (Video Frame 1; Audiovisual Material 1): With Ayumu to the left and Pal sitting behind Reiko (1s), Ayumu hits his sister (2s). Next, Reiko vocalizes in the direction Ayumu took off, and extends her hand to Pal (6s). In chimpanzee communication, this gesture ("extend hand, palm sideways") can function as reassurance or appeasement after retrieving an infant from rough social play.⁵ Surprisingly however, even if fully integrated into the PRI group, Reiko's start as PRI's first chimpanzee was quite peculiar.

^I As of July 2017, PRI-born infant Pico (2 y/o), and the elder Puchi (\cong 51 y/o) were the Institute's other losses.



Video Frame 1 Reiko extends her hand to Pal after Ayumu hits Pal. From Audiovisual Material 1. Audiovisual Material 1 Reiko extends hand to Pal after Ayumu hits Pal, 11s. From KUPRI 2005.⁶

In Reiko's early life, for about a decade she lived without any conspecifics, that is, without members of her species. On the other hand, she enjoyed a close relationship with her caretaker, Kumazaki Kiyonori, described by a student as probably "her best friend" (Photo 3). When she first arrived, Reiko was inadequately housed in a small room in the basement, but during the daytime, she appeared to join other primate species outdoors.⁷

Commenting on an old photo of Reiko in the company of monkeys, Matsuzawa explains she interacted with a mix of sympatric and allopatric primates, as the photo depicted a sympatric patas monkey (*Erythrocebus patas*), whose distribution in the wild overlaps with chimpanzees, and an allopatric rhesus (*Macaca mulatta*), indigenous to Asia.⁸ Furthermore, Kumazaki specifies her group also included the following primates: baboon (*Papio* spp), green monkey (*Chlorocebus sabaeus*) and spider monkey (*Ateles*

spp), which she joined from age five until she was almost ten or eleven years old.^{9,II} Whereas patas, baboons and green monkeys are sympatric in some locations chimpanzee currently occupy in Africa, the Asian rhesus and the American spider monkeys are allopatric.

Reiko's former caretaker reveals there were occasional fights, but as they all grew bigger things 'turned awkward' ("kimazukunatte...").^{III,}

Note 10 It seems the word was used not only to denote an increase in aggressive episodes, which he mentioned right after, but also to refer to the fact that Reiko and a male baboon mated (it was later discovered by microscopic analysis that she carried sperm). Given there were also female baboons, Kumazaki said did he not understand the situation at all, nor,



Photo 3 Kumazaki and Reiko. Courtesy of Sakuraba Yoko.

when asked, could he determine who the alpha was. Increase in "agonistic behavior",¹¹ that is, fighting-related activities, and mating between species were hinted the causes for the dissolution of the group. Reiko's first conspecific group would be formed in 1979 during the Ai Project period, and it would be composed of subadults her age - in other words, other teenagers. These were Puchi, a female named after the Japanese pronunciation for *petit*, and Gon, who became the Institute's first alpha male. Both wild-born in about 1966, they were kept as pets in private households, but as they grew bigger and stronger, they were sent to PRI, ¹² a pattern quite common among chimpanzee pets.¹³

^{II} Vernacular designations for animals may refer to a specific species, or to a genus comprising several species. In Japanese, Kumazaki's description is *hihi* (baboon/genus), *kumozaru* (spider monkey/genus) and *midorizaru* (green monkey/species).

III "kimazukunatte" from *kimazui* (気まずい), also in the sense of uncomfortable (Minamide and Nakamura 2012).

Concerning Reiko's interactions with non-primate species, Kumazaki graciously adds she enjoyed having pets (petto $\sim \gamma \uparrow$). Carvalho and colleagues explain that based on the literature, chimpanzees in the wild and in captivity seldom capture animals without eating them, but this behavior is mostly seen in youngsters.¹⁴ Moreover, among younger chimpanzees, "animal toying" ¹⁵ has even been observed to occur with species previously consumed in the same community (e.g., West African wood-owl, *Ciccaba woodfordi* ¹⁶) and elsewhere (e.g., western tree hyraxes, *Dendrohyrax dorsalis* ¹⁷). In these cases, behavior associated with toying was multifold and included not only raising the animal into the air, poking and grooming, but also hitting it while still alive (in the case of the hyrax). In both case studies, toying happened after the animals' death as well, possibly indicating play in a more tool-like manner, as with a non-living entity.

To the best of my knowledge, there are no reports characterized by primatologists as "pet-keeping" by wild chimpanzees. Note, though, that for wild capuchin monkeys (*Cebus libidinosus*) with access to a provision site, Izar and colleagues described the cross-genus adoption of a marmoset (*Callithrix jacchus*).¹⁸ The adoptive mothers' nurturing behavior and the marmoset's social integration strongly favored the label "adoption", although, co-author Eduardo Ottoni adds that they have considered the hypotheses of the animal being kept as "pet" or even as "Christmas turkey".¹⁹ In captivity, Ross and colleagues' study of interactions between zoo-housed great apes and local wildlife found that of 71 surveyed institutions, about 40% reported having seen chimpanzees initiate play with vertebrates, including light touching (31.43%), while adults were significantly more likely to engage in aggressive interactions than youngsters (age six or younger).²⁰

Occurring in the context of play, though not exclusively, is chimpanzees' curious habit of carrying things in the area between the thigh and the abdomen, the so-called "groin pocket".^{21,22} Reiko was no exception, performing it even with a "pet". According to Kumazaki, after catching a mouse and playing with it, she stored it in her "pocket", but her apparent pet did not survive, be it from the handling or the groin pocket. Could the mouse have been more of a toy than a pet? Curiously, the above-mentioned animal-toying cases include placing and transporting animals in the groin pocket, but the use of groin pocket is not limited to probable toys or pets; in fact, Biro reports that this technique has been used by chimpanzee mothers to carry their dead infants in the wild.²³ Yet, this seems rather tough handling for living beings.

The owl and hyrax apparently died just prior to the chimpanzees' use of the "pocket".^{24,25} Nonetheless, given that at least in the context of the carrying of the chimpanzee corpses, these were consistently handled gently,²⁶ this suggests that the groin pocket technique might not necessarily be equated with a general lack of care. In Reiko's case, besides the mouse, she also took interest in a kitten that fortunately lived on, indicating her interaction with a non-primate species might have been less like using an object than the word "toy" would imply. Koko, the gorilla trained in sign-language, certainly hit the news with the story of her relationship with her first kitten, whom she named "All Ball",²⁷ sometimes referred to in the media as a pet or as adopted. It remains contentious whether nonhuman animals would be able to understand a relationship in terms of "pet-keeping" or any imaginable functionally similar category. Yet, humans certainly attribute pet-keeping to nonhumans, as seen in Kumazaki's speech.



Photo 4 Reiko dressed as a toddler. Courtesy of Sakuraba Yoko. Credit: Kumazaki Kiyonori.

Another noteworthy point when reconstituting "PRI prehistory" lies in the way Reiko was represented, which is observed in Photo 3 and Photo 4, where she is seen dressed as a human, generally considered kawaī, or 'cute'. "Costumes" are common place not only in the early history of captive chimpanzees (Photo 5) but also in monkey performances in Asia²⁸ (Photo 6 and Photo 7), in "exotic" - read wild - pet ownership (Photo 8), and in some TV shows worldwide.^{IV} It is unlikely that Reiko was dressed most of the time and the clothes per se are of less importance. Rather, it is the strong

message it triggers among consumers of these visual materials that worries contemporary primatologists.

^{IV} E.g., the Japanese shows *Tensai! Shimura Dōbutsuen* and *Dōbutsu Kisōtengai!* (Photo 9) and the 1970's show Lancelot Link in the Unites States, (Photo 10).

The practice of dressing primates in costumes strongly discouraged for several reasons, the most pertinent being that it may contribute to the public perception of primates and, critically, of endangered species as being good pets to keep.²⁹ Thus, the World Association of Zoos and Aquariums make the following recommendation: "Do not present animals in a way that the visitors could perceive them as exotic pets or 'performers'". ³⁰ Currently, this is followed both by laboratories where nonhuman primates are not subject to media exposure and by research facilities where they may figure as ambassadors for their species; for instance, Ai in PRI under Matsuzawa,³¹ the gorilla Koko under Patterson, ³² and the bonobo Kanzi, formerly under Savage-Rumbaugh.³³ In this context, the portrayal of Reiko in clothes is in conflict with contemporary views in chimpanzee research.





Photo 5 Chimp Rita in a gas mask to raise war morale among civilians, 1941, Japan. Source: Ochiai et al. (2015).³⁴ Credit: Tennoji Zoo.

Photo 6 Monkeys dressed for monkey performance in China. Credit: Reuters (Mauldin 2016).³⁵



Photo 7 Monkey dressed for monkey performance in Shōdoshima, Japan, 2015. By Daly.



Photo 8 Exotic pet ownership by a celebrity. Chimp Bubbles and Michael Jackson. Credit: AP/AP (Nocera 2009).³⁶



Photo 9 Japanese TV star, Pan-kun, dressed as a human, and his dog James. Source: Nyūsunodepāto (2012).³⁷



Photo 10 American TV star, chimp Tonga, dressed as detective. Credit: Allan Sandler, SBM Productions (Jones 2012).³⁸

Overall, Reiko's initial environment could be characterized in two ways: on the one hand, by absent interaction with conspecifics and inappropriate housing conditions in comparison to current PRI guidelines³⁹ and, on the other, by interaction with other primates, including allopatric ones, and face-to-face caretaking spanning beyond infancy. Apropos of Reiko's group, Matsuzawa concludes: "For me it is acceptable, or... even more, good idea to keep single chimpanzee with other primate friends, so this is very good idea... in 1972".⁴⁰ Indeed, PRI would go through a major change in housing infrastructure and in husbandry philosophy while keeping some elements of its past.

Primate husbandry is understood as the management and care of primates, as well as their planned breeding and, more specifically, the type of training aimed at facilitating care.⁴¹ Present husbandry subjects to intense scrutiny conditions like those exemplified by Reiko's case, and considerable research is devoted to assessing animals' wellbeing. Yet, although there are many similarities, practices observed in Japanese chimpanzee research and broader worldwide husbandry practices differ in the way these points are weighted and pondered, particularly when considering the role of humans in chimpanzees' social lives. These idiosyncrasies shall become clearer as the ethnographic descriptions of PRI practices progress, and caution is needed since these particularities reflect more the institutional, overarching disposition of those involved in Japanese chimpanzee research, rather than an "ethnic" way of doing things.

In primatology, because nonhuman primates should be able to express their species-specific social repertoires, the International Primatological Society, or IPS, notes in its guidelines that "[h]uman interaction, even where it is welcomed by the animal,

should never be seen as a substitute for conspecifics and does not meet the social needs of a nonhuman primate".⁴² Further, to compose a conspecific group, "[t]he natural social grouping in the wild can be used as a guide when creating a captive group with respect to reproductive strategy (i.e., monogamous, harems, promiscuous or multi-male/multi-female) and kinship ties (i.e., family group, female-bonded or male-bonded group)".⁴³ Yet, IPS also advises "the main considerations should be that the animals show positive social interactions and a minimum of overt aggression".⁴⁴ More precisely, they need to be compatible on an individual level as well.

Contemporary husbandry prioritizes conspecific groupings and puts together agesex compositions of compatible individuals.^{45,46,47} Furthermore, it is advisable to maintain physical separation not only by species, but also broader sympatric groupings (i.e., New World monkeys, Old World African, and Old World Asian primates) to avoid disease transmission with serious clinical consequences for primates of other regions.⁴⁸ In zoos, mixed exhibits composed of more than one species also take into account transmissible diseases and potential interspecies and hierarchy-related aggression,⁴⁹ but these exhibits are still rare for great apes.⁵⁰

At the same time, genetic management that guides husbandry of endangered species proceeds under careful consideration. It avoids inbreeding, that is, procreation between related individuals, but it also attends to hybridization; preferably, it refrains from assembling geographically separated populations, species, or even subspecies that would potentially mate, ^V.^{Note 51, 52} or as Williams-Blangero and VandeBerg affirm, "[i]deally, nonhuman primate colonies should be composed of a single subspecies".⁵³ Moreover, "it is important to consider between-population genetic differences even when subspecies are not formally recognized".⁵⁴ A classic example of geographical separation cited by the authors is Rhesus macaques (*Macaca mulata*) of Chinese and Indian origins, which may present differences in several aspects, ranging from behavior to morphology and immunology.⁵⁵ Therefore, these factors should be carefully scrutinized depending on the type of research conducted. Whereas the subspecies level may not pose a major problem to, for example, testing chimpanzees' cognitive abilities in general, other types

^V In contrast to closely-related species, sexual behavior among phylogenetically distant species in the wild is rare but documented, as in the case of a male Japanese macaque (*Macaca fuscata yakui*) toward female sika deer (*Cervus nippon yakushimae*) in Yakushima, Japan (Pelé et al. 2017), and the case of male fur seals (*Archtocephalus gazella*) toward king penguins (*Aptenodytes patagonicus*), the latter including coercive penetration (Haddad et al. 2015).

of investigation may call for a more fine-grained approach and a more stringent selection of participants.^{VI, Note 56}

Despite its importance, the concept of species and subspecies is a contentious issue both in general and in the particular case of chimpanzees,⁵⁷ who are so far currently attributed the status of two species, namely, bonobos (*Pan paniscus*) and common chimpanzees (*Pan troglodytes*), with the latter being subdivided into four subspecies capable of generating fertile descendants across subspecies: the western *P.t. verus*, the Nigerian-Cameroonian *P.t. ellioti*, the central *P.t. troglodytes*, and the eastern *P.t. schweinfurthii* (Figure 1). Hybridization in the wild may occur in bordering areas of two populations.⁵⁸ Whereas morphological differences between bonobos and chimpanzees are more easily distinguished, this is not the case for chimpanzee subspecies.⁵⁹ Although in some cases the locale of capture or dealers' activity range could be used as rough estimations for chimpanzees imported from Africa, conducting controlled breeding at the subspecies level is indeed difficult without genetic information on the individuals and without institutional effort, and as a consequence, hybrid individuals have been bred in captivity as well.



Figure 1 "Distribution and current taxonomy of Pan" (Gonder et al. 2011, 4767).⁶⁰

The import of chimpanzees from Africa has been controlled by the CITES Convention, an international agreement entered in force in 1975 to regulate the international trade of wild specimens,^{61,62} meaning, in practice, virtually all imports have

^{VI} For instance, Hayakawa and collaborators (2012) identified diverse bitter taste receptor genes that depend on chimpanzees' subspecies; this is of ecological importance for chimpanzees' discrimination of poisonous compounds in the wild. Thus, in such cases, subspecies level matters when selecting subjects.

legally ceased among its signatories.^{VII,Note 63} CITES has 183 members and in 1980, Japan entered the "Convention on International Trade in Endangered Species of Wild Fauna and Flora",⁶⁴ therefore, wild-born chimpanzees like Reiko and Ai were imported into Japan before that date, as stressed by Matsuzawa.⁶⁵

There are currently 316 chimpanzees in Japan spread across 50 institutions of zoo, sanctuary, and research-facility types.⁶⁶ In an effort to monitor this population, the Japanese Great Ape Information Network, or GAIN,⁶⁷ provides breeding facilities and researchers with a detailed database of apes living in Japan, including personality assessment of individuals and genetic information collected during a nationwide subspecies identification initiative. According to Shinoda and colleagues' comprehensive study published in 2003, hybrids constituted nearly 30% of the captive chimpanzees born in Japan; nonetheless, around 60% of the total individuals, including those born in Japan and abroad, were *Pan troglodytes verus*.⁶⁸

To an extent, these results mirror those found elsewhere; in a recent study by Hvilson and colleagues covering 20% of the European zoo population, almost 40% of the chimpanzees were of mixed ancestry, while among the nearly 60% non-hybrid remainder, the most represented subspecies was western chimpanzees, in other words, *P.t. verus* (40%).⁶⁹ As for the United States, in an assessment investigating about 50% of the African founders in this country, Ely and colleagues reported that 95% of these were *P.t. verus*.⁷⁰ Furthermore, the largest breeding program managing chimpanzees, the European Endangered Species Programme (EEP), held by the European Association of Zoo and Aquariums (EAZA), so far covers only the *verus* subspecies^{VIII, Note 71} due to its taxonomic consensus⁷² and habitat fragmentation.⁷³ In summary, considering these samples, captive chimpanzees are overall skewed toward the western variant and since hybrids and different subspecies exist in facilities worldwide, this requires effort to preserve chimpanzees at a subspecies level.

Whereas several guidelines orient husbandry and more specifically, breeding, in practice, the management of nonhuman animals involves considering and identifying the best possible situations given physical, institutional, and research-related constraints while simultaneously bearing in mind the animals' health and psychological well-being.

^{VII} However, note that because of CITES' paper-based system, fake CITES permits are more easily created (Schukman and Piranty 2017). I thank Cécile Sarabian for bringing this point to my attention.

^{VIII} "Once a new test for a more precise identification of chimpanzee subspecies is developed and can be applied, additional specimens that are tested as pure *P. t. verus* can be 'upgraded' to the EEP. Also, the potential for an additional EEP for any of the other subspecies can be evaluated" (Becker et al. 2007, 19).

Suppose that when compatibility between individuals is assessed, it does not resemble the wild social structure. Should nonhuman primates be kept alone or should an "unnatural social group" be formed? The International Primatological Society suggests the following: "The formation of same-sex peer groups for holding stock primates, and to prevent breeding, is common in many laboratories. Despite it being an *unnatural social grouping* for many species, it allows *socialization* and is certainly a better alternative to keeping animals individually housed".⁷⁴ Here, it is possible to observe how the reasoning behind husbandry of social primates puts more weight on socialization than on the naturalness of the social grouping - except; many cases are not so clear-cut. For instance, what does one do with closely related social species that are nonetheless housed alone?

A case at the Japan Monkey Center concretely illustrates this issue. At JMC, they have recently formed a pair for the welfare of two gibbons of different species.⁷⁵ A research fellow at PRI involved in this activity, Uchikoshi Makiko, reported the case.^{76,77} Gibbons are apes that belong to the family Hylobatidae and are called lesser apes in contrast to the Hominidae family, or great apes.⁷⁸ They are territorial and live in monogamous family groups with the offspring leaving the group in adulthood, at around age ten.⁷⁹ Uchikoshi explains that it is not an easy task to adequately house and match gibbons due to lack of space in most zoos, species differences, hybridization, and unknown social histories. In addition, some gibbon species are rarer, making it even more of a challenge. Now, who was the gibbon pair?

The gibbons in question are Cricket and Jas.^{80,81} Cricket is a Mueller's Bornean gibbon, also known as a gray gibbon (*Hylobates muelleri*), and according to Uchikoshi, she is a very old lady who has probably been living alone for more than twenty years (the typical lifespan of *H.muelleri* life span is forty seven years ⁸²). Given she is an infertile, non-cycling female, JMC staff decided to pair her with Jas, a white-handed gibbon (*Hylobates lar*). Because JMC is a zoo as well, Uchikoshi pondered the effect that such an "unnatural combination", as she called it, would have, particularly as a non-ideal educational message for the public. In spite of that and other difficulties, the gibbons were matched favoring socialization; they first met through a mesh barrier and about one month later, they had a full contact meeting. As observed, the stakes of "unnatural combinations" between related species seem much higher than those among conspecifics, and it should be noted this case represents no rule.

Also challenging is the choice between environmental and social factors. In a hypothetical situation, if funding is scarce and one can allocate resources to either improving and enriching the housing facility of an individual living alone, or one can devote resources to match this animal with other(s), how does one decide how to allocate funds? Citing works by Schapiro and colleagues, ⁸³ Lutz and Novak, ⁸⁴ Rennie and Buchanan-Smith, ⁸⁵ and Smith and colleagues, ⁸⁶ the International Primatological Society reasons that "[a] compatible conspecific probably provides more appropriate stimulation to a captive primate than any other potential environmental enrichment factor [...] The presence of a conspecific enables the primate to utilize its repertoire of social behavior, which can occupy a considerable proportion of the daytime activity budget in captivity and provide a social buffer to stress [...]".⁸⁷ In other words, provided the housing facility does not fall within any extreme case, socialization is likely to be more enriching than improvements in nonhuman primates' living environment.^{IX,Note 88}

Lastly, one must consider the place of humans in social interactions. It has already been noted that humans are no replacement for conspecifics.⁸⁹ Yet, consider what should happen if no conspecific or other type of grouping is possible for various reasons. Is it better for a nonhuman primate to be alone or to have a human as a social partner? Noting a study by Heath,⁹⁰ the International Primatological Society concedes that "[w]here the experimental protocol makes it difficult to provide the animals with a sufficiently rich social environment, a good repertoire with human caretakers can be valuable [...] Even a few minutes a day spent interacting with the animal and allowing it to groom oneself can make a significant difference to the quality of its life". ⁹¹ Simply stated, regarding nonhuman primates' social world, even humans seem to be better than nothing. However, when most standards are met, it is the extent to which humans should interact and relate to nonhuman primates that is controversial.

Overall, husbandry involves many challenges on multiple levels and there might not be a consensus involving exactly what to do in each concrete case. Based on the literature discussed above, the strongest principle to guide decision-making is "compatible conspecific grouping", which allows for conspecific socialization. To generalize, in captivity, compatibility takes priority over natural grouping, conspecific socialization over environment, and human interaction over no social interaction at all. In any case, the acceptable levels of human-animal contact are disputed depending on the

^{IX} Social housing might be viewed as stressful or dangerous for chimpanzees with severe disabilities, such as the paraplegic Reo at PRI or the blind Kanako at Kumamoto sanctuary. Yet, amputated at the forearm, the female Akiko was able to be socially reintegrated with success at Higashiyama zoo (see Sakuraba 2014).

cultural, institutional, and individual views of the human actors. The ideal might range from absent/minimal interaction to full-blown reciprocal social learning between species.

In the context of current husbandry recommendations, Reiko's early life was far from ideal, especially due to lack of conspecifics and appropriate indoor housing. Nevertheless, outdoor excursions and socialization with other primates, even if allopatric, perhaps acted to counterbalance these effects to some extent, with incompatibility being assessed in terms of agonistic and mating behavior. On the one hand, human caretaking must also be understood in this context, as another venue for socialization. On the other, human representations of Reiko and how she was perceived in research as a test subject depart considerably from current representations in primatology and from present Japanese chimpanzee research. In fairness, at that time, much was yet unknown about chimpanzees, and the building blocks of our current scientific views were just being laid.^X. Note 92

Prior to Reiko, early Japanese psychologists made the initial effort to study chimpanzee cognition in Japan. Starting in 1961, for research purposes, the pioneer Okano family raised an infant chimpanzee, Sachiko, together with their own child for approximately 18 months, with the Okanos tracking similarities in the cognitive development of both species, after being inspired by psychologists in the United States who raised chimpanzees at home.^{93,94}At PRI, according to Matsuzawa and colleagues, the first psychological experiment with Reiko was conducted by Asano Toshio and Kumazaki Kiyonori,⁹⁵ who investigated Reiko's light control of the room where she was housed.⁹⁶ They intended to better understand the relationship between illumination and circadian rhythm by means of her "operant behavior", ⁹⁷ that is, her self-initiated turning on and off of the light.

Operant behavior is understood behavior that is freely emitted and that is capable of augmenting or diminishing in frequency by reinforcement or punishment; however, this notion is, in fact, closely associated with another concept, that of operant conditioning.⁹⁸ For now, consider that operant conditioning regulates the appearance of a behavior as a function of a stimulus that works as a reinforcement (for instance, a reward) so that when an individual gives the correct response and receives a positive stimulus (e.g., a treat), the targeted behavior is likely to increase in frequency.⁹⁹

^X For instance, it was not until the 1960s that the effects of social isolation in primates were the subject of considerable interest (Rennie and Buchanan-Smith 2006).

Contemporarily, operant conditioning is widely used in an enormous array of situations, ranging from experiments to husbandry training, although only one variety is most highly recommended - the use of positive reinforcement (i.e., rewards after correct behavior) rather than punishment.^{100,101}

Even if broadly used nowadays, the roots of operant conditioning can be traced to a particular moment in the history of psychology in which the scientifically accepted attitudes toward nonhuman animals differed from most contemporary chimpanzee research. To be precise, operant conditioning is a product of an approach in psychology called behaviorism. Flourishing in the first half of the twentieth century, behaviorism focused on observable behavior solely in terms of antecedents and consequences and rejected the study of mental events, consciousness, or mind,¹⁰² concepts that would be vital to the famous "cognitive revolution" of the 1950s.¹⁰³

The type of experiment conducted by Asano and Kumazaki¹⁰⁴ owes more to the sort of studies carried out by early twentieth-century behaviorists than to cognitive views on chimpanzees. There is a subtle line to be noted, though. It is indeed possible to resort to behavioral training techniques that make use of operant conditioning and to interpret the results of an experiment as a matter of stimulus-response-reinforcement while simultaneously *not* adhering to a behaviorist philosophy rejecting the notion of animal mind. Protocols and explanations drawn from behaviorism can coexist with those supported by cognitive views.

An illustration of this point can be found in Reiko's case. According to Matsuzawa, the classic study by Wolfgang Köhler on chimpanzee tool use was replicated in the basement of PRI during the early days of the Institute.¹⁰⁵ Köhler's work involved posing chimpanzees a set of problems which seemed difficult enough, but not impossible to solve.¹⁰⁶ In its accomplished and most famous form, a variety of solutions were observed; in order to obtain bananas that were purposefully hung from the ceiling, chimpanzees used joint sticks, propelled themselves with them, and stacked crates, sometimes combing these options. Originally published in 1917, a great deal of Köhler's research was actually intended to undermine the underlying assumptions of behaviorism.¹⁰⁷ In PRI "prehistory", these two forms of theoretical backgrounds were present. Nevertheless, to a contemporary observer, the perception of chimpanzees likely tended toward behaviorist philosophy.

This is hinted at by Matsuzawa, who reveals that even though Asano, a leading researcher during Reiko's early lifetime, was a good teacher, he was very "conservative", and one could not talk about "mind" or "cognition" with him.¹⁰⁸ Matsuzawa however,

admired Kumazaki's careful observations of Reiko, as for instance, when the caretaker documented Reiko playing in her room with the shadow of her own hand in the context of the light control experiment.¹⁰⁹ Then, commenting on the above-mentioned study by Asano and Kumazaki, Matsuzawa concluded, "[a]gain, I want to say I have no intention to blame those things of 40 years ago, but for them, a chimpanzee is... a **big black monkey**... who is intelligent".¹¹⁰

From the Ai Project on, except for face-to-face caretaking practices (Photo 11), there would be drastic changes regarding the assumptions behind how research is best conducted and how chimpanzees are represented. Scientific paradigms, as conceptualized by the physicist and historian of sciences Thomas Kuhn, describe a set of theories, methods, and standards but also norms and values that can indeed act as worldviews.¹¹¹ This is why Matsuzawa's use of the word "prehistory" should be understood not only in the sense of the period that precedes the Ai Project but as a real paradigm shift. So, how did the chimpanzee turn into something more than a "big black monkey"? We shall see in the next section.



Photo 11 Puchi, Kumazaki, Reiko, and infant Reo. Courtesy of Sakuraba Yoko.

1.2 The Ai Project Teaching Chimpanzees Language-like Skills



Figure 2 Ai uses lexigrams. Credit: Matsuzawa and Yabuuchi (1985, 22).¹ By Yabuuchi Masayuki.

Audio Material 1 Matsuzawa meets Ai (4m51s). Credit: Matsuzawa (2015).²

I clearly remember the very first day of meeting Ai chimpanzee. It was a very cold day in November and it was, again, the basement, no windows, nothing. And I was... just a 27-year-old assistant professor, and I was asked to be the person to study this particular chimpanzee, Ai. And I ha[d] no knowledge at all, no preparations, I just -I w[ore] a lab coat and went to the basement to say hello to the chimpanzee. And it was a tiny chimpanzee [...] I was so surprised! The first thing I was so surprised is; she was looking me into my eyes! When I look into her eyes, she was looking me. I got my position in December 1976, so one full year I had the experience of watching monkeys. Suppose that you are facing to the

monkey, if you do the direct gaze to the monkey, the monkey is very uncomfortable. So, making grimace, is showing the teeth, show the fear or.... aggression to you, because direct gaze means mild threat in the case of monkeys, so you are not recommended to see directly the eyes of monkeys. I was so surprised, a chimpanzee, baby, infant, a year old, looking me into my eyes! [...] Then I had nothing to give to her, no food, no gift, nothing. But I have - wear the lab coat, white lab coat [...]. This cloth [an arm warmer] I take it off from my arm and give it to her. Again, I was so surprised. Give it to a monkey, just... sniffing, or may bite and understand this is not edible one, they throw it away, that's all. But Ai chimpanzee receive[d] the cloth looking into my eyes, receive[d] the cloth, and immediately put into her arm, and fly it up and fly it down and fly it up and fly it down. And take it out and put it back to me. Wow! I did not expect such a kind of interaction with the chimpanzee, so right from the beginning, right from the very first day, I was so much fascinated by the mutual gaze and this kind of "imitation" and motivation to communicate, to interact. And I immediately recognized this is not a big black monkey, this is something else. So, from then on, every day was new, every day I learned a lot from the chimpanzee.

Ai's origins can be traced back to West Africa. She was brought to Japan by a dealer who had business with the United States, Europe, and Japan, and because of her teeth eruption it is estimated she must have been born in October 1976.³ Matsuzawa explains that in the 1970s, before Japan signed the CITES Convention, the international agreement regulating the imports of endangered species, the nation "imported more than

100 wild-born chimpanzees, mainly for biomedical research of hepatitis B".^{4,I,Note 5} He continues: "This infant chimpanzee was one of them. However, instead of being sent to a biomedical facility, she was sent to KUPRI where she was to become the first subject of an ape-language research project in the country" (Figure 2). Her name, which reads "eye" in English, means 'love'; it is a common name for girls in Japan, but it seems to have been loosely inspired by the protagonist of the romantic manga series *Ai to Makoto* (愛 と誠).⁶ Ai arrived on November 30, 1977, and was later followed by the nearly 1.5-year-old infants Mari and Akira, who were brought at the end of January 1978.^{7,8}

By the end of the 1970s, three approaches that sought to investigate linguistic skills in chimpanzees inspired Japanese researchers:⁹ the approach by the Gardners, who taught American Sign Language to the female chimpanzee Washoe in a complete human-rearing environment (Photo 12);^{10,II, Note 11, 12, 13} the work of the Premacks, who used plastic symbols with chimpanzee Sarah in a laboratory setting with human social contact (Photo 13);¹⁴ and the research conducted by the Rumbaughs, who studied chimpanzee Lana using a computer-controlled lexigram system with human tutoring in the laboratory (Photo 14).¹⁵ Intending to implement this line of investigation in Japan, the Ai project would end up being, as Matsuzawa puts it, "at the tail-end of ape language studies carried out in the second half of the twentieth century, and a front runner of studies of comparative cognition in chimpanzees".¹⁶

The research team was formed by Murofushi Kiyoko, head of the psychology section at that time, and by two assistant professors, Asano Toshio, who had conducted the first psychological experiment with Reiko,¹⁷ and Kojima Shozo; however, since both of them were about to take two years of sabbatical leave, Matsuzawa Tetsurō was left to "face the three chimpanzees by [himself]" as the main trainer and researcher under Murofushi's supervision.¹⁸ Among other collaborators, the project counted on the counsel of specialists in neurophysiology (Kubota Kisou), computer technology (Nagao Makoto), and the linguistics of generative grammar (Kamio Akio and Kuno Susumu), with Nagumu Sumiharu helping to build the experimental system.^{19, 20} Even though

¹ For detailed records of early captive chimpanzees in Japan, see Ochiai et al. (2015; in Japanese with abstract in English).

^{II} An attempt to replicate the Washoe Project was conducted by Herbert Terrace with Nim Chimpsky (a pun on linguist Noam Chomsky). Terrace and colleagues (1979) concluded ape sentences were explained by nonlinguistic processes; however, an opposing view from ape language research points out that the use of operant procedures in a restricted environment hindered Nim's abilities (Hillix and Rumbaugh 2004). For a powerful narrative on ape language research, see the documentary "Project Nim", which retraces Nim's life (Marsh 2011).

Murofushi had experience in split-brain research in monkeys, performing invasive experiments with chimpanzees was rejected by all involved.²¹ It should be noted that Japan lacks laws banning invasive experiments in apes,²² so its actual absence depends on "people's mentality".²³





Photo 12 Washoe, taught ASL. Credit: NhRP (2012).²⁴

Photo 13 Sarah, taught plastic symbols. Credit: Premack and Premack (1983, 16).²⁵



Photo 14 Lana, taught lexigrams. Credit: Hillix and Rumbaugh (2004, 128).²⁶ By Frankly Kiernan.

The project leader, Murofushi, gave Matsuzawa freedom in terms of the research plan as long as it related to language. Consequently, Matsuzawa's interest in philosophy during his bachelor's degree and his later training in psychophysics shaped the goals of the Ai Project. In his words: ²⁷

[Q]uestions along the lines of "Can apes acquire human language?" seemed too vague to me. I was interested in the perceptual world, neither in communication nor language itself. Therefore, I decided to teach chimpanzees language-like skills only as a medium to gain access to their mind. I did not care whether the skills themselves qualified as language or not: I wanted to learn what chimpanzees saw, what they knew, what they thought, etc., all through a sound, scientific method. I tried to gain access to

the perceptual world of Ai with the help of symbolic media such as numerals, lexigrams, Kanji characters, and letters of the alphabet.

Matsuzawa alludes to biologist and ethologist Jakob von Uexküll as the original proponent of this set of questions that opens up the unique world of each species, or their "Umwelt".^{28, 29} If, in general, the German *Umwelt* is translated as 'environment', Uexküll's use of the word is so distinctive that it has been maintained in many texts in its original form. Conceptually, *Umwelt* evokes the 'the animals' point of view' (or "Standpunkt des Tieres"). ³⁰ For instance, only superficially do animals living in the sea inhabit a common homogeneous 'world' (Welt), and this is because the structure of their bodies and the relationship between their bodies and the surroundings differ.³¹Uexküll asserts the experimenter has to try to determine which parts of an animal's surroundings influence it and in which form that happens.^{III, Note 32}

Matsuzawa, who defines himself as a "psychophysicist",³³ explains Uexküll's topic was picked up by the discipline called "animal psychophysics",³⁴ which the professor linked mainly to Donald Blough and William Stebbins as early references.^{35,36} In Stebbins' words, the field "can be defined as an area of research in which the primary concern is with the behavioral analysis of sensory function".³⁷ It is noteworthy, however, that even though some overlap in interests exists between Uexküll and later animal psychophysicists, their approaches are very unalike, and neither Blough's nor Stebbins' above-mentioned works pay homage to the early biologist. In fact, Uexküll would become a foundational author in the field of semiotics, which investigates signs in terms of meaning-making activities, ³⁸ whereas animal psychophysics owes much to behaviorist techniques, and, above all, operant conditioning.³⁹

The fact that Matsuzawa ^{40, 41} alludes to both traditions to substantiate the original goals of the Ai Project is subtly revealing and it indicates multiple heritages and disparate philosophical influences regarding how nonhuman animals are to be studied in the course of their research. These points reflect a facet of opposites well accommodated in the history of the Ai Project up to the present: high-tech procedures with milliseconds precision à *la* animal psychophysics with an overarching disposition to understand and treat chimpanzees according to their own "point of view" via a more philosophical manner. In fact, starting with the perceptual world of chimpanzees, the Ai Project would

^{III} In the original: "Der Experimentator mu β festzustellen suchen, welche Teile dieser Umgebung auf das Tier einwirken und in welcher Form das geschieht." (Uexküll 1921, 5)

later cover many other areas, and in several studies, it would compare humans, chimpanzees, and other species in the same experimental settings, an approach best exemplifying the so-called "comparative cognitive science".⁴²

Comparative cognitive science(s), as summarized by Matsuzawa, is "a discipline that compares cognitive functions in living species".⁴³ The main logic behind it is that by comparing how other species and humans process the world, we can illuminate our differences and similarities. Frequently, the notion of "out-group" is evoked. As Matsuzawa elaborates:⁴⁴ "[W]e have to know ourselves, so that is my main motivation [for studying chimpanzees]. As a tiny, tiny seed of philosopher, I wanted to know who I am, where did we come from, what is uniquely nature of human beings? And in my case, I have been focusing on chimpanzees. The logic is explained by the keyword out-group [...] [or] outside member. So, who are the out-group of humans? That is chimpanzees, gorillas, and orangutans. Biological classification: That is called family hominidae. Family hominidae consists of four genera: humans, chimpanzees, gorillas, and orangutans".

Chimpanzees (*Pan* spp.) are considered the closest species to humans in terms of our evolutionary history; in other words, our "phylogeny" ⁴⁵ shows the divergence between the ensemble of our genes, or our genomes, is only about 1.1 to 1.4%.^{46,47} The time at which human and chimpanzee lineages became separated is still controversial, especially due to a lack of reliable paleontological records, but estimates usually range from nine to five million years ago.⁴⁸ Our shared ancestor is named "last common ancestor" (LCA), a link whose evolutionary path would lead to humans (*Homo* genus) and chimpanzees (*Pan* genus).⁴⁹ Then, approximately two million years ago, the bonobochimpanzee common ancestor speciated into common chimpanzees (*Pan troglodytes*) and pigmy chimpanzees, that is, bonobos (*Pan paniscus*).^{50,51}

Due to shared ancestry, the logic of comparative cognition follows: if a feature is observed in both chimpanzees and humans, it is likely to have been present in our common ancestor, the LCA (Figure 3). If it is absent in chimpanzees and present in humans, the feature is expected to be evolutionarily more recent in our history. Nonetheless, sorting out a clear reconstruction is usually not straightforward. The umbrella term "cognition", as it was first conceived, refers to how beings, be they humans, nonhuman animals, or machines, process the world around them.⁵² Still, there are many ways one can solve a puzzle. From this perspective, are humans, nonhuman animals, and

critically, robots solving problems in the same way? Are the same cognitive processes being used?



Figure 3 The logic of comparison between chimpanzees and humans. Adapted from a video project by Daly, Eder, Fluijt, and Nignon.

This leads us to the debate of homology analogy. versus "Homology" refers features to inherited from a common ancestor, whereas "analogy" points to characteristics that appeared independently in separate lineages.⁵³ Complex concepts requiring the use of cognitive abilities, such as culture, generate heated debates among researchers and different disciplines.

Grosso modo, the discussions ponder, on one hand, whether certain cognitive processes considered to be vital properties of a concept are observed when nonhuman animals solve problems and, on the other, what exactly these vital properties should be.⁵⁴ In other words, what does the checklist consist of and should the items all be ticked off? In the *Pan-Homo* case, there is evidence of homology if what is observed in chimpanzees matches previously debated prerequisites. ^{IV, Note 55, 56, 57}

However, here again the comparative endeavor is complexified, this time by the fact that observing common cognitive processes in humans and chimpanzees is a challenge on its own. Ideally, comparative cognitive sciences put special effort into testing subjects in a comparable manner. Sometimes what has already been tested in humans is imported into research with other species, or certain procedures are proposed for cross-species comparisons that include humans.⁵⁸ To be able to assess abilities under fairly equal conditions the setting, or how subjects will concretely be tested, is important.

This is well summarized by a discussion among professors during a presentation at PRI on cognitive development.⁵⁹ The presenter and the participants pondered that while object manipulation could be used as a valid measure in manually dexterous species like humans and chimpanzees, the same measure might not be appropriate to species with

^{IV} The best example of this type of debate is the one surrounding the question of "culture", which is addressed in detail in McGrew's (2004) "The Cultured Chimpanzee" and in Laland and Galef's (2009) edited book "The Question of Animal Culture". I have also discussed the subject elsewhere (Daly 2012).

fundamentally different morphologies, like birds. Then in this case, a professor argued, it should, in theory, be better to "cut apart" the cognitive function one wants to assess and create settings adapted to each species.

In fact, both methods have pros and cons. While in terms of setting an exact match is directly comparable, concern arises depending on the species. Conversely, taking species-specific features into account may be a solution. Yet, there is a cost to introducing uncertainty about whether different apparatuses and/or procedures are capable of mobilizing the same cognitive strategies from subjects of all species. *Mutatis mutandis*, when referring to shared ancestry, a debate exists over whether bonobos or chimpanzees constitute the best model for the LCA.⁶⁰ Due to our phylogenetic proximity, chimpanzees have received considerable attention compared to other great apes, but this has consisted mostly of *Pan troglodytes*, since bonobos' relatively small habitat south of the Congo River hindered their study and made them the rarest ape in captivity.⁶¹

Chimpanzees and bonobos differ greatly in terms of social and sexual behaviors. As de Waal phrases it, there is a contrast between chimpanzees' "male bonding", "warfare", "hunting" and "meat eating"; and bonobos' "relative peacefulness", "female dominance" and "sex rather than power-oriented" society. ⁶² Refining the comparison, he states that "a coherent picture of human social evolution has arisen around the chimpanzee as close relative, one emphasizing meat, violence, and male superiority. This picture fit well with post World War II developments [...]".⁶³

Notwithstanding, Prüfer and colleagues' study on the bonobo genome brings to attention that "chimpanzees and bonobos each possess certain characteristics that are more similar to human traits than they are to one another's".⁶⁴ Furthermore, they note that our last common ancestor "may in fact have possessed a mosaic of features, including those now seen in bonobo, chimpanzee and human".⁶⁵ A noteworthy point is that features observed in all three genera would therefore make an even stronger case for homology. Yet, from within cognitive ethology and philosophy of biology comes a disclaimer by Bekoff and Allen, who emphasize the importance of studies that complement the "primatocentric" perspective on cognition.⁶⁶

All things considered, at this point, a note of caution is in order. Much controversy among sociocultural anthropologists and biology-oriented disciplines has arisen due to misinterpretations and misuses of the described comparative rationale, as I have discussed elsewhere. ⁶⁷ From within social anthropology, Descola pinpoints a major concern: "[E]ven if no scientist would these days dare to claim that peoples once called "primitive"

represent an intermediary stage in between the great apes and ourselves, one cannot but be disturbed by the interest that evolutionary psychologists take—from afar, admittedly — in the present-day mental functions of hunter-gatherers, whom they implicitly assimilate to our Pleistocene ancestors and who, we are led to believe, must therefore be closer to nonhuman primates than any Stanford professor".⁶⁸ In any case, comparative endeavors will profit from more explicit underlying assumptions in order to speak to multiple disciplines anchored in the humanities.

To a greater or lesser extent, chimpanzee studies at PRI and elsewhere aim to tackle questions along the lines of "What makes us humans?" and "What is uniquely human?". This ultimately anthropocentric concern might be deceiving though. Considering primatologists may come from different disciplines such as veterinary medicine, biological anthropology, biology, cognitive psychology and so on, what holds the area together in terms of common values is intriguing. Despite idiosyncrasies in answers, it appears primatologists are deeply committed to understanding primates "in their own terms" - contrary to studies that use primates only as a proxy for understanding human biology, such as much research in the neurosciences.

This is made clearer by a primatologist's opinion on the subject. When asked whether neuroscientists could be considered primatologists, a professor involved in chimpanzee research at PRI was inclined to answer "no", pondering that neuroscientists may simply turn to monkeys as a substitute for the human brain, or as a "tool".^V Likewise, an American intern and experimenter at PRI gave a revealing answer when asked why she would not join the conference of the International Primatological Society: she stated it was because she is a psychologist not a primatologist, emphasizing it twice. This can be read in the sense that she was only interested in the psychological mechanisms regardless of the "medium". In contrast, Professor Matsuzawa is indeed a primatologist with a background in psychology, who conducts studies in comparative cognitive sciences.

Primatologists' apparent commitment to understanding primates in their own terms somehow runs parallel to sociocultural anthropology in regard to its natives (i.e., its studied populations), even though what is meant by a group's "own terms" may vary in approach for both areas. In a similar fashion, to a greater or lesser extent, primatologists

^V I did not succeed in having clear access to neuroscientists to ask the same questions, perhaps because I was also a chimpanzee experimenter at KUPRI, a category of researchers that usually opposes invasive experiments.

and ethnologists are dedicated to conservation and to the rights of indigenous peoples respectively, but not exclusively. Along these lines, whereas comparative cognitive sciences may abstract processes independent of their embodiment by humans, nonhuman animals or robots, a primatological disposition seems to strive for grasping how these processes are embedded in individuals' and species' specificities, be it in physiological, ecological or social contexts. These poles are not mutually exclusive but are instead complementary. Moreover, they are not a simple juxtaposition of "abstract" and "particular".

First, not only because generalizations exist in both comparative cognitive sciences and primatology but also, and more critically, because the idea of "in someone's own terms" involves changing the perspective under which *we* would formulate and answer a problem to take upon the other's perspective, that is, to understand how *the other* would frame or phrase a problem. Arguing from within social anthropology, Viveiros de Castro considers that the distinctive problem of anthropology consists less in determining 'What are the constitutive social relations of anthropology's object?' and much more in asking 'What does the object make of social relation?' or 'What is a social relation in the terms of its object?'.^{VI,Note 69}

As sociocultural anthropology is able to resort to complex verbal communication to investigate subjective meaning, it possesses methods unavailable to the study of nonverbal animals. Even if we consider that primatologists' skills in primate communication might alleviate this issue, it cannot be denied that a barrier exists. Yet, if the barrier is there it is not insurmountable, to a certain extent. In the context of primate cognition, how does one access the mind of nonverbal creatures, or at least, parts of it?! How do we know how they process the world? Now, once again, in terms of laboratory studies, this brings us to the question of experimental settings.

To conduct their experiments, the group involved in the Ai Project chose the computerized system used by the LANA Project (Language Analogue Project).⁷⁰ In the American setting (Photo 14), Lana used lexigrams, or artificially created geometric symbols, with each one corresponding to a word. Whenever she pressed a lexigram key, the chosen lexigram appeared on the apparatus' upper part as a lighted display unit for the visualization of sentences. The order of the lexigrams was randomized so that she

^{VI} In the original: "[S]eu problema característico consiste menos em determinar quais são as relações sociais que constituem seu objeto, e muito mais em se perguntar o que seu objeto constitui como relação social, o que é uma relação social nos termos de seu objeto [...]" (Castro, 2002,122)

would learn not by memorizing the position of the keys, but by attending to the actual words represented on it. The LANA Project made use of Yerkish grammar, a special set of rules for connecting types of items (e.g., actors and actions) that could be checked by the computer for grammaticality.^{VII, Note 71} The name "Yerkish" honored Robert Yerkes, pioneer primatologist and founder of the first primate field station in the United States.⁷²

Three factors contributed to the choice of the LANA apparatus over American Sign Language ⁷³ or over plastic symbols attached to a metallic board.⁷⁴ As Matsuzawa specifies, first, computer-controlled experiments had already been introduced at PRI to test monkeys for visual discrimination tasks, which bore some similarities to the LANA procedure. ⁷⁵ Then, "objective, precise, and detailed records" were needed for the psychophysics of the processes underlying both the participants' perceptual capabilities and their acquisition, in contrast to interpreting and tracking gestural communication or symbol exchange. At last, seeking future non-invasive applications for brain sciences, they hoped chimpanzees "would sit quietly on a bench facing the computer system".

Since the Ai Project at that time had no contact with the LANA Project, they replicated the setup solely based on existing LANA publications, except, as already seen, their aim was directed toward perceptual studies:⁷⁷ By the means of a keyboard in an experimental booth (2x2x2m), Ai would respond to Matsuzawa's display of an object through a window (20x30cm), so, in fact, both were physically separated



Photo 15 The original setting of the Ai Project, 1983. Credit: Matsuzawa (2003, 204).⁷⁶ By Matsuzawa.

during the tests (Photo 15). The keyboard consisted of three panels, each with 35 keys.

^{VII} Here is an example of an actual conversation in Yerkish grammar between Lana and her trainer on May 6, 1974 (Hillix and Rumbaugh 2004, 133-134). Lana wished for a box of M&Ms, but she did not know the name for "box" at the time: "?TIM GIVE LANA THIS CAN". Tim gave her an empty can. "?TIM GIVE LANA THIS CAN". Tim gave her an empty bowl. Lana asked for another person "?SHELLY". Tim replied "NO SHELLY". Then, Lana wrote "?TIM GIVE LANA THIS BOWL", but before his response, she erased the sentence and asked "TIM GIVE LANA NAME-OF-THIS [Lexigram to ask for names]". Tim wrote "BOX NAME-OF-THIS". Lana pressed "YES", then continued, "?TIM GIVE LANA THIS BOX". As a result, she finally got her M&Ms and managed to learn a new word.

Special lexigrams designed by KUPRI were inserted over the keys, allowing randomization. Then, the lexigrams available for each task would be lit. When a lighted key was chosen, a feedback sound (a click) would be produced, and as its light faded, the chosen lexigram would appear on the projectors above the keyboard.⁷⁸ When touch-panel technology became available around 1984-1985, it was readily introduced and it substituted the original apparatus.⁷⁹

Beyond acting as a simple machine or interface, the experimental apparatus must be conceived as part of an architecture of objectivity on a very concrete level. It should enable the correct implementation of the experimental procedure (i.e., how the experiment is carried out), but even more critically, an experimental apparatus should act as the physical medium to eliminate confounding factors that could influence the results, like position cues. For example, are the choices randomized or not? If so, the apparatus design should allow for the modification of the keys. Are chimpanzees tested one at a time or in groups? If in groups, perhaps more than one apparatus is needed. How are instructions given? If by reinforcement, speakers and a food dispenser should be attached. Is the subject allowed to change her mind and choose another key? If yes, there must be a button to signal her answer is complete. And so on and so forth.

It is worth mentioning that sometimes embodying a procedure into an apparatus is one of the main challenges of an experiment. In sum, as observed above, the setup for the Ai Project framed the human-chimpanzee interactions to be physically separated, it excluded the possibility of the chimpanzee responding to cues in position order, it reduced the possibility of human error through the use of automated records of responses, and it made univocal the reading of chimpanzees' responses (output of a pressed key *vs* analyses of gestural communication). In other words, the Ai Project's setup controlled the conditions.

Now, we shall inspect the symbolic media used. In the context of ape language research, a symbol operates "on the conceptual level and without reference to a particular perceptual or behavioral instance of the item they signify", ⁸⁰ that is, symbols are not icons in the sense that they do not represent pictorially what they stand for, even though some might be pictorial in origin. In total, there were four groups of symbols employed in the Ai Project (Figure 4): (a) The Kyoto University Lexigram System (KUL) recently invented by the team (b) *kanji* or Sino-Japanese characters used in the current Japanese writing system (c) Arabic numerals conveying quantities in their cardinal aspect (d) letters

記号素 S D С R В 0 W S Η 1 物体 OBJECT 9 種類の記号素の 相対的位置関係 身体部位 BODY PART ロープ コップ ボウル 積木 手袋 靴 錠前 耳 眼 鼻 スプーン 歯ブラシ 鍵 鉛筆 ます 紙 まり 色 COLOR 紫 青 祆 杉 Ŀ 再 はいいろ むらさき ももいろ しろ くろ きいろ みどり あお ちゃいろ あか だいだい 数 NUMBER 9 10 5 6 8 Δ 五 参 几 九 1 ろく なな はち < じゅう いち 12 さん L ぜろ 名前 NAME (ORANGUTAN) 名前(ヒト) NAME (HUMAN) 形容詞 ADJECTIVE (オランウータン) 11 としお しょうぞう てつろう じゅんぞう ふしみ きよこ 大きい 小さい ドゥドゥ ナナシ (しょうじ) 人称代名詞 PERSONAL PRONOUN 名前(チンパンジー) NAME (CHIMPANZEE) かれ かのじょ わたし あなた アイ ペンデーサ ポポ レオ マリ アキラ 集合名詞 NOUN 接続詞 FOOD 動詞 VERB 食物 N ... 2 --近づく リンゴ バナナ ニンジン キャベツ 色 物 イモ 固形飼料 アイがおぼえた文字

of the Roman alphabet, which stood for living beings. Furthermore, the ampersand (&) expressed addition.

Figure 4 "Characters remembered by Ai". Adapted from Matsuzawa (1995, 33).81

A single meaning could sometimes be conveyed by more than one symbol type: <u>Lexigrams</u> represented objects (14x), body parts (4x), colors (11x), personal pronouns (4x), food (6x), a verb (1x), and collective nouns (2x); <u>kanji</u> represented colors (11x), adjectives (2x), and numbers (from zero to nine, e.g., $\neg roku = six$); <u>VIII number concept</u> was covered by kanji and Arabic numerals (from zero to ten); and the <u>Roman alphabet</u> referred to humans (6x), chimpanzees (6x), and orangutans that used to live in the institute at that time (2x).

Perceptually, not all symbols are processed equally because the visual complexity of their elements differs. The artificially-made KUL lexigrams are designed for symmetry, whereas kanji may induce more error in chimpanzees' performance, just like humans learning Japanese may fail to identify subtle differences in stroke compositions.⁸² In particular, this issue may play a role when the number of options that can be matched to a sample are increased. Even when symbols of different groups share the same meaning (the signified), the form of the symbol (the signifier) may impose a differential load on the discrimination of meaning, which is why psychophysics plays a role in concept learning for chimpanzees (*cf.* $\[mathbf{mean}$ and 0).

Regarding procedures, teaching chimpanzees to be "computer literate" ⁸³ requires consistent training sessions. Depending on the situation, succeeding in novel tasks can take persistence, both on the part of humans to come up with good experimental design and procedures and on the part of chimpanzees to not be discouraged by errors. Unlike adult humans, who can receive extended verbal instructions, chimpanzees need to learn step-by-step, or more aptly put, experimenters must carefully consider the path required to make subjects understand (a) *how* things should be answered (i.e., the procedure) and then (b) *what* should be answered (i.e., the content of the task). Although Ai arrived in late 1977 and many preparations were needed before the first experimental session, Matsuzawa judges April 15, 1978 - the date when Ai first touched a keyboard connected to a computer - as the official start of the Ai Project. ^{84, 85, 86}

To begin with, consider that the steps toward the final outcome of an experiment are smaller than most would imagine and as humble as learning to touch a lit key. This was Ai's first task (Video Frame 2, 1m51s; Audiovisual Material 2).⁸⁷ Now, recollect the experimenter and the participant were physically separated and imagine that the panel so

^{VIII} Note that for zero, one, two, and three, instead of regular kanji characters, which are visually very simple (respectively: o, -, \equiv , \equiv), *daiji* was used (大字), or the alternative and more complex kanji for legal writing (see Figure 4).

far bears no meaning as a differential space in the booth. So, how does one instruct a naïve infant chimpanzee to simply touch a key? The answer is; one associates the proximity to the apparatus as a positive stimulus. Whenever Ai got near the panel, a chime was produced, and a piece of apple was delivered to a cup attached to the apparatus.⁸⁸ Gradually, the criterion for delivery would change from approaching the panel to getting close to a key and then, finally, to pressing it. This method is called "successive approximation".⁸⁹ Step by step, the apparatus, the key, and then the action of pressing were linked and perceived as desired behavior.

This method is part of a procedure described by the behaviorist Frederic Skinner as "shaping", wherein if the probability of a certain outcome is very low, the result becomes feasible by rewarding each step required for its accomplishment or, in his words, "[o]perant conditioning shapes behavior as a sculptor shapes a lump of clay.⁹⁰ Although at some point the sculptor seems to have produced an entirely novel object, we can always follow the process back to the original undifferentiated lump [...]". A full understanding of how to use the keyboard and how to relate it to a task also progressed in incremental stages. But now, after learning how to use the keyboard, how did Ai learn what each lexigram meant, that is, the content of the task *per se*?



Video Frame 2 How Ai learned symbols. From Audiovisual Material 2. Audiovisual Material 2 How Ai learned symbols, 4m37s. Excerpt from Nakamura (1997).⁹¹ Courtesy of Nakamura Miho.

For learning purposes, the Japanese researchers used a versatile experimental paradigm. As explained in the first section, the full concept of "paradigm" stems from Thomas Kuhn,⁹² but even though this is formally referred to in psychology, ⁹³ in practice, experimenters use this word in a much narrower sense, perhaps closer to its ancient meaning of 'pattern' or 'model' (*paradeigma*, $\pi \alpha \rho \dot{\alpha} \delta \epsilon \imath \gamma \mu \alpha$).⁹⁴ The paradigm employed for Ai is called "matching to sample" (MTS).⁹⁵ MTS allows learning in a variety of ways, depending on how it is implemented, which is why this procedure is considered to be "at the forefront of psychological research".⁹⁶ MTS tasks are used to explore responses that may require complex information processing (e.g., categorization) rather than the simple associative learning implied in behaviorist learning theories (e.g., item specificity). In its simplest form, the subject is presented with a stimulus called "sample" and then two choices of stimuli after that. Commonly, the individual must choose the one equal to the sample for a reward to follow.

Suppose the sample is \doteq (*shiro*, white) and your choices are \doteq (*shiro*) and \ddagger (*kuro*, black). The correct answer is therefore to match \doteq to the sample. In a more complex version, if the <u>sample</u> is "ABCD" and if <u>stimulus one</u> is "ZZZZ" and <u>stimulus two</u> is "IJKL", then stimulus two is the correct answer because the sample "ABCD" is composed of different letters. Even though neither stimulus one nor stimulus two entail any letter of the sample, "ZZZZ" is a series of equal letters and "IJKL" is a series of distinct ones, just like the sample. Because the sample and stimulus two bear no perceptual resemblance, it is the relationship among relations that is assessed in this variant.

The matching-to-sample procedure helped Ai learn the meaning of symbols.⁹⁷ The logic is broken down here: The first task was to perceptually match a color sample and the corresponding color in a series of colors. The same was done for lexigrams (Figure 5). This method ensures that chimpanzees are able to identify equal colors and equal shapes and that they know they must match equal things in the task. Remember, "correct" responses - in this case, equal relationships - are rewarded. In a third step, a color sample was shown, and Ai had to choose among a series of lexigrams that were potentially symbols for this color (Figure 6). At first, it was expected that she would choose randomly because she had not learned yet the symbol name of the color; however, as she happened to choose the correct lexigram, she was rewarded. By repeating this procedure over and over, she came to link the symbol with the referent, and because the

position of the lexigrams was randomized, it was not to the position on the keyboard that she attended but to the lexigram itself. The same procedure was followed for object naming (Video Frame 2, 3m; 3m56s).



Figure 5 Matching-to-sample, KUL perceptual matching. Stimuli courtesy of Muramatsu Akiho.



Figure 6 Matching-to-sample, KUL meaning. Stimuli courtesy of Muramatsu Akiho.

Furthermore, one vital point about chimpanzee use of experimental settings is that not only do they solve tasks, but in many cases, they generalize and learn how to learn. Chimpanzees may show "transfer" abilities in complex contexts, meaning that previous learning influences later learning.⁹⁸ In its simplest form, chimpanzees may generalize what they learn with specific items to novel ones, realizing the structural relationship between stimuli. Additionally, depending on the setting, "learning by eliminating" might also be employed,⁹⁹ which is especially useful given the impossibility of extended verbal instructions. An example in Ai's learning history graciously makes this point.

When Ai knew well how to count up to four, she was introduced to number five (Video Frame 3; Audiovisual Material 3). On the keyboard, numbers one to five were displayed randomly. Matsuzawa showed her five pencils; however, Ai repeatedly responded with number four and a buzzer rang to indicate an incorrect choice (Video Frame 3, 1m8s). Aware of the cardinal aspect of one, two, three, and four, it seems it became clear to her that the largest number she knew was not the solution. At last, three

minutes later, Ai presses the only numeral she did not know - five - therefore succeeding in the trial (Video Frame 3, 1m48s). In a real *tour de force*, Ai would become the first chimpanzee to master the use of Arabic numerals to convey numbers, having learned both their cardinal (i.e., quantity) and ordinal (i.e., sequence) aspects, including the notion of zero.¹⁰⁰





Video Frame 3 Ai learning how to learn. From Audiovisual Material 3. Audiovisual Material 3 Ai learning how to learn, 1m50s. Excerpt from Nakamura (1997).¹⁰¹ Courtesy of Nakamura Miho.

It must have become increasingly clear how the paradigm, the training, the implementation, and the execution of an experiment are driven by an amalgam of procedures. In the bigger picture, these originate from distinct ways to approach nonhuman animals. Skinnerian shaping works well for habituation and training, though its behaviorist philosophy concedes them only very minimal "intellectual" complexity. Conversely, the match-to-sample paradigm is used to assess symbol learning, an audacious hypothesis in terms of how far nonhuman animal cognition reaches. The instrumental use of behaviorism, that is, rather as means to an end, dissolves the apparent contradiction in these scientific practices. Yet, the methods *per se* are not sufficient to explain how learning takes place. Even further, what needs to be acknowledged is the strong sense of "individuality" expressed by individuals' idiosyncrasies, not to mention subjectivity, which will be saved for a later discussion in this manuscript.

Regarding chimpanzees' individuality, Jane Goodall expresses very well Ai's attitude to most experiments:¹⁰² "[She is] a remarkably intelligent chimpanzee. One of the reasons she is able to master very complex tasks is because she has an incredible power of concentration, and because she truly wants to succeed. Indeed, if she gets a bad score after one 20-minute test session, she may actually ask for another session so that

she can try to do better".

During his last teachings as a Kyoto University professor, Matsuzawa discussed his lifetime work in a three-day workshop. ¹⁰³ After he spoke passionately about the beginning of the Ai Project, I grew curious to know in detail his first-person account of the two other infants, Ai's comrades, so I brought up the subject during the event.

GABRIELA B. M. DALY. So, after Reiko, the chimpanzees that came were Ai, Mari, and Akira, correct? So you described how it was your first experience with Ai, and I was wondering about Akira and Mari.

MATSUZAWA TETSURŌ. [*Laughs*] Suppose that you have three kids. You have the very clear memory about the first kid, but I'm terribly sorry for the second kid and third kid [*audience laughs*]. That is one. Hum... the second point is; very clear difference of personality that I did not mention. I was so impressed by the difference [...].

In explaining these differences, Matsuzawa points out the setup was identical for the three, and then he describes the method:

MATSUZAWA. [W]hen I show the "cup", she may choose the visual symbol "rope", then I repeat again "cup", she may choose the wrong visual symbol "paper", so the third trial again – no, no, no, this is it, look at this one. So, this is called **correction method**; up until the time the chimpanzee touches the correct corresponding visual symbol, we continue. So that was the method, and we believed this is the good way of correcting the response. And eight objects: cup, paper, pencil, toothbrush, and so forth. Ai chimpanzee, in my recollection, in 59 days or something, she learned to do the symbolic matching. It's symbolic, the visual symbol, geometric figure, has *no* similarity to the real object, but Ai chimpanzee learned this one in 59 days, and Akira chimpanzee 90 days, and Mari chimpanzee 120 days. Huge difference, because I adopted the same method [...].

He goes on to explain how chimpanzees reacted to error:

MATSUZAWA. Her [Ai's] spontaneous behavior is looking at the sample, looking at the keyboard, looking at the sample, looking at the keyboard, and take her time to try to touch the different key [...] to reach to the correct answer. But in the case of Akira - a boy - there is a "cup", and he did touch a wrong key, and the next trial again "cup", but he touches the same key but hit strongly or hit quickly [...] so, power solution, solving the problem by the power. It may be effective in the forest living creature, hum... the prey is passing in front of you, it's better to quick or grasp strongly, but it doesn't work in this cognitive task. And he is *so* strong, he is *so* tough about the correction, because correction means no food reward, and the feedback sound of buzzer "boo boo". Correct answer is signaled by the chime: "yes yes yes", "rol rol rol rol" chiming. But error is "boo boo". The next trial, "boo boo". The next trial, "boo boo". The next trial, "boo boo". He is *so* tough, and touching strongly or quickly or whatever and then finally, he switches and again and again and again... but he learned.
But in the case of the third chimpanzee Mari... happens to touch the wrong key "boo boo"; she shows the grimace. Second wrong "boo boo"; almost screaming. The third time "boo boo"; "huu".^[IX, Note 104] I do not hit, I do not scold, I do nothing. My way is the same, the computer is doing the same, but the personality is different. So, Ai is very patient and paying attention to the task, but Akira is so easy-going, and he doesn't care about anything at all. But Mari is very much caring about the feedback sound, so that is the reason why so long time for Mari to acquire a skill. So suppose that this is a more practical clinical situation like school. The teacher should take a different way of teaching. For Mari, the so-called **errorless learning**. No error, no error feedback. When I present "cup", always only one key "cup". So she touches "cup" and the computer say "rol rol rol rol rol", chime, or I say "good, good job, very good girl" and she got the result [...] so this kind of training [...] still you can learn the things. Like nine times one choice, but one out of ten times, now you add the incorrect alternative,^[X] so gradually introduce the discriminations, Mari may have had a different result.

NICOLAS LANGLITZ. So, did you actually do this, or?

MATSUZAWA. No, sorry. Hum... I think I was - it's not the school, classroom situation. So, I was rigorous scientist keeping the same method to get the data of three chimpanzees, so that is one reason. And the second reason is I'm only one researcher who is doing the research. [S]o in that sense I really regret - I feel very sorry for Mari, because people's perception to Mari is very much skewed by this result. People believe Ai is very smart chimpanzee, Mari is not smart. But I know it completely depends on the teacher and teaching methods. [...] Suppose that we are allowed to do a different teaching method to different chimpanzees, I think the result is different.^[XI]

This lengthy passage evokes the dynamics of standardization in science and individual differences in performance. Whenever the tests directly involve learning, the topic plays an especially important role. Note, though, that not all tasks require previous training, including, for example, many studies in visual recognition, such as those conducted by Professor Tomonaga Masaki at PRI.¹⁰⁵ To refine the topic precisely, there is a subtle line between asking "Can they do it?" and "Do they do it?". The standardization of procedures is important to provide parameters to replicate results; thus, it is not a concept that can be easily abandoned to pursue completely tailor-made experiments.

^{IX} Matsuzawa makes a moderately high-pitched sound, which likely translates to the category of a "scream" (Nishida et al. 2010, 163), but an alternative interpretation is "huu" (ibid., 98), indicating a chimpanzee response to a strange sound or object. I have reproduced the vocalization as "huu", since the category "scream" is not coded onomatopoeically.

^X Note, this is the opposite of learning by eliminating; an incorrect choice is added, not the correct one.

^{XI} Matsuzawa then cites PRI's personalized skylab system, designed for this intent. It tests chimpanzees semi-automatically by facial recognition, adapting tasks accordingly. It is used less than regular laboratory rooms due to the difficulty of coordinating between researchers' and chimpanzees' schedules.

Nonetheless, there are a few ways to take this issue into account, such as maintaining equal conditions but adapting consecutive tasks or criteria. Even if nourished by scientific criteria, these decisions are also of contextual and pragmatic orders, many times without straight-forward answers.

At this point, one may ask whether the laboratory can be considered as school. To which extent testing chimpanzees school situation is resembles a a multifaceted issue. In the media, the school is mentioned setting on purpose: Chimpanzees go to the laboratory 'to study' (benkyōsuru 勉強する), and researchers themselves insist upon this wording for the general public due to clarity and to the invasive connotation the



Photo 16 "Now, who is studying is Chārī". Higashiyama Zoo, 2015. By Daly.

term 'experiment' carries (jikken 実験).¹⁰⁶ This is also the case for TV, including the regular documentaries on chimpanzee research by the local Chūbu-Nippon Broadcasting, ¹⁰⁷ and for Japanese zoos that imported the PRI apparatus and conduct experiments in public, such as the Higashiyama Zoo in Nagoya (Photo 16). In addition, in his book for children, Matsuzawa employs the words 'study' (benkyō 勉強) and 'pupil' (sēto 生徒), and although "experiment" is mentioned when referring to a certain means of understanding, chimpanzee Ai goes to a 'room' (heya 部屋) - not an experimental room.¹⁰⁸ At most, she goes voluntarily to a 'room to study' (benkyōsuru heya 勉強する 部屋). Furthermore, PRI experimenters and technicians are asked to take theirs masks and caps off when TV crews visit the facilities, although it should be added that the more exposed basement is off-limits to outsiders.

At times, this analogy seems real even among researchers. On a regular basis, master's and PhD students eagerly share chimpanzees' accomplishments and difficulties in the experiments: what their learning curves are, if they passed to the next experimental condition, the best and worst learners, and so on. Of course, as difficult to disentangle interests as it is, it seems that beyond just hoping for a positive result to publish, laboratory members are truly invested in chimpanzees' progress. While I was working as an

experimenter, one of the usually quiet technicians frequently asked me whether chimpanzees had passed their sessions that day. Notably, she was not participating in any publication "ambition", and their results would not make a difference to her work.

Whether we are able to tackle the full potential of nonhuman animal cognition is a preoccupation among researchers, who also seem to have high expectations for the species they work with. For example, a professor at PRI gave in during a presentation that "it's a little bit sad" to discover the species with which he works might not differentiate the faces of their keepers - as his research suggested. Along the same lines, according to rumors, a Japanese professor even performed a "happy dance" when a naïve subject hit a correct answer... Clearly showing a great enthusiasm for an animal's performance in experiments.

On the other hand, the "teacher-student" analogy might not quite apply. This is due to the fact that researchers are there mainly to investigate the participants' cognitive functions, even when their experiments involve animal learning. Chimpanzees are the ones that, by their results, inform us. In this sense, researchers only teach to learn, rather than to pass on knowledge primarily for the benefit of the "students". Alluding to Ai, Matsuzawa¹⁰⁹ confirms: "I actually learned more from her than she from me", and in fact, he refers to Ai as his "research partner". But how was this partnership between humans and laboratory chimpanzees built over time? We shall see next by retracing how the PRI community grew and produced their first institute-born offspring.

1.3 The Ai Project Building a Community



Photo 17 PRI's youngest: Ayumu, Pal, and Cleo (from top to bottom). Credit: KUPRI (2002).¹ By Hirata Akiho.

Nowadays, PRI has twelve living members, and the youngest generation was born in the year 2000 (Photo 17). Around the time the Ai Project was set on motion in 1977-78, three infant chimpanzees regularly participated in experiments: Ai, Akira, and Mari. The sub-adults Reiko, who was PRI's first chimpanzee, along with Puchi and Gon, who were brought in from private households, composed another group starting in 1979. Also arriving in 1979 was the three-year-old Pendesa, born almost next door to PRI at the Japan Monkey Centre. Through artificial insemination, new babies were expected.² The female Popo was

born to Puchi and Gon in March 1982, and immediately following this, in May the same year, the male Reo was born to Reiko and Gon. Popo would get a sister from the same parents in December 1983, when Pan arrived.¹ In 1985, Chloe (*Kuroe*) was brought from Paris, being integrated into the PRI community at the age of four.³ As for the infants born in PRI, sadly, while Reiko accepted rearing her son Reo (Photo 18), this was not the case for Popo and Pan, who were rejected by Puchi.

Puchi's reaction to giving birth to Popo and Pan was virtually the same: she screamed and ran away. During his last teachings at Kyoto University, Matsuzawa elaborated on PRI's first experiences in breeding by comparing Puchi and Reiko's attitudes:⁴

¹ In English, Pan's name is pronounced like the word "pun", whereas Pendesa's name is pronounced like the word "pen". Their names are usually abbreviated to "Pan" and "Pen".

MATSUZAWA TETSURŌ. [A]t that point, for the first time, we recognized the problem of chimpanzee mother cannot become a good mother in captivity. Human rearing is not good.Human-raised chimpanzee [Puchi] failed to nurse the baby. [...] We naïvely believed the maternal behavior must be instinctive because it's so important for the survival of the species, so everything must be innate, within, so the mother turns to become mother, but not... what I learned is; mother



Photo 18 Mother and son: Reiko and Reo. Courtesy of Sakuraba Yoko. By Kumazaki Kiyonori

turns to become mother through learning, through experience. Suppose that a chimpanzee was completely isolated from her conspecifics, she cannot become the mother. She can be pregnant, she can be giving the birth, but she cannot show the maternal [side]... So that is what I learned from this incident.

CATHERINE HOBAITER [PRIMATOLOGIST]. Do you think that it would be enough for a chimpanzee who was human-reared, who then lived socially with other females and watched them raise their babies - so do you think it is important that they themselves experienced being raised by a chimpanzee?

MATSUZAWA. Good point, and I think the short answer is yes. Whenever it is, once the chimpanzee is socialized, they learn a lot from the social interaction with the conspecific and [how] to become more and more close to the natural chimpanzee. But another point; there must be a critical period, and the critical period is the first one year old of life. [...] We should carefully look at zoos' data [about maternal deprivation].

Matsuzawa continues his argument but then, at some point, he concedes that certain factors are difficult to determine:

MATSUZAWA. Reiko successfully kept Reo chimpanzee. Well... so interaction with patas monkey, rhesus monkey, spider monkey... it may have helped, or... I don't know! Both Puchi and Reiko should have the - coming from the wild means [they] should have the short period with the mother, but I think Puchi was raised by home, home-reared chimpanzee. Reiko was institute-reared chimpanzee, and [had] a lot of interaction with the other nonhuman primates. I don't know. I cannot tell the reason. But anyway, what I learned is; the chimpanzee must give the birth and rear the baby by herself.

Indeed, Puchi was kept as a pet for twelve years.⁵ Her third child, a girl named Pico born in 2003, was reared by humans for ten days due to Puchi's neglect and Pico's health condition, but was successfully returned to her mother afterwards.^{6,7} Yet, the

process was not without challenges for Puchi. In a short video extract (Audiovisual Material 4; Video Frame 4) it is possible to observe her reaction to the only offspring she would manage to bring up. The recording is summarized here: In the first scene, keeper Kumazaki holds baby Pico, while Puchi observes in close range (4s). The camera cuts to the next scene, which depicts Pico on the floor vocalizing. Puchi approaches while showing signs of piloerection. She smells the infant, backs off, and sits on the bench. Then, she moves to the other side of the booth. With her arms tight to her body, Puchi lies flat with her chest down looking at Pico (34s). She stretches her arms to her front, rocks her body twice, gets up, and approaches the baby, leaning over (44s). The video ends.





Video Frame 4 Puchi's reaction to newborn Pico. From Audiovisual Material 4. Audiovisual Material 4 Puchi's reaction to newborn Pico, 46s. Excerpt from KUPRI (2015).⁸

Her overall behavior seems to indicate anxiety since, by and large, her hair is erect,⁹ and she goes back and forth around the booth toward the infant as if agitated. Finally, the prone posture she adopts seems to indicate a sort of "handicap self" whereby an older individual shows gentle restraint during play.¹⁰ Matsuzawa considers lying prone to be a way of her signaling Pico that she is not a threat.¹¹ Observers' general impression

is that Puchi simply does not know what to do, and this is the case for many captive chimpanzee mothers. Unfortunately, even if Puchi had managed to keep Pico, the baby had paralysis in the lower limbs and a malformation of the thoracic vertebrae and did not survive, passing away at the age of two.¹² Before her death, Pico was taken for a health inspection while Puchi was asleep, and as she did not return, it is said Puchi continuously searched for the infant.¹³

The abandonment of infants among captive chimpanzees is a very complex issue. In Japan, nearly one third of captive chimpanzees face problems raising offspring.^{14,15} In many monkey species, as long as the mother does not actively reject the newborns, they are physically capable of surviving (e.g., clinging, climbing on the mother's body and suckling); on the other hand, just like humans, chimpanzees need cradling and nurturing and are helpless without support.¹⁶ Maternal behaviors in chimpanzees include cradling, grooming, playing, gazing, assessing the baby's behavioral and physical state, and performing physical exercises to encourage motor development.¹⁷

In a long literature review, Bard analyzed studies according to their support - or lack thereof - of multiple hypotheses raised around the maternal competence of nonhuman primates and, more specifically, chimpanzee mothers. ¹⁸ Besides species-specific differences and the fact that each developmental phase mobilizes different skills in parenting, she argues there is no support for a single explanatory factor. "Early experience" (i.e., having been raised by the biological mother) and "observational learning" (i.e., watching others caring for offspring) facilitate but are not sufficient conditions for raising offspring without the need of human intervention, whereas "direct hands-on interaction" with an infant seems to be a much more crucial factor.¹⁹

Some multiparous females do not necessarily improve their skills, suggesting familiarity does not follow from mere observation. Moreover, in the wild, these skills are usually acquired while chimpanzees are juveniles or adolescents, be it for related or unrelated females.²⁰ The care of infants by one other than the mother is an important phenomenon, and is labeled "alloparenting".²¹ Even though touching a newborn is rarely allowed by the mother before two months old, and even if alloparenting does not explain all interactions with infants (*cf.* female-female competition), social groups of mixed ages and genders as found in nature are of great importance for successfully raising offspring.²²

In Bard's words, "[t]here is not a maternal *instinct* for warm and caring attention to infants; that is, there is not an instinct to provide care to infants that is always responsive to their needs. [...] Moreover, there is not a single theoretical account that explains or

predicts the diversity of patterns of infant interactions with individuals other than the mother". ²³ Still, citing Fairbanks, Bard argues that the mother balances care in relation to her own reproductive success whenever conditions are poor or the likelihood of infant survival is low, in other words, providing a support to "parental investment theory".^{24,25} Here, however, the picture is again not so straightforward. Peculiar case studies in the wild have illuminated that mothers might continue to hold on to their infants even at some cost to their reproductive success.

This was the case for Jire, in Bossou, Guinea, who carried the mummified body of her daughter Jokro for a month of observations despite resuming estrus twenty-one days after the infant's death, a fact well emphasized by Matsuzawa.^{26, 27} True, cycling may have contributed to the "gradual 'letting go'" in Jire's case and in that of other Bossou mothers with the same fate; nonetheless, this was not immediate.²⁸ Likewise, in Mahale, Tanzania, chimpanzee Christina showed "compensatory care", altering even her feeding behavior (arboreal ant fishing) to deal with the constraints imposed by her infant's severe disability.²⁹ The extra care and the alloparenting provided by Christina's elder daughter, Xantip, may have helped the infant to survive for twenty-three months; yet, the exclusiveness of the allowed alloparenting and the fact that Xantip ceased this activity after giving birth herself might have increased the burden of parenting and the likelihood of death.³⁰

It is likely that in the bigger picture, to explain attachment between chimpanzees and offspring, reproductive success and chances of survival will not always be good predictors - just as for humans. At the least, the importance of mother-infant relationship in chimpanzees and the strong bonds formed during infancy seem undisputed.^{31, 32, 33, 34} After addressing the relationship between mother, infant, and other conspecifics, we shall return to the PRI cases and examine the place humans occupy in chimpanzee development in captivity.

As observed, rejection by the mother is quite a common phenomenon in captivity, which puts the lives of newborns in danger and, therefore, requires human intervention. Puchi's second daughter, Pan, was an extreme case when she fell to the ground after birth.³⁵ Matsuzawa took Pan home, raising her with his daughter (Photo 19). He described the experience as follows:³⁶

The experiences of a chimpanzee infant reared in a human environment may have little in common with a chimpanzee's natural upbringing. Human caretakers will

do their best to frequently hold the infant, but they cannot embrace them all day long like a chimpanzee mother would. Instead of such constant care, we often have to resort to alternative measures, such as providing them with, for instance, a towel to cling to. Chimpanzee infants become very nervous when they do not have anything to hold on to. At night, I did not hold Pan. We slept side by side; I watched her resting next to me. She was reared just like a human infant".

After acknowledging the importance of past hand-rearing studies, Matsuzawa elaborates on raising Pan: ³⁷

[T]he experience of raising infant chimpanzees has taught me another key lesson: the importance of the mother—infant bond. I recognized that comparisons of homereared chimpanzees and home-reared humans were not fair because these chimpanzees were not being raised by their own parents. I noticed that most of our knowledge of the cognitive development of infant chimpanzees came from artificially-reared chimpanzees isolated from their conspecific community. One must not forget that there are aspects of chimpanzee intelligence that can only be explored among members of their own species.



Photo 19 Pan (2 months) and Matsuzawa's daughter (9 months) in 1984. Credit: Matsuzawa (2001).³⁸ By Matsuzawa.

In the year 2000, three new babies arrived, marking the beginning of a paradigm shift in chimpanzee research at PRI. On April 24, Ai gave birth to Ayumu, Akira's son. Cleo (*Kureo*) was born on June 19 to Chloe and Reo. Last but not least, on August 9, Pal (*Paru*), daughter of Pan and Akira, made her appearance.³⁹ While Ayumu and Pal

were conceived by artificial insemination, Cleo was conceived by natural means.⁴⁰ During the years accompanying their development, the project's aim "has been to clarify aspects of the chimpanzee mind within social contexts, focusing specifically on the emergence, modification, and cross-generational transfer of cultural traditions in chimpanzee communities".⁴¹

From then on, a team of researchers started to perform daily face-to-face experiments with the mother-infant pairs. This new type of research on chimpanzees was considered "a sort of "participant observation" [...] [T]he close bond established between the human experimenter and the mother – based on years of experience and daily interaction – allows us to test the infant chimpanzees in much the same context as that in

which human infant developmental tests are conducted. In a face-to-face situation and with the mothers' cooperation, we are able to closely replicate many such tests, as well as design our own for illuminating developmental changes in the chimpanzee infants".⁴² Three teams were created: "Team Matsuzawa" studying Ai and Ayumu, "Team Tomonaga" with Tomonaga Masaki in charge of Chloe and Cleo, and "Team Tanaka" with Tanaka Masayuki as main tester of Pan and Pal.

Much of what is known about cognitive development in chimpanzees in terms of laboratory studies owes to research accompanying these infants' growth. In this sense, the human-chimpanzee relationship that enabled these studies is key. Even more, our knowledge of the topic greatly owes to Ayumu, Cleo, Pal, and their mothers - on a personal level. A good compilation, though not comprehensive, of the works conducted during this phase can be found in "Cognitive development in chimpanzees", edited by Matsuzawa, Tomonaga, and Tanaka.⁴³ At any rate, save for prenatal studies,⁴⁴ even before the research program could be set in motion, Ai, Chloe, and Pan first had to learn how to become mothers.

Ai was born in the wild (*ergo* mother-reared to some extent) and arrived at PRI at around one year old.⁴⁵ Chloe, zoo-born, was rejected and had to be human-reared.⁴⁶ Then Pan, as seen, was raised by Matsuzawa during her first year of life. In 2000 when their offspring arrived, Ai was twenty-four years old, Chloe nineteen, and Pan sixteen, thus all adults. Pan was at that moment the youngest mother of the PRI community, and Chloe, from her arrival at four years old on, would be older only to Popo (fifteen months), Reo (seventeen months) and Pan (three years old). The age difference from Ai to Pan, the youngest, is about seven years. In the bigger picture, it seems Ai was provided greater social complexity and more opportunities to engage in a "hands on approach" with youngsters than Chloe and Pan were. Nonetheless, becoming a mother was not a completely natural act for Ai.

Two and a half years before Ayumu, Ai gave birth to her first baby, Atom. Very unfortunately, he was still-born. As Matsuzawa recollects: "Ai screamed and run from her infant the moment he appeared. She screamed and screamed, and would not approach the infant. It was a sad moment for Ai and for me".⁴⁷ As we shall see, even Ayumu's birth was surrounded by uncertainty, but luckily he grew to step forward firmly, living up to his name, 'to walk' (歩む). The three mothers-to-be went on a sort of training program.

Matsuzawa describes his thinking at the time as following: 48

If a chimpanzee can acquire the knowledge and skills of child-rearing through learning and practice, I might be able to teach her how to bring up her own infant even in a captive situation. So I started training Ai how to take care of a baby. I showed her video footage of wild chimpanzee mothers breast-feeding and taking care of infants. Around the same time, we also happened to have infant gibbons at the institute, reared by humans. We demonstrated to Ai how we humans look after a gibbon baby. We provided Ai not only with the opportunity for observational learning but also with a chance for her to learn by herself. I thought it would make a difference if she could practice things that she had learned from observing others' behavior. For this purpose, I gave Ai a stuffed toy - a chimpanzee baby, similar in size to a real infant. At the beginning, she would press the toy against her forehead or put it on the floor. When I showed her how I embraced the toy, she began holding it following my verbal direction and encouragement. Although early on she would often hold the toy upside down, she eventually learned to hold it the right way up.

This passage alludes to a vital point about raising a chimpanzee baby, which is having the appropriate body technique toward the infant. In terms of the mother-infant relationship, clinging to the mother is one of primates' traits (see moro and grasp reflexes)⁴⁹. On the other hand, clinging with an embrace is more restricted to simians; some prosimians cling without embracing (e.g., ring-tailed lemur, *lemur catta*) or transport infants orally and leave them in nests (e.g., aye-aye, *Daubentonia madagascariensis*).⁵⁰ Yet, unlike many monkey species, newborn chimpanzees do not possess the strength to hold on for more than a few seconds at a time, and thus, they need to be actively cradled.⁵¹

For a new mother, the basic actions to learn are picking up, embracing, putting the infant in the correct position (not upside-down!), and allowing suckling. None of these are evident even despite a mother's best intentions. When the mother does not approach the baby, humans must intervene in at least one of these steps but, more commonly, in all. A palette of examples is provided: Kumazaki teaches Puchi to hold Pico (Video Frame 5); Tomonaga teaches Chloe to correctly position Cleo (Video Frame 6, *cf.* 07m44s); Tomonaga bottle-feeds the infant (Video Frame 7) after Chloe refuses Cleo's suckling (in fact, the adult seemed more interested in drinking the milk herself [Video Frame 7, *cf.* 11m27s]).



Video Frame 5 Kumazaki teaching Puchi to pick up Pico. Excerpt from KUPRI (2015).⁵²



Video Frame 6 Tomonaga teaching Chloe to position Cleo correctly. Excerpt from CBC (2013).⁵³



Video Frame 7 Tomonaga bottle-feeds Cleo while Chloe holds her. Excerpt from CBC (2013).54

Ayumu, Cleo, and Pal's births demonstrate precisely the emotional component of human-chimpanzee relationship in PRI. Concerning Ai, Ayumu's birth had quite tense moments. As Matsuzawa recalls:⁵⁵

On the night of April 24th 2000, Ai successfully delivered her infant. She stood quad-pedally to receive the body of the infant with her hand at the moment of delivery. Then, she started licking the infant's whole body. However, the baby did not move, nor was he breathing. My heart sank - the scene was so reminiscent of our previous sad experience [the stillborn, Atom]. But then Ai put her index finger into the mouth of the infant as if to prompt his breathing, and began to lick his face. Soon, Ayumu coughed and moved for the first time within his mother's arms. It was incredible: Ai's treatment had worked. We never taught Ai such behaviors. Nevertheless, she did all she could - and saved the life of the infant.

Ayumu's birth can be seen in Audiovisual Material 5 which powerfully presents the elements discussed so far (Video Frame 8): Students and staff gather at night to view the birth through a TV screen (6s), and the atmosphere is cheerful when Ai starts giving birth, with applauses and exclamations like "sugoi!" (amazing!). However, when the baby is born, he does not move; amniotic fluid prevents him from breathing. Ai cleans Ayumu's face and mouth, and he finally responds (1m54s). Despite Ai's remarkable reaction to this dangerous situation, and despite having embraced Ayumu at first, next, Ai is not holding the baby in the correct position (2m34s), prompting Matsuzawa to go into the room and show her how to embrace the newborn by mimicking cradling and by emphatically encouraging her with "sō sō sō" (yes yes yes), "sō da!" (it is correct) and "subarashī!" (wonderful), words commonly used in husbandry. It is not until twenty hours after birth, that Ayumu finally starts suckling (3m14s).



6s

1m54s

2m34s



Video Frame 8 Ayumu's birth. From Audiovisual Material 5. Audiovisual Material 5 Ayumu's birth, 3m18s. Excerpt from Nakamura (2001).⁵⁶ Courtesy of Nakamura Miho.

Chloe's case was not straightforward either. Tomonaga comments that from the three mothers-to-be, Chloe was the one that had the strongest response to the stuffed toy.⁵⁷ She was very attached to the fake chimpanzee baby and would not give up on it, and she even harshly refused a teddy bear that was later presented to her. Tomonaga believes Chloe showed signs of understanding the plush as both a representation of a 'living thing' ("ikimono" 生き物) and as an 'object' ("mono" 物) due to 'pretense-play' ("furiasobi" ふり遊び).⁵⁸ Yet, learning-to-mother or just simply interacting with a real newborn - in this case, Ayumu - would prove to be difficult, as seen in Audiovisual Material 6.

Important moments of the extract are summarized (Video Frame 9): In the possession of her plush toy, the lower ranking mother-to-be, Chloe, solicits Ai's newborn. This is observed at 12s4frames by her gesture "extend hand palm upward".⁵⁹ Ai reaches for Chloe's hand (12s19frames). The subordinate retreats (12s29frames). Attentively, Chloe has been looking to the infant. She creates distance and extends her hand to Ai (31s), who grasps it without a shaking motion (33s). Markedly, the last behavior, "grasp hand", is performed by a dominant individual in response to a subordinate's request for reassurance.⁶⁰ Recall that it is usual for mothers not to allow others to have contact with their newborns until approximately two months old, ⁶¹ and in this sense, Ai seems reluctant to meet Chloe's hand. Given that approaching an infant, especially one born to a dominant individual, is a very delicate situation, Chloe and Ai engage in mutual reassurance after this series of interactions, which is a way to say "we are fine".



Video Frame 9 Chloe tries to interact with newborn Ayumu. From Audiovisual Material 6 Audiovisual Material 6 Chloe tries to interact with newborn Ayumu, 39s. Excerpt from CBC (2013).⁶²

On the day of Cleo's birth, Chloe would only release the stuffed toy moments before labor.⁶³ In fact, Chloe did not come to the newborn and screamed. Unbelievable to Tomonaga was that her next step was actually to go to the stuffed chimpanzee, not the real one! Due to health concerns, Cleo spent the night in an incubator. The next day, when the plush had already been taken away, Tomonaga sat down, held the baby, and observed the adult's reaction (Video Frame 10, 21s). Then he left Cleo on the floor wrapped in a towel. To Tomonaga, Chloe seemed concerned.⁶⁴ She approached a few times. At a certain point, Cleo's hand grasped her mother's hair (1m52s), and finally, Chloe picked her up (1m57s). Just as in Ayumu's case, students and staff were following the process through a monitor and cheered this moment. Details of the mother-infant reunion can be seen in Audiovisual Material 7.



Video Frame 10 Cleo's birth. From Audiovisual Material 7. Audiovisual Material 7 Cleo's birth, 2m9s. Excerpt from CBC (2013).⁶⁵

The next difficulty was breastfeeding; Chloe held the baby low on her abdomen, a non-functional position. A strategy was invented to remedy the problem. Separated by bars, Tomonaga tried to make Chloe crouch multiple times by spoon-feeding her honey from a lower position. Like this, Chloe's nipples would be closer to the baby, who eventually discovered them. ⁶⁶ There was one last problem though; ⁶⁷ Chloe was displeased by Cleo's suckling for some reason - perhaps discomfort. She even started to suck her own nipple, seemingly whenever the sensation of the child suckling hers was unpleasant. At first, she would only allow breastfeeding when her mood was "calm" and when she was in a "gentle" situation; luckily, though, she gradually came to accept Cleo's suckling. Apropos of "intuitive parenting", Tomonaga believes parenting might be genetically programmed to some extent, but in order to push that 'switch' ("suicchi" $\nearrow 4 \ y \ f$), support from society is needed in various forms.⁶⁸

The last mother-to-be, Pan, reacted very curiously to giving birth to little Pal. As Matsuzawa recalls: ⁶⁹

Pan delivered her infant without any problems - there was no sign of fear or screaming like at her own birth [by Puchi]. However, she did not pick the infant up off the floor. The baby was left gently lying on the floor while Pan crouched over her and looked on. She seemed to have been at a loss as to what to do at this point. **She lay down, side by side with the infant. She reminded me more of a**

human mother than a chimpanzee. Pan's behavior toward her infant was much like the way human caretakers brought her up. To try and ease the situation, Masayuki Tanaka, who was in charge of taking care of Pan and her infant, now entered the room. He softly pushed the infant toward the mother. However, Pan moved away from the baby, always keeping a small distance between herself and the infant. The movements were repeated several times. Finally, the infant's extended arms happened to touch Pan's hair. Her fingers closed - once the grasp was successful, the infant would not let go. She clung to her mother who in return finally embraced her.

Contrary to humans, chimpanzee newborns are always in ventral-ventral contact with the mother during the first month,⁷⁰ therefore, side-by-side positioning resembles more the context of a human upbringing. Indeed, recall that this is how Pan was brought up in Matsuzawa's house.⁷¹ Matsuzawa goes further; he considers that human's "stable supine posture", which allows our babies to safely stay put horizontally, encourages vocal exchange and manual gestures in humans.⁷² One thing is clear though, the basic steps required for the care and nurturing of a newborn chimpanzee do not appear independently of a social context, making a strong case for social learning.

Regarding the forms of social transmission between humans and chimpanzees, first, consider humans' active teaching role for chimpanzees in captivity. Humans actively engage in a program to foster learning. This, in turn, may elicit in chimpanzees observational learning (e.g., by watching videos of wild chimpanzees or by observing a baby gibbon being taken care of), learning by doing (e.g., plush toy strategy and reenactment of body postures), or facilitation of a certain positioning (e.g., spoon-feeding strategy for Chloe). The fact that after the researcher's "program", Ai, Chloe, and Pan managed to keep their babies indicates that social learning likely took place. On the top of that, consider differences in rearing history, whereby a hand-reared chimpanzee may reenact the conditions of her own upbringing (e.g., Pan's reaction to Pal). As observed, most of these first and crucial steps involve not only accepting certain conditions but also learning the body positioning that enables the chimpanzee to nurture the infant.

This discussion naturally evokes the issues raised Marcel Mauss, in his famous article *Les techniques du corps*.⁷³ By 'techniques of the body', he means the way humans make use of their bodies in each society, while under a framework that is at the same time biological, psychological, and social. His paper presents techniques that vary according to societies. Among these, he points out differences in the upbringing and feeding of infants or "techniques de l'enfance",⁷⁴ that is, 'techniques of childhood'. He mostly discusses ingrained traditions that feel rather mechanical to their agents, rather than

exploring the techniques' inventions. His argument remains within one species though; humans. *Mutatis mutandis*, when comparing chimpanzee-chimpanzee interaction in captivity, there are differences in mother-infant interactions that might be attributable to social learning, as for instance, sustained gaze by PRI mothers, whereas Yerkes mothers look away from infants within seconds.⁷⁵ Yet, the cases presented in this manuscript go beyond forms of social learning by a single species.

This brings us to the second point: What is being taught may be shared between our species or be species-specific to chimpanzees. For instance, humans need to insist the chimpanzee remains in constant contact with the baby, not leaving the newborn unattended at the mercy of the bare supine posture, despite the fact that human babies do not require the same type of care. On the other hand, humans also teach cradling and both *sapiens* and *troglodytes* need to fully support the baby for breastfeeding - not necessarily a requirement for monkeys. ⁷⁶ Therefore, the "message", content, or techniques transmitted at once comprised and surpassed species boundaries. In sum, in terms of the basic steps for nurturing a newborn, after having alienated chimpanzees in captivity, humans are obliged to teach chimpanzees how to be both great apes and chimpanzees.

Again, these "techniques of the body" are ape and chimpanzee. True, a culturalist approach prompts us to interrogate how humans from a specific culture pass on certain specific techniques, whereas humans from other cultures might do things differently. This is appropriate, especially considering that face-to-face husbandry of laboratory chimpanzees is markedly a characteristic found in Japanese institutions, which shall be discussed at length. Yet, ignoring species-typical patterns and how they are subject to social learning within a species and across species simultaneously is to cast aside a full understanding of the phenomenon. We should be aware that first, species-typical behaviors are not necessarily automatic - to shortly avoid the conundrum of the word "instinct". Secondly, species-typical behaviors can be learned from a conspecific group with certain tradition forms, and they can be learned from an allospecific group, who also bear particular tradition forms. In addition, as we shall see, the modes of transmission may be characteristic of one species and/or another. But first, we should go over the most important social role for the survival of an infant chimpanzee - the role of the mother.

Hand-rearing means humans also mother chimpanzees, especially if a person is mainly in charge of care duties (*ergo*, spending increased time together) and if both develop close ties. However, what is meant by the word "mother" is clearly difficult to ascertain. The Premacks, who raised chimpanzee Sarah and other infants, believe that

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"[w]hen removed from the wild and brought to the laboratory, the chimpanzee transfers its maternal ties to the human trainer".⁷⁷ In the absence of complex verbal language, it is difficult to clearly assess how chimpanzees perceive humans who somehow serve an equivalent social role to their mothers in the wild. The challenge remains to create good research paradigms to investigate these intricate, culturally-laden issues without resorting to language. Nonetheless, if trusted, ape language might prove useful for insights into the matter. Michael, a wild-born language-trained gorilla, was reported to have had this conversation about his gorilla mother in 1981: ⁷⁸

[BARBARA WELLER]: Who is your mother? (no response). BW: Who is your mother? MIKE: Gorilla lip [Gorilla-adapted Sign Language for "woman"]. BW: Yes! You so smart. Who is your father? M: Foot gorilla good. ("Foot" is GSL for "man."). BW: I see. Do you know your mother's name. Did your mother have a name? **M: Good nice gorilla.** (Good with a capital "G" signifies gorilla mother in what follows.) BW: Mother takes care of you when you a baby. Do you remember when you a baby? M: Baby know Good gorilla Good. BW: Remember when you a baby gorilla? M: Big-trouble do. BW: Why big trouble when you a baby? M: Chase chase gorilla do red do. BW: Who chase gorilla baby? M: Visit foot [man]. (Mike then hits his foot with his fist.) BW: Foot chased you when you a baby? M: Foot (emphatically) Good. [Translation: man, mother] BW: What did foot do to you and your gorilla mother? M: Do out gorilla big-trouble. BW: What happened to your mother? M: Eat. BW: Eat? M: Squash gorilla. BW: What happened to your mother? M: Sorry do Good [mother] do rock. BW: Rock? What happened with rock? M: Do rock gorilla sorry. BW: Rock squash your mother? M: More hit do neck neck bite. **BW:** Bite? M: Bite bite. BW: Who bite? M: More gorilla chase. (Mike rests on floor.) BW: Tell me more please. Did foot hurt your mother? (Mike ignores her.) BW: Tell me more about your mother.

M: Mother Ann you. (*Michael called Barbara Weller "Ann" to distinguish her from Barbara Hiller.*)"

Perhaps, for apes who have established close ties to a certain human, this person might bear some resemblance to the wild counterpart or might become the main person of attachment for those who had no exposure to the biological mother's care. In institutional settings where chores are distributed and contact with infants is limited, attachment patterns in baby chimpanzees were found to show some similarities to children in orphanages.⁷⁹ In the case of hand-rearing, however, the picture seems much more complicated. It might be simplistic to label the phenomenon "alloparenting", because humans indeed become the main providers, as in an adoption case.

Furthermore, in the multi-male, multi female chimpanzee society, it is with the mother that the offspring create the strongest bond; as for the solitary orangutans, fathers usually do not stay close to mother-infant pairs while, for gorillas, paternal care takes place but in a harem-based society.⁸⁰ Anyhow, humans do find analogies between their biological offspring and nonhuman animals. In modern societies, the emphasis is put on the social role of parents rather than on the birth-act; unlike the hand-reared Pan, Ai ended up to be the at the center of Matsuzawa's investment of time and in extreme cases, he could be heard saying that Ai is like a daughter to him.

Now, one may ask whether being tested with the chimpanzee mother makes a difference. Indeed, the way in which Ayumu, Cleo, and Pal learn how to perform in computer experiments differs from the original setting of the Ai project, which used operant conditioning techniques to give meaning to the experimental apparatus. In the new setting, infants always go to the experiments with their mothers; a human would be present in the booth with the adult and infant, or a younger researcher would stay with the infant in a separate booth while the adult chimpanzee interacts with a senior researcher. Alternatively, a mother-infant pair is tested without humans inside, and more than one pair might even be tested at the same time. Certainly, face-to-face testing with Ai is documented at early age, but the way the main studies were conducted, followed a protocol by which chimpanzees remained alone in the booth. In this sense, the know-how of experimental procedures seems to have been learned in a qualitatively different manner by infants Ai, Akira, and Mari back in 1978 than by little Ayumu, Cleo, and Pal in 2000. The first case is shaped (*sensu* Skinner)⁸¹, and the second, as we shall see, is socially scaffolded.

Although there are a few reports of active teaching in the wild, this is not a cognitive strategy commonly used by chimpanzees. ^{82, 83} Based on field studies, Matsuzawa and colleagues conceptualize chimpanzees' observational learning as "master-apprenticeship", whereby juveniles are mostly careful observers, mother-models display high level of tolerance, and learners acquire and hone skills by practicing (Photo 20 and Photo 21).⁸⁴ How Ayumu learned the protocol of a token experiment is noteworthy for Matsuzawa,^{85,86} because the first outcome of the task was not a food reward but Japanese *yen*, that is, tokens that later could be exchanged for food items. Thus, the motivation should lie elsewhere.





Photo 20 Cleo watches Chloe cracking nuts, PRI. Credit: KUPRI (2002).⁸⁷ By Hirata.

Photo 21 Joya watches Jire cracking nuts, Bossou. Credit: Nogami (2011). By Nogami.⁸⁸

Important moments are summarized in Video Frame 11 and Audiovisual Material 8: Ever since Ai returned to computerized tasks after giving birth, two-week-old Ayumu has shown interest in the activities his mother undertakes. At four months, able to stand while holding onto surfaces, Ayumu looks at the screen often, sustaining this disposition through eight months old (43s). His first attempt to touch the screen in the token task would be at nine-and-a-half months (1m7s). It is important to note that although Matsuzawa previously presented a laptop to Ayumu so he could become familiar with the touch panel, this is the first time Ayumu takes steps to solve his mother's tasks. The infant understands that first, the initial circle needs to be touched for the stimuli to be presented, then the kanji character, and subsequently, one of the two colors (3m55s).

However, at that moment, he does not have an understanding of the content of the matching-to-sample, that is, what the symbols mean. His choices are random. Eventually a coin drops, but he does not associate it with a food reward and plays with it instead. In

his learning process of accompanying his mother to the laboratory every day, at last, he grasps that the coin is actually exchanged for food (04m0s14), and afterward, that he must choose only one of the two food options. In this manner, Ayumu succeeds in understanding the full experimental procedure, or the "know-how", although it would take him longer to grasp the symbols' meanings, that is, the "know-what". Truth be told, the token concept was an integral part of the experiment, so to some extent, a form of "know-what" was also learned, but detailed data of his behavior are not available.



3m55s

Video Frame 11 Ayumu learns his mother's computerized task for the first time. From Audiovisual Material 8.

Audiovisual Material 8 Ayumu learns his mother's computerized task for the first time, 5m23s. Compilation from Nakamura and Aso (2003).⁸⁹ Courtesy of Nakamura Miho.

In Ai's first years, she pressed buttons on an apparatus, whereas Ayumu used a touch-screen, so the technical settings bear resemblances. Ai's task was a matching-tosample, and so was the first part of Sousa and Matsuzawa's procedure, up to token exchange.⁹⁰ Nonetheless, the experimental know-how was acquired by successive approximation method in the mother's case, with positive reinforcement (i.e., food rewards) in each accomplished new step. Ayumu learned in more naturalistic conditions, despite the fact that the place was actually a laboratory. What is meant by this is that Ayumu was able to resort to the same type of learning that chimpanzees use in the wild.

This does not mean Ai had no motivation besides food rewards; in reality, food plays a minor role in her motivation for tasks, as we shall see later. However, these are two qualitatively different forms of learning a procedure during an experiment, and in Ayumu's case, there is a clear social value attached to these activities.

Now, after having seen how an infant learns an experimental procedure, we tackle how the solution to an experiment may emerge in a social context. In an experiment modeled after ant fishing in the wild, chimpanzees were tested in two mother-infant pairs at a time in order to assess horizontal (i.e., same age) and vertical transmission of knowledge (i.e., across ages) in tool use (Audiovisual Material 9; Video Frame 12).⁹¹ The experiment starts with several objects spread on the floor. They range from more to less efficient in retrieving honey from a small hole in a plastic tube. After trial and error, Ai adopted a knobbly plastic string, and Chloe, a rubber tube. Both were the best tools in the setting.

Across trials, the infants show interest in the objects and carefully watch not only their own mothers (0s24frames) but also the other adult. Each infant picks up their mother's tool choice as well as the other mother's. Likewise, the children observe each other (1m26s and 2m6s). As their developmental stages progress, they are more and more able to manipulate tools. They eventually succeed and even develop individual strategies, like Cleo, who skillfully uses her mouth to manipulate the rubber tube (1m26s), a technique Ayumu finds difficult. Finally, despite succeeding, infants try other tools, a behavior not observed in adults once they have adopted a successful strategy.^{92,93} All in all, the solution to a tool-use task was supported by how other chimpanzees do it.





0s24frames

1m26s



Video Frame 12 Knowledge transmission during an experiment. From Audiovisual Material 9 Audiovisual Material 9 Knowledge transmission during an experiment, 2m10s. Compilation from Nakamura and Aso (2003).⁹⁴ Courtesy of Nakamura Miho. Several types of experiments test chimpanzees in either groups or pairs, providing social context within the setting *per se*, although it should be noted that the context must occur under controlled conditions. Many of these studies address chimpanzees' cooperation, social learning, and so on. The point here, however, is at another level: When conducted within a social context for infants (i.e., mother and/or peer presence) the experiment itself enables a more naturalistic socialization into an "experimental culture". This does not mean infant chimpanzees who studied under single-testing protocols (e.g., little Ai, Akira, and Mari) were tested a-socially. Nonetheless, in the kinds of experiments they engaged in, once the infants are in the booth and the experiment starts, the way procedures are learned is not supported by conspecific presence, and testers, who could in theory provide this sort of scaffolding, refrain from it for the sake of the protocol.

Regarding the settings in which little Ayumu, Cleo, and Pal were tested, the subtle point is this: not only do we deal with the fact that the experimental results indicate horizontal and vertical transmission of knowledge; but we also deal with the matter that the experimental activity itself acquires meaning in a fairly more complex social environment. In this sense, what chimpanzees are learning from their mothers and community - in human terms - is how to be test subjects. Ultimately, infants learn how to be "laboratory chimpanzees" from their own community. Yet, not all chimpanzees, for some reason or another, become fully integrated into the experimental culture, and *mutatis mutandis*, there are chimpanzees who sociologically speaking could be considered "outsiders". The three chimpanzees who grew up being tested with their mothers became standard test subjects. Nonetheless, for numerous reasons, we should be subjects, especially considering the observed human efforts undertaken to ensure these chimpanzees continue to be standard subjects.

What can be affirmed, though, is that performing laboratory tasks becomes a part of infants' social lives with conspecifics. The coupling of conspecific social activity with the learning of experimental procedures implies the know-how of a setting introduced by humans is to a great extent transferred into the next generation by the chimpanzees themselves. Still, as already hinted at, there are experiments in which, indeed, humans are present in the booth. Note though, that even in these situations, the human may ask the chimpanzee herself to demonstrate the task to the offspring, as for example, when Matsuzawa asks Ai to do a task with which Ayumu is having difficulty.⁹⁵

After having seen the role that other chimpanzees play, we shall explore whether being tested with humans makes a difference. Recall PRI's new testing paradigm from 2000 was based on the triadic relationship between mother, infant, and human tester. In concrete terms, this means humans get inside the booth with the pair, an activity requiring a long-term relationship with the adult, as chimpanzees can be fairly dangerous to work with face-to-face. Ai was not completely relaxed with Matsuzawa interacting with Ayumu until he was two months old.⁹⁶ The tolerance the mothers show to their respective researchers is remarkable. How laboratory chimpanzees react to humans and differentiate them shall be discussed at length. For now, the crucial point to bring to attention is how in a non-automated setting (i.e., no computer and automatic feeder), testers may include social praise in the protocol. When systematically used after a certain desired behavior, social praise functions as positive reinforcement. This means for instance, right after the chimpanzee performs well, the human says 'Great! Good job!'.

Some remarks on this are necessary. First, this mode of interaction is fairly human, since it is linked to active feedback in teaching. Not only do chimpanzees use their typical learning strategies like master-apprenticeship, but they respond to and benefit from human strategies as well. Protocols that include social praise are likely to add social support in the process of becoming a skilled "laboratory chimpanzee". If the setting is face-to-face, this is even more the case. Again, there is a qualitative difference between the asocial feedback of receiving a food reward from an automatic feeder and being in a face-to-face situation where the "correct" behavior is signaled by a human's positive feedback. This brings us to the second point. Why would human praise act as reinforcement in the first place, particularly for a species that has not been purposely selected to interact with humans, that is, which is not domesticated?

It might be that features of praise such as tone of voice are naturally perceived as pleasant stimuli, but to the best of my knowledge, so far this has only been tested in domestic dogs.⁹⁷ For social praise alone to act as reinforcement, humans must likely bear a social value for infants. It is in hand-rearing studies and face-to-face experimental settings that the strongest bonds between humans and chimpanzees are observed. Face-to-face settings test the strength of the social relationships, and it is probable that physical contact plays an important role in attachment. Moreover, the relationship between the mother and the tester is likely to aid in how far an infant is open to social interaction with a human.

Thus, face-to-face testing may create an environment in which human social praise acquires a positive meaning, or further, in which even being observed by a "meaningful" human may alter an infant's reaction to a testing situation. This seems to be the case for experiments conducted by a collaborator at Matsuzawa's laboratory, who admitted having to ask the professor to leave the laboratory while testing Ayumu, given he would become more agitated when he made errors if Matsuzawa was present. Considering Matsuzawa does not use negative reinforcement (e.g., scolding), it is reasonable to speculate that this professor's presence bears a social significance for Ayumu.

This point is well illustrated during PRI studies of smiling in chimpanzees.^{98, 99} These have shown chimpanzees, like humans, exhibit neonatal smiling, or spontaneous smiling not directed to agents, which occurs during sleep. From one to two months old, developmental changes take place whereby smiling is elicited less as a reflex-like response and more in social contexts - in other words, "social smiling". ¹⁰⁰ The "participant observation" setting is clear in Audiovisual Material 10 and Video Frame 13:¹⁰¹ Ai rests in the booth while Matsuzawa tests Ayumu's response to hand movements at the age of two-and-a-half months (5s). At three months, Ayumu is tested for human face recognition, and Matsuzawa presents a picture of himself attached to a handycamera (32s). Ayumu responds with a clear social smile to Matsuzawa's photo (35s and 41s). In this context, face-to-face experiments with praise add another social layer to the learning involved in experimental procedures, this time, one between species.



5s

32s

34s



Video Frame 13 Ayumu's social smile to Matsuzawa. From Audiovisual Material 10. Audiovisual Material 10 Ayumu's social smile to Matsuzawa, 45s. Excerpt from Nakamura (2001).¹⁰² Courtesy of Nakamura Miho.

To conclude the section "Building a community", we should briefly point out the social outreach of KUPRI's chimpanzee research. Chimpanzee research at KUPRI is frequently broadcast by NHK and CBC television (e.g., "Ai the Intellectual Chimp", "The Baby and Ai", "Ayumu and Ai")^{103,104,105} and so are the research activities in partner institutions like the Japan Monkey Centre and Kumamoto Sanctuary. High school students may even be asked to write essays based upon KUPRI research.¹⁰⁶ Additionally, PRI has an "open campus" program by which high school and bachelor-level students visit the laboratories. On Ayumu's first birthday, they received many letters and presents from all over Japan.¹⁰⁷ In fact, as we shall see, Ayumu would become one of the most famous chimpanzees worldwide for his performance in a memory test, in one of the few experiments to demonstrate chimpanzees might outperform humans intellectually. But much before him, his mother was already an icon. As Matsuzawa reminisces:¹⁰⁸

On the subject of letters, we have over the years received many messages from children all over the country. I remember one of these letters very clearly. I published a children's picture book 16 years ago called "The chimpanzee who learned words".^[109] It became part of the elementary school curriculum around the same time as the city of Kobe was shaken by a devastating earthquake. Many people were killed in the disaster and much of the city lay in ruins. Although schools reopened not long after the quake, many of the victims were still living in the gyms of school buildings. A teacher at a school in Kobe sent me a letter to tell me the story of some of these people. The homeless taking refuge in the gym had heard the voices of children reading out loud the story of a chimpanzee. The bright voices cheered them up and gave them back their will to live. There were other memorable things in that package from the school. One was a small envelope with "donation" scrawled on it in a child's handwriting. Inside the envelope was a small amount of money, seemingly a portion of a child's allowance. Another pack was filled with biscuits rescue units distribute in emergency situations, along with the message "Please give to Ai". I was deeply moved by the warmth and courage in the hearts of these small children. Although they themselves had been suffering greatly in the earthquake, they found it in themselves to lend a helping hand to others.

1.1 The "Prehistory" of the Ai Project: Compared Husbandry Practices and Research Philosophy

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1.2 The Ai Project: Teaching Chimpanzees Language-like Skills

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 ¹⁰⁷ Tetsuro Matsuzawa, "Essay on Evolutionary Neighbors. Letters and Gifts Warmly Received." (Accessed March 5, 2017, http://langint.pri.kyoto-u.ac.jp/ai/en/gallery/904_2001-04-00.html, 2001). ¹⁰⁸ Ibid.

¹⁰⁹ Matsuzawa and Yabuuchi, *Kotoba O Oboeta Chinpanjī ["A Chimpanzee Learned Language"]*.

Chapter 2 Physical Boundaries The Architecture of Dangerous Social Interactions

2.1 The Social Organization of Space in Captivity

'Dangerous, do not approach.' So reads the sign next to the chimpanzee facilities when entering the Primate Research Institute (Photo 1). Yet, the warning stars an adorable infant, nothing but approachable. Although the use of puerile mascots is a trend in Japan, ¹ this plaque, nevertheless, powerfully condenses the paradox of engaging in social interactions with a related and relatable wild animal. It seems to be a



Photo 1 'Dangerous, do not approach.' Sign next to chimpanzee facilities, 2014. By Daly.

widespread view among primatologists and keepers that from the four nonhuman great apes, common chimpanzees (*Pan troglodytes*) are the most dangerous regarding husbandry. Indeed, caution is required when handling all these great apes, but orangutans (*Pongo* spp.) are "slow", gorillas (*Gorilla* spp.) are "gentle giants", and the pigmy chimpanzees, the bonobos (*Pan paniscus*), are "feminists" and "hippies" - except, a bonobo keeper might warn that they are not as peaceful as most think.²

The enhanced danger of working with chimpanzees is acknowledged by chimpanzee specialists and non-specialists, but researchers focusing on other species might have less generous words to describe the *troglodytes*: utterances by more than one interlocutor range from "I never trust chimps!", passing by how chimpanzees try to "take advantage from each other always", up to how they are "nasty". Conversely, personnel in charge of chimpanzees are particularly sensitive about one's ability to keep all fingers, on a palette from advice to brag: seniors warn newcomers; a keeper defines "success" as having all ten fingers; a professor proudly presents his unscathed hands...

A certain communion among researchers is created based on the specificities of the species with which they work. One can be a "chimpologist",³ or an "orang-person" in

contrast to a "chimp-person",⁴ or one can be part of "the Language and Intelligence people" (a reference to the chimpanzee section at PRI); so on, and so forth. Danger is one of the main features to bring chimpanzee personnel together in terms of both specific skills and responsibilities. At PRI, staff and researchers receive specialized training for chimpanzees' escape, which differs from the drill to catch the relatively light-weighted and less physically threatening macaques, equally housed in the Institute.^{5,6; I,Note 7}

In a formal meeting at PRI, a researcher who studies Japanese macaques was quite intrigued about this topic and asked the chimpanzee personnel attending the event what she should do as a "civilian" in case of a runaway chimpanzee. Indeed, while both Japanese macaques and chimpanzees are wild species, regarding the latter, the potential consequences of an escape gain a slight military tone. Incidentally, the transparent dome inside the chimpanzee living area, where humans conduct research completely surrounded by chimpanzees, has been said a couple of times to resemble the scenery of the dinosaur movie "Jurassic Park". Although the facility complies with safety measures, even trained students are only allowed to go inside if supervised by seniors.^{8, 9} This extreme case clearly indicates that a given risk level comprises more than the physical aspects of facilities.

Regardless, chimpanzees are capable of real bonding with humans, and more than one interlocutor remarked that interactions among chimpanzees can be quite rough, not to mention contact with a physically weaker species like us. In episodes when PRI chimpanzees accidentally wounded researchers during face-to-face experiments, professors reported that they looked surprised at the sight of having inflicted injury to the human in question. In fact, in one of the few studies to measure chimpanzee strength, it was found that chimpanzees (*P. troglodytes*) were more than four times stronger than men used to hard manual labor, when body mass was accounted for.^{10, 11} If comparing extreme values, while tested with a dynamometer, the most motivated chimpanzee (a female!) pulled approximately 571 kg (*Sic* 1,260 pounds), whereas the strongest man of the study reached about 222 kg (*Sic* 491 pounds). Furthermore, it has been argued that the human nervous system exerts finer inhibition over our muscular system, allowing us better strength control in less forceful tasks.¹² All in all, not only are chimpanzees stronger than humans, but they seem to have a harder time controlling their power.

¹ Danger here refers to serious or to fatal physical hazard, yet, the bite of some monkeys may pose a severe biohazard. E.g., B virus in *Macaca*, which is life-threatening for humans and listed as the highest level of biosafety precautions, i.e., BSL-4 (Hilliard, 2007). Regardless, monkeys are more easily restrained.

Currently, PRI has twelve living members but they do not live in the experimental rooms. Instead, eleven chimpanzees form two separate groups named after their respective alphas (Akira's and Gon's groups). They inhabit three main spaces, the "Outdoor Enclosure", the "Green Cage" and the "Silver Cage" (Photo 2, Photo 3 and Photo 4). Sometimes personnel relocate females to the other counterpart for husbandry purposes, and they make the groups rotate to balance the use of the spaces. The only chimpanzee to live in the experimental area is Reo, who woke up one day to an unexpected disease.^{13,14} Due to his former tetraplegia and current lower limb paralysis, researchers and staff at the Institute decided it would be a risk to his life to reintegrate him given that he cannot defend himself, nor can he receive specialized care elsewhere. As a countermeasure for the isolation from conspecifics, humans schedule regular visits from formerly known chimpanzee mates. Considering his progress over the years, a plan to reintegrate him into the community is now foreseen.¹⁵



Photo 2 Aerial view of the chimpanzee research area. Adapted from Matsuzawa (2017) by Daly.¹⁶ Courtesy of Hayashi Misato to Matsuzawa.





Photo 3 Outdoor enclosure. View from the ape research annex, 2014. By Daly.

Photo 4 Outdoor enclosure. View from the green cage, 2015. By Daly.



Photo 5 Chimpanzee being called into the experimental/feeding area, 2015. By Daly.

By their names, chimpanzees are called inside from their living areas (Photo 5). All of them must head to the basement in the silver cage for feeding and health check, but the ones participating in experiments are led, in a second moment, into the experimental area of the basement and/or first floor of the ape research annex (Video Frame 1; Audiovisual Material 1). The administration building and the offices inside the ape research annex are human-only spaces, and the compounds primarily intended for chimpanzee use, such as the outdoor enclosure, can be entered for cleaning, repairing, and enrichment purposes (*cf.* Photo 2). Importantly, though, in this case, chimpanzees need to be relocated for humans to enter. In general, humans and chimpanzees are never

together in a barrier-free room, except for particular cases like face-to-face experiments with specific human-chimpanzee pairs.



Video Frame 1 Calling chimpanzees into the experimental area. From Audiovisual Material 1. Audiovisual Material 1 Calling chimpanzees into the experimental area, 2015, 1m28s. By Daly.

When considering the management of dangerous wild species, the main concern is how to establish safe care. However, an additional issue at PRI is the fact that some physical structures are made purposefully "porous", unlike zoos. All these structures are intended to be exceptionally strong and to separate both species, yet, the boundaries between human and chimpanzee spaces are made porous precisely in order to allow interspecies social interaction during husbandry. This creates what shall be referred to as "permeable interface areas" for human-chimpanzee contact, or spaces in which - by architectural design - both species are allowed to share the immediate surroundings and briefly trespass physical borders while still being separated.

Permeable interface areas are composed of an amalgam of materials and designs; acrylic, polycarbonate panels, metal bars, meshes, and different types of feeders, doors, corridors, and experimental apparatuses. The combination of design and material results in a spectrum of risk levels that a physical structure can embody. On the other extreme lies the risk assessment by humans (and chimpanzees) regarding the context of a given

interaction. *In situ*, these aspects are referred to respectively as the "hardware" and the "software" of interactions, in the sense of how the materiality of spaces and how one's *modus operandi* influence the danger level.¹⁷ Therefore, the flow of humans and chimpanzees and their social interactions in mixed spaces are mediated by physical structures and dispositions one toward another.

When considering the social aspect, space is organized according to how it is conceived (*sensu* design), how it is sensed (*sensu* space perception), and how it is occupied (*sensu* territory and body techniques). In permeable interface areas, the social organization of space is a constant trade-off between safety and interspecies physical proximity. An etho-ethnographic analysis of PRI permeable zones indicates that safety measures involve an understanding of (**a**) the architecture of interface areas (**b**) the physical structure of the apparatuses (**c**) the surroundings immediate to one's body (**d**) the context of the activity being undertaken (**e**) chimpanzee behavior and individuals' abilities (**f**) human-chimpanzee relationship on a dyadic basis (**g**) group dynamics among humans and chimpanzees (**h**) safe body techniques. We shall see these in detail.

Be for experiments or for feeding and care, the flow of *Homo* and *Pan* through interface areas, such as the basement and experimental rooms, is a complex activity of coordination and cooperation within and across species. First, let us consider the general architecture of interface areas, taking the basement as the most prototypical example (Figure 1 and Figure 2). Experimental rooms are the typically known "laboratories", where chimpanzees are tested inside booths or transparent compounds that separate them from humans. In particular, testing this species requires additional safety measures in the structural design, in comparison to, for example, Japanese macaques. Thus, there is the need for "chimpanzee-proof" experimental rooms, and these exist in the basement and on the first floor of the ape research annex, along with a series of less used rooms elsewhere.^{II} Moreover, there are rooms conceived for chimpanzee use during feeding and care, which provide shelter to sleep in, especially during winter (i.e., N1 to N5 and S1 to S4). At last, the "Eastern Sunroom" and "Western Sunroom" are chimpanzee living areas within the silver cage (*cf.* Photo 2).

 $^{^{\}rm II}$ E.g., the "dome" within the outdoor enclosure, and the so-called "skylab" facilities in the silver and green cage.



Figure 1 Chimpanzee flow in the basement. Adapted from KUPRI (2011,6) by Daly.¹⁸ Courtesy of Hayashi Misato.



Figure 2 Human flow in the basement. Adapted from KUPRI (2011, 6) by Daly.¹⁹ Courtesy of Hayashi Misato. Measurements taken in 2015 by Daly.

For safety reasons humans and chimpanzees do not share doors, thus, we can group them into two major categories, which organize human and chimpanzee flow. Doors for humans, dubbed as "human doors", are of human size and connect human spaces and areas for chimpanzee use. These are equipped with three locks; one by key, and two by sturdy metal levers. Additionally, a light bulb placed on the top of each door indicates whether they are open. These extreme precautions signal how risky can be a forgotten open access between chimpanzee and human areas. In fact, in the experimental rooms, not only one but two human-sized doors separate the chimpanzee booth and the human space. Conversely, "chimpanzee doors" are of reduced size (approx. 47Lx 38H cm), which acts as a safety measure, allowing passage exclusively one by one. They resemble an upward-downward guillotine (also known as "guillotine doors") and are operated by humans from the outside of chimpanzee rooms and experimental booths. Thus, no direct interaction is needed when coordinating the chimpanzees' flow.

Another important architectural feature of the interspecies organization of space is the tunnel system. Chimpanzees move from one room/floor to another through an overhead tunnel, split in two by a metal barrier (50cm width each). The tunnel itself has automated doors within, which, again, are controlled by humans standing below the chimpanzees they wish to move (see Audiovisual Material 1; Video Frame 1). A set of doors block the entrances and exits, while another set allows communication between tunnel one and two (respectively, yellow and blue sets in Figure 1). This way, chimpanzee flow is organized and restrained, similar to how car traffic is controlled by red and green lights.

All laboratories have a fixed time slot to test either a single chimpanzee or a mother-offspring pair at a time. For instance, the South Play Room (SPR) on the first floor tests the Ai and Ayumu pair in the first morning slot (approx. 9:00-10:30), while Laboratory 4 tests Chloe and Cleo at the same time. To go to both places, Ai and Ayumu share one tunnel, while Chloe and Cleo, another. By controlling the automated doors, SPR members are in charge of Ai and Ayumu's flow, and Lab 4 members, of Chloe and Cleo's. Furthermore, other laboratories test different chimpanzees in the same period. Up to seven chimpanzees have been observed distributed across laboratories at once, although this is not even the Institute's full experimental capacity.

During this ethnography, humans coordinated the flow of a total of twelve chimpanzees being called into the basement for feeding, that is, into rooms N1 to N5 and S1 to S4 from around 8:00 to 8:30 am. Afterward, seven chimpanzees were led to the

experimental rooms from 8:30 to 9:00. This activity is done not only once but several times a day due to the fact that chimpanzees attend sessions in multiple laboratories and have their main meals served in the basement.

Despite the careful planning, overlaps do occur because chimpanzees are not forced to move. Instead, they cooperate upon human request or our sheer begging. They might also become agreeable after negotiation techniques are employed, such as the use of peanuts and other treats



Photo 6 Luring with peanuts, overhead tunnel, 2015. By Daly.

(Photo 6). When these resources fail, a chimpanzee may be found stuck in another's way, a situation referred to as "traffic jam".²⁰ In smooth days, though, the calling activity resembles a ballet in which humans and chimpanzees dance their parts according to the choreography.

In fact, there is a specific protocol to move chimpanzees. For safe flow to occur, the architecture of human and chimpanzee spaces and the correct actions linked to these venues need to be mastered. In the learning protocol, at first, a trainee is allowed to watch seniors, then to operate doors under supervision and, finally, the trainee is allowed to move chimpanzees independently; however, promotion to the next level is judged by several skilled persons.²¹ To prevent fighting, two spans of safety in the overhead tunnels are enforced, in other words, two vacant adjacent compartments separating a chimpanzee or a mother-offspring pair from others. In practice, this means that the flow is structured, and it is coordinated following a rule for positioning.

Moreover, the two broad categories "door for humans" and "door for chimpanzees", are, in fact, divided into several unlabeled subcategories, so that each door-subtype is associated with an action on the part of the operator. Where an outsider sees a "human" or a "chimpanzee door", the expert sees linked actions. Chimpanzees' ground doors that give access to the sunrooms and the outdoor compound require assessing the "inner state of each enclosure and chimpanzee arrangements"; chimpanzees' overhead doors from/to the main overhead tunnel require confirming "back and forth situation" and warning people near; humans' doors from/to N and S rooms require

double-checking whether someone is cleaning the area; chimpanzees' access to the first floor calls for a person staying on each floor to accompany the animals; and so on.²² Only trained personnel are able to act according to the risk level that seemingly equal-looking doors embody, that is, only a trained eye can accurately spot the qualitative difference among deceivingly plain entrances and exits. The same applies to other physical features of human and chimpanzee spaces, such as feeding apparatuses. It takes "literacy" to read the danger levels in the architecture and to respond appropriately.

Nonetheless, accidents may occur occasionally. According to a case report of unintended encounters, in 2010 an undergraduate student opened a chimpanzee guillotine door (in S2) in order to call in a chimpanzee from the outdoor enclosure, while a keeper was cleaning the chimpanzee rooms (S1 and S2).²³ However, since the human door between both rooms and the main corridor was closed, the chimpanzee's escape into the main corridor was prevented. In addition, the keeper was keen enough to lock himself into the room not yet reached (i.e., S1), instead of trying to exit through the corridor, an act that would possibly jeopardize everybody's safety. In another case report, this time, of unintended encounters among chimpanzees, in 2008 a PhD student returned Puchi to the wrong group, that is, Akira's, due to overlooking the information board and releasing place.²⁴

Indeed, communication is key to safety and is enforced by protocol, as observed in "the flow chart of chimpanzee's experiment" (in Figure 3, see information board; checking for human presence; call for support). Messages are, in fact, quite standardized in both the basement and in the laboratories, and they may sound like template phrases. Matsuzawa even encourages newcomers to whistle when alone in the basement so as to signal one's presence and, also, to always speak loud and clear during husbandry and experiments and never rely on "theory of mind" (or mind reading) when it comes to protocol.²⁵ In a review of the recent accidents at PRI, Professor Hayashi considered that they were "mainly caused by human error", with some situations being influenced by a "misunderstanding or over-trust" regarding chimpanzees and, in addition, by "weak points in facilities".²⁶ Faculty members were involved in a few accidents as well, but most episodes seem to have occurred during a period of experience from one to two years.²⁷



Figure 3 Safety protocol to conduct chimpanzees from/to experiments. *Sic* KUPRI (2011).²⁸ Courtesy of Hayashi Misato.

Putting Hayashi's report in context, even trained personnel can make mistakes, and it is likely that new obligations bring students a wider range of judgment calls and, with that, the possibility of major errors. Alternatively, regarding the presence of both faculty members and students in accidents, it cannot be ruled out as an explanation the fact that the "Section of Language and Intelligence" (i.e., researchers, technicians, and students) has an increased number of working hours in comparison to employees of the "Center for Human Evolution" (i.e., keepers). Thus, fatigue and lower attention levels may be involved. Once more, overall, reading the architecture of permeable interface areas involves being able to link topographies with certain types of actions. These actions are defined either by protocol, such as the rules for moving chimpanzees in husbandry and laboratory spaces, or by a concrete danger assessment, such as the keeper's decision to lock himself in rather than escaping in that given context.

However, if accidents are rare, one of the most dangerous daily activities in human-chimpanzee interaction is personalized feeding, whereby a human, instead of scattering food in an empty room, accompanies a chimpanzee through the whole meal. As with children, humans make sure chimpanzees are eating properly, and they coordinate their actions with chimpanzees' responses, such as the refusal of certain vegetables, and so on. Due to the increased contact, and given the fact that humans are handling very desirable items for chimpanzees, feeding duty requires as much expertise as moving chimpanzees around.

In general, trainees are put under a varying period of training, which consists of just observing seniors during dinner feeding (i.e., up to four months on weekdays in 2015), before they can start feeding "amenable" chimpanzees, like Puchi and Popo. The main meals are given in the sunrooms and in the husbandry rooms (N1-N5 and S1-S4), usually, through a major opening in the concrete structure secured by metal bars (Photo 7). Each structure varies in size (Figure 2) and is furnished with one or more types of feeders. In practice, this means that the composition of the apparatuses is not the same across locations. A few rooms have the feeder directly built into the wall with no opening (S4 and S1), so, in these cases, the only way to observe chimpanzees is through perforated metal structures, which are part of the human doors accessing the chimpanzee rooms. These variations introduce a vast array of risk levels to be assessed on the spot.

This brings us to the second point of attention formerly mentioned, that is, the physical structure of the apparatuses. While evaluating the risk of the feeders in the basement area, Hayashi determined risk points by a sum of "frequency of approach" (i.e.,

use), "possibility of injury", and the "level of injury severity".²⁹ Depending on its points, a feeder was categorized into risk levels ranging from I to V; the maximum corresponding to "problems to be solved immediately".³⁰ Apart from Hayashi's evaluation in 2012 during a presentation targeting the section of Language and Intelligence, the risk level of feeders is not explicitly labelled on the spot and, instead, danger perception is passed on orally during training and other contexts, in a more fluid manner.



Photo 7 Feeding area in the basement. Room N3, 2015. Risk level data from Hayashi (2012), courtesy of Hayashi Misato.³¹ Measurements, adaptation, and photo by Daly.

A clear example of the risks that a permeable interface area entail is depicted in Photo 7: A keeper stands on one side (a human-only corridor) and a chimpanzee on the other (a chimpanzee-only room); but to allow feeding and interaction, the structure is not sealed. Instead, it has openings through which both humans and chimpanzees can trespass temporarily (e.g., hands, mouth, etc.) while being well anchored in their exclusive spaces. The feeder level II in Photo 7 is, in fact, the safest feeding apparatus of the basement in native perception, because its distance to the metal bars is comparatively higher and chimpanzees' hands cannot reach the end of the funnel. In contrast, the feeder risk level III requires humans to precisely place the food into the hole in much shorter range.

Be it by curiosity, gluttony, or mischief, a chimpanzee who inadvertently grabs a human may inflict serious injury, thus, all feeding activities require careful observation of the individual. For example, in the same room of Photo 7 (N3), a case report discloses a bite accident through the metal bars, which resulted in a student losing part of the index finger.³² In 2007, during breakfast feeding, "[chimpanzee] Chloe seemed calm and invited the student to play with a piece of grapefruit held on her lips". Then, she suddenly caught the student's finger and bit the tip off. Despite Chloe's innocent look and funny nature, this and other minor episodes gave her the fame of one of the most dangerous chimpanzees at PRI. To stress the importance of the design of physical structures, it should be noted that an interlocutor expressed concern over how Chloe's current feeding location could be better furnished in terms of apparatuses, which reflects how danger perception is tied to the idiosyncrasies of a chimpanzee and the material features that support interaction with a given individual.

Now, we shall inspect how humans move safely next to chimpanzees. Once again, permeable interface areas, regardless of some fair amount of separation, are spaces that can be briefly occupied at the same time by both species. Due to this particularity, considerable attention is devoted to being aware of the surroundings immediate to one's body, which is the third point previously evoked as safety assessment. Suppose chimpanzees are being moved into the basement area, a time when they can potentially be roaming free either in the sunrooms, rooms or overhead tunnels. In this case, humans will actively avoid being caught off guard by a nearby chimpanzee, yet, with up to twelve chimpanzees on the move in several possible locations, body positioning in relation to points in space becomes crucial.

The materiality that constitutes someone's surroundings plays an important role in orienting placement in space. Because of the overhead tunnels structure, where the inferior part is made of metal bars (see Photo 6), chimpanzees can potentially reach through, grasping a human's extended arms and fingers, or they may urinate, and more rarely defecate through the tunnel, thus, crowning unwary bystanders. More clearly intentional is spitting at newcomers, seemingly, an almost rite of passage before some chimpanzees become habituated to a novice. As a result, people in general avoid standing below the overhead tunnels when chimpanzees are being moved (Figure 4), although members responsible for "traffic" may be seen standing below but just a little ahead of them.

In theory, unless someone reaches out, chimpanzees cannot grab humans though the overhead tunnels, except for relatively tall persons, like a student (1m86) who reports having to pay attention to his cap. Furthermore, walking before or after a chimpanzee's position seems unproblematic. In spite of that, in practice, when affluence is high or when the routine locations are not so clearly mapped in one's head, as during training, the context calls for a general attentiveness to the region below the tunnels. Therefore, the "walkable" area in the humans' main corridor is reduced. As shown in Figure 4, if both tunnels are potentially being used, given that tunnel one and two take up 1m width, a 70cm "tunnel-free" area is left. Still, there are two factors to consider. The first is the 20cm groove to the extreme side, which is difficult to be walked upon. The second is the fact that feeding locations exist on this border, therefore, this area comprises permeable areas where chimpanzees may reach humans. Thus, a space of 50cm within the main corridor is ideal to cross the basement. Yet, a closer look into Figure 2 and Figure 5, reveals obstacles to this remaining "walkable" area.



Figure 4 Human and chimpanzee flow in the basement main corridor. Measurements, photo icons and figure by Daly.

Following, we will simulate the crossing through the basement area. This mental exercise will provide a clear picture of the importance of the surroundings of the body, or the so-called "peripersonal space".³³ The concept of peripersonal space refers to the distance in which things in the environment are within reach and it is opposed to someone's "extrapersonal space".³⁴ Indeed, while navigating through interface areas,

humans need to avoid being within chimpanzees' peripersonal space in its furthest limit beyond barriers. Therefore, when crossing the basement, an awareness of human and chimpanzee peripersonal space is needed. Now, imagine someone is on the opposite end of the feeding area and wishes to go to the laboratories during peak traffic time, that is, when the chimpanzees can potentially be in the rooms and overhead tunnels.

In Figure 5, the person starts the crossing from the lower far right, which is next to the chimpanzee outdoor enclosure. There, there are feeding stations with 15cm width (purple spheres), but because the stations are recoiled and do not stand below any overhead tunnel, freedom of movement is enjoyed and attention level may drop. Then, just a few steps ahead to the left of the map, space perception becomes narrower and attention increases: Rooms S3 and S4 have feeding stations of equal 15cm width (green spheres), but this time, the stations are placed next to an imminent bottleneck, that is, just before the overhead tunnels. Moving along S2 in the direction of the western sunroom, an overhead passage is necessarily crossed and one must stay within the 50cm "walkable area". Luckily, the sunroom feeding zone is 80cm width, which is far beyond chimpanzees' grasp (dark blue spheres). Thus, one can make use of the entirety of this 50cm space.



Figure 5 Detail of Figure 2, Human flow in the basement.

Right after, however, in front of room N2 on our walking side, there is a kitchen with a sink occupying 45cm and then a rack for chimpanzee food boxes that take up approximately 67cm (orange stripes) from the precious 70cm overhead tunnel-free area. In other words, here, human space might feel quite "squeezed". On the top of that, just afterward, there is an overhead passage. Thus, the N2/Kitchen area is the narrowest space in the main corridor during peak, which calls for highly controlled locomotion, when comparing to other points of the basement. Yet, a subtlety should be noted. Even though the rooms N2 and N3 have the same type of feeding station (a small window of 10cm width), during flow the N2 station poses no major problem, since it is already neutralized by the width of the sink area, while the barrier-free N3 station requires attention (beyond being placed just below an overhead tunnel). Therefore, one should be attentive to the particularities of both the left and the right side of the basement.

To conclude the simulation, we are brought to the fourth point in safety assessment, that is, the importance of not just the surroundings, but also the context of the activity undertaken in order to determine one's body positioning. Again, during calling, chimpanzees can potentially roam through overhead tunnels and rooms. However, during feeding duty, accesses to these tunnels are blocked, making a person's "walkable" area considerably enlarged, and the sense of usable space expanded. The surroundings are identical, but by framing the presence and absence of chimpanzees, locomotion is more or less restrained according to the context. In other words, an activity such as walking is not the same during calling or feeding slots. By simulating the context, the obstacles, and chimpanzees' peripersonal space it is possible to identify and predict controlled locomotion and space perception among researchers and keepers.

In addition, professional roles play a part in the context as well. For example, keepers seem to attend very carefully to zones related to their duties, such as the border between the human main corridor and the chimpanzee outdoor enclosure, in other words, the far end of the basement. Since it is mainly keepers who access this chimpanzee living area and since they are in possession of this door key, this is a spot to be double-checked, especially considering that the door is large sized (*ergo* escape prone) and that it directly separates humans from the full chimpanzee group. In contrast, as a trainee, I quickly remarked I did not fully know where to place myself and I could not accurately identify the risk that certain zones pose, or the appropriate safe distance. Yet, as time passed and I received keys linked to high security doors, I could not help but noticing that passing by and through newly accessible doors occasionally sent chills down my spine, possibly

because from that moment on, I had become responsible for these doors as well and, consequently, for people's safety. In other words, the activity of "passing by" as a trainee and as a keeper potentially differs.

It is clear, though, that unlike the precise measurements above, humans do not move neatly in space as if calculating and keeping an exact width in their pace. Nevertheless, these are points that by default of the architecture, context, and chimpanzee behavior, one needs to be aware of when navigating through permeable interface areas. There is, indeed, a controlled locomotion in what the Gibson refers to as "the edge of danger", ³⁵ and because risk level varies from apparatus to apparatus, chimpanzee to chimpanzee, and factor to factor, the so-called "margin of safety" is highly contextual.³⁶ Once again, at PRI, a clear-cut separation between humans and chimpanzees is not desirable for the sake of social interactions and this is reflected in the architectural design of interface areas. In native's terminology,³⁷ the "hardware" (i.e., the infrastructure) allows trespassing, that is, potentially unsafe interactions and, in turn, the "software" (i.e., personnel's behavior) needs to counterbalance this fact by being particularly skilled in identifying dangerous situations. This lead us to the fifth point; the understanding of chimpanzee behavior and individual abilities. Now, let us turn to a few ethnographic episodes to make this point clear.

Be careful! Staff lost many cameras over the years, but once you learn how fast they are, you can put your camera through the fence - so said the keeper Michael Serres after seeing my frustrated attempts of getting clear footages of bonobos in my visit to Kumamoto Sanctuary.³⁸ In my first encounter with the sole pigmy-chimpanzee group living in Japan, I felt sandwiched between the wall and the mesh barrier at a distance of no more than 1m40cm. By experience, I knew that at this distance I could not avoid the spitting or feces flinging that sometimes welcome newcomers, and bonobos' excited high-pitched vocalization made me a bit disoriented. Instead, unlike my predictions, there were no such agonistic interactions and, in fact, one of the males, the bonobo Vjay,³⁹ looked at me straight into my eyes as if I were the most interesting person in the world. Soon, my initial tension dissipated with some exchanged greetings. During my stay, Serres and two other visiting students kept me company and, as I would later come to know, this bonobo group never learned to spit or throw feces.

On the other hand, the chimpanzee group was another story. One of them, Mizuo,⁴⁰ (from Mizu, meaning 'water' in Japanese), made spitting a refined part of his display to newcomers as an "insecure dominant", as Serres puts it.⁴¹ "Mizuo is preparing

water" said a researcher, warning us. Mizuo would use the water available in his compound to turn his mouth into a water cannon, reaching visitors from afar. Throwing is such a common practice among these chimpanzee groups that the Sanctuary put up human-sized barriers to protect a few areas. However, according to Serres, it is visitors in white coats who are usually covered by feces, because most of these chimpanzees are retired from biomedical research, where this garment is typically worn.⁴² While the keeper was showing us each group, my colleague, who would soon be relocated to the Sanctuary, bravely endured the spitting session while I hid cowardly behind the panels, particularly afraid for my electronics (Photo 8). Later, she clarified that they would eventually have to get habituated to her and hiding would not help her future work.

For a moment, I evaded Mizuo and the others, but he eventually managed to strike me when I let my guard down. I went to another part of the Sanctuary to observe the blind chimpanzee Kanako but since I had no knowledge of its architecture, to me, Kanako's room seemed completely disconnected. Giving some steps back, I sat down on a stairstep without fully acknowledging the wooded compound behind. Without further delay, I was crowned and my ear was completely sprayed: I had just sat behind Mizuo's territory. To judge by the volume, it was at least comforting to think it was mostly water, not full chimpanzee saliva in my ear canal.

Noteworthy, aimed throwing is a rare behavior in nonhuman animals, but in nonhuman primates it has been more frequently observed in chimpanzees and it is hypothesized that it might have been a precursor for adaptations necessary for complex motor actions, like language, and speech in hominins.⁴³ Hopkins and colleagues found that chimpanzees who reliably throw (n=38) are significantly better at communication tasks, but they do not differ in physical cognition tasks from those that do not throw (n=38).⁴⁴ The results suggest a correlation between this action and communicative sophistication, in the sense of an increased sensitivity to how one's own behavior may change or manipulate the behaviors of the others. It seems Mizuo and the other poop flingers might be particularly skilled in communicating their ways to undesired newcomers.

While navigating the Sanctuary, other *faux-pas* happened. In one of these episodes, I would learn bonobo females are a force to be reckoned with. The bonobo group is composed of two males and four females, and although they live together, at times they are separated by sex. My experience with bonobo males was very positive and I spent a lot of time observing them, but from the start I noticed that the females seemed to challenge me and my colleagues. As form of enrichment of their daily routines, seeds reachable only through the manipulation of twigs are placed near the meshes, and the bonobos use the small branches from the trees inside their compounds to obtain the treats (Photo 9). I had observed this form of tool use in both the male and the female groups, but having spent most of my time with the pacific males, I did not pay particular attention to the possible alternative uses of these twigs, until two bonobos in the female group used it to try to pierce us.





Photo 8 Panel barrier against spitting and feces flinging, Kumamoto Sanctuary, 2015. By Daly.

Photo 9 Bonobo Junior uses a twig to reach for treats, Kumamoto Sanctuary, 2015. By Daly.

Caught with my guard down, I remember being hit in the thigh at least once. I managed to evade to some extent, but the strike hurt, and my impression was that the amount of strength invested was not friendly, in comparison to my interaction with the males. At this point, I realized the safe "walkable" area had considerably diminished around the female compound, meaning I had to squeeze myself at the opposite side. I was very much surprised by the females' determination. As I had to cross over, one of them was preparing a twig, disbranching it to make it pass smoothly through the mesh holes. While I was preparing myself to cross, I and this female stared at each other. I was trying to evaluate her behavior and, likely, she was doing the same. As soon as I got near her grasp, she tried to pierce me again but, this time, I knew better. I felt slightly paranoid, yet, I was not willing to downplay their cognitive capacities or their individual abilities. Indeed, they acted upon the environment in ways I clearly could not have foreseen. I had to count on the fact that they can outsmart us. I became cautious - not due to what I knew - but due to what I did not know.

Phrased in another way, at that time, I failed to perceive an affordance of the tool (i.e., the twig). The term "affordance" was coined by Gibson to refer to potential actions

made possible because of the inherent relationship between the environment and an actor (e.g., a human or an animal):⁴⁵ In a straightforward example he provides, air is a feature of the environment that affords breathing for terrestrial animals, but not for fishes. However, to Gibson, an affordance is rather a capability, which is relational, but which, nonetheless, is independent from the individuals' subjective experience. Building up on this concept within cognitive engineering and design perception, Norman distinguished affordances from "perceived affordances", the latter being the subjective ability to fathom this relationship between an actor and how the environment can be acted upon.^{46,47} In sum, through the behavior of female bonobos I came to picture, the hard way, an alternative use of the environment by this species and could, thus, adjust body positioning accordingly.

Sometimes, dangerous positioning can happen in places one believes to know well. This was the case for the Primate Research Institute. During training, I had always perceived the S1 room in the feeding area as safe, mainly because in this place there are no exposed openings like meshes or bars; just the door and a feeding apparatus built into the wall. The chimpanzee typically fed there is Pendesa and I did not pay particular attention to the surroundings of the apparatus, that is, until the day I was warned her hand and arm can unbelievably pass through the feeder and reach our side. From this day on, it is as if the danger borders were enlarged around the feeder. In fact, while not all chimpanzees have the same arm-reach beyond a normal fence, the thinnest hands at PRI are indeed Pendesa's, who stretches approximately 24cm beyond metal bars,^{III} while the width between bars and human side is usually only 15cm (see Photo 7). Thus, it is important to learn and acknowledge the individual idiosyncrasies of chimpanzees in a detailed, concrete manner.

Understanding how particular chimpanzees behave toward sharing nearby spaces or interface areas with humans is important for safety and so is perceiving and visualizing the reach of each individual, which may vary. Whereas female and male bonobos did not spit or throw feces, the area next to females required more caution than the one next to the less territorial males. In other words, the structure of the compound and the tools available (i.e., twigs) were the same, but the uses of the environment differed. Likewise, even one's garment may influence a chimpanzee's willingness to extend reach to act upon

^{III} I thank the keepers Fujimori Yui, and Godjali Shizuka, and the technician Takashima Tomoko for helping me measure Pendesa's hand reach.

a nearby human, like in the lab coat case. Body positioning has a communicative, social function that should not be underestimated.

Furthermore, knowing individuals' specific abilities, like Pendesa's, orients our attitude toward the environment, because what is considered as an interface area may shrink or enlarge accordingly. This does not imply we will always be on the human-only side of the border, but it is dangerous not to draw the boundaries in a correct manner, in other words, it is risky to believe to be out of a chimpanzee's reach when one is not. Humans need to be fully conscious whether space is being shared, not only in the sense of chimpanzees' within-grasp peripersonal space, but also in the sense of tool use and throwing, which considerably enlarge contact range. To this purpose, an assessment of chimpanzees' behavior and individual abilities is called for. However, this alone does not suffice because, in the social organization of space, the relationship between individuals considerably alters the ways in which they act. This brings us to our sixth and seventh points: the understanding of human-chimpanzees.

The most extreme case of space sharing is face-to-face encounters; however, safe close-range interactions with chimpanzees depend on many factors. During this ethnography, in a daily, situated context, I have asked interlocutors (N=8) what is necessary to be capable of such proximity.⁴⁸ All these interlocutors were or are currently capable of sustaining unbarred physical contact with at least one adult chimpanzee. Overall, the responses varied but were not mutually exclusive. In addition, the same elements appeared in the discourse of those who have never been in such context. Across all personal communications (i.e., with face-to-face experienced and naïve personnel) "time spent with chimpanzees" appeared more prominently. For interlocutors, it is important to spend time building up a good relationship with the particular targeted chimpanzee before any barrier-free contact is made.

Personality, age, and frequency of recent interactions were also mentioned. Some chimpanzees never seem to accept humans. Then, teenagers are most difficult to deal with, for example, Ayumu, Ai's son, who tries to challenge Matsuzawa. Because the professor could not continue face-to-face encounters on a daily basis to assert his dominance, Ayumu's behavioral changes during teenage years made Matsuzawa discontinue this type of interaction. Furthermore, even if a person has a history of faceto-face interactions with a certain chimpanzee, after an extended period of absence it is advisable to rebuild the relationship by increasing interaction time before getting into the same room. At last, for Matsuzawa, trust between humans and chimpanzees is the most important factor.

It is noteworthy that food was not mentioned as a factor explaining the possibility of unbarred interaction, although food items are usually provided in this situation. Instead, like play, food has been mentioned only as one of the means to build up a good relationship with chimpanzees. In all the face-to-face interactions I observed during this ethnography, be it at PRI or at Kumamoto Sanctuary never once did I witness a chimpanzee trying to obtain edible items in the possession of a human by aggressive means (*sensu* threat or attack).^{IV} As long as food was within the humans' personal space, these chimpanzees respected the boundary. Obviously, if chimpanzees really wanted to obtain the food items immediately, no human could have stopped this. It seems it is not because one has food to provide that the chimpanzees will refrain from doing any harm, rather, it is the relationship a chimpanzee sustains with a human that guides interactions.

However, the relationship between a single human and a single chimpanzee may change with the introduction of a third party. While explaining how dominance plays a role in safety, Professor Matsuzawa comments in a joyful manner that he usually warns students: "Matsuzawa is dangerous".⁴⁹ This is because if he approaches, chimpanzee behavior may change. He believes this would not happen to chimpanzee Ai but, perhaps, to adolescent chimpanzees. Likewise, keeper Michael Serres stresses that when interacting with chimpanzees and bonobos it is important to have a panoramic view of the situation:⁵⁰ If you are, suppose, touching a lower ranking individual and a more dominant one approaches, then the subordinate may become aggressive toward the respective human to signal protection of the dominant. Another point the keeper raised is the role that stimuli from the outside play, such as noises (e.g., from airplanes), which can quickly disturb the animals and provoke a change in behavior. A professor at PRI also considers that the number of visitors present at once may contribute to a chimpanzee feeling less at ease in a face-to-face experiment, although this depends on the individual and the context.

^{IV} Even though no sampling was conducted, 19 face-to-face encounters were observed reflecting a total of nine chimpanzees and five humans (three researchers and two keepers) at PRI and Kumamoto Sanctuary from October 2014 to December 2015. Interactions were observed from beginning to end except for one case. Most were fully recorded. (a) n = 13, human 3-chimpanzee 9 dyad, chimpanzee's age ca.39 y/o (b) n = 1, 3-3 dyad, ca. 33 y/o (c) n = 1, 9-9 dyad, ca. 22 y/o (d) n = 1, two humans 3 and one chimpanzee 3, age n/a (e) n = 1, two humans 3 and one chimpanzee 9, 10 y/o (f) n = 1, two humans 3 and two chimpanzees 9, ca. 16 and 7 y/o.

At Kumamoto Sanctuary face-to-face experiments with more than one adult chimpanzee at a time are currently conducted. Professor Hirata, for instance, has developed a long-term relationship with certain chimpanzees with whom he has worked since they were children.⁵¹ On the other hand, Nogami Etsuko, keeper at the Sanctuary, is capable of face-to-face encounters with adult chimpanzees not familiar from childhood.⁵² Perhaps, the chimpanzee to whom she is dedicated the most is Kanako,⁵³ a blind female chimpanzee. Her case is quite intriguing though. Hirata and colleagues consider her to be the second chimpanzee so far confirmed with trisomy 22, a condition seemingly analogous to human trisomy 21 (i.e., Down syndrome), and she is also the only one to have survived into adulthood.⁵⁴

Due to not being able to evade aggressive interactions, Kanako is housed alone and, in Nogami's assessment, she does not deal well with social stimulus to the same extent as fully healthy chimpanzees do.⁵⁵ However, to improve her welfare, Kanako visits a wooded and sunny outdoor compound every day and Nogami spends time with her twice a day. In addition, an encounter between Kanako and Roman, ⁵⁶ a female chimpanzee with a calm demeanor, is provided on average once a month, and sessions last from half to one hour.⁵⁷ Yet, what allows Kanako and Roman to share space is Nogami's presence as mediator, or practically, as a barrier. Habituation went step by step. First, they have met through bars and only six months later were they allowed to be in the same space.⁵⁸

Nogami considers that this type of group dynamics works because of Roman's high social skills and her ability to follow humans' suggestions.⁵⁹ For Nogami, Roman is interested in Kanako but Kanako's companion does not know very well how to communicate in this context. Also, Kanako has restrictions of her own. Sometimes Roman gently touches Kanako but the reverse is very rare. Occasionally, though, both Kanako and Roman display against each other, in which case, Nogami acts "like [an] alpha male".⁶⁰ Yet, before being able to do this, one needs to build a good relationship first, as Professor Morimura contends during our conversation.⁶¹

The closer humans and chimpanzees share space the more habituated they need to be to each other, and both humans' and chimpanzees' personal boundaries depend on the idiosyncrasies of each dyad or group. A human X who shares an unbarred space with chimpanzee Y might not do the same with Z, or might have this relationship altered by the introduction of another party. Likewise, in an extreme case such as Kanako and Roman's, a human may serve as a physical barrier between chimpanzees, adjusting the potential shared space according to context (i.e., affiliative or agonistic). Now we shall see the last vital point for safe interactions with chimpanzees: one's ability to internalize safe body techniques.

Indeed, safety assessment is expressed by controlled locomotion in space. Due to the multiplicity of factors that can turn the tide of the interactions, it is never completely safe being placed in permeable interface areas, where humans and chimpanzees can temporarily cross boundaries. This is supported by the fact that even experienced researchers and keepers suffered from minor injuries during face-to-face experiments.^V Thus, to be more precise, judgment calls are on a spectrum of "less safe" to "safer".

At Kumamoto Sanctuary, I had the opportunity of learning an interesting body technique to initiate physical contact in a safer manner.⁶² At a secured distance, a keeper held my hand close to the bonobo VJay, and I was instructed to clench my hand into a fist. Vjay reached for my hand through the mesh, and when the bonobo had stretched his hand the furthest, I approached. With the point of his fingers, VJay patted the upper part of my fist, and as he did it, he looked into my eyes, as if tracking my reactions. Progressively, Vjay increased his strength but not in an aggressive manner and he never exceeded the use of force; the bonobo was firm but gentle. The keeper believes that VJay was testing me: What will she do if I do this? Or that? In fact, the keeper considers that, in these situations, not only should we let them extend the arms at maximum reach but we should not show the palm open. In this context, presenting the fist would signal friendly interest, because they are aware that humans can grab them otherwise. In addition, this is a way to protect our fragile fingers.

Yet, experienced humans can go as far as placing small food items into chimpanzees' mouth, although only with individuals who are highly trusted. Safe, or rather, safer forms of interaction are varied. For instance, one may use twigs to scratch a chimpanzees' back, always paying attention to hit a place not easily reached by the hands; one may ask for objects by saying *chōdai* (roughly, 'give me') and then place an open hand far from grasp; one may "catapult" food or small items instead of entering in direct contact, a practice very often used during chimpanzee feeding; one may alter body

^V Considering the extreme case of complete space sharing, like face-to-face situations, during this ethnography five past incidents were brought up, having occurred to four humans at PRI within both keeper and researcher's role. None of them were serious. Notice though, that the total number of accidents in this condition was not surveyed.

positioning depending on pieces of clothes that might be seized like caps; so on and so forth.

Through progressive learning, certain ways of being and behaving in space are internalized and are felt, to a good extent, as mechanical to the agents, as Mauss' techniques of the body.⁶³ These particular ways to make use of one's own body during interactions are to some degree efficacious in terms of safety and are transmitted in oral form, as during training or presentations, and in written manner, like in protocols. Furthermore, they are also learned through sheer observation of "models", which is particularly praised by Japanese researchers at PRI. It is important to read space boundaries in conjunction with architecture, context and inter/intraspecific social relations. This orients how the controlled locomotion in space will be exerted, even when this knowledge becomes quite implicit and unnoticeable.

Increased danger perception requires an increased control of locomotion. In the terms of this ethnography, the edge of danger potentially reflects the space just before any permeable interface areas where chimpanzees may briefly share space with us. In fact, as already argued, the real boundaries are not always physical barriers, but an imagined extended space. Some behaviors, like spitting and feces flinging, enlarge this space considerably, although the consequences are not as dire as in the case of direct physical contact. Others, like object throwing, might be extremely dangerous. Thus, depending on the "gradient of danger", a person needs to estimate a more generous "margin of safety".⁶⁴

Now, let us consider as an example, Matsuzawa's laboratory, or the South Play Room (SPR), since its entrance provides a concrete case to assess danger. The South Play Room entrance door has a kitchen area on one side and, on the other, a chimpanzee area separated by metal bars (Photo 10 and Photo 11). Overall, bars pose a challenge for orientation in narrow spaces because humans have to estimate how to position the body in relation to a chimpanzee's potential maximum perispersonal space, that is, the distance a chimpanzee's hand can reach through at best. Having taken measurements based on the maximum reach of the thinnest chimpanzee hand, I have estimated the minimal safety distance in order to be out of a chimpanzee's hand grasp. Then, based on body positioning, I have assessed how comfortable each placement felt, as if an average chimpanzee was in front of me, that is, a chimpanzee whom I did not trust neither the most nor the least.^{VI}

^{VI} Measurements have as reference an immobile human body, centered at the hips and dressed in laboratory garment. The chimpanzees' maximum reach was approximately 24cm beyond bars (i.e., Pendesa's max.), and for human arm reach the reference was 71cm (i.e., extended hand to clavicle). Measurements were



Photo 10 South Play Room entrance measurements, 130cm, 55cm and 40cm, 2015. Photo and measurements by Daly.

Based on this simulation, there were three critical distances: (a) 40cm, corresponding to the very minimal distance in order to be out of grip reach (b) 55cm, which reflects the distance between the door opening and the metal bars (c) 130cm, which represents the subjective assessment of a comfortable distance. In the first case, body locomotion is completely restrained, because any movement of the arms or the garment may cross the minimal threshold, in other words, the person should stand as a "statue", with arms next to body. In the second case, when entering the laboratory while a chimpanzee is present, upper limb



Photo 11 South Play Room entrance and danger perception, 130cm, 2015. By Daly.

taken on December 11, 2015, approximately 14 months after my arrival. For safety reasons, a "live" measurement with real chimpanzees was not advisable.

movement is controlled, that is, the person enters with caution. Lastly, at the subjective estimation of 1m30cm, full upper limb movement is allowed, but within felt proximity important for social interaction.

Regarding the margin of safety for the most dangerous form of contact in this situation, that is, direct grasp, 40cm is indeed a poor margin in comparison to 130cm. The first is likely to produce feelings of narrowness and it supposes a much greater control of movements, whereas the second allows less attention to body positioning, attention that can be directed to other tasks. Notice, though, that more experienced workers may have a different subjective threshold, which, remember, is relative to one's relationship to each individual chimpanzees and context. Nonetheless, the principle remains the same; whenever a situation is perceived as more dangerous - whatever the threshold - increased controlled locomotion is in order.

2.2 The Dynamics of Space Boundaries in the Wild

Physical boundaries between humans and chimpanzees are extremely delicate, as it has been argued. Yet, numerous times interlocutors remarked that wild and captive chimpanzees have different attitudes when facing humans; captive chimpanzees seem to know they are stronger than humans.^{1,Note 1} Even though in the wild there are no enclosures with barriers such as meshes, concrete, and panels to mediate the encounters between humans and chimpanzees, individuals not familiarized with human presence will mostly flee. Researchers who wish to study chimpanzee communities go through the process of habituating individuals to humans either by provisioning them of food or by gradually shortening distances without resorting to edible items, a process that may take several years.^{II,Note 2} Curiously, there seems to be an effect of social learning, with habituation being catalyzed by the migration of habituated individuals into a non-habituated group, as a study in the Budongo Forest supports.³

As a result of habituation, there is a decrease in the distance and an increase in the time animals spend next to humans. In other words, chimpanzees can be observed for longer hours and within shorter range. Nonetheless, researchers and guides usually guard a distance of at least seven meters (e.g., Taï Forest, Côte d'Ivoire; Budongo Forest, Uganda; Bossou, the Republic of Guinea).^{4,5,6} This is due to several factors, including ethical considerations such as disease transmission and over-habituation, whereby the loss of fear of humans might make primates more vulnerable to poachers and more prone to crop-raiding and negative interactions with local people.⁷ McLennan and Hockings caution, however, that "[w]hile habituation might make apes less reticent about directing physical aggression towards humans in some situations, it is important to note that many recorded attacks involved semi-habituated (e.g., Bulindi) or entirely unhabituated individuals (e.g., Kibale)".⁸

When human population density is low and advances into their natural habitat is not far-reaching, encounters between humans and chimpanzees do not pose a problem,

¹ This is consonant with a review of aggressive encounters with wild chimpanzees, which remarks that "unlike captive apes, wild chimpanzees are presumably unaware of their greater strength relative to adult humans" (McLennan and Hockings 2016, 383).

^{II} The estimation for pygmy chimpanzees, i.e., the bonobos (*Pan paniscus*), is two to five years, whereas for common chimpanzees (*Pan troglodytes*) and lowland gorillas (*Gorilla gorilla*), five to fifteen years are expected. Note though, that several factors influence habituation time such as species, home-range size, group composition, among others. Besides, even over the years, strong individual differences in tolerance levels may be remarked (Williamson and Feistner 2011).

and, in fact, in the two field sites where human-chimpanzee interaction has been studied the most (i.e., in Bossou, Guinea, and Bulindi, Uganda) attacks occur less than once per year, even though the animals come across people daily.⁹ Moreover, attacks of great apes are rarely fatal.¹⁰ Human-chimpanzee coexistence in original habitats is indeed a broader political, economic, and environmental issue, yet, when focusing on the micro scale of human-chimpanzee interaction during encounters and during the occupation of potentially common spaces, then, similarities with the captive setting emerge.

The first point to notice is the surroundings immediate to one's body. In a recent review, McLennan and Hockings consider that provoked attacks commonly occur when humans - intentionally or not - enter an animal's "personal space", that is, the animal's surroundings where it reacts to our presence; a threshold that depends upon context.¹¹ Therefore, hands-on efforts such as clearing around fields and trails, which increase visibility, are important to prevent surprise attacks.¹² Moreover, different solutions have been suggested and implemented, as for example, the creation of green corridors connecting patches of forest, buffer zones between natural and cultivated areas, and buffer crops to which apes show no interest, although each one of them entails different financial costs and ecological side-effects.¹³ This supports our second point by suggesting that the configuration of bordering places between the forest and heavily anthropogenic habitats play a role in the dynamics and outcome of encounters.

Thirdly, regarding the material composition of blockades, several options are possible; from traditional and electrical fencing, and boundary water canals, to live, thorny species.¹⁴ However, even though the use of physical barriers and fencing has been a usual solution in delimited spaces, like sanctuaries; the practicality of fencing off large areas inhabited by human populations is indeed low, the economic and ecological costs might be high and, in addition, apes show the ability to surmount these challenges, which altogether, suggests that barriers in the wild may help but do not guarantee the solution to human-ape conflicts.¹⁵ Moreover, cases such as Bossou, where human and chimpanzee areas have traditionally overlapped extensively,¹⁶ complexify the picture because no clear-cut separation between human and chimpanzee territories has been historically conceived and enforced.

The fourth and fifth key points to remark are human-chimpanzee dynamics on an individual and on a multiparty basis. It is known from laboratory studies that chimpanzees not only identify conspecific faces and their behinds, but are also able to effectively discriminate and search for human faces.^{17,18} Curiously, experiments conducted at the

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Primate Research Institute with three mother and offspring pairs (Ai and Ayumu; Chloe and Cleo; Pan and Pal) support that whereas younger chimpanzees are better at discriminating faces of their own species, older captive chimpanzees with limited exposure to conspecifics and greater exposure to humans show the inverse pattern, that is, they recognize human faces better. ¹⁹ Therefore, like many primate species, chimpanzees are able to identify particular humans and it is even advisable in the early phases of the habituation process that observers be fairly the same and keep a consistent appearance (e.g., clothing, hat, backpack, etc.).²⁰

Overall, the role that local guides play in mediating interactions with wild chimpanzees should not be underestimated. This is suggested by accounts and observations during a shortterm fieldtrip to the research site of Kyoto University in Bossou. In Bossou, local guides (i.e., the native



Photo 12 Guide escorts woman and children on a road, Bossou, 2016. By Daly.

research assistants) regularly access the forest to monitor the population and to manage the camera-traps located in different points to record chimpanzee behavior. It was possible to observe how the guides' presence safeguards both researchers and locals. A clear example is seen when chimpanzees cross roads: When the research group has been following chimpanzees in the vicinity of a road, if there are pedestrians nearby, a guide escorts the locals through the area where chimpanzees might potentially traverse (Photo 12).

In Bossou and in other field sites, reports indicate that attacks are more likely to be initiated by male chimpanzees and be directed against children and women, which, in turn, translates into formal recommendations to not leave children alone and, whenever possible, to put a man in charge of leading or accompanying a group throughout the bordering areas of the forest.^{21,22} Yet, it is not clear which factors explain this pattern; sex, physical size, or reactions.²³

Additionally, local guides stay in close proximity to researchers, especially when chimpanzees approach. An ethnographic episode in Bossou illustrate well this point. Being used to PRI chimpanzees and the dynamics of sharing space in captivity, my first encounter with a wild chimpanzee was breathtaking - in the metaphorical and literal sense (Audiovisual Material 2; Video Frame 2). After having located a few individuals in the forest, our group crouched. Yet, we did not creep on the chimpanzees; our location was clear and we occasionally engaged in conversation. As a lab researcher, my eyes were not trained to sort out figures in the vegetation and, naïvely, I started to adjust my camera in the chimpanzees' direction, with the serenity and confidence that our distance would not decrease unless we, humans, chose so.

With a guide to my right but perhaps a meter apart, I was surprised by a chimpanzee coming to our (mine!) direction. First, he glanced at me, then he paused, briefly looking away as if searching for something. Next, he continued to approach, gazing at me intently. In this split second, I froze. I did not know whether I wanted to retreat in fear, enjoy the experience, or continue to film this personally unique moment. Feeling a chill down the spine, I lowered the camera to assess the situation, ending the footage. This chimpanzee seemed much smaller than the ones I worked with at PRI. Yet, he was no one but Jeje, the alpha male. As he continued to stare and draw near in a straight line, I made visual contact with the guide, who signed me to stay put. I held my nerve to the best and, finally, Jeje changed trajectory to my left in an abrupt manner, looking with determination to his new path as if I and the others did not exist.

These few seconds were challenging: Not being able to move and, yet, have an unknown, bold and wild chimpanzee approaching me like a straight arrow to a target... As a researcher from the "lab-tribe", this encounter put the field primatologists' skills into perspective as a different set of challenges to deal. After this episode, I was told that had the guide not been by my side, I would for sure have been in danger. In another episode of a series mirroring the same type of boundary issues, while Jeje was passing by, a guide calmly changed his position and sat right next to me, again, to act as a safeguard (or rather, as a bodyguard).

Furthermore, this seems to occur not only with newcomers but with researchers who visit the site seasonally each year. An interlocutor of our group in Bossou reminisced on a few stories when guides were unavoidably far away: Upon chimpanzees' approach, the guide had to be called back in a rush. It is not far-fetched to assume that, overall, the guides' presence acts as an inhibitor, preventing chimpanzees from diminishing distances, like a sort of barrier. In sum, the relationship that chimpanzees maintain with specific humans (e.g., guides, newcomers, etc.) and the composition of the group (women, children, male chimpanzees, etc.) are factors that might contribute to the repartition of physical boundaries between species.





Video Frame 2 First encounter with the alpha male Jeje. From Audiovisual Material 2. Audiovisual Material 2 First encounter with the alpha male Jeje, Bossou, 2016, 26s. By Daly.

An integral part of the previous points discussed are the sixth and seventh factors to influence the physical boundaries, namely, the context in which human-chimpanzee encounters occur, and chimpanzee behavior and individual idiosyncrasies. Who attacks, who is attacked, where and when the encounters take place, the activity undergone, or the reactions during the incidents are all important facets of dangerous interspecies contact, although it is not clear-cut which of these aspects contribute the most to increase risk. As already mentioned, surprise encounters in which chimpanzees suddenly enter in close proximity to humans are a potential danger and, additionally, most of the episodes in the literature suggest the pattern of male chimpanzees targeting women and children. However, humans may also provoke chimpanzees, for example, by throwing branches and stones, and by chasing them off with dogs; to which apes usually retaliate.^{24,25}


Figure 6 Chimpanzees' feeding points in Bossou. (Bryson-Morison et al. 2017, 388).²⁶

Not only do attacks occur in places where human-chimpanzee encounters are more likely, such as roads, narrow paths, and cultivated fields (see Figure 6 for reference) but they coincide with periods of fruit scarcity (when apes venture into human crops) and with cropping seasons (when the human use of paths is increased).^{27,28} Yet, chimpanzees do not have the same stance toward humans and those with a more risk-taking attitude pose higher danger. For instance, currently in the Bossou community, only Jeje, the alpha male, is a matter of concern in human-chimpanzee encounters.²⁹ Furthermore, during my fieldtrip to Bossou, interlocutors stressed the existence of fine-grained individual idiosyncrasies regarding interspecies etiquette; for example, a physician studying aging in chimpanzees advised me not to stare at the old female Velu, after realizing from her long-term study that Velu seems to find it inconvenient.³⁰

Finally, in situations in the wild, one needs to ponder the safest body techniques during encounters, controlling one's locomotion. In the practice guidelines to prevent human-ape conflict, Hockings and Humle advise: "In general, people should keep calm, try not to scream, and avoid running away and scattering, especially when in groups".³¹ In fact, in the literature, running ranks as the worst reaction toward not only chimpanzees but also other great apes.^{32,33} Indeed, a local guide in Bossou believes that running gives

chimpanzees strength because, in such case, they will know they are stronger; also, because they are habituated, running may make them think you are a 'bad person' ("mauvaise personne").³⁴ Instead of running, a second guide advised me to calmly recoil a bit whenever Jeje crosses, in order to give him space.³⁵

People's overall disposition toward chimpanzees may vary depending on location. In the case of Bossou, chimpanzees are protected by the local Manon people due to being considered the founding family's totem, but note that locals mostly avoid direct contact with them.³⁶ Eleven incidents have been reported from 1995 to 2009, all non-fatal, and educational programs instruct how people should behave in such encounters.³⁷ In the villages of Cadique and Caiene (Cantanhez National Park, Guinea-Bissau), where chimpanzees are not considered a physical threat, people remain calm during contact and there have been no reports of attacks (as of a 2013's study).³⁸

At this point, one may ask how chimpanzees might perceive anthropogenic spaces within their natural habitat. Systematic accounts of chimpanzees' innovative solutions and reactions to human-made challenges provide us with insights. In the Sebitoli region of Kibale National Park (Uganda), where anthropogenic spaces border chimpanzees' home-range by more than 80%,³⁹ Krief and colleagues found that in this location, chimpanzees, a species considered strictly diurnal, repeatedly raid crops at night, an activity which accounted for more than 40% of the time spent in the vicinity of the maize field.⁴⁰ With the aid of video traps equipped with infra-red light, it was possible to conclude that chimpanzees hesitate less to enter the field at night and, in addition, they stay twice as long and show less frequent signs of anxiety and vigilance at night than during the day.⁴¹ Moreover, they transport food items to the forest with higher frequency during daytime, indicating that, in this period, chimpanzees may not feel at ease to consume raided items *in situ*.⁴²

Thus, not only is the crop-raiding activity (Photo 13) perceived in regard to a riskier anthropogenic space (i.e., human fields), but also to a riskier time when chimpanzees are most likely to encounter humans (i.e., daylight). Chimpanzees' movement within anthropogenic spaces may influence the spatial boundaries of research groups as well. In the field station of Bossou, there is a fairly delicate triangulation created by (a) chimpanzees' incursions into cultivated fields (b) a research group's location and (c) local farmers. For instance, during my field trip in 2016, when chimpanzees ventured into the fields, the research group did not follow the apes. As a local guide explained, this

is mainly because farmers may be led to think that assistants and scientists somehow bring them along.⁴³

Nonetheless. the relationship to chimpanzee cropraiding in Bossou seems to have differed historically. There, the founding family, the Zogbila, instituted the local chimpanzees as the totem of the village, therefore, the consumption of their meat has become a taboo for all the inhabitants. Moreover, in an interview with the village sages, which had as topic the human-chimpanzee relationship in Bossou, the eldest living member of the Zogbila family



Photo 13 Velu crop-raiding, Bossou, 2016. By Daly.

affirmed that offerings were made to chimpanzees:⁴⁴ Villagers living around the sacred Mont *Gban* would offer chimpanzees a part of the first harvest of the year, leaving crop items on the ground for them to pick up. This tradition, however, is observed only by the two older, worshipers' family, the ones allowed to occupy this space (i.e., the Zogbila and the Goumy). The director of the Environmental Research Institute of Bossou (IREB) remarks, though, that when he arrived in 1981, locals indeed used to leave a part of the harvest, but that this observance changed over time.⁴⁵ It is likely that this practice contributed to the well-known historical habituation of chimpanzees in this field site before long-term studies were conducted.

Another example shedding light into chimpanzees' perception of anthropogenic spaces is road-crossing, although systematic studies of this activity are still sparse. In the Kibale National Park, Cibot and colleagues found that chimpanzees were particularly cautious when crossing a high-speed traffic road (13m incl. shoulder): More than 50% of the individuals crossed running, more than 90% looked left and/or right, almost 20% paid attention to conspecifics; furthermore, vulnerable chimpanzees (e.g., mother with infants) crossed less frequently while healthy adult males led the way predominantly more than

when compared to climbing and descending trees.⁴⁶ Moreover, although they did not choose safer points to traverse, in addition to showing individual vigilance, they readjusted group size accordingly, that is, by crossing in small subgroups (likely due to the short distance between vehicles).⁴⁷

In Bossou, where chimpanzees' home-range is fragmented and where they have to cross roads to reach foraging sites, chimpanzees even developed preferential crossing points used for decades.⁴⁸ Hockings and colleagues found that, when comparing two routes, a large one with pedestrian and vehicle traffic (12m wide) and a narrow one for passers-by (3m), chimpanzees waited longer before crossing the large road, in which case, the auditory or visual presence of locals and vehicles increased the waiting time.⁴⁹ Adult males led and scanned the way, and appeared in the rearward more often, whereas the alpha female increased her forward positioning on the large road.⁵⁰

Thus, a "protective socio-spatial organization" is implemented during riskier situations, with males preferentially being placed at the front and rear-end while females and youngsters occupy middle, more protected positions.⁵¹ Additionally, chimpanzees took longer to move toward open-areas than toward the forest.⁵² These results suggest that the forest in which the chimpanzee community of Bossou inhabit is, comparatively, a less threatening space, and that spaces occupied by humans are perceived in terms of the degree of risk the may pose (higher for larger, busier spaces). Thus, chimpanzees modify how they socially occupy spaces according to potential interactions with humans. Moreover, the socio-spatial organization is likely adapted to the specificities encountered by each community, given that, for example, in Kibale's high-speed asphalted road, chimpanzees cross in subgroups instead of in a straight line, like in Bossou (*cf.* Cibot and colleagues)⁵³.

The social organization for crossing an anthropogenic space can be witnessed in a movie clip shot in Bossou (Audiovisual Material 3; Video Frame 3). In this event, all members from the Bossou community were present.^{III,Note 54,55} The first one to screen the route and walk on is the male Foaf (Video Frame 3; 2s23frames), followed by the elder females, Jire and Fana, respectively (12s20frames; 26s2frames), succeeded by the infant Fanwaa (on his own) and the others (34s4frames on). During the crossing, chimpanzees

^{III} MALES: **Jeje** (Dec 1997, 18y/o, adult, Jire's son, alpha), **Foaf** (late 1980, 35y/o, mature, Fana's son), **Fanwaa** (Nov 2012, 3 y/o, infant, Fanle's son) FEMALES: **Fana** (1956 estimated, 60 y/o, very old), **Fanle** (Oct 1997, 18y/o, adult, Fana's daughter), **Jire** (1958 estimated, 58 y/o, very old), **Velu** (1959 estimated, 59 y/o, very old), **Yo** (1961 estimated, 55 y/o, very old). Lineage information from Ohashi (2011) and, for Fanwaa, KUPRI (2017); Age grouping after KUPRI (2017); For age reference, video filmed in July 5, 2016.

show frequent looking at the road sides and also at conspecifics. In particular, a couple of times, Foaf moves ahead, stops, and looks at others, continuing as they come closer. He scratches himself once, perhaps, indicating mild anxiety. As the crossing comes to an end, the members form a straight line: First Foaf, then the elders Fana (1m4s), Yo, Jire, and Velu (1m10s), followed by the mother Fanle, and her clinging infant Fanwaa (1m17s), escorted by the alpha male Jeje at last (1m23s). This episode mirrors the probability of the social organization described by Hockings and colleagues,^{56,57} with the exception of the increased presence of the alpha female in the last position in the small road condition.



1m4s: 1) **∂**Foaf 2) **♀**Fana

1m10s: **3**)**♀Yo 4**)**♀Jire** 5)♀Velu



1m17s: 6) **Fanle 7**) **Infant Fanwa**

1m23s: 8) Alpha 🖧 Jeje

Video Frame 3 Chimpanzees cross road in Bossou. From Audiovisual Material 3. Audiovisual Material 3 Chimpanzees cross road in Bossou, 2016, 1m33. By Daly. The event, however, provides other interesting points for discussion. I have conducted a microanalysis of this crossing episode (Solomon Coder©; 0.2 second), in order to demonstrate the social organization of space in a concrete manner and to explore how conspecifics, researchers, and the assessment of anthropogenic landscapes can be integrated, at the same time, in this type of study. Thus, for each individual it was calculated (a) the time spent walking on the road (b) the frequency of head-turns toward the road, conspecifics, and researchers.

Regarding time spent on the road, the route was categorized into three segments (Photo 14); two for bordering areas and one for the middle of the road. It was assumed that the main part of the road is likely the most dangerous one, not only because of vehicle positioning, but also because it is



Photo 14 Chimpanzee crossing and road segments. By Daly.

the farthest away from the borders. Therefore, the hypothesis was that chimpanzees occupied these spaces in a different manner, and it was expected they would refrain from segment two. As a result, the mean time spent on the road for all chimpanzees was 47 seconds.^{IV} The average for the males Foaf and Jeje was 55 seconds (i.e., 43.2 and 67.6); for old females, 47 seconds; for all vulnerable individuals, including mother and infant in not-clinging position, 44 seconds. On an individual level, the maximum time spent on the road was recorded for the male Foaf, surprisingly, followed by the elder female Jire (67.6; 65.8), whereas the minimum was recorded for mother Fanle, followed by elder Yo (28.8; 38.6). Interestingly, infant Fanwaa spent more time exploring the road on his own next to conspecifics (44.6), than his mother's total time spent on the route (28,8).

Taking all chimpanzees into consideration, on average, segment one was occupied 18 seconds, the middle segment 14 seconds, and segment three 15 seconds. Jire was the one who occupied the middle of the road the most (26s) in contrast to Yo (4s). When comparing the bordering segments one and three with the main segment two, there was,

^{IV} All averages were rounded. Fanwaa's time on the route excludes clinging period, since carried infants do not choose which segment they occupy.

however, no significant difference (t[7] = 0.3), meaning, chimpanzees did not preferentially occupy the borders in this episode, likely due to the reduced size of the road. Furthermore, chimpanzees' attention was also investigated, being calculated as a measure of the frequency with which they turned their heads in the direction of the road, the conspecifics, and humans (before, during, and after crossing). Whenever it was not possible to visualize head direction, "time-out" was computed, so that an individual score is relative to the visible, not the total observation time.^{V,Note58}

During the whole crossing and filming, I was placed on segment three and a guide, on segment two, at approximately ten meters distance (n.b., scenes were zoomed). Therefore, all head turns to the right of the traffic sense were scored as belonging to both categories, "human" and "road", but this was not necessarily the case for turns to the left; only in the end of the crossing when another researcher and a guide appeared to the chimpanzees' left (1m7s on), head-turns to the left of the traffic sense were marked as attention to humans and the road. Overall, chimpanzees' attention was greater toward the road (0.2 turns per second), than toward humans (0.1) and conspecifics (0.09).

On a group level, the two males scored the minimum values, showing, comparatively, less head-turns toward the road (0.11), conspecifics (0.09), and humans (0.7), whereas the old females scored the maximum values, showing more attention to the road (0.25) and conspecifics (0.1). Regarding increased attention to humans, vulnerable individuals (i.e., elders plus the mother-infant pair), ranked as high as the elderly group alone (0.15). When comparing the mean for attention toward the road versus the mean for attention to humans and conspecifics, a significant difference was found (t[7] = .0028), meaning, chimpanzees in this crossing episode scanned the route significantly more than humans or conspecifics. Overall, the results suggest that for these individuals, while there was no preferential locomotion pattern within the route, the road elicited more attention than the presence of others (humans and chimpanzees).

This however, refers to a single, modest episode and systematic studies contribute to eliminating biases such as differences in visibility records. It is also possible to conduct a more fine-grained analysis and take into account other behaviors and operational

^V Attention was operationalized as each head-turn between 45° and 95° in the direction of the traffic, humans or conspecifics (adapted from Cibot et al 2015). Infant Fanwaa's attention score was calculated for the entirety of the crossing. Time-out for head-turns considering individual appearance time: Foaf, Jire and Yo 0%, Jeje 19%, Fana 6%, Fanle 13%, Velu 20%, Fanwa 28%.

definitions. ^{VI,Note 59,60} Nonetheless, beyond the concrete illustration of the social organization in space, one of the reasons why this case study was conducted was to propose a design bringing to light the observers' presence. This is vital due to the difficulty in discriminating whether a chimpanzee was monitoring the road or, actually, the researchers, and guides on the road. Thus, it was assumed here that habituation level does not preclude increased attention to researchers, especially when danger is enhanced.

True, some instances are better grounded in one of the two categories, such as infant Fanwa's turn-back look at the end of the crossing (see 1m16s), which seems likely toward the researcher and the guide than the road. When studying social factors, it might be risky not to hold into account the observers' view, and it can be difficult to delimit clear criteria to analyze only what falls outside the observers' influence. To stick to the previous analysis, this issue can be though in the sense of the following questions: What are the criteria that make sure the chimpanzee was screening the road and not researchers? Or even, that a screening was not serving the function of checking up the observer and the road together?

Etho-ethnographers and ethologists wishing to assess the influence of anthropogenic landscapes regardless of the observers' view may alternatively count only those instances of attention directed to researchers' opposite side (e.g., head-turns to the other side of the road as an exclusive measure of attention to the road), likely at some costs such as increased data collection.^{VII} Indeed, how to take into account the observers' influence should be adjusted depending on the design of each study and the research questions, given that, for instance, even the act of not-looking may serve a social purpose and be considered a social interaction *per se* despite the apparent non-interaction. These are important points when trying to assess what the "perception" of nonverbal animals (taken in socio-anthropological terms) would be.

^{VI} For instance, Cibot and colleagues (2015) included postures, gaits, and Krief and colleagues (2014) included anxiety indicators such as diarrhea, self-scratching, among others.

VII For etho-ethnographers wishing to conduct video studies, it has been particularly helpful the use of both a video camera and an action camera attached to a chest mount harness, which provided material to check up the broader context of a shooting (especially useful for follow-ups).

2.1 The Social Organization of Space in Captivity

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2.2 The Dynamics of Space Boundaries in the Wild

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⁴⁶Cibot et al., "Chimpanzees Facing a Dangerous Situation: A High-Traffic Asphalted Road in the Sebitoli Area of Kibale National Park, Uganda."

⁴⁷ Ibid.

⁴⁸ Kimberley J. Hockings, James R. Anderson, and Tetsuro Matsuzawa, "Road Crossing in Chimpanzees: A Risky Business.," *Current Biology* 16, no. 17 (2006): 668–70.

⁴⁹ Ibid.

⁵⁰ Kimberley J. Hockings, "Behavioral Flexibility and Division of Roles in Chimpanzee Road-Crossing.," in *The Chimpanzees of Bossou and Nimba*, ed. Tetsuro Matsuzawa, Tatyana Humle, and Yukimaru Sugiyama (Tokyo: Springer, 2011), 221–29.

⁵¹ Hockings, Anderson, and Matsuzawa, "Road Crossing in Chimpanzees: A Risky Business.", R668.
⁵² Ibid.

⁵³ Cibot et al., "Chimpanzees Facing a Dangerous Situation: A High-Traffic Asphalted Road in the Sebitoli Area of Kibale National Park, Uganda."

⁵⁴ Footnote, Gaku Ohashi, "Appendix A. Lineage of the Bossou Community as of January 2010.," in *The Chimpanzees of Bossou and Nimba*, ed. Tetsuro Matsuzawa, Tatyana Humle, and Yukimaru Sugiyama (Tokyo: Springer, 2011), 404–5.

⁵⁵ Footnote, KUPRI, "The Chimpanzees in Bossou." (Accessed June 17, 2017. http://www.greencorridor.info/en/chimp/profile/relationship.html, 2017).

⁵⁶ Hockings, Anderson, and Matsuzawa, "Road Crossing in Chimpanzees: A Risky Business."

⁵⁷ Hockings, "Behavioral Flexibility and Division of Roles in Chimpanzee Road-Crossing."

⁵⁸ Cibot et al., "Chimpanzees Facing a Dangerous Situation: A High-Traffic Asphalted Road in the Sebitoli Area of Kibale National Park, Uganda."

⁵⁹ Footnote, Ibid.

⁶⁰ Footnote, Krief et al., "Wild Chimpanzees on the Edge: Nocturnal Activities in Croplands."

Chapter 3 Experimental Boundaries Testing and Being Tested by Chimpanzees

3.1 Practices Structuring Chimpanzee Care and Research

The main peculiarity at the Primate Research Institute of Kyoto University is the role humans are encouraged to play in chimpanzees' social lives. Professor Matsuzawa places considerable importance to what he calls a "holistic approach" to chimpanzee care and research.¹ First, in what concerns scientific work, he considers that this line of thought is translated into his parallel effort to execute both experiments and fieldwork in the wild. Secondly, in terms of chimpanzee management, this holistic philosophy is expressed through the fact that researchers and research assistants, unlike most institutions around the world, actively participate in duties traditionally allocated to keepers.

Thirdly, perhaps a more subtle point in which this philosophy is expressed is the fact that research personnel are expected to understand chimpanzees as a whole. In practice, this means that the knowledge of chimpanzees' wild behaviors is supposed to be linked with how chimpanzees act in captivity. In other words, humans should stimulate the appearance of wild behaviors in captivity or functionally simulate nature through artifice.² This is meticulously articulated; from striving to simulate fission and fusion wild social dynamics through the way facilities are built,³ up to tiny details such as the use of wooden protectors for chimpanzees to sit on the concrete floor during experiments. This is due to the fact that they apparently dislike sitting on cold, wet feeling surfaces in the wild, and females' swollen bottoms usually stand outside tree branches.⁴ In fact, at PRI, not only experimenters but also keepers, veterinarians and research assistants are given the opportunity to go to the field station administered by professor Matsuzawa and colleagues, in Bossou, Guinea, in order to understand the bigger picture of chimpanzee behavior. Moreover, knowing chimpanzees as a whole also means mastering the particularities of each individual of the PRI community in a very detailed, concrete manner; from a chimpanzee's reluctance to perform experiments on a slightly wet floor, to a chimpanzee's handedness.

However, Matsuzawa does not view this holistic philosophy as his own idiosyncrasy; he interprets it as a part of a general Japanese mindset.⁵ Indeed, the structure of chimpanzee care and

research at PRI bears more similarities to other Japanese facilities than to Western institutions. Likewise, over the years, PRI, has been the major hub of Japanese primatology in terms of publication and rotation of Japanese and international researchers. On a worldwide level, chimpanzee research conducted at PRI figures among the most reputable, a fact well documented by its immense production and impact.^{INote 6,7} If chimpanzee research at PRI has become an "obligatory passage point"⁸ in terms of scientific outcomes, its caretaking practices and philosophy seem to be more visible in the context of a national network of institutions than in a worldwide scenario.

So far, the holistic approach has been presented as one of the major points structuring chimpanzee care and research at PRI. This is expressed through the effort of conjointly studying chimpanzees in the wild and in the laboratory; in the active participation of research personnel in duties that entail considerable social interaction with chimpanzees; in the promotion of the appearance of wild behaviors in captivity or in the implementation of artificial means that function as processes observed in nature; and at last, in the knowledge of the particularities of each individual of the PRI community. Now, other structuring points follow as a consequence of the holistic approach, namely, face-to-face caretaking practices, face-to-face experiments and personalized feeding.

It should be clear from previous discussions that face-to-face interactions with adult chimpanzees are, overall, considered risky. Whereas younger chimpanzees may be hand-reared whenever necessary in institutions around the world, few are those who venture into entering the same enclosure with an adult chimpanzee. Matsuzawa even remarks that, in the wild, the humongous and likely more confident gorillas may even groom humans, but the professor reveals not to risk grooming a wild chimpanzee, including those he has observed over many years in Bossou.⁹ In the recent history of PRI, face-to-face caretaking (i.e., in the same enclosure) has been restricted to a few members (keepers; veterinarians; professors) who sustain a good relationship with certain chimpanzees, and entering the space of adult chimpanzees is only done due to a strong reason, as for instance, medical care. This practice is now occasional but qualitatively differential

¹Readers may simply consult the vast references cited in this manuscript and the quality of the journals in which PRI publications appear. Matsuzawa's (1985) early publication in the journal Nature can be considered a milestone in the Ai Project. Furthermore, from 2012 to 2016, Matsuzawa was president of the International Primatological Society. From 1964 to 2016, 25% of the presidential terms were occupied by Kyoto school primatologists (i.e., Matsuzawa; Yamagiwa; Nishida) (see IPS 2017).

(e.g., Reo's face-to-face physiotherapy). On the other hand, face-to-face experiments with adult chimpanzees continue to be performed systematically, although in 2015 only Matsuzawa conducted them on a regular basis.

For Matsuzawa and other interlocutors, mutual trust is the key allowing humans and chimpanzees to share the same space, have physical contact and positive social relations. In order to reach this goal, personalized feeding is considered to be vital, especially when personnel are new or still inexperienced. At PRI, before the year 2000 when Ayumu, Cleo and Pal were born, for the most time-consuming feeding duty, that is, dinner, all available researchers joined feeding and chimpanzees moved freely.¹⁰ However, in 2000, the current system was implemented. In this system, research personnel are allocated to different feeding duty slots and chimpanzees are fed in separate rooms in the basement. Each chimpanzee has a lunch box with the appropriate amount of food, which is generally equal for all but can vary depending on dietary and health issues. With each species in their own separate areas, humans give the food items one by one to each individual, accompanying them through the whole meal to make sure the chimpanzees are eating properly (thus, this practice is dubbed as personalized feeding). Usually, for dinner feeding duty, each person is in charge of two or three chimpanzees, rotating among them while each one is eating. This contrasts with the system of scatter feeding generally found in zoos, where food is scattered in the enclosures and chimpanzees feed on their own.

During experiments, chimpanzees are fed on three occasions: (a) every time the individual scores a correct response, the automatic feeder delivers a piece of apple or raisin (b) when a set of trials ends, a research assistant or researcher delivers pieces of fruits (c) when research personnel want to motivate a chimpanzee to perform an action. However, formal feeding duties, that is, main meals in personalized style, are viewed as opportunities to strengthen and test social bonds with each particular individual. This brings us to the last structuring point in chimpanzee care and research, already glossed previously: feeding is important but relationships are based on mutual trust not on positive reinforcement though food. In positive reinforcement, a desired stimulus (e.g., food reward) is presented after a behavior that the experimenter wishes to reinforce occurs (e.g., a correct answer or a specific action).¹¹ As consequence, an increase in the appearance of the behavior is expected (i.e., correct answer or a specific action).

Yet, Matsuzawa points out that even though food is used during interaction with chimpanzees, they allow humans to perform many actions without previous reinforcement. An example evoked is when chimpanzee Ai calmly accepted a blood draw. Moreover, as observed during quasi-experiments in Matsuzawa's laboratory in 2015, chimpanzees may continue experiments even when the automatic feeder is intentionally turned off and replaced for a social praise such as 'yes!' ("sō!"), which shows how human praise is viewed positively by chimpanzees. Furthermore, keen observers may notice that in PRI food can be used as a motivator, that is, preceding the behavior that one expects, therefore, acting in a different way of positive reinforcement. Sometimes, a human may present or tease with a treat and wait for the chimpanzee to perform the desired action, in which case, the food acts as positive reinforcement. Yet, it also occurs that after repeating a request several times (though husbandry commands, gestures, etc.) the human gives the chimpanzee a few pieces of fruit or a piece of jelly as an incentive. In simple terms, food as positive reinforcement is akin to "you did good, here is your treat", while food as a motivation can be translated as "I am giving you a treat, so please do as I asked".

For Matsuzawa, the relationship between chimpanzees and humans is based on mutual trust, however, he considers that there is another level to this relationship. For him, trust means that "I am always on your side, in any situation, even if I lose something".¹² In his point of view, the one who trusts another is ready to accept anything. So, if Matsuzawa asks Ai to open her mouth and he places his hand inside, he does not expect her to bite him; but if she does, he is willing to accept it. Matsuzawa also considers that trust takes time to build, and once a human and a chimpanzee have been apart for too long, time is needed to reestablish the relationship (however, this does not seem to be the case between Ai and Matsuzawa, who can go on long periods without interaction). Matsuzawa mentions chimpanzee Chloe as an example. If he would ever wish to perform face-to-face experiments with her, then, he says: "I need the time to be friends with Chloe again, like two or three months".¹³

To recapitulate the points explored so far, at PRI, chimpanzee caretaking and research is supported by a set of vital practices and views, namely, (a) its holistic approach to the research setting in the wild and captivity; to the division of labor between research personnel and keepers; and to knowing chimpanzees as a whole in terms of wild behaviors and individual particularities (b) strategic face-to-face caretaking of adult chimpanzees (c) systematic face-to-face experiments (d) personalized feeding and participation of research personnel (e) emphasis on mutual trust over positive reinforcement. Nevertheless, PRI shares some of these characteristics with other Japanese and worldwide institutions while, at the same time, it sets its own boundaries to distinguish its uniqueness.

Now, we should inspect the differences and similarities between PRI and other institutions. The golden thread connecting the above-mentioned points on caretaking and research is, as evoked before, the role humans play in chimpanzees' social lives. At PRI, as it is the case of other Japanese research institutions, humans are expected to develop their social relationship with chimpanzees to sustain the smooth carrying out of experiments and chimpanzees' husbandry. However, conspecific living and mother-rearing are also factors stressed by interlocutors. Their own species should be the primary source of social contact, yet, human interaction is not perceived as a handicap to chimpanzees as long as they can express wild behaviors as much as possible in captivity. In other words, human contact *per se* does not "taint" chimpanzees' status as real chimpanzees.^{II}

When comparing institutions, the one to resemble PRI the most is Kumamoto Sanctuary. Kumamoto Sanctuary currently belongs to Kyoto University and is a sister institution located in the south of Japan, created to absorb retired chimpanzees from invasive biomedical research.¹⁴ Unlike PRI, the facility counts with a large number of common chimpanzees, approximately sixty, and it has welcomed six bonobos more recently.¹⁵ A short-term visit to the sanctuary indicates that this institution mirrors, to a great extent, PRI's caretaking and research philosophy. Moreover, key researchers at the Sanctuary have conducted research at PRI in the past, and they are constantly in collaboration. As in PRI, strategic face-to-face caring of adult chimpanzees takes place (e.g., face-to-face social interaction with the blind chimpanzee Kanako). ¹⁶ Systematic face-to-face experiments are conduct as well, however, with more than one adult chimpanzee at a time (two humans and two chimpanzees in a booth were observed). As of 2015, Kumamoto Sanctuary exceeded PRI in terms of researchers systematically conducting face-to-face experiments and in terms of the number of chimpanzees in face-to-face setting. Regarding feeding, both scatter and direct handing occur, and researchers also participate in the breakfast, lunch and dinner during weekdays, while keepers are exclusively responsible for weekends and holidays.¹⁷

^{II} In the wild, though, the situation differs, as a short-term visit to the field site of Bossou in 2016 indicates. In this context, researchers make sure to refrain from close contact due to the danger involved in unmediated encounters, due to concerns regarding over-habituation, which may lead to an increase in chimpanzees' incursions into anthropogenic habitat and, more drastically, due to epidemiological concerns as chimpanzees are vulnerable to human diseases. Still, long-term studies in Japanese field stations are needed for in-depth comparisons.

Given that the Sanctuary and PRI are formally considered to be sister institutes,¹⁹ and given the prolific exchange between their researchers, it is not surprising that they share many similarities. Although such institutional comparisons merit a long-term study on its own, at Kumamoto Sanctuary, face-to-face some practices seem to be more intensive. This is likely due to the



Photo 1 In the deactivated GARI, humans and chimpanzees slept in the same place (Nakagawa et al. 2012, 192).¹⁸

previous participation of current researchers in the now deactivated Great Ape Research Institute of Hayashibara Biochemical Laboratories (GARI).²⁰ GARI was regarded by more than one professor at PRI as being PRI's extreme version of human-chimpanzee interaction.²¹ A few factors were evoked to justify such boundary. The first was systematic multiparty, interspecies contact, in which several chimpanzees and several humans would occupy a barrier-free space, allowing physical contact for an extended period. The second and third factor mentioned were co-feeding, meaning, humans and chimpanzees would eat in the same enclosure, and co-sleeping, meaning both species would fall asleep together in the same space (Photo 1). Yet, a few PRI interlocutors pinpointed that some practices at GARI seemed difficult to maintain. They point out that, for instance, humans would wait for chimpanzees to be asleep but quietly withdraw to humanexclusive spaces. Matsuzawa, as one of the interlocutors, considers that GARI's approach is "more radical than mine".²²

If PRI is not like GARI, on the other extreme, interlocutors consider that PRI "cannot be like a zoo", where a more prominent separation between humans and primates occurs; both on an architectural and on a social level. This view is well illustrated by the perception regarding a case occurring at Japan Monkey Centre (JMC). At JMC, a newborn siamang (*Symphalangus syndactylus*) called Melon²³ was abducted by her father, who would not let go of the infant, thus, making it difficult for the mother to breastfeed. Siamangs live in a family group composed of

mother, father and offspring, and males actively participate in rearing.²⁴ Yet, as a result of this extreme situation, Melon was growing weaker each day, reaching a critical stage. According to a view from PRI, because personnel did not take time to build up a good relationship with the siamang father, they could not effectively ask him to return the child and, eventually, the father had to be anesthetized, a move that entails risks: it is not possible to be sure of how an anesthetized, groggy animal will manipulate the baby in the process. Melon had to be hand-reared for some time to regain her strength but she was successfully reintroduced later. Luckily, the case was closed with a happy ending. However, an interlocutor at PRI stressed that the case should teach JMC staff a valuable lesson on the importance of the relationship between humans and primates.

This perception is not shared everywhere. For instance, a keeper at Kumamoto Sanctuary, Michael Serres, who has worked in several and prominent institutions around the world, remarked that whereas in Japan personnel are expected to play with chimpanzees, in some countries where he previously worked, like the Netherlands, personnel are supposed to refrain from any contact with chimpanzees to allow them being chimpanzees: "In Holland, still, animals are respected but they are animals. Here [in Japan], they are equal with humans (...) In Holland they had this philosophy that once they rescue the animals, they are already living in a - from their point of view - bad life. So, they should become animals again, they should live a decent life. So, when you rescue them and put them in a cage it is already bad; but respect them and do not interact with them because they should interact with each other and become animal again."²⁵

Then, Serres, who is an advocate of human-primate interaction in captivity, and has received the tender nickname of "chimp-whisperer", complements that the reason for his different experiences in Japan and elsewhere is not only based on contrasting philosophies, but also on how institutions operate: "[in Holland] only few people are working full time with these animals and they control other people who are volunteers (...) Partially because they want the animals to be animals, they said "no touch policy", "no communication with animals"."²⁶ However, Serres continues saying that part of it was to make sure people kept their fingers and accidents were prevented, given that many of the volunteers "have a pet shop love attitude [*squishy sounds*] without realizing that the animal can be dangerous."²⁷ Indeed, at PRI, only regular personnel are trained to feed chimpanzees and, more recently, stricter selection has been applied.²⁸

Similar philosophy regarding human-chimpanzee separation is also found in the Catalonian sanctuary studied by Alcayna-Stevens, where humans strive for dehumanizing and re-socializing

chimpanzees in the correct manner so that they can learn how to be chimpanzees.²⁹ Again, in chimpanzee research in Japan, whereas mother-rearing, contact with conspecifics, and the support for the emergence of wild behaviors in captivity is emphasized, human interaction is sought and desired as part of their lives in a captive setting. In this sense, humans are not denied of becoming part of chimpanzees' social ecology in captivity; the issue is rather how to administer this process well.

So far, we have observed to which extent PRI's philosophy and practices are similar and to what extent they differ from its partner Kumamoto Sanctuary, from the deactivated GARI, from the zoo-type facility Japan Monkey Centre, and from a couple of other institutions outside Japan. Now, we shall briefly address other high performing institutions for chimpanzee research in the world. At the Max-Planck Institute, organization that makes use of the Leipzig Zoo facilities in Germany, research personnel are not required to participate in any ape feeding non-related to experimental purposes; such task is covered by keepers, although research personnel might be welcome to do so occasionally.^{30,31} Furthermore, the feeding system is a combination of scattered and personalized. ³² Prominently different from Japanese institutions, neither keepers nor researchers enter the enclosure in the presence of adult apes.^{33,34} Likewise, at the Edinburgh Zoo in Scotland, where the University of Saint Andrews focuses its research activities in captivity, research personnel only engage in feeding related to experiments. ³⁵ Moreover, the meals are scattered and no barrier-free interactions between humans and chimpanzees occur.³⁶

Perhaps, more closely resembling the infrastructure at PRI is the Yerkes National Primate Research Center, in the United States, which is also a laboratory facility. There, research personnel (mostly research assistants, students, and postdocs) are reported to often attend feeding outside regular research time, due to this being considered "good bonding time with the chimpanzees".³⁷ Nonetheless, husbandry staff is responsible for feeding, while research personnel are an extra in case they show up.³⁸ It should also be noted that, although the schedule varies, experiments are said to often take up one to two hours a day; the same for observation time.³⁹ In practice, when comparing schedules, at Yerkes, personnel's voluntary participation seems to occur under a less constrained time budget. As for the feeding system, it is reported that feeding is scattered due to Yerkes hosting larger groups, yet, at least a portion of the food is individually targeted; from a tower, personnel would call a chimpanzee's name and throw pieces of food.⁴⁰ Finally, at Yerkes, no unbarred face-to-face contact is said to occur.⁴¹

Overall, at these institutions, we observe predominantly a scattered or mixed system, no binding engagement of research personnel in feeding and, more conspicuously, absolutely no unbarred face-to-face interactions with adult chimpanzees. However, it would be misleading to assume that face-to-face practices are restricted to Japanese research. The ape language research of the 70s, which sought to teach apes human language, ^{42,43} is a clear example of face-to-face interaction spanning beyond ape adulthood. Nonetheless, it should also be noted, that although face-to-face interactions with adult bonobos⁴⁴ (Pan Paniscus) and gorillas (Gorilla gorilla)⁴⁵ occur conspicuously, the picture is not so clear for common chimpanzees (Pan troglodytes), as many programs ceased by the time chimpanzees were too dangerous for unbarred encounters. For instance, chimpanzee Washoe, studied by the Gardners was maintained under cross-fostering during only 51 months.⁴⁶ Nim Chimpsky, initially studied by Terrace, moved from one institution to another during maturity.⁴⁷ Chimpanzee Sarah, studied by the Premacks, had to be separated from humans after reaching maturity, although it is true she was said to be a particularly difficult chimpanzee.⁴⁸ In other words, if face-to-face practices with common chimpanzees are not restricted to Japanese research, it seems that is in Japanese research where they are observed in their most extreme form, that is, during chimpanzees' adulthood.

Overall, elements of the philosophy and practices structuring chimpanzee care and research at PRI appear on other research sites to a lesser (Western facilities) or a greater extent (Japanese facilities), and when taken individually, none of them seem completely unique to the Institute. However, such skeleton should be taken in its entirety and in conjunction with other practices revolving caretaking and research, such as linguistic usages to refer to chimpanzees, power relations affecting human-chimpanzee interaction, the assessment of chimpanzees' perspective, the views on chimpanzees' life and death, to name a few points that shall be later explored. When these elements interact together, they present us a powerful and particular model of chimpanzee research and caretaking.

Unlike most institutions, at the Primate Research Institute, research personnel are expected to actively participate in many duties traditionally allocated to keepers. By research personnel it is understood researchers, that is, professors, post-docs and graduate students who are experimenters, and research assistants, also referred to as technicians. Furthermore, this category composes the section of Language and Intelligence, whereas keepers work under the Center for Human Evolution Modeling Research. Thus, these professional categories are separated on an institutional and practical level. The most striking duty research personnel take upon is feeding, however, some other tasks are also performed along with keepers, be it occasionally or in parallel. Below, readers will find a comparative table summarizing the main duties of each category (Table 1), and a table providing a description of the duties (Table 2). The tables have as main reference the laboratory work conducted at South Play Room, laboratory where Matsuzawa bases his research activities.

Overview of Duties by Personnel				
	Scientists	Technicians	Keepers	
Experiment – Chimp. Calling	X	X		
Experiment – Assistance	Х	X		
Experiment – Execution	Х			
Experiment – Analyses	Х			
Experiment – Cleaning	Х	X		
Scientific Presentations	X	X	X	
Husbandry – Chimp. Calling			X	
Basement Cleaning			X	
Daily Health Check-up	Х	X	X	
Enrichment Duties	X	X	X	
Feeding Duties	X	X	X	

Table 1 Comparing duties by chimpanzee personnel at PRI.

Duty Description			
Experiment	Guidance of chimpanzees into and out of the laboratory		
Chimp. Calling			
Experiment Assistance	Refilling the feeder; preparing rewards and food for feeder; giving chimpanzees rewards; preparing cameras; etc.		
Experiment Execution	Computer manipulation; exchanges with chimpanzees for experimental purposes (e.g., objects)		
Experiment Analyses	Processing of the data from experiments; analyses		
Experiment Cleaning	Cleaning of the booths after chimpanzee use		
Scientific Presentations	Presentations in meetings on behavioral data and/or animal welfare (oral or poster)		
Husbandry Chimp. Calling	Guidance of chimpanzees into and out of the basement for husbandry purposes (health, management, feeding, etc.)		
Basement Cleaning	Cleaning of the chimpanzee basement rooms and enclosures		
Daily Health Check-up	Measurement of female estrus size, administration of regular medication (e.g., pills); Technicians and scientists are expected to report any visible alterations in chimpanzees' health		
Enrichment Duties	Daily enrichment (e.g., food distribution into enrichment tools); occasional enrichment (e.g., planting trees)		
Feeding Duties	Providing breakfast, lunch, dinner and snacks outside experiments; Preparing food		

Table 2 Description of chimpanzee personnel's duties at PRI.

There are two important points of overlap between the duties of keepers and research personnel: the calling and the feeding. Regarding the calling activity, as it has been discussed previously (see architecture of dangerous interactions), chimpanzees inhabit outdoor compounds and are called into the basement and into the laboratories by their names. This activity can be quite time-consuming because it mainly depends on chimpanzees' motivation to come, given that they are not forced to participate in experiments or to join humans in the basement. The three

professional categories work together to accomplish this activity, although some division of labor occurs. Keepers' main objective is to call chimpanzees from the outdoors into the basement (and vice-versa), the place where chimpanzees are fed, including the chimpanzees that do not partake in experiments. This has been referred to as "husbandry – chimp. calling" on Table 1 and Table 2. On the other hand, researchers and technicians work together to bring the chimpanzees into the basement as well, however, their focus is on accompanying the chimpanzee(s) participating in experiments; passing by the basement is a required step for reaching the laboratories (i.e., "experiment – chimp calling").

The calling into and out of the laboratories is done by both the experimenter and the technician(s). Especially in the mornings, experimenters and technicians call chimpanzees together until they arrive in the room right next to the laboratory. Then personnel split. In South Play Room, a tunnel connects the basement to the first floor, so one person, usually the experimenter, stands inside the laboratory to receive the chimpanzee (open doors, etc.) while the other sends him or her off. Furthermore, after the first session in the morning and in the afternoon, the technician is the one to bring the chimpanzees in and out of the laboratory while the experimenter receives and sends off the newcomers. Overall, the calling activity is conducted by all three professional categories, although the immediate objectives may differ and some division of labor is seen.

Note that keepers do not participate in the calling of chimpanzees into and out of the laboratory; thus, researchers and technicians need to sustain a quite good relationship with chimpanzees to make this process smoother. In other words, research personnel must not rely on the keepers' social experience with chimpanzees; they are "on their own". This is when the second point of overlap with keepers' duties comes to play. Feeding that is non-related to experiments is considered of major importance in order to strengthen ties with chimpanzees, yet, elsewhere this is an activity traditionally allocated to keepers. Building up a good relationship with chimpanzees has multifold purposes; it allows research personnel to effectively bring chimpanzees in and out the laboratories, but it also supports the social negotiation required for the conduction of experiments. Thus, feeding is highly regarded as a key activity for this purpose, although the intensity of feeding duty is sometimes called into question. At PRI, as we shall see, the major stakes rely on research personnel.

At this point, one may ask why feeding is important in human-chimpanzee relationship in captivity. Regarding PRI, the first reason why feeding is considered central is due to the context

in which a human provides helpful, essential care for chimpanzees, who come to acknowledge the human as a provider; a not far-fetched assumption. For instance, whenever humans spot a wound, the chimpanzee is asked (though husbandry commands) to show the spot. Yet, they do not always receive a treat after complying with the request, meaning, they are not always positively reinforced for it. Once, Pendesa was said to have spontaneously shown a wound on her hand to humans around, a behavior that made some researchers wonder whether she was not calling humans' attention to her care rather than a simple act of positive reinforcement. Chimpanzees' acceptance to humans can vary greatly. In addition, they vary regarding which task they accept a human to do. For example, a person to whom no agonistic behaviors are shown while manipulating the automatic feeder, might face banging, spitting and other not so friendly attitudes when trying to conduct an experiment. In this context, feeding aids building a positive relationship, that is, a relationship where affiliative behaviors increase and agonistic behaviors decrease.

Moreover, feeding is considered important because during this activity relationships are tested; there is nothing more dangerous than having a chimpanzee's desired food item in possession, especially when the chimpanzee knows to whom the item belongs. During feeding, a non-accepting chimpanzee will show agonistic behaviors toward the feeder, although chimpanzees, like Ayumu, may continue to do so with familiar humans, only to a lesser extent. Newcomers to feeding always start with amenable chimpanzees like the Puchi and Popo pair. Moreover, in feeding, much negotiation occurs. Because personnel are instructed not to deliver all food at once but item by item, some chimpanzees may even hide food to proceed to the next treat. Pendesa, for instance, has been spotted hiding unwanted food behind her back or discarding items by passing them through the gap between her room and that of her companion Mari. Thus, feeding chimpanzees is not as straightforward as it might appear, and the activity involves interspecies social skills and substantial knowledge on what is safe or not to do. Such situations act as a clear means to assess where one's relationship stands.

At last, personalized feeding duty is translated into considerable time spent with chimpanzees in a barriered but face-to-face manner. The quality of the relationship is important but time is also vital; a good, stable relationship with a chimpanzee is not built over a single feeding instance of ten minutes. On this day a chimpanzee or a human might have acted particularly friendly, but is it always the case? Consistency is important for both humans and chimpanzees. At PRI, research personnel spend considerable time with chimpanzees outside the context of

experiments, a practice that, as stressed, differs from several institutions of chimpanzee research worldwide.^{III} In addition, when research personnel are considered, feeding duty, even though tacitly expected, is voluntary, and so the level of commitment shown by personnel is extremely high. Next, we shall see how time spent with chimpanzees and engagement level are concretely reflected into personnel's schedules, and how the holistic philosophy is translated into blurred boundaries across professional categories and increased interaction time outside experiment-related tasks.

In order to better understand human-chimpanzee relationship at PRI and the dynamics personalized feeding under the perspective of research personnel, I have conducted a quantitative analysis of time spent with chimpanzees during feeding. Four studies constitute the material: Feeding Duty Study 1 assesses the total amount of time that research personnel spend per month with chimpanzees during feeding, whereas Feeding Duty Study 2 and Feeding Duty Study 3 investigate the commitment level that research personnel display by tackling, consecutively, the total time spent with chimpanzees in feeding during leave days and the percentage of leave days on feeding duty. It is important to notice that feeding during weekends and holidays is done only by research personnel not by keepers, and this activity is voluntary, albeit expected. This fact motivated further investigation, addressed in the two later studies. However, in order to put all three studies in context, a last study, Feeding Duty Study 4, was conducted to compare the roles of research personnel and keepers in feeding duty.

Regarding data collection and study design, the data were assembled from all the chimpanzee feeding duty schedules pertaining to the section of Language and Intelligence in the year of 2015 and were analyzed with SPSS®24. Additional clarifications were provided by several participants.^{IV} To comply with the time frame and purpose of this etho-ethnography, only participants who took part in laboratory experiments with chimpanzees during 2015 were included; the part-time helpers in the feeding duty were not included because these were not related to the chimpanzee experimental research. One outlier has been eliminated as, after further inspection, it did not comply with the selection criteria and, therefore, was not representative. Apart from this

^{III} Cristopher Krupenye brought to my attention that the situation might differ in monkey research in laboratories, where graduate students might be responsible for feeding.

^{IV} I am indebted to Kawakami Fumito, Hayashi Misato, Chloé Gonseth, Duncan Wilson, and, indirectly, to Fujimori Yui and Ichino Etsuko for having answered my questions thoroughly and/or having provided missing parts of the feeding duty schedules for the purpose of these studies.

exception, the data represent all those regularly and fully involved in chimpanzee feeding in 2015 (in sum, Professor = 4; Student = 5; Technician = 2; Postdoc = 2).

For each member, an individual mean was calculated based on the full schedule for 2015. However, months of absence/departure, that is, months with no data points (or "ghost months") were not taken into so that the group mean would not be dropped unrealistically. Thus, the individual means were calculated proportionally. Weekends and holidays were included in the analyses (i.e., "leave days"). Holidays consisted of national holidays and PRI closing days in 2015, in accordance with the label for holidays in the feeding schedules. When a holiday fell on a weekend, it was not double-counted. During the meeting of the Primate Society of Japan, keepers took over the duty (n = 2 or 1.5% of total holidays in a year).

As for the schedule structure, feeding occurs in two places; in the basement where twelve chimpanzees are fed in individual rooms, and on the first floor, where the handicapped chimpanzee Reo is fed. Thus, basement feeding and Reo's feeding cannot occur at the same time. The time slots analyzed were breakfast, lunch and dinner for twelve chimpanzees in the basement and Reo; on weekdays and on leave days. This amounted to12 slots across January to December 2015 (for reference, see Table 3 in Feeding Study 4). Snack-time by keepers and food given during the experiments were not considered. It has been reported that in 2015 keepers gave snacks twice a day, however, because this was done as scatter feeding it has not been included, since only personalized feeding is being analyzed due to its role in human-chimpanzee relationship. On the other hand, snacks given by keepers twice a day but in personalized style were disregarded as well. The main reason for this choice lies in the fact that research personnel feed chimpanzees during the experiments as well; not only as positive reinforcement after correct answers, which directly relates to the necessities of the experiment, but also as a means to keep chimpanzees motivated. This last mode of feeding chimpanzees may fall within the category "snack". Therefore, in order to keep equanimity and consistency, only major meals were compared on the three studies.

In regards to the amount of time allocated to each feeding duty slot, the studies followed mostly what was stated in the official schedules. However, in the absence of precision in a schedule, time was estimated according to information from participants. When the same person had overlapping duties (i.e., feeding Reo and chimpanzees in the basement) the largest slot was counted and smallest slot was not summed up so as not to increase the means unrealistically. It is important to notice that the time spent preparing food in the basement was excluded, whereas preparation

time for Reo was maintained. This decision was based on the fact that, in the basement, preparation time is spent in the kitchen, away from chimpanzees, whereas in Reo's case it is prepared *in locu*, as supported by regular participant observation. Therefore, because the goal of the study was to account for human-chimpanzee interaction, the results report the average time in which research personnel are potentially in the presence of chimpanzees and not the total time worked in care.

In Feeding Duty Study 1, in order to understand how much time research personnel invest in personalized feeding and the differences within this group, the total amount of time potentially spent with chimpanzees in feeding was calculated. This total amount refers to minutes spent per month on average, calculated from all months worked in 2015 ("ghost months" excluded). A oneway ANOVA was conducted and personnel were classified into four groups: professor (n = 4), student (n = 5), technician (n = 2) and postdoc (n = 2). Data were normally distributed as assessed by visual inspection of normality plots (probability and quantile-quantile plot) and by Shapiro-Wilk's test (p = .2). There was no homogeneity of variances, as assessed by Levene's test (p = .306). Time spent per month was statistically significantly different across groups, F(3, 9) = 18.780, p < .001. The data are presented as mean \pm standard deviation: time increased from professor (M =277, SD = 49.8) to postdoc (M = 924, SD = 256), to student (M = 1,194, SD = 293) and to technician (M = 1,545, SD = 180), in that order. Tukey post hoc analysis revealed that the mean increase from professor to postdoc (647, 95% CI [42.9, 1,250]) was significant (p = .036), as well as the increase from professor to student (917, 95% CI [449, 1,384], p = .001) and professor to technician (1267, 95% CI [664, 1,871], p < .001), but no significant difference was found among the postdoc, student and technician groups (Graph 1).



Graph 1 Feeding Duty Study 1, time spent per month with chimpanzees during feeding.

As postdoc, student and technician did not significantly differ from each other, they were clustered to summarize the data (Graph 2). A one-way ANOVA was run to precise the significance level when the above-mentioned categories are conflated. Data were normally distributed as assessed by visual inspection of normality plots (probability and quantile-quantile plot) and by Shapiro-Wilk's test (p = .127). However, homogeneity of variances was violated, as assessed by visual inspection of the residual plot and by Levene's test (p = .031). Because the equal variance assumption was violated but not normality, a Welch's ANOVA was conducted, Welch's F(1, 8.814) = 71.859, reaching a significance level of < .001. In conclusion, potentially, professors spend on average 4h37m and postdocs, students and technicians 20h12m per month with chimpanzees during feeding.



Graph 2 Feeding Duty Study 1, summary of time spent per month with chimpanzees during feeding.

In Feeding Duty Study 2, in order to assess the research personnel's engagement level in a quantitative manner, it was taken as proxy the time spent (per month) with chimpanzees in feeding during leave days. By leave days, it is understood weekends and holidays; holidays overlapping with a weekend were not counted and ghost months were excluded. Furthermore, the groups were the same as in the previous study. A one-way ANOVA was conducted to investigate whether there was a significant difference in at least one of the groups. However, the assumptions of normality (Shapiro-Wilk [p = .009]) and equal variance (Levene [p = .002]) were not met. Thus, a Kruskal Wallis H test was conducted.

In this study, the significance level reported is the asymptotic sig, which is corrected for ties. Moreover, given that the shape of the distributions was not similar, mean ranks instead of medians are reported. The mean rank for professor (M = 3.25), postdoc (M = 7.25), student (M = 8.60) and technician (M = 10) were not statistically significant, H(3) = 5.788, p = .122. The graph bellow (Graph 3) was plotted according to mean minutes per month, as this is likely more informative than visual information on mean ranks. The group mean for all 4 groups is 427 minutes on average or approximately 7h12m per month spent with chimpanzees in feeding during

weekends and holidays. In sum, professors, post-docs, students and technicians do not significantly differ regarding time spent during leave days.





Graph 3 Feeding Duty Study 2, time spent per month with chimpanzees during feeding on leave days.

In Feeding Duty Study 3, in order to complement the previous analyses, another aspect of feeding was investigated, that is, the leave days on duty in relation to the total leave days within all months worked in 2015. The groups were the same as all the above-mentioned studies. By design, "ghost months" with no data points were excluded (i.e., departure from the Institute or vacation); the data were calculated relative to the period the person was present in at least one duty slot in a month. They are, therefore, relative and not absolute, in which case, the total number of leave days in a year would have been taken into account.^V Furthermore, these studies are designed to investigate potential interactions (consequently, relative proportions) and they are not intended to reflect a sociology of labor strictly speaking (to which absolute proportions would be the most

^V N.B., 46% were present in at least one slot in a month across all months within a year, in other words, they had their scores calculated according to the total number of leave days in 12 months, overlapping relative and absolute scores.

appropriate). In other words, Study 3 presents the percentage of the total leave days engaged on feeding duty in the months research personnel were actually present at PRI.

A one-way ANOVA was conducted to determine whether at least one of the mean percentages of the groups differed. However, the assumptions of normality (Shapiro-Wilk [p = .016]) and equal variance (Levene [p = .016] as well) were not met. Thus, a Kruskal Wallis H test was conducted. In this study, the significance level reported is the asymptotic sig, which is corrected for ties. Moreover, given that the shape of the distributions was not similar, mean ranks instead of medians are reported. The mean rank for professor (M = 3.63), student (M = 7.70), postdoc (M = 9.50), and technician (M = 9.50) were not statistically significant, H(3) = 4.895, p = .180. Again, as in Study 2, the graph below (Graph 4) was plotted according to mean minutes per month, as this is likely more informative than visual information on mean ranks. The group mean of all four groups was 24.55%, that is, when research personnel are at PRI, they spend on average approximately 25% of their leave days on feeding duty.



Graph 4 Feeding Duty Study 3, percentage of total leave days on feeding duty when in PRI.

Altogether Study 1, 2 and 3 indicate that (a) postdocs, graduate students and technicians spend, on average, 20h12m per month in potential interaction with chimpanzees during feeding, while professors spend 4h37m per month on average; weekdays, weekends and holidays comprised (b) during months of presence in PRI, professors, postdocs, graduate students and technicians spend all, on average, 7h12m per month of their leave (weekends and holidays) in potential interaction with chimpanzees during feeding (c) during months of presence in PRI, in 25% of their leave days, professors, postdocs, graduate students and technicians are recruited to be on feeding duty. Furthermore, these data do not represent the amount of time worked in chimpanzee care, which is higher, but the potential amount of time spent with human-chimpanzee interaction during feeding.

Although quite comprehensive, the three studies had some limitations. First, they only reflect a snapshot of the dynamics of personalized feeding in the time frame of this ethoethnography, reason why they must be complemented and interpreted in the light of qualitative data. The second limitation consists in the fact that these studies represent a rough approximation of the interaction time with chimpanzees (thus, the use of the word "potential"). The actual interaction time on a microscopic level (i.e., recording each minute spent in front of chimpanzees) was not a method sought. This was based on the consideration that, in socio-anthropological terms, it might be regarded as too invasive. Besides, this procedure would require an unrealistic observation time to reach the same number of participants. Yet, I deem that for the purpose of investigating this sociological practice, no such microscopic level of precision is required, and the method used, despite imprecise, appears accurate, that is, it measures what we seek to observe.

At last, in order to estimate the roles of research personnel and keepers in the feeding duty, a final study, that is, **Feeding Duty Study 4** was conducted. No data from keepers were readily available for a direct comparison, thus, as proxy, I have assessed which professional category was assigned to which duty slot. The official schedules are distributed according to three main categories: professors; students, technicians and postdocs (hereafter, STP); and keepers. Twelve slots composed the schedules (*vide* Table 3 Basement – breakfast, lunch, dinner on weekdays and weekends; Reo's North Play Room – breakfast, lunch, dinner on weekdays and weekends).

Feeding Duty for Main Meals				
Weekdays				
	12 Chimpanzees	Reo		
Breakfast	1 Student, Postdoc or Technician ≅ 30m	1 Student, Postdoc or Technician \cong 30m		
Lunch	3 to 5 Keepers NG	1 Student, Postdoc, Technician or Keeper ≅ 1h30		
Dinner	2 People (St./Postdoc/Technician) + 2 to 3 Keepers ≅ 1h30	1 Keeper NG		
Weekends and Holidays				
	12 Chimpanzees	Reo		
Breakfast	1 Student, Postdoc or Technician ≅ 30m	1 Student, Postdoc or Technician ≅ 30m		
Lunch (overlap)	2 People (St./ Postdoc/Technician) + 1 Professor ≅ 30m	1 Student, Postdoc, Technician or Professor ≅ 1h30m		
Dinner (overlap)	2 People (St./ Postdoc/Technician) + 1 Professor ≅ 1h30m	1 Student, Postdoc, Technician or Professor ≅ 1h30m		
Obs:	Preparation time in the kitchen excluded for the 12 chimpanzees' feeding; preparation time in Reo's room is maintained in Reo's schedule; when the same person had overlapping duties in the same slot, only the largest was counted.			

Table 3 Summary of feeding duty by slot, profession and time.

First, consider the exclusive responsibility for slots, that is, when a professional category does not take turns with another to fill in the slot, and recruitment for duty is exclusive to a single category. Comparing the total number of slots, keepers were exclusively in charge of 2 slots (i.e., basement lunch on weekdays; and Reo's dinner on weekdays) and STP of 4 slots (i.e., Reo's and basement breakfast on weekdays and weekends) while the category professor was never exclusively in charge of a slot; a professor might feed a chimpanzee (Reo) alone, but the category will take turns with STP to meet this demand. In sum, keepers were exclusively in charge of nearly 17% of the total slots, STP of 33% and professors of 0%.

However, let's now consider, as a second point, how slots are distributed in total, including taking turns with other categories to fill in a slot and sharing a slot with other categories at the same time. According to this criterion, keepers might be assigned to up to 4 slots (i.e., being exclusive for basement lunch on weekdays and Reo's dinner on weekdays; taking turns for Reo's lunch during weekdays; and necessarily sharing the slot with STP for basement dinner on weekdays). Professors might be assigned to up to 4 slots (i.e., taking turns with STP for Reo's lunch and dinner on weekends; and necessarily sharing the slot with STP for basement lunch and dinner on weekends). STP might be assigned to up to 10 slots (4 breakfasts; 3 lunches; 3 dinners). In other words, when considering professional categories, STP are mostly responsible for feeding duty. Moreover, the category professor and keeper are responsible for the same amount of charge for chimpanzees' main meals. In sum, keepers and professors might appear in up to 33% of the slots, whereas STP might appear in up to 83%.^{VI}

On the other hand, in order to refine this short analysis, a third point becomes of interest; the within-group distribution inside each slot. In 2015, the category professor was composed of 4 people distributed across 4 slots, each slot requiring one professor at a time (i.e., 1 head each in the basement for lunch and dinner on weekends, sharing with STP; 1 head each in Reo's feeding for lunch and dinner on weekends, alternating with STP). Then, in the category keeper, there were 6 members distributed across 4 slots. These 4 slots required, in total, the presence of minimally 7 keepers and maximally 10 keepers to fulfill the slots (i.e., 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for lunch alternating with STP; 1 head in Reo's for dinner during weekdays, exclusively; 2 to 3 heads in the basement

^{VI} N.B., the total number of slots is twelve, however, because each of them is differentially subdivided across, and assignment of a professional category might vary within the slots, the percentage of slots in which categories appear will not add up to compose 100%.

for dinner on weekdays sharing with STP; 3 to 5 heads in the basement for lunch on weekdays, exclusively).

In the category students, technicians and postdocs (STP), the participants meeting the criteria of the feeding duty studies were maximally 9 and minimally 6 (some departed the Institute at some point in the year 2015). The number of slots to which STP might be assigned is 10 (4 breakfasts; 3 lunches; 3 dinners), requiring a total of 13 "heads" to fulfill the slots (i.e., 1 head each in the basement for Reo's breakfast, necessarily; 1 head in Reo's for lunch on weekdays alternating with keepers; 2 heads in the basement for dinner, sharing with keepers on weekdays; 1 head each in Reo's feeding and in the basement for breakfast on weekends, necessarily; 2 heads each for lunch and dinner in the basement on weekends, sharing with professors; 1 head each in Reo's lunch and dinner on weekends, alternating with professors).

When comparing ratios of the number of existing members and the number of heads required to fill all duty slots for the category, if the number of actual members is lower than the number of members required, then participants are expected to engage more. When comparing ratios in the best possible conditions, that is, increased number of participants and lowest number of required members, then we encounter: professors 4:4; keepers 6:7; and STP 9:13. In the worst condition, we find for professors a ratio of 4:4, for keepers 6:10, and for STP 6:13. In any of these two conditions, none of the ratios are comparatively equal, meaning that there is a variation across categories in how often an individual is called for duty, due to the differences in the relationship between the number of members and number of requests across all three units. Increasingly, it seems that professors, then keepers, and finally, STP are more requested.

When taken together, the analyses point out that (a) STP bear most of the exclusive duty slots (33%), with a decrease followed by keepers (approx. 17%) and then professors (0%) (b) STP might appear in up to 83% of the slots, whereas keepers and professors are equally mobilized in up to 33% of the slots (c) within each category, STP members are requested more often, following a decrease in the keeper's category and then in the professors'. The differences and similarities among students, technicians, postdocs and professors' duties have already been well assessed by the previous studies (Study 1, 2 and 3). However, this study attempted to place such findings in the bigger context of PRI personnel.

Caution is, however, recommended due to the limitations of the study. This study is but a rough estimation of the amount of time keepers spend in feeding duties. Furthermore, it is also
important to notice that some variation in the schedule occurs, since a keeper would occasionally give breakfast to chimpanzees that do not participate in the experiment in case they did not come to the basement before experiments started. Nonetheless, even though the study may not quantitatively and accurately depict feeding duty hours for direct comparison with research personnel, they do point to a clear contrast, at least in terms of research personnel (as of students, technicians and post-docs) and keepers. It remains to assess the exact differences in the role that professors and keepers play, as both categories seem to match, to a great extent.

After having explored all four studies, the first conspicuous point is that postdocs, graduate students and technicians spend considerably more time per month with chimpanzees during feeding in comparison to professors. However, qualitative information on chimpanzee feeding aids at interpreting such results in a diachronic manner; professors have had an increased amount of interaction during feeding in the past, either as postdoctoral researchers or as graduate students.⁴⁹ If feeding supports the construction and maintenance of a good relationship with chimpanzees, "newcomers" are then expected to spend considerably more time with chimpanzees (approx. 20h/month) than those who already have a long history built up (approx. 4h30m/month). On a quantitative scale, the philosophy of building up a good relationship with chimpanzees is then reflected in additional twenty hours per month of interaction with chimpanzees in a feeding context, on the top of interaction hours during experiments. Thus, each graduate student, postdoc and research assistant is expected to set this time apart for this type of caretaking.

The second interesting point of these studies is that professors and other research personnel did not significantly differ neither in the number of hours dedicated to feeding during weekends and holidays nor in the percentage of leave days in which they are recruited. For a voluntary activity, the commitment level of all research personnel is high, translated into being recruited for feeding nearly 25% of the leave days during months one is not fully away from Inuyama city. Curiously, not only in English but also in Japanese the word employed in the schedules is "duty", or "tōban" (当番). The holistic philosophy that blurs the boundaries between keepers' duties and research personnel's duties is reflected into a high level of engagement on the part of researchers and alike.

The third important point is the difference in keepers' participation in feeding duty, in comparison to students, technicians and postdocs. If elsewhere worldwide keepers are traditionally allocated to feeding as main function, at PRI research personnel take up the biggest share of this

role. Moreover, although further investigations are needed, keepers and professors' role seem surprisingly similar, even when keepers are likely recruited more often than researchers.

There are still some points to be made regarding the perception of this practice by participants. As already mentioned, this activity is voluntary for research personnel but not for keepers. Yet, voluntary work is what composes the schedule on weekends and holidays. During the course of this ethnography, never has an interlocutor doubted the importance of the practice. However, the intensity with which it is practiced has been occasionally called into question. As this was not a study in sociology of labor, at this point, it is worth emphasizing that, for instance, a participant on duty during a weekend might have a great part of the day blocked if his or her turn is divided into more than one slot (e.g., breakfast and dinner). Moreover, duties on weekends mean that, in general, research personnel need to call chimpanzees into the basement area,⁵⁰ a time-consuming task.

Therefore, when the bigger picture is considered, caretaking work is higher than the actual interaction time with chimpanzees. Some interlocutors mention a few points of concern, however, two are recurrent: (a) the unequal distribution of work between keepers and research personnel, given that the latter are the sole responsible for feeding during weekends and holidays (b) the preoccupation that increased caretaking duties consume precious time of scientific work, which is pushed more and more to the end of the day, since the conduction of experiments might take an experimenter's full working hours. All things considered, when viewed under this perspective, PRI's holistic philosophy requires a deep commitment on the part of research personnel. Whereas this commitment is positively valued, its intensity is subject to debate.

At this point, readers from different academic backgrounds might still question what the inclusion of such quantitative studies brings to the bigger ethnographic picture given that such composition is not traditionally observed in ethnographies. In fact, the role of quantitative studies is, here, understood as complementary to qualitative analyses as in a feedback loop. The quantitative aspect is informed by qualitatively vital issues, yet, it refines those and inspires further qualitative investigations.

First, we were able to pinpoint in a very concrete manner the most important factor in human-chimpanzee relation as perceived by interlocutors, namely, interaction time with chimpanzees in a feeding context. Thus, the studies *per se* were informed by ethnographically crucial issues and covered all the relevant population. Being able to measure this specific factor

provides us a clear picture of how much time is actually dedicated to this practice, or, in other words, what "time" really means, especially given that what interlocutors bring to light is directly quantifiable.

Moreover, such "interaction-time design" makes possible to compare these results with other future research sites in a very concrete, achievable manner, in order to look for patterns of interaction and idiosyncrasies across sites. In such design (elaborated specifically for this manuscript), we do not need to record in presence every single interaction during feeding. This would take several researchers and a yearlong to follow all personnel and to cover the relevant population. Instead, we are able to count on available schedules that are then adjusted in an ethnographically-informed manner to account for the most likely time-range of interactions. Such design even makes possible to conduct historical investigations. In other words, a quantitative study of this sort is (a) meaningful (b) feasible (c) supportive of comparative efforts across sites (d) synchronic and diachronic.

Secondly, we were able to inspect another facet considered ethnographically important, that is, the division of labor. Such design allowed a fine-grained treatment of this factor, and we could observe differences within research personnel, and between them and keepers. The choice of analysis by profession was not meant to simply bring superfluous details because, as we have observed, the way labor is organized is one of the vital elements structuring chimpanzee care and research philosophy. Whereas the division of labor is stricter elsewhere, the hybridization of the professional roles at PRI changes the way through which research personnel cares for chimpanzees and how they make science of them. This is mainly the reason why we have systematically explored "who does what" at PRI.

The blurring of the traditional division of labor indicates the strong need for not bracketing off the social relations as a realm inhabited by keepers and the scientific, protocoled interactions as a realm inhabited by researchers. In addition, here, the quantitative level offers us a picture not foreseen by qualitative analyses, or the fact that the hybridization of professional roles is even higher than expected. When researchers from humanities carefully make use of quantitative studies and re-design them for their own ethnographic purposes, then, the measurement of phenomena has a lot to provide to ethnographic accounts.

3.2 Computer and Face-to-Face Settings

After having explored the philosophy and the structuring practices surrounding chimpanzee care and research at PRI, we shall now investigate the points emphasized by actors when introducing their activities to third parties. It has already been mentioned that Matsuzawa's laboratory receives regular visits from filming crews from several TV channels, including Japan's national public broadcasting company, the NHK. Yet, even though PRI members participate in shaping the content of such programs,¹ a material that is entirely produced by researchers is likely to provide valuable insight into how actors perceive their own activities, or which features they wish to promote. Chimpanzee research at PRI is promoted by members themselves through a series of media. The website "Ai and her friends", is abundant, featuring not only the latest publications, but also photos, chimpanzees' drawings, a rich number of videos, and detailed information on each chimpanzee member, along with other materials. ² In addition, the YouTube channel "TheFriendsAndAi" (*sic*) provides viewers with a vast array of videos, and as of 2017, it has reached more than a thousand subscribers.³

A video clip prepared for the meeting of the American Association for the Advancement of Science (the AAAS) is revealing of the points that researchers wish to highlight, figuring as the most popular video on the website "Ai and her friends".⁴ The 2013 video "symbolic representation and working memory in chimpanzees" features what perhaps has become PRI's most popular experiment in chimpanzee research, due to the simplicity and powerfulness with which it is capable of catching humans off guard. The chimpanzee who performs the trials is Ai's son, Ayumu, who lived up to his mother's reputation from early age and was the participant with the most "legendary" performance in such experiments. His performance has even been evoked in a documentary about the Nonhuman Rights Project, an organization which seeks to give chimpanzees and other cognitively complex animals the legal status of persons.^{5,6} On the internet, surprisingly, Ayumu has gained his own memory game, "Ayumu's game", where humans can test whether their performances can beat his.⁷

The above-mentioned video is reproduced in Audiovisual Material 1 and Video Frame 1. While chimpanzees are performing experiments, the video teases the viewers with the following subtitles: "Do we underestimate chimpanzees? Do we overestimate ourselves? See for yourself. Ai and Ayumu". The camera cuts to show a panoramic view of Inuyama city: "Historical city Inuyama, central Japan. The Primate Research Institute of Kyoto University." Next, the footage shows where chimpanzees live: "14 chimpanzees live in an outdoor compound, designed to be like an African forest. Ai and her son Ayumu live here." The scenery changes to both chimpanzees entering the South Play Room, Matsuzawa's laboratory: "Each day they come to the laboratory by choice to take part in cognitive research. Each chimpanzee uses a different screen." Now, the footage zooms into Ai performing kanji-color tasks: "Ai touches the kanji representing the color shown. She can also do the opposite task matching color to kanji." The camera switches briefly to Matsuzawa writing on his notebook: "Tasks are run and recorded automatically."

Afterward, zooming into Ayumu performing tasks, the caption explains: "Ayumu has learned the sequence of numerals 1-19. We tested his working memory. When the first numeral is touched... the others are masked. He touches the correct order from memory. In a more difficult task, numerals are masked automatically at 210 ms. This task is so challenging that sometimes he loses concentration". Ayumu is then seen looking aside several times. In the last event, he starts the trial and, subsequently, numerals are masked but he turns his back to the screen. When he resumes the task, the caption continues: "but he still remembers the correct order." Next, the movie shows Ai and Matsuzawa's face-to-face interaction: "Trust between researchers and chimpanzees is fundamental." The video concludes, displaying once again the outdoor compound, with a zoom in Ayumu and Ai: "Although Ayumu is the best at these memory tasks, other chimpanzees here can also succeed. Chimpanzees are so similar to us but not the same. Knowing the chimpanzee mind illuminates the human mind.









56s



1m44s



2m18s



3m42s



32s



1m16s



2m14s



3m37s



Video Frame 1 Video presentation of chimpanzee research at PRI. From Audiovisual Material 1. Audiovisual Material 1 Video presentation of chimpanzee research at PRI, 4m50s. KUPRI (2013).⁸

The video highlights many of the points important for interlocutors of chimpanzee research at PRI, which have so far been explored in this manuscript: simulation of nature, trust, voluntary participation of chimpanzees, objectivity of the experimental interface, and chimpanzees as outgroup to understand human mind. However, the strongest message of the video is how chimpanzees' abilities might "decenter" humans' perception of our own abilities and that of our closest evolutionary relatives. Whoever watches Ayumu's disconcerting performance, will quickly notice that any non-trained human will miserably fail at catching up with the animal. Yet, the virtue in question is not exactly a physical one; it might not be surprising that an animal might see, hear or smell better than a human, or be faster and stronger. But can an animal really be *smarter* than us? Can a chimpanzee's test performance decenter the perception of human cognitive abilities?

The experiment above investigated a specific cognitive competence: working memory using as means symbolic representation of numbers. In a simple way, working memory can be defined as "memory as it is used to plan and carry out behavior".⁹ As for symbols, in the usage of cognitive sciences, the most basic way in which they are conceptualized is to consider that "a

symbol is something that someone intends to represent something other than itself".^{10,11} Chimpanzees at PRI have learned to represent, to some extent, both the ordinal and the cardinal aspects of numbers (e.g., 8 comes after 7 and before 9 *versus* 8 means ******* units).¹² By the end of 2015, chimpanzees had advanced as far as 19 in terms of the ordinal aspect of numbers.

Two types of task were set in place and three mother-infant pairs were tested (Ai and Ayumu; Chloe and Cleo; Pan and Pal) in addition to human participants. After all naïve chimpanzees (i.e., non-experienced) had learned the numeral sequences, a masking task started when youngsters were around five years old.¹³ As we have seen above, in this task, after a chimpanzee touches the first numeral, all others are replaced with a white square so that the individual has to remember which numeral appeared where, and has to choose the next one based on the knowledge of numerical sequence.¹⁴ For instance, if the nonadjacent numerals dispersed on the screen are 1, 8, 6, 5, 3, 9 you should first touch 1, then 3, then 5 and so on.

Moreover, not only the set of numerals but also the location of the numbers was randomized so that chimpanzees would not follow any cues (e.g., as in number 8 always appearing on the bottom right and number 9 on the upper left). All chimpanzees mastered this task but youngsters performed better than their mothers.¹⁵ In addition, the accuracy of the youngsters was within human variation (i.e., spread of humans' data points), with Ayumu's accuracy matching the human average.¹⁶ In regard to chimpanzees' response time, Ayumu, Cleo, and Pal were faster than humans at an accuracy of approximately 80%, 60% and 50%.¹⁷ In sum, in this task, humans were, on average, more correct than Cleo and Pal but both were still better than a poorly performant human, while Ayumu was as good as humans in general.

Afterward, a new test was introduced, the "limited-hold memory task".¹⁸ In this task, whenever chimpanzees touched the regular white circle to start a trial, five numerals appeared during a limited duration, that is, for 650, 430 and 210 milliseconds.¹⁹ Note that, in contrast to the first task, where subjects could look at the screen disposition and only have numerals disappear after touching their first choice, in this new task, the decision was not up to the participant and the stimuli were presented and masked at controlled durations. In the limited-hold memory task, the experimenters, Inoue and Matsuzawa, compared the best mother and younger performer, that is Ai and Ayumu, to nine human participants, all university students.²⁰ Whereas the humans and Ai showed the tendency to perform poorer with a decrease in the duration with which stimuli were presented (i.e., $650 \rightarrow 430 \rightarrow 210$ ms), Ayumu kept his performance regardless; outperforming in

both speed and accuracy.²¹ Interestingly, 210 milliseconds is a timeframe close to human saccadic eye movement, meaning that subjects do not have time to explore the numeral dispositions through eye movement.²²

Matsuzawa compares this ability to eidetic or photographic memory, and considers that "[t]he common ancestor of humans and chimpanzees five to six million years ago may have possessed an extraordinary memory capability. At a certain point in evolution, because of limitations on brain capacity, the human brain may have acquired new functions in parallel with losing others—such as acquiring language while losing visuospatial temporal storage ability".²³ The 2007 study received appraisal but also critique, in particular, the second task in which Ayumu not only performed as good as humans but outperformed our species in terms of speed and accuracy.

In a 2009 study, Silberberg and Kearns contended that Inoue and Matsuzawa's study was methodologically flawed because chimpanzees had many sessions on the limited hold task.²⁴ Indeed, Inoue and Matsuzawa report that for the limited-hold memory task, each session consisted of 50 trials; each chimpanzee received ten sessions while humans received one (i.e., fifty trials).²⁵ Concretely, this means that for condition one at 650 ms chimpanzees had 450 more trials than humans, for condition two at 430 ms they had other 450 more trials, and for 210 ms, again, 450 more. The statistical difference between Ayumu and humans started to be observed from the second condition on, that is, from 430 ms to 210 ms.²⁶

Thus, "to determine whether practice on the limited-hold task elevates human performances to the levels seen in Ayumu", Silberberg and Kearns, two male university professors aged sixty-three and thirty-three years old respectively, tested themselves with the same procedure but with extended practice.²⁷ The two participants/authors used different data collection strategies. One of the participants showed no practice effect due to having to debug their own program, therefore, completing sessions before recording his own data.²⁸ Yet, the other improved over sessions.²⁹ The conditions were 250 ms, 210 ms (like the original), 100 ms and 210 ms again.³⁰ Both were able to match Ayumu, however, the author who had no previous experience before recording his results, reached Ayumu's accuracy rate in approximately 2,500 trials.³¹ They conclude that "the results suggest equivalence of function and capacity between apes and humans on this sensory-memory task".³²

In 2010 the discussion was fueled again. Cook and Wilson contended that Silberberg and Kearns results did not "decisively overturn" Inoue and Matsuzawa's result because Ayumu succeeded with no prior practice in the 210 ms condition, while Silberberg and Kearns trained this condition over and over and so it was necessary to test humans under the same conditions from 650 milliseconds (Inoue and Matsuzawa's first condition). Cook and Wilson teased:³³

Do chimpanzees have better spatial working memory than humans? In a highly publicized study, a juvenile chimpanzee, Ayumu, performed substantially better than university students on memory for digits displayed for 210 msec in a spatial array (...) The authors described these abilities as "extraordinary" and likened them to eidetic (so-called "photographic") memory. The findings were reported by The New York Times, the BBC, NPR, and all four U.S. television networks, as well as in the pages of Science.

Cook and Wilson underwent to test two undergraduate research assistants:³⁴ First, they introduced a phase called "pretest" in which each participant accomplished two blocks of fifty trials at 210s and the first block was eliminated as practice. In the second block, both performed as good as the humans in Inoue and Matsuzawa's study. Then, in the so-called "training phase", humans did sessions at 650ms; 300 blocks of 50 trials. In the posttest at 210ms, humans ran one block of fifty trials for practice, which was discarded, and four test blocks. The authors achieved 94% and 96%. Cook and Wilson considered important to stress that:³⁵ "humans tested by Inoue and Matsuzawa on the training procedure chose to look at the display much longer (sometimes over 7 sec), but were more accurate than the chimpanzees, indicating a speed–accuracy trade-off. Clearly, humans, left to their own devices, would give themselves a training experience different from that chosen by Ayumu." Finally, the critics concluded:³⁶

Our results show that practice with a 650-msec stimulus duration is sufficient to improve task performance at 210 msec without notable prior exposure at the shorter duration and that humans are capable of better performance on this task than even the most talented chimpanzee. In addition, humans can tolerate a delay on this task with no impact on performance, undercutting any claim that Ayumu's ability is extraordinary in this regard.

Now, we shall inspect the details of Cook and Wilson's procedure comparatively. To make it simpler, we shall refer to Inoue and Matsuzawa's paper as "Ayumu's study",³⁷ and the critics, the "professors' study".³⁸ Unless gross misreading of the reports, the conditions and trials are summed up in Table 4 and Table 5. When analyzed comparatively, in any possible condition, the

professors' study seems to grant a considerably higher amount of trials for reaching the chimpanzee's performance. Remember that differences between humans and Ayumu started already at 430ms, the second condition, but when considering 210ms specifically, chimpanzees had an "advantage" of 900 trials prior to being tested at 210ms.

Ayumu's study					
Conditions					
	650ms	430ms	210ms		
Chimpanzees	500 trials	500 trials	500 trials		
Humans	50 trials	50 trials	50 trials		
Difference	450 trials	450 trials	450 trials		
Total \neq before 210ms		900 trials			

Table 4 Summary of limited-hold memory task, after Inoue and Matsuzawa (2007).³⁹

Professors' Study, Human Training				
	Pretest 210 ms	Conditions Training 650ms	Posttest 210ms	
Trials	50 trials practice (discarded) 50 trials test (included)	15,000 trials	50 trials practice (discarded) 200 trials test (included)	
W/o Practice	50 trials at 210ms	15,000 trials at 610ms	200 trials at 210ms	
With Practice	100 trials at 210ms	_	250 trials at 210ms	
Total Exposure		At 210ms: 350 trials At 650ms: 15,000 trials		

Table 5 Summary of limited-hold memory task, after Cook and Wilson (2010).40

Notwithstanding, in the professors' study, humans were given prior exposure to the very condition they intended to be tested upon, conducting a pretest which gave participants up to 100 trials of exposure to 210ms condition. In such case, a between-subjects design should better assess the baseline condition, that is, recruiting other humans to be naïvely tested at 210ms and then comparing results with those that underwent training at 650ms and then 210ms. In addition, in both the pretest and the posttest, trials were discarded as training; again, within the very condition that was critical for the analysis. Regarding the 650ms condition, it amounted to 15,000 trials (300 blocks of 50). These numbers contrast with the 900 trials of "advantage" that Ayumu had in comparison to humans, before consistently maintaining his performance at 210ms.

Inoue and Matsuzawa's publication of 2007 reported the results for the condition where there were five digits distributed around the screen.⁴¹ However, building up on Matsuzawa's more recent report in 2009, which indicated unpublished data where Ayumu was performing at 80% with eight digits, Roberts and Quillinan recruited nearly 170 participants, adopting the task to run online in the form of a game with increased difficulty modes to allow training.⁴² The most difficult condition, the so-called chimp mode consisted of nine digits at 210 milliseconds.⁴³ Some points of the original experimental setting could not be exactly replicated in this study, for instance, the task was run online and participants would "unlock" phases and return to the beginning if the "lives" they accumulated were lost.⁴⁴ However, with a much larger sample size and with the eight and nine digit conditions, humans' performance was still significantly lower than Ayumu's.

Now that we have argued from within cognitive sciences, let us take a step back and discuss from another perspective, a more anthropological one. The type of critiques addressed at "Ayumu's study" misses out one point about training conditions: humans, the species who created the very symbols upon which chimpanzees are being tested, consider largely unequal not to be tested under the same amount of training. Had the task mobilized memory capabilities exclusively in a way in which chimpanzees could have been equally exposed to stimuli, then the objection might have been more grounded. However, the task mobilizes the ordinal aspect of numbers, and in this realm, by and large, humans are at advantage.

Instead, university professors that have had not only a lifelong exposure to numerals but also advanced math, consider that "humans, left to their own devices, would give themselves a training experience different from that chosen by Ayumu".⁴⁵ Under this light, it becomes unclear

which part of this process is not a human "device" in the multiple senses of the word. In this context, by making the number of trials unequal, one is actually making the conditions more equal. This is not to say that Inoue and Matsuzawa's study cannot be criticized. However, the types of critique we address say a lot about our implicit assumptions and our conception of what good science should stand for. Largely, in cognitive sciences, when species differences are assessed, differences in socialization are "the elephant in the room"; to the disadvantage of nonhumans.

After having scrutinized the laboratory's key computerized experiment and its worldwide repercussion, we shall turn to the dynamics of Ai and Matsuzawa's unbarred experiments. Whenever Professor Matsuzawa is in Inuyama, city where the Primate Research Institute is located, he accompanies Ai and Ayumu's session in the South Play Room, his laboratory. Ai and Ayumu's session is the first one in the morning, thus, if calling occurs smoothly, around nine o'clock experiments start. Occasionally, Matsuzawa enters the booth with Ai, an activity known in the laboratory as "face-to-face experiment". This occurs mainly when there are visitors, when Matsuzawa has been absent for a long time, or when there is a specific need for health check training. Over the fourteen months of this etho-ethnography, Matsuzawa has engaged in unbarred face-to-face interactions with Ai once a month on average, although the distribution of the sessions varied greatly due to his fieldtrips and commitments outside Inuyama. Curiously, the denomination "experiment" congregates experiments *strictu sensu* and, in addition, a series of activities, such as play, grooming and health check, which take place conjointly. In what regard experiments *per se*, those consisted of trials (single attempts) of previous studies. In the past, however, face-to-face experiments denoted new studies, systematically conducted in an unbarred form.

In 2015, the regular experiments during face-to-face were block stacking and nesting cups. Both types of experiment stem from child developmental psychology and they are means to assess object manipulation and cognitive development in chimpanzees and human infants.⁴⁶ In the simpler version, block stacking consists of giving the chimpanzee several blocks; the task is to pile them up in a way that they do not fall, although more complicated varieties exist. In the nesting cups task, the chimpanzee is presented with a series of different-sized cups, one slightly smaller than the other, and she or he has to insert one cup into another, observing their sizes. The task ends when all cups have been inserted into the largest one. In studies with human children, three strategies for combining cups have been described: (a) the pairing method, in which a single cup is placed into another (b) the pot method, in which two or more cups are inserted into another but

one by one, and (c) the subassembly method, where two or more cups are picked up as a unit and inserted into another cup or structure at once.⁴⁷ In human development, the subassembly method is considered the most advanced strategy, increasing with age in children.⁴⁸

When Ayumu, Cleo, and Pal were younger, they have been tested with a nesting cups task, along with their mothers. The results report that the three infant chimpanzees rarely showed subassembly strategy, and so did the mothers Chloe and Pan; yet, the adults increased the use of this method after being presented with fewer cups.⁴⁹ On the other hand, Ai, from the start, showed increased use of subassembly (34%).⁵⁰ Note that naïve, non-trained chimpanzees did, in fact, present some subassembly usage, however, the percentage was low (4% infants; 7% Pan and Chloe).⁵¹ These methods mirror a hierarchical complexity in terms of sequential codes that an individual has to fathom, and, therefore, it is likely that chimpanzees with no experience preferred simpler forms due to the cognitive load while combining cups.⁵² The interesting point to notice from such experiments relating object manipulation and developmental processes is that the underlying elements of action have differential loads in terms of how they are processed, even when they are not clear to the bare eye. Thus, something as evident as inserting cups hides complex processes at play to produce a visible, simple action.

Apart from nesting cups and stacking blocks, during face-to-face, Ai would occasionally be asked to draw or paint. Usually, either Matsuzawa would present a series of marker pens, and Ai would choose her favorite color, or Matsuzawa would give her a pen of a certain color. This activity is conducted in an ordered fashion, color by color. In the painting version, Matsuzawa presents her the brush tipped into a paint and Ai carefully paints within the canvas area, usually avoiding brushing the floor. When the chimpanzee is done with a color or when the brush is dry, she gently delivers it back to Matsuzawa. Not only Ai, but other chimpanzees in the past have been given the opportunity to paint extensively. More recently, Pan, during the object categorization task with pencils, occasionally enjoyed doing what has been labeled in the laboratory as "street art", that is, "graffiti" on the booth door. On the other hand, also recently, her daughter Pal, when presented with marker pens but left unattended, preferred to shred the paper and feast on the tip of the pen than to perform any activity resembling an art form, even though in the past her paintings had been aesthetically pleasing to human eyes.

Another curious activity of Ai and Matsuzawa's face-to-face is taking pictures. Typically, this occurs when Ai has finished a masterpiece or when there are visitors. Matsuzawa asks Ai to

pose for the cameras while he holds the canvas. Whenever she looks at him or elsewhere, he points and redirects the position of her face. When there are visitors, usually Ai takes great interest in the newcomers and Matsuzawa takes advantage of the momentum; he chooses the best position for Ai and asks her to stay in place, instructing humans in a similar fashion. In this sense, in many of the photos, Ai is posing as a model, a task to which she is usually most agreeable. In addition, selfies with Matsuzawa's cell phone are another modality of photo taking; Matsuzawa comes close to Ai and asks her to pose along, focusing on their image mirrored in the phone. Indeed, not only Ai but most chimpanzees at PRI are used to camera click-sounds and recording, and even though chimpanzees' response to cinematographic scenarios merits a study on its own, they apparently do not alter their behavior as a function of being filmed, although they might show self-inspection with reflective surfaces as in mirror self-recognition.

Beyond the somewhat superfluous but amusing activity of photo taking, a very important task conducted during face-to-face is health check. Regularly, Matsuzawa weighs Ai, inspects her body, and measures her temperature. Occasionally, her nail is clipped, and a series of activities are conducted, aimed at helping the health check by veterinarians. For instance, during 2015, ultrasound training was observed. In this training, Ai is asked to lie down while Matsuzawa places one of the nesting cups on her abdomen, simulating the exam. Occurring more often was the injection training and the training for blood exam: Matsuzawa would cut her hair and clean the area where the needle would be in contact with the skin and would apply an injection or draw blood. These activities were meant as means to conduct future health checks without the need for anesthesia, that is, with a conscious chimpanzee.

Another activity conducted during face-to-face shall be dubbed here as "husbandry training". This activity is recognizable due to being a series of sequential husbandry words. These words are command-type utterances meant to ask chimpanzees to accomplish a certain task or show a certain part of their bodies so that humans can inspect their health. The commands are usually in Japanese, however, Matsuzawa also uses a vast array of English words, in addition to gestures in Japanese sign language (JSL).^I During this activity, Ai is prompted to show body parts

^I EXAMPLES OF WORDS AND GESTURES: *Regular husbandry words to show body parts*: **ashi** (foot); **te** (hand); **mimi** (ear); **me** (eye); **onaka** (belly); **oshiri** (bottom, used with a specific gesture: rotating index and thumb at the same time); **kuchi** (mouth, used with specific gesture: first pinching index and thumb and then moving them in the opposite direction). Except for oshiri and kuchi, they usually co-occur with pointing and with the touching of human's equivalent part. *Regular words in Japanese to prompt action*: **itte** (go); **suwatte** (sit); **dame** (no good); **chōdai** (give me); **matte** (wait). Itte and suwatte are generally accompanied by pointing, whereas chōdai may be accompanied by

or move from one location to another, and the primary function seems to assess how well she responds to these words, except when, for instance, commands such as "open your mouth" are followed by a health inspection.

Last but not least, Matsuzawa and Ai's face-to-face session is punctuated by many episodes of play and grooming, activities that strengthen social bonds. The interspecies version of play includes features of chimpanzees' version of social play,⁵³ such as tickling, swinging, and pulling. However, curiously, Ai has not been observed to engage in play forms that mimic fight, like play bite, or any rough play form. On the other hand, as in chimpanzee play, Matsuzawa may firmly slap Ai's back while mimicking chimpanzee's play face; yet, Ai has not been seen reciprocating the movement. The absence of certain forms of play in Ai's context is likely an indicator of her self-control during interactions with a weaker individual. Furthermore, Ai frequently directs pant-grunts at Matsuzawa when he enters the booth and in other contexts, which provides us clues into Ai's perception; this vocalization functions "as a token of respect given during greeting by submissive chimpanzees and during submissive interactions".⁵⁴

The interspecies version of grooming is more idiosyncratic. Grooming is a behavior that may function as appeasement, reassurance, reconciliation, and hygiene, and the action *per se* is characterized as the "use both hands, pushing the hair back with the thumb or index finger of one hand and holding it back while picking at the exposed skin with the nail of the thumb or index finger of the other".⁵⁵ Regarding Ai, typically, she inspects Matsuzawa's head hair and, seemingly, searches for grooming spots in Matsuzawa's ears and his almost hairless arms, in addition to uncovering his skin by pulling hems and alike. However, there is another related activity she enjoys: buttoning and unbuttoning Matsuzawa's shirt. Ai carefully unbuttons the shirt in an ordered manner, button by button. After she is done, she delicately buttons it again. The professor considers it a form of grooming a hairless ape, and he notes that she has come up with this behavior on her own when she was younger. As for Matsuzawa, he may groom Ai in the chimpanzee manner, however, he usually performs a human activity that resembles grooming in the sense of

gesturing a palm open or by the equivalent Japanese sign language in the case of Matsuzawa addressing Ai. *Regular* words to prompt action in English (mostly used by Matsuzawa): sit; sit up (on the bench); sit down (from the bench to the floor); touch (the computer); open (the mouth). Open follows the same gesture as kuchi (mouth). *Regular words in Japanese sign language*: arigatō (thank you); chigau (it's not that); owari (the end) (see Table 6). *Regular words of praise*: sō (yes); sō da (that's it); yoshi (good); erai (great). These are only conspicuous examples of words and gestures used, however, more than a thirty have been identified to be consistently used by humans during this ethnography. Chimpanzees' understanding seems to be most efficient through multimodal communication (i.e., use of words and gestures in conjunction).

manipulation of other's skin and this is usually done in conjunction with standard grooming: Matsuzawa may rub a wet cloth over the chimpanzee's body parts, such as hands and feet; or oil her skin, especially her back (at PRI, chimpanzees are said to have dry skin).



Table 6 Example of Japanese sign language used by Matsuzawa with Ai.

After this overview of the activities conducted during Ai and Matsuzawa's face-to-face, we shall explore them concretely though footages of sessions recorded in 2015. Usually, not all the above-mentioned activities take place in the same session but at least a few of them occur during a short session. The first activities to be described are the nesting cups task and block stacking. In the video (Audiovisual Material 2; Video Frame 2), Matsuzawa disassembles five cups of various sizes and presents them to Ai. She quickly picks up the smallest one. However, she hesitates; without letting go of the smallest, she simulates insertion into the third biggest one, then the fourth, then back to the third, then, she briefly aims toward the fifth but finally inserts her cup into the second biggest, that is, the correct choice. Next, she picks up the smallest and second smallest cup together (i.e., using the subassembly method) and subsequently moves the units into bigger and bigger containers (8s; 10s) until she accomplishes the task. Matsuzawa claps his hand once and Ai delivers all the cups as one unit to him (14s). Then, Matsuzawa says "arigatōgozaimasu" (thank you in a politer form) and gestures the corresponding Japanese sign language, while setting the cups aside.

Now, Matsuzawa presents Ai with several small wooden blocks; Ai tries to stack them but as the number of stacked blocs increase, they become unstable and the incomplete structure falls four times (50s; 51s). As Ai is initiating her 5th attempt she hears a pant-hoot outside and leans toward the voices (1m10s); Matsuzawa asks her to pay attention twice (in English), and she resumes the task. Once more, Ai stops to hear the sounds but swiftly focuses again. The structure falls once more. At last, in her 6th attempt, the complete structure holds (1m33s). Matsuzawa claps his hands effusively and says "sō da" (that's it) (1m35s). Ai moves her right hand in the direction of Matsuzawa's, who was still clapping, and they hold each other's hands (1m36;1m37s). Then, Matsuzawa holds Ai's right hand with both of his hands. A slight shake is seen during their hand grasp, although it seems to be initiated by the human.

When the "handshake" is over, Ai seems distracted, looking to her left, and Matsuzawa calls her attention verbally. Afterward, he points at the blocks and then at the bowl where the blocks are usually stored (1m45s). She is responsive and starts grabbing the structure. At the same time, Matsuzawa is making use of Japanese sign language to repeat the request, asking her to insert the blocks into the bowl. He praises her verbally ("sō da") and in the equivalent JSL as she continues to comply (1m49s). Matsuzawa then says "good" and afterward "give me" (in English),

while gesturing the JSL for *chōdai*, that is, the Japanese version of 'give me'. Ai gives him the bowl and Matsuzawa says "arigatō" (thank you), both verbally and in JSL. The video ends.





51s

1m10s





1m58s

2m

Video Frame 2 Face-to-face, nesting cups and block stacking. From Audiovisual Material 2. Audiovisual Material 2 Face-to-face, nesting cups and stacking blocks, 2015, 2m. By Daly.

After having detailed the block stacking and nesting cups tasks, we shall turn to painting. The video (Audiovisual Material 3; Video Frame 3) begins with Matsuzawa giving Ai a brush he had just tipped in light green paint (8s). Ai starts painting with her right hand and then switches to the left (33s). She smells the brush and puts it in her mouth but Matsuzawa redirects her hand to the canvas. Ai continues to paint until the brush is dry, when she drops it. Matsuzawa points at the tool and signals 'give me' in Japanese sign language (JSL) (36s; 37s). Ai picks up the brush and hands it to him, to which Matsuzawa replies "arigatō"; verbally and in JSL. Then, Matsuzawa delivers her another brush, this time, in color red. Ai makes wide movements and the brush slightly trespasses the canvas, making a spot on the floor. When Ai is done with this color, she delivers the brush back to Matsuzawa (1m19s); he smiles at the personnel. He signs 'thank you' in JSL and while storing the brush, he utters "subarashī" (wonderful). Matsuzawa gives Ai a third color, dark green, and Ai begins to paint (1m56s) [the camera moves slightly; the filming area is busy]. When the color wears off, Ai drops the brush; she picks it up, tries to paint once more and then delivers it to Matsuzawa, who signals JSL and utters "arigatōgozaimasu" ('thank you' in a politer manner).

With the painting ready, Matsuzawa points at the canvas, Ai starts picking it up and Matsuzawa opens both his palms. She delivers the canvas with her right hand and he receives it with both hands (2m25s). Matsuzawa thanks her verbally ("arigatōgozaimasu") and in JSL. Matsuzawa gets closer to Ai and tries to position her face for pictures, along with the canvas. Now, Ai and Matsuzawa are both looking at the cameras and he holds the canvas between them (2m35s). Photo shots are heard. He comes closer, repositions her body again and points in the direction of

the cameras. Ai moves toward Matsuzawa to inspect his collar (2m49s). Matsuzawa smiles and recoils. The footage fades to the next painting.

A new canvas Ai colored in yellow can be seen on the floor and Matsuzawa prepares the next brush. He hands her a brush with light blue paint (3m2s). As Ai uses the brush, she smells it but does not put into her mouth. After the paint is dry she drops the tool. When she moves on to pick it up, Matsuzawa signals in JSL 'thank you' and then 'give me' (3m44s). After he receives the brush, he says "arigatogozaimasu" and signs JSL once more. Now, he presents her the last brush, in purple. Interestingly, Ai pays particular attention to filling the borders (4m20s). When the paintbrush seems dry she drops it, but then she picks it up and tries again, yet, no color comes out. As she places the brush on the floor for the last time, she glances at Matsuzawa. The professor signals 'give me' in JSL and then says "arigatogozaimasu" along with the corresponding JSL sign (4m39s; 4m40s). Then, he stores the brush and utters "subarashī" (wonderful). As Ai is about to change location, Matsuzawa says "Ai, sit, sit" pointing at the wooden protector on the floor. She regains her initial position. Matsuzawa comes closer to her and places the canvas between them but Ai reaches for his clothing. The professor puts her hand down and points at the cameras saying "pay attention" (5m07s). Ai is not responsive so he points at the cameras once more until she finally gives a quick look in their direction. Soon after, a vocalization is heard in the room and Ai turns her attention to it. Matsuzawa inspects her reaction and starts pant-hooting (5m32s). Ai does not pant-hoot together but inspects his ears instead (5m35s). The video comes to an end.





8s





36s





1m10s









2m35s

2m25s

2m49s



3m2s

3m44s





4m20s

4m39s



4m40s

5m07s



5m32s

5m37s

Video Frame 3 Face-to-face, Ai painting. From Audiovisual Material 3. Audiovisual Material 3 Face-to-face, Ai painting, 2014, 5m40s. By Daly.

The next activity illustrated is health check, or better, its simulated version. The video (Audiovisual Material 4; Video Frame 4) starts with Ai and Matsuzawa in the booth and a visitor watching from the outside. Matsuzawa is cutting Ai's arm hair while she quietly observes his movements (9s). Matsuzawa tells the foreign visitor: "Very interestingly, no positive reward training". The visitor agrees: "yeah". Matsuzawa continues the talk without stopping his activity: "Nothing; just the mutual trust... very much Japanese way. This is for the first time in her life... trial to the injection to get the blood. I give the injection here for anesthesia [points at Ai's upper arm] but we never tried [this; blood draw]. The advantage of taking blood like this means no anesthesia is necessary. Anesthesia is not good for her health but we need the blood sample for her health check." Then, while holding her chin and gazing at her, Matsuzawa whispers: "Aichan" (little Ai). Ai puts her right hand on his shoulder and her left arm on his head (1m30s); she starts inspecting his collar but Matsuzawa recoils. The video fades to the next scene within the same face-to-face session.

Now, Matsuzawa is cleaning Ai's left arm with a cotton pad (1m41s). He chooses the place to introduce the needle in her left arm (1m52), while Ai inspects his left-arm sleeves, uncovering one of them. Matsuzawa chuckles and says "don't touch" (in English), after which Ai stops. Ai looks at the syringe while Matsuzawa says "yoshi, yoshi, yoshi" (good, good, good); "don't move" (in English). Apparently, Matsuzawa is finding it difficult to find the veins and so he sighs. He tries to position the needle once more and Ai looks around (2m17s). At this point, he realizes he

has been using a pseudo-needle and notes it cannot perforate Ai's skin (2m31s). Matsuzawa changes to Ai's right arm; he cleans it with a cotton pad, says "yoshi", and apparently introduces the needle [his left hand is incidentally covering the view]. Ai seems tranquil and both make a play face, swiftly (2m48s). Matsuzawa says "don't move, ok?". Matsuzawa notices the syringe is not drawing blood; he seems to cut the tip of the needle and makes another try, while Ai inspects his head (3m36s). Ai remains tranquil and Matsuzawa reiterates "Ai, don't move, ok?". He picks up a gauze and places it on her arm while withdrawing the syringe. At last, he counts until ten in Japanese, while applying pressure to the spot with the gauze. The video fades to the next activity during the same session.

Now, Matsuzawa is about to simulate an ultrasound exam. While placing his hand on her shoulder and directing her back downward, he asks: "nete kudasai" (please, lie down); "neru" (lie down); "sit" (in English). Then, he taps the floor indicating where she is supposed to lie, and he repeats "neru"; "neru"; "nete". Ai starts leaning toward the floor and Matsuzawa says "sō, sō" (yes). He touches her right foot for her to extend it and says "kochi no ashi" (this foot/leg here). As Ai extends her leg, Matsuzawa emphatically says "sō!" (yes). Matsuzawa caresses her belly and places a plastic cup on it (of those used for the nesting cup experiment). He simulates scanning her abdomen by moving the cup around; Ai has both her legs extended, her back slightly leant and she finds balance holding the upper bench with her right hand (4m29s). While looking in Ai's direction, Matsuzawa says "kakkoī, ne" (cool, right?!); "subarashī, ne" (wonderful, right?!); "yoshi" (good). He puts the cup aside, then says "don't move, ok?!"; "don't move" (twice more). Ai holds her position.

Matsuzawa picks up a scissor and starts cutting the hair around her abdomen. Ai watches as he manipulates her hair (4m53s). Matsuzawa puts the scissor aside, picks up the cup again, and makes another simulation (5m24s): "we have to check the kidney", he comments. Ai moves her body toward him and Matsuzawa taps her head. With one finger, Ai pulls the hem of Matsuzawa's pants slightly up, uncovering his lower shin skin and Matsuzawa holds her index finger. He finally puts the cup down and says "beautiful girl". While he utters "yoshi" (good), he gestures Japanese sign language for 'the end' (see Table 6; Video Frame 5m38s). After he signals, Ai moves aside but Matsuzawa touches her arm, calling her attention: "wait a minute". Then, he points at the wooden protector (5m41s), slaps it, and says "sit down". Ai goes on to sit and the video ends.





1m41s

1m52s



2m17s

2m31s





2m48s

3m36s





4m29s

4m53s



5m24s

5m38s



5m38s

5m41s

Video Frame 4 Face-to-face, health check simulation. From Audiovisual Material 4. Audiovisual Material 4 Face-to-face, health check simulation, 2015, 5m47s. By Daly.

Now, we shall accompany the multifold activity labelled as "husbandry training", in which common husbandry words are said one after another without being necessarily used for the immediate purpose of health check, apart rare exceptions during these sequences. We shall also explore the dynamics of play, which, in this video, is intercalated in the previous activity. In fact, husbandry training *per se* might have a double purpose: on the one hand, it checks the commands consistency, one the other, it may act as a form of play. For clarity, readers might recognize such activity as the famous "do as I do".

In Audiovisual Material 5 and Video Frame 5, the footage starts with a wide frame, picturing most part of South Play Room. Ai is sitting on an elevated bench, Matsuzawa sits on the floor, and a research assistant records the face-to-face session (4s) (recording is usual for all sessions in the laboratory). Matsuzawa verbally asks Ai to sit down ("Ai, suwatte") and points at the same time. Then, he gives filming instructions to the assistant. Finally, their activity starts: Matsuzawa utters "atama" (head) and puts his hand on his head; when Ai puts her hand on hers, he praises: "sō" (yes). Next, he utters "kuchi" (mouth) while pointing at his mouth, and Ai moves her hand toward her face, but imprecisely. Matsuzawa makes the husbandry gesture 'open' and says "open your mouth" (in English), to which Ai is responsive. He touches her teeth with his index and thumbs open. After, Matsuzawa voices "touch nose" (in English), while pointing at his own nose. Ai touches her eyebrow area and she moves her hand away. Matsuzawa repeats the word "nose" and then he touches the chimpanzee's nose. As a result, this time, Ai touches her own nose and Matsuzawa praises: "sō" (yes).

Next, Matsuzawa says "me" (eye) and touches his eye. Ai goes for her head but swiftly switches to her eyes; "sō, sō, sō, sō, sō, ne answers (26s). Now, Matsuzawa proceeds to utter ear ("mimi"), pointing at his ears (33s). He repeats "mimi", but Ai touches her head with both hands instead. Matsuzawa points at his own ears again. Ai passes her index finder in the area between her eyes and then along her nose. Right after, she glances at her index. Changing request, Matsuzawa points at the bench and says "sit up" (37s). Ai sits on. Then, pointing, he asks her: "climb up" (42s). Climbing up, Ai holds onto the bars of the ceiling with both of her hands and stops half way upside-down, as in a summersault. Matsuzawa approaches and both make a chimpanzee play face (48s). He grabs her right foot and points at her left foot, which is near the ceiling. Ai moves her foot downward and Matsuzawa grabs both of her feet, shaking her upside-down body (53s). Ai changes position; while continuing to hold onto the bars with her hands, she now grasps them with her two feet as well. Both Matsuzawa and Ai make a play face and he massages her shoulder (59s).

Changing the location of the activities, Matsuzawa verbally asks Ai to sit again on the bench, while he bangs the seat. As Ai reaches the bench, Matsuzawa points at the wooden protector on the floor (1m7s) and asks her to sit (twice), supporting the request with gestural communication. Ai heads on and he replies "sō da" (that is it) while signaling the corresponding sign in JSL (1m9s). Matsuzawa repeats the gesture and the vocal praise: "sō da, sō da, sō da". With Ai well sat, Matsuzawa says "open your mouth" while doing the husbandry gesture for 'open', to which Ai is responsive (1m16s). He continues: "keep open". He touches her teeth with his index and thumb open. Then, he utters "yoshi" (good), followed by "good" (in English), and JSL for 'good' ("yoi"). At last, Matsuzawa presses her forehead with his open hand.

Next, he asks "te" (hand) and open the palm of his left hand; Ai puts her right hand on his. He repeats the request for the other hand and she follows (1m25s). Changing body part, he points at her right foot and says "ashi" (foot); Ai presents him her foot, onto which he holds. He repeats the request, now, pointing at the other foot: "kochi no ashi" (this foot here). Ai presents her left foot; "sō" (yes), he replies. Then, holding both of her feet in his hands, he swings them slightly (1m27s). The following word he utters is "atama" (head) and he proceeds to put his hand on his head; Ai does the same for hers, doing as he did (1m32s). Next, Matsuzawa touches Ai's hand over her head. Now, letting his hand go, he asks "mō hitotsu" (once more) while moving his hand onto his own head. Ai hesitates and then presents him her right hand open. Matsuzawa slightly

caresses her hand. Matsuzawa goes back to a difficult command; he utters "o mimi" (ear), pointing at his ears. Then, he touches Ai's ear. He repeats the request verbally and touches her ear three times more. He rephrases by saying "touch" twice and pressing her earlobes gently, but Ai is not responsive. Matsuzawa holds her face with two hands.

Changing request, he slaps the floor with his open hand. While positioning his body next to the floor and saying "neta" (lied down), he opens one palm of his hand and makes it move toward his other open palm, the one closer to the floor (1m54s; n.b., this is a slightly modified common gesture for "sleep"; the movement reenacts trajectory). Matsuzawa also escorts Ai's body, prompting it to lean. As Ai changes position, he replies "sō da" (that is it), repeating it several times (2m1s). Next, Matsuzawa says "Ai, sit up" and points at the wooden protector, gesturing along. As Ai stops near the seat, he repeats the request in order for her to precise the positioning; Ai is perfectly sitting down. Now, making use of the husbandry gesture, Matsuzawa asks her to open her mouth and instructs her verbally: "keep open". Ai slightly opens her mouth. Then, Matsuzawa gestures in JSL for her to wait. As Ai moves her face, he replies by verbally saying "open" while gesturing the husbandry command (open). This is followed by the JSL sign 'wait' and by the verbal command "wait", uttered twice.

Ai does not open her mouth, instead, Ai's hand is next to her face. Matsuzawa casts her hand aside and repositions her face up: "pay attention", he asks. Then, he gestures JSL for 'wait' and says it twice, verbally. Ai moves her index finger in the direction of her chin. Matsuzawa, once again, casts her finger aside and says "don't move". He utters "wait" and gestures it in JSL (2m19s). As Ai remains completely immobile, Matsuzawa responds "sō da", both verbally and in JSL. He holds her face with two hands and leans his forehead onto hers. Ai gently touches his right shoulder. Then, she reaches his sleeves; he redirects her face and says "pay attention". Next, he requests "open your mouth, keep open, keep open" while distancing his index and thumb (i.e., the husbandry gesture for open). He touches her upper and lower teeth with his index and thumb and says "keep, keep, keep, keep open" while having her widen her jaws by opening his fingers (2m32s).

When Matsuzawa slightly closes his hands, Ai relaxes the position but Matsuzawa asks "don't move, ok?". He recoils, gestures the husbandry for 'open' and says "keep open", while touching her teeth. Ai holds her mouth open. He repeats: "keep". Once Ai is completely immobile, he manually inspects her teeth, and her full gums and teeth show in an impressive manner. After

Matsuzawa is done, he presses her lips with his fingers and then puts his hand on her head. Ai presents him her right hand open, and Matsuzawa reaches it. A slight handshake is seen (2m53s) and the footage comes to an end.





4s





33s





42s

48s









1m48s

1m54s



2m1s

2m19s



2m53s

Video Frame 5 Face-to-face, husbandry and play. From Audiovisual Material 5. Audiovisual Material 5 Face-to-face, husbandry and play, 2015, 2m59s. By Daly.

The last activity we shall explore is buttoning and unbuttoning, which has been considered to be Ai's idiosyncratic grooming of a naked ape. The video (Audiovisual Material 6; Video Frame 6) also presents an example of the beginning of a face-to-face session. The footage starts with a vision of the full laboratory; chimpanzee vocalizations can be heard (2s). When vocalizations cease, the camera is redirected to the lateral of the room, where a window faces one of the chimpanzees' enclosure; in fact, a chimpanzee can be seen in that area (15s). Ai moves around the second booth. She glances in the direction where Matsuzawa is about to come in, and she shortly stops while looking in the direction of chimpanzees' enclosure. Next, from the first booth, Matsuzawa addresses an experimenter: "Could you help me? Please open the door and leave it open". As Matsuzawa is finishing the sentence and the door starts opening, Ai pant-hoots (56s). She moves on her own to the bench and sits. While the door is still opening, Ai swings her body and pants in Matsuzawa's direction. Matsuzawa says "don't move, leave it open, ok?!". When the door is fully open, Matsuzawa looks at the experimenter and confirms: "yes, keep it open". Ai continues to swing her body. Matsuzawa enters the booth and puts the utility basket on the floor.

Right after, Matsuzawa moves toward Ai, who immediately manipulates his laboratory coat. Matsuzawa places his hand on her back; Ai starts unbuttoning Matsuzawa's shirt from top to bottom (1m28s). He caresses her head. Soon, Ai looks to her left as if distracted by some outside noise (1m38s). Matsuzawa taps her right arm once and Ai turns her head to the shirt again. Matsuzawa does it again and says "pay attention". A faint pant-hoot can be heard outside; Ai moves her head in that direction but rapidly resumes the activity, while, at the same time, the panthoot gets louder (1m44s; 1m50s). As the pant-hoot is reaching its end, Ai turns left. After climbing up to the ceiling (2m2s), she quickly regains her original position (2m5s).

Now, Ai manipulates the lace of Matsuzawa's pant (i.e., a laboratory garment used over common pants). With a new vocalization starting, Ai glances in that direction. Yet, she does not put her activity on hold (2m31s). Ai continues to inspect Matsuzawa's clothes and Matsuzawa swiftly caresses her shoulders and arms as the vocalizations outside continue. Ai opens wide his laboratory coat (2m44s). Matsuzawa swings his arms up and down toward her body and leans his head against hers a couple of times. As Ai apparently starts buttoning up his shirt Matsuzawa says "sō da" (that's it). Ai briefly stops to move her head twice toward the vocalizations outside but keeps on with her activity. While Ai buttons his shirt up, Matsuzawa encourages: "sō, sō, sō, sō; sō; sō da, sō da, sō da" (yes; that's it). Once more, Ai glances toward the vocalizations outside, but continues to manipulate the buttons. Then, she moves on from the bottom to the middle of the shirt; Matsuzawa says "yoshi" (good) (3m40s). With another button done, he repeats: "yoshi". Ai continues working on the upper-middle area of the shirt (4m3s) and as she moves to his collar, Matsuzawa exclaim: "yoshi; sugoi" (good; amazing). Ai buttons the collar area (4m18s) and the video ends.








56s





1m38s









2m5s

2m31s



Video Frame 6 Face-to-face, Ai unbuttoning and buttoning Matsuzawa's shirt. From Audiovisual Material 6. Audiovisual Material 6 Face-to-face, Ai unbuttoning and buttoning Matsuzawa's shirt, 2015, 4m26s. By Daly.

3.3 Coproducing an Experiment with Chimpanzees

After having explored one of PRI's most famous experiments in chimpanzee research, and having discovered the dynamics of Ai and Matsuzawa's face-to-face experiments, we shall turn to the preparation, implementation and execution of a particular experiment, from beginning to end. This experiment is no other than the one proposed by Professor Matsuzawa to the author of this manuscript. The experience of conducting an experiment in the site where, as an anthropologist, I studied human-chimpanzee relationship, was revealing of many inside aspects of chimpanzee research at PRI that otherwise might have gone unnoticed. On the one hand, it refined my analysis as an anthropologist. On the other, the practice of thinking in others' terms and, at times, of becoming native enabled a perceptual switch through which my own discipline, social anthropology, would be re-signified. At last, this involvement was vital in order to become a member of PRI *Homo/Pan* community and be accepted by chimpanzees; an experience not only intellectually enriching but profoundly meaningful on a subjective level.

Nonetheless, the journey of being both a social anthropologist and an experimenter was characterized for quite a long time by what Bateson describes as a "double bind", that is, a situation in which a subject is confronted with two important but contradictory demands that he or she is not able to escape or ignore.¹ This had been the experience of dealing with the taboos and precepts of sociocultural anthropology and biology-oriented sciences until both could be seen at distance and understood in a metacommunicative form. I have chosen to craft this part of the manuscript in the first-person form, not to indulge in self-absorption, but to be able to unveil epistemologically and methodologically powerful tools for practitioners of both fields; because such tools relate more to a subjective questioning of one's own scientific practices than to pre-set, third-person guidelines on how to be objective in these sciences.

Here is how the journey began: I had started field work in Matsuzawa's laboratory in the beginning of October 2014, and although the idea of field work in a laboratory sounded quite strange for the "natives" (i.e., the primatologists), from the start I was welcomed into their schedule even more deeply than I expected. I was familiarizing myself with the "field" and I had been given the consent to place a fixed camera to record interactions in the laboratory. Apart from the goals set for my ethnography, I had planned an observational study with video-coding, focusing on

human-chimpanzee-machine interaction. The inspiration for this specific project had come not only from ethology but also from ethnomethodogy and Goffmanian-like approaches. In sum, from the start, I had never planned to conduct a fully traditional ethnography in social anthropology but I never anticipated the ways in which the ethnography would really unfold. Once the material was collected, its analysis would have had to be put on hold for a couple of years because a different opportunity I could not refuse was being presented on a tray, literary.

One day, late October, Professor Matsuzawa asked me and another student whether he could join us for lunch in the cafeteria. After we had finished our meals, Matsuzawa mentioned that he would like me to think of a work with chimpanzees; nothing like the traditional matching-to-sample tasks in the computer, but something that allowed me to ask larger questions, since I was an anthropologist. He then proceeded to demonstrate what he had in mind. Our meals had come in different bowls and plates on a tray and, at this point, Matsuzawa started to rearrange them mysteriously. He ordered them in multiple ways and, at last, he said: but look, I can also do *this*. Then, he sorted the plates and the bowls from bigger to smaller in size, one inside another. He continued: Action can be organized in different manners. What if there is a grammar of action? Think about it; action grammar.

The cryptically organized bowls and plates resonated with me, but I still thought of it as all too abstract and soon my attention was diverted to the more practical anthropological concerns of my daily life at PRI. In about a week, Matsuzawa brought the subject up again: You are studying scientists and a particular manner of studying chimpanzees, which is different from the West. Please, continue to do so. But for this purpose, it would also be good if you could conduct an experiment. There is a professor here who focuses on object manipulation, but I am thinking of an even simpler level; object categorization or object sorting. There has been an idea back in the beginning of the Ai Project, which was never pursued further....

Matsuzawa detailed: Imagine you have twenty-five objects; five kinds of objects painted in five colors. Like pencil, spoon, block, rope and key - in red, yellow, green, blue and orange. You put them all in a bucket and throw them into the chimpanzee area. Then, the chimpanzee returns the objects one by one - to a box, which is safer. In the end, the chimpanzee receives an apple. The next day; the same session, so on and so on. This would be the baseline trial. After, there are many variations you can test but only a single returned object or color is rewarded. Suppose the criteria is to reward "spoon" and you divide the apple into five pieces and give a piece to the chimpanzee every time he or she delivers a spoon. What will happen?

He continued: Across sessions, if the chimpanzee has the concept of spoon, then, in twentyfive actions, spoon will be delivered earlier and earlier to obtain the rewards sooner. Overall, nothing changed, there is always one apple - but behavior might differ. So, in the initial stage, no reward for specific items; then you observe what changes when the reward is introduced. What is key to this test is that they have the free choice of items, but by making them sort these in a temporal order, you might be able to access chimpanzees' representation through nonverbal response. But look, before doing the experiment you need to simulate it. Also, you need to think: What kind of potential does this task have? What does this task mean? You can make any kind of modifications - he concluded.

The experiment sounded very interesting because of its simplicity and the ways in which one could increment upon. The whole notion of underlying principles that could structure, or, at least, scaffold action was appealing to me, and the idea of investigating the building blocks supporting categorization in chimpanzees was very intriguing. I had to admit; the level was much more micro than I was used to. As an anthropologist, should I not simply conduct experiments on primate social cognition? But again, as a social anthropologist, I had always been interested in categories and categorization processes, and I was still inebriated by a methodology course in action, conversation analysis and the likes, which I had taken just before going to Japan. What if I could expand my horizon even further simply by zooming in even more?! From the start, I was motivated beyond the sheer lessons I would learn as an anthropologist immersed in the natives' practices. And frankly speaking, this would be the only reason for not quitting the excruciating schedule of becoming an experimenter and an anthropologist full time.

But then, there was one last problem. I was a "humanities-person", meaning most of my practical higher education included highly advanced philosophy but no real-world experience with our typical nemesis: numbers. Also, I did not feel my mind was oriented in the same way lab primatologists' minds were. I gave myself a pep talk: Look, you are not completely inexperienced. You have taken many classes in cognitive psychology and all the related fields required for this task. You even went that extra mile to take statistics and.... you survived! So, ok you are still raw, but you are motivated and you will learn a lot. How embarrassing can it be playing another part?

Challenge accepted - and I soon had many modifications and a next phase with symbol categorization proposed. By the beginning of November, I had been introduced to my main advisor for the experiment, Professor Hayashi, who would become a long-term collaborator. In our first meeting, I let all my hidden obsession with synthesis come out in the form of a structured proposal divided into stimuli, phase 1, phase 2, research questions, and predictions. In our third meeting for the experiment, this time, with Professor Matsuzawa, things were taking shape. We were starting to think about the apparatus and other practical details. Soon enough it had been decided that the object "key" would have to be substituted by something else; it was definitely not good to have chimpanzees systematically manipulating keys, even non-functional ones.

Back in the old days of the Institute, before doors were automated, someone once dropped a bunch of keys next to Ai's enclosure. As expected, Ai probed them all. She opened her room, Akira's and that of the orangutan next door. The event occurred outside working hours: Ai headed directly to the bureau and was caught using the phone (she used to play with a toy phone when she was younger). The gentle Akira, on the other hand, was found completely frightened in a nearby temple. While no one got seriously wounded by Akira's escape, the local media publicized that the experiments made them so smart as to be able to break out.

Eventually, we set up the object stimuli as pencil, spoon, block, rope and cup; and the color stimuli as red, yellow, green, blue and white. We wanted stimuli with which the chimpanzees have had some familiarity either during tasks or during husbandry (e.g., spoons for medicine). The colors were all equivalent to those in the color-kanji/kanji-color matching-to-sample tasks on the computer. The rationale was that the goal of the experiment was not to know whether chimpanzees had the capacity to categorize; a point proved by several experiments, especially those previously conducted at PRI. The point was *how* they categorize. Therefore, instead of novel stimuli, we could count on already familiar ones. This was advantageous; it would allow us to build upon during the next stages, because at least the color stimuli would be fairly the same as the ones in the automated tasks. In addition, for the object stimuli, we pondered that we could, in the future, be able to test Ai's long-term memory of the symbols for these objects, which she had learned in the past.

In addition, there was another motivation behind the experiment, a point long discussed with Professor Hayashi. The experiment consisted of semi face-to-face exchanges with an experimenter (i.e., mediated by a box). Hayashi had conducted unbarred face-to-face experiments with chimpanzees in the past and her work mainly focused on object manipulation and developmental psychology, therefore, her specialty was different from the traditional automated, computer experiments at PRI. The non-computer, "real world" setting brought together a common interest: if chimpanzees at PRI have systematically been tested with computers; how would they apply this knowledge in a "real world", 3D situation? By using the same stimuli as those in the computer tasks and in previous language-training at PRI, we would be able to, perhaps, tackle the effect of being "computer-proficient". Yet, before the first experimental session could be conducted much planning was still required and things needed to get off the paper.

At this point, one of the most important practical tasks was to decide upon and construct the experimental apparatus. This was a critical point because chimpanzees are so strong and safety needed to be addressed well. With some considerable back-and-forth, first, we considered several designs, such as a funnel system, before we made our final call. In addition, we had to decide the best location to set the apparatus. Last but not least, we also needed to refine the protocol as much as possible because this could influence the type of the apparatus and location. When looking back in retrospective, the neat steps necessary seem obvious, however, I had been given much freedom to work on the ideas and the implementation, and for an inexperienced person, many things that should have been done sequentially were being conducted in parallel, only to discover one point was a necessary step for another.

Whereas vital points in the experimental design were readily addressed, when considering the implementation of the experiment, a few directions were provided instead of a clear, fully structured plan; I was expected to sort things out by initiative and by consulting with superiors. Indeed, personnel were always at my disposal; not only the advisors for the experiment, that is, Professor Matsuzawa and Professor Hayashi, but also my *senpai*, in other words, the senior student in the laboratory. In fact, freedom was evoked as the motto of Kyoto University. However, I must admit I was struggling. Even if I could count on the superiors, I could not anticipate some potential issues and so I would have to learn the hard way. Or, as a philosopher of science puts it: one does not know exactly what one does not know.^{1,2} In fact, the experience of working with chimpanzees proved this point several times.

Then, another issue started to show: the cultural barrier. Having lived and studied in six different countries across Europe, and North and South America, I had learned to be flexible, but I could not be more Western. Sure, I had dedicated a long time to learn about Japanese culture,

^I In the original: "Man weiss nicht genau, was man nicht weiss." (Rheinberger 2007)

language and history, but this was still my first time in Japan... I did not have the ambition to be a Japanologist and I definitely stuck out and made *faux pas*. Again, looking in retrospect, I was too blunt, too direct, too explicit and too pragmatic for a *modus operandi* that relies heavily on picking up people's implicit cues and on a precious concept: 'reading the atmosphere', or the famous "kūki wo yomu" (空気を読む). Once in a while, my adventures in Japanese soil seemed like those of Amélie Nothomb in her comic novel *Stupeur et Tremblements*.³

As inexperienced as I could be, the implementation was on its way. The apparatus for the experiment would take considerable time so we started thinking of its design right away. We went through many ideas and when we had a rough sketch of its important features, we decided to ask for the help of a more experienced person. It was, at this point, that one of PRI's first keepers,



Photo 2 Design of the experimental apparatus, 2015. By Daly.

Kumazaki-*san*, came to our aid. The plan was to have him help with a safer design. Kumazaki designed a chimpanzee communication box with two holes, in which one would serve the purpose of receiving objects from chimpanzees and, the other, of providing their rewards. He worked on two designs (Photo 2) but the second and final one reflected an improvement to account for the size of chimpanzees' hand. It was important not to give the chimpanzees a chance to fully access the experimenter's side, otherwise, in a tantrum, they could hurt the experimenter or passing-by personnel. Thus, the last model had the holes slightly diminished, matching the chimpanzee's body part.

At the point where the design was final and consolidated, it was still not clear how it would come to life. Apparently, the company that was usually hired to fabricate some of PRI's panels could not be fully counted upon for the whole process. When discussing the issue with colleagues in the laboratory, I came to know some students in the past had been quite independent and produced their own panels: How and with which machinery? - I asked, surprised. Oh, there is a workshop in the building to cut acrylic panels and stuff, you know, with those big machines - said my colleague. I let the idea sink in for a second. I recalled some carpentry gears I had seen as a child and, by then, I had already imagined myself clumsily manipulating the electric saw, cutting my hand off and fainting at the sight of blood sprinkling in the room, like a horror movie. Ok, I am not up to that task - I thought. When I confided it to Hayashi-*sensei*, she mentioned that I could, in theory, ask for Kumazaki's help, but that I should hurry up because he was about to retire.

So, I humbly turned to Kumazaki-*san* again and admitted defeat. He not only helped me but became a precious source of stories of PRI's old days and of his relationship with Reiko, although my Japanese skills were crude and lacking elegance. He was, on all levels, incredibly patient. Kumazaki worked on the confection of the panel throughout many days and I accompanied him to the workshop whenever I could (Photo 3 and Photo 4). He explained parts of the process to me, including some important details, such as smoothing the borders of the holes so that chimpanzees would not get cut in the case of trying to insert their full hand. Watching his skills in action, I was certain I would not have been able to accomplish the task and felt somewhat relieved that my exaggerated imagination had been, in fact, a good guide. When the panel was ready, it looked like a piece of art to me and I was thrilled (Photo 5).



Photo 3 Confection of the experimental apparatus, 2015. By Daly.



Photo 4 Confection of the experimental apparatus, 2015. By Daly.

In parallel, we had been figuring many other points out. Because we decided to use the same color stimuli of the computer experiments, I turned to my *senpai* to know exactly the colors they employed. But how do I match these colors in a precise way? - I worried. At that time though, a French intern had been experimenting with color preference in the same laboratory and so she suggested that I to compare the colors on a Munsell scale. She had a readily available



Photo 5 Final experimental apparatus. Left, object hole. Right, food hole.

Munsell color chart, in which each color composition (hue, lightness and chroma) is attributed a number. I then bought color paints based on the computer stimuli and Munsell notation, and tested upon the objects. Afterward, she helped me visually evaluate whether the colors were equivalent; we would look at the colored object, compare it to the chart, note down what we thought was the matching number and then compare with what others in the laboratory had chosen.

The process of working on the stimuli, however, was not a straight line. Because the design of the panel had slightly changed, now some of the objects we had ordered did not fit through the hole and we had to buy new ones. In addition, the paint I had chosen was not appropriate. Except for the rope, all the objects were in wood, yet, the so-called "paint for wood" would show different colors on different objects depending on how the



Photo 6 Stimuli of the object and color categorization experiment, 2015. By Daly.

object would absorb it. No matter what I did, the result did not look good. I investigated which type of paint would provide better results, ordered those online or quickly biked to the next shop, and started painting the stimuli again with as many coats as necessary to make them all even. And,

oh, we never managed to find the same green paint of the computer stimulus, so I had to manufacture that at home using other colors and testing the product against the color chart, just in case. By the end of the workday I could be seen crouching in the balcony of our office putting another layer on the twenty-five official objects and their twenty-five spares (Photo 6). Painting objects was such a tiny, little detail of the experiment but so time consuming and never ending; either because chimpanzees would break objects, especially in the first half of the experiment, or because the paint started to look faint.

Yet, painting was, still, somehow fun. As an experimenter, my true tantrum trigger was the "cabin". The cabin was, in fact, a tent-like protection where the experimenter was supposed to sit to conduct the experiment. At this point, we had simulated several potential spots to place the experimental apparatus but one issue remained recurrent. Wherever we would put the apparatus, the other chimpanzee could see the companion's performance, given that offspring and mothers usually come in pairs. In principle, this was not an issue for me but soon enough my colleagues, cognitive psychologists, started to become unruly over the subject. Why is this an issue? - I asked my advisor, Hayashi-*sensei*. I continued: Why is there a problem if they eventually peek at the other's task? After all, when human children learn to categorize, they do not withdraw to an empty room, but they do so in the presence of other humans, right?! Wouldn't this be more realistic? - I argued. However, without completely dismissing my point, *sensei* considered that a stricter version of the experiment would have to control for peeking.

Over many days, I reflected upon the issue. I also recalled the experiments conducted on social learning in the past, in PRI. In those experiments, the chimpanzees were tested with their partners. However, there was a striking difference. The social factor was present but was controlled for. This means, for instance, that a chimpanzee duo would have the same amount of sessions with all other pairs. In other words, exposure was balanced to make conditions even. That means that the results would not come as a matter of Ai and Ayumu preferentially partnering Chloe and Cleo or Pan or Pal, and vice-versa.

In fact, what we were about to set up was not an *observational study* of the "situated cognition" type, which anthropologists know well. We had to set up an *experiment*; this inevitably meant controlling as many variables as we could to be able to infer causation. In simple terms, the logic is as follows: we control all the factors we think might interfere, making them equal across sessions; we test to see what the results look like when everything is the same; we then manipulate

only the factor we want to investigate while holding others equal; and, finally, we compare the results with and without manipulation to see what changed. Because we kept everything equal, we are able to infer that this tiny thing we modified is what caused the change in the results.

Indeed, *sensei* did not dismiss the social aspect of the experiment but its uncontrolled part. I eventually came to the conclusion that if we wanted to test for social factors, we should be able to control them in a certain way, but our immediate laboratory setting and chimpanzees' schedules were more prone to individual testing than a social experiment, which, in theory, could be conducted in the future. So, after this long detour, we shall return to the "cabin". After having agreed that chimpanzees should not peek at each other's results during our experiment, we headed to control this variable. We concluded that, in order to effectively separate chimpanzees and to allow the experiment to be conducted outside the other's visual field, the apparatus should be placed in the first booth, the one closer to the chimpanzees' entrance. While one chimpanzee waited in the "hall" area, the other would perform the task. However, from the entrance, the standing-by chimpanzee could still peek. To solve this issue, we came up with the idea of building a "cabin" that would protect the experimenter's area.

The idea was great, in theory, but not exactly practical. Going over the issue with my colleagues in the laboratory, they presented me beautiful wooden panels that, put together, looked like a professional photographer's booth. It was elegant, aesthetic, it did not occupy much space, and, of course, it was of no-use. The panels were too low to provide effective cover. Now, what is our other option? - I asked, disappointed. Build a higher cabin out of cardboards - suggested my *senpai*. In this moment, I confess I wanted to avoid any extra work beyond the fair amount I usually had on my plate, attending experiments on a full-time basis in addition to researchers' seminars at PRI; but as Japanese say - *shōganai*; it cannot be helped, one must accept one's fate. My busy *senpai* provided me old cardboards stored in the building and, in the evening, once alone in the laboratory, I proceeded with the construction. I put up several layers of cardboard to make the structure hold, built a ceiling and wrapped it all up with tape. The move took me several hours to achieve just a humble hut. Yet, in the end, I was proud. It is a success - I thought. Let's get in!

Well, let's just say the structure did not hold the first bump and I found myself defeated among bent cardboard. In fact, the process of strengthening the cabin would take several days, and many set-backs and tantrums in the solitude of the empty lab. Finally, holding the structure with flexible wire made it definite. The final product was fairly invasive and stuck out like a sore thumb as soon as someone would enter the laboratory. Nonetheless, it was the minimum amount of space needed to accommodate my body and the box to store the received objects.

In reality, the ugly, clumsy cabin (Photo 7) triggered other mixed feelings. It started to look like this was not going to be a marginal experiment in the laboratory routine but that, instead, it would disturb the working area and actually demand considerable labor on the part of other people. Even if social anthropologists reject naïve notions of objectivity and consider that one is always in social relation with the people they study, still, this started to seem a bit too intrusive for my standards. As an anthropologist, do I have this right? - I sometimes asked myself. At this point, our protocol included extra work for others, such as separating chimpanzees, preparing rewards, being present for my experiment when no other experiments were being conducted, and so on. Even if I would accomplish a lot alone, it was still a collaborative work.



Photo 7 The experimental cabin, 2015. By Daly.

Little by little I came to realize that such burdens were not accepted because I was an anthropologist but because I was an experimenter, regardless of the means by which I ended up becoming one. When taking care of the experiment, my role was not that of an anthropologist making use of the experience for my own anthropological writings. This role was marginal in those situations. The anthropologist can always think from the "outside" but I had to think from "within" to be able to fulfill my role. In this regard, my first presentation as an experimenter was quite challenging: I presented our experiment, for about one hour or so, to an audience of cognitive psychologists and chimpanzee researchers at PRI. In such a situation, I could not step out and digress, that is, go over what I was making of my experience as an experimenter. I had to *be* the experimenter and had to present and answer the questions in experimenters' terms.

Eventually, during my stay at PRI, I would propose changes to procedures and comment others' work based on anthropological and philosophical concerns. Later on, I also had the opportunity to give more humanities-oriented presentations. However, I still had to be fully committed not to run away from specialist questions I was supposed to answer. Whenever handling the experiment, I dove as much as I could into an experimenter's life and paradigms. From time to time, I would step out and ask what my "anthropological self" would make out of my practices as an experimenter, and vice-versa. In the beginning, this experience felt slightly schizophrenic, as in double bind situations, but after a while I discovered more common goals than I previously imagined, and spaces for fostering understanding across disciplines rather than epistemological and methodological clashes. However, the journey would be quite long.

For our experiment, there were still several issues to be dealt with. The visibility problem was still a matter, despite the cabin. Even though chimpanzees and humans are so alike, there is a vast array of immense practical points in which our species differ and when experimenters design an experiment thinking within a human perspective, they are setting themselves up for failure. This was a lesson I learned over and over. Still, many facets of "chimpanzees' perspective" only become evident after our own miserable blunders and so, as in everything in life, experience is precious to anticipate potential problems. Luckily, a point of chimpanzees' perspective that was easily spotted was their visual field. Unlike humans, chimpanzees are naturally gifted climbers and when coming to South Play Room, they would climb up to higher locations. When assessing visibility, at a certain point we noted: But wait, can they perhaps peek from the ceiling? We brainstormed: Humm, it is possible... But how do we verify? Our conclusion was that, well, when in Rome, do as the Romans do.

As the experimenter, logically, I had to take the initiative, after all, this was my problem. In fact, the entrance was small, the ceiling was not too high and I could count on bars and an upper box connected to the trap door to climb up. This would be more convenient than finding suitable stairs that would fit the restricted area. Once up there, I explored all the areas chimpanzees could access and tried to peek at the experiment location. Before these shenanigans, we had covered all the potential visible areas of the panels in the first booth with either black paper or black fabric; we even noticed that the fabric was relatively see-through so a double layer was necessary. After the chimpanzee climbing simulation, it became clear that, overall, we were correct in our guesses of places requiring cover but some minor adjustments were still needed. As in the case of the hole size in the apparatus, assessing chimpanzees' bodily dispositions proved useful.

Now, we still had some perspective issues to address. This time, not chimpanzees' but the cameras'. In principle, the experiment should require us to identify only the stimuli given to the experimenter. Thus, in theory, a single clear view should suffice. However, because we wanted to address larger issues in the future, such as, object manipulation, we concluded that a setting with no blind spots would be required. After doing some simulations, we decided that three cameras would be needed: A camera placed next to the bottom of the booth, picturing an upper, broad view; a camera focusing on the experimental apparatus and the exchanges; and a third, marginal camera covering the whole floor.

A long testing of the camera positioning was required because the perspectives had to be confronted: First, to make sure of how many cameras were actually needed (perhaps with a different combination we could diminish the number of cameras used); secondly, to ensure that all of them had a holistic, entire picture of the experiment (i.e., that we could see everything if we synchronized them together); thirdly, the views had to be consistent across sessions to guarantee that no blind spots would occur as a result of misplacing the camera one day or another, or of someone bumping into them (i.e., the positioning had to be trackable). Thus, after the best parameters were decided, the tripods, panels and floor were marked.

Three aspects were important; inclination, height and positioning of the tripod feet. In fact, the experiment was quite ritualized in this regard. Before calling a chimpanzee into the booth, I turned on and checked all three cameras in a precise sequential form, and only then proceeded to go inside the cabin. Due to the nature of the experiment, this task was not delegated to a research assistant. By the time my stay was coming to an end, my body had ingrained the full sequential steps of the experiment: turning on cameras, picking up the storage box, avoiding nearby obstacles, squeezing into the tight cabin without bumping into the apparatus, positioning rewards in my hands effectively, and so on.

When recollecting the practicalities of implementing an experiment, a powerful experience was paying attention to minimal details and being surprised that some unthinkable others were important. A vital feature of experiments, without which an experiment can only be called a pseudo-experiment, is randomization. Randomization allow us to eliminate biases that we did not even know we had. As such, of course, the positioning of the stimuli (i.e., the objects) should be randomized. In this experiment, when chimpanzees would enter the booth they would always find the same objects laying on the floor. We went through a couple of options of how to randomize their location but decided that the most effective one would be to just put the objects inside a box, shake them and throw them on the floor.

After having found a seemingly appropriate box, I decided to test, just in case. I carefully observed the position of the objects after some shaking. I was surprised to discover that this box did not correctly randomize the items as expected. The objects inside remained fairly as they were before. I quickly came to the conclusion that the box was simply too small and low for the objects to freely move inside and change positions. Of course, once thrown in the floor they would likely randomly change positions, but to make sure there was no patterning, the box was changed and tested before the sessions started. The other issue was in the case that an object would eventually roll too far from the location where the stimuli were supposed to stay (e.g., under the bench). For these cases, a pseudo random would be more appropriate: the assistant would carefully put the objects within the previously designated area, maintaining its initial disposition.

With this issue came another concern: What if chimpanzees are influenced by my gaze? Gosh, should I do the experiment in sunglasses? - I chuckled at the vision of it. Still, when assessing the setup again, it became clear that our procedure was a safeguard in this regard; it guaranteed that objects would be thrown and kept within a certain circumference and were not so separated as to provoke a detectable change in eye gaze. In addition, the apparatus height was just in front of my eye level when sitting, and although chimpanzees could see my eyes, their vision was somehow barred. At times, I questioned whether or not I was becoming a little paranoid. On the other hand, already during the training phase, I discovered, by experience, that even more important than my face were my hands, because they were the ones picking up and holding the rewards. Consequently, I devised a consistent hand positioning, which held all the required rewards at the same time but effectively delivered them one by one. This too, was a part of the experiment that was very much embodied.

A last randomization concern was which chimpanzee would receive which stimulus in which order. After a chimpanzee encountered the objects on the floor, according to the protocol, they were required to deliver the object of their choosing one by one. We foresaw a preference test, or a baseline condition, in which they would only receive a reward for completing the experiment, nothing else. Then, in the test phase, each chimpanzee would receive a "target", that is, a stimulus

that would be rewarded (e.g., the color red or the object cup). The targets were five colors (i.e., color condition) and five differently shaped objects (i.e., object condition). From our readings on human categorization and child development, we expected shape targets to be easier for chimpanzees as well. That is, supposing they categorize in a similar fashion to humans. Had randomization not been implemented, implicitly, it could be that the less performing chimpanzees would be allocated to the condition we assumed to be the easiest (i.e., shape). Thus, randomization, like in any experiment, was a vital step to eliminate any implicit bias.

However, by purely randomizing which chimpanzee would receive which target, there was still the possibility that chimpanzees were allocated to a certain condition in a very unbalanced manner; let us say, from eight chimpanzees, the randomization output could match seven chimpanzees in the color condition and one in the object condition. Obviously, this is not what we wanted but, in theory, a pure random may produce an unbalanced matching. Therefore, to account for balanced conditions, we conducted a pseudo-random. In simple terms, this just means that we want randomization but within certain established criteria that we need to control for. This design balances out the conditions and chimpanzees. For instance, concretely speaking, four chimpanzees started with targets in the object condition (spoon, cup, rope, block) and four with targets in the color condition (blue, white, green, red). However, even if balanced, the matchings were all randomized (i.e., chimpanzee X was randomly assigned to stimulus Y but half chimpanzees were in the object condition and half were in color, plus, stimuli were not repeated).

In addition, as it is usual for cognitive experiments with chimpanzees, our experimental design foresaw repeated measures. A repeated measures design means simply that several measurements are taken across a period of time. Concretely, chimpanzees repeat sessions with the same target. For instance, consider chimpanzees' preference test, that is, the phase without any rewards during the experiment, nor targets; where all objects have equal value except for chimpanzees' own choosing. Suppose one day a chimpanzee is particularly non-responsive, distracted or chooses randomly. Shall this single session be representative of a chimpanzee's preference? At least for our experimental purposes, likely not.

Thus, in repeated measures, the chimpanzee performs the same task (condition; target; etc.) over several days. With preferences, a chimpanzee's choosing may vary slightly from one day to another, but what is the overall pattern? Likewise, with tests where there is a correct choice, if a chimpanzee is very consistent, little variation will occur (e.g., being mostly good or mostly poor),

yet, it might also be the case that great variation takes place (one day is great, the other awful, and so on). We do not want to judge chimpanzees neither by their best nor by their worst performance but by their average. A repeated measures design is particularly useful when working with a limited number of participants, that is, the ever-so-dreaded small sample size. Other experiments might call for other designs, however, in our case, especially because we did not verbally communicate the target to the chimpanzee, he or she would have to learn over the course of the sessions and would not have means to know a target in advance. A similar concern was accounting for training effect. We expected learning but under controlled conditions. This translates into balanced sequences of stimuli and into a comparison between chimpanzees' preferences with no manipulation and their choices after the introduction of a sequence of targets.

The conception and practical set up of the experiment took us a considerable amount of time; the experiment had been proposed by Matsuzawa in late October 2014, but its first session occurred only by late May 2015. In addition, we had planned to test Reo, the handicapped chimpanzee who lived in North Play Room, just next to South Play Room on the first floor. Therefore, we had to take care of not only one, but two setups. Because Reo's schedule conflicted with the one in South Play Room, taking Reo up on our wings would require considerable effort, especially because he would have to be tested during lunch time.

For this endeavor, I counted on the two technicians of South Play Room, who fed Reo's lunch once a week, and tagged along to test him after feeding. It is, of course, always best to have larger sample sizes, so this was one reason for testing Reo as well. The prospects of having to squeeze, twice a week, the already short lunch time was discouraging, but I had another motivation. At that point, I knew nothing about the activities taking place in North Play Room, and I felt this ethnographic aspect should be covered. Nevertheless, this was still not enough to skip lunch. Indeed, my true motivation was to get to know him and have a common activity that would likely be enriching for him (and for me). In fact, as the experiment progressed and our plans changed, Reo's data could not be included anymore, simply because the number of sessions would not suffice. Still, for quite a while I continued to accompany the technicians and conduct the experiment nonetheless, without regret.

Regarding formalities, some requirements had to be crossed off of our list prior to the experiment. A vital one was the approval of the ethics committee, which was submitted by Professor Hayashi and granted in the beginning of February 2015. Another formality that had to

be fulfilled was certification. I would have to pass a test to receive a license on primate care and experiments. A colleague in the same laboratory prepared for the exam at the same time and so I had someone with whom I could share insights. The topics for the exam covered basic primates' physiology and social structure, animal welfare, safety in general and biosafety, primate handling, laws, ethics, among others.

In addition, because chimpanzee escape was somewhat on another level of that of monkeys, all members working with chimpanzees, even those already licensed, participated in chimpanzee escape drills each year. In such drills, a student or research assistant from the section would serve as a guinea pig, or better, as a chimpanzee, and play the escape. The act was elaborated; no one was supposed to know the "chimpanzee's" plan and people would scatter in several teams, with maps, restraining nets and walkie talkies to find the escape and support the veterinary team to shoot the runaway with tranquilizers.

The preparation for the license also included some material communal to all types of certifications. Whereas our license was specific for non-invasive procedures, others were aimed at monkey researchers and veterinarians, who deal with surgery. Being a hemophobic myself, it was quite a surprise to discover we shared the same video material after having to witness torn-apart rats without prior warning. The viewing must had felt nothing but natural for the idealizers of the syllabus, after all, most of those engaged in animal research come from biology-oriented sciences, and at a certain point, these students must have had some live tutorials on how to deal with open flesh, a fact that my lab colleague brought to my attention with a compassionate look for my pitiful exaggerated reaction.

Indeed, at the end of my stay I had toughened up a little bit. I would ask a morphologist, a colleague of mine, to accompany her and her supervisor in their work so that I could gain insight into that primatological field. The experience proved enriching - and bloodless, because the monkey corpses had already been treated, and our task of the day consisted of carefully washing out the flesh from the bones so that model skeletons could be made. At PRI, a morphologists' work was, in fact, to deal with the aftermaths of invasive research in monkeys, along with death by natural causes. It astonished me that specimens coming from noninvasive research were named, instead of being anonymized. In reality, many came from zoos. It was a powerful experience; to wash the flesh off of bones and skulls of individuals who had names and, likely, stories in their home institutions.

My colleague admitted that, in the beginning, this specific task was psychologically strenuous, but that she eventually got used to it and found relief in the fact that she was not conducting invasive experiments herself. Afterward, we dove into PRI's bone collection and I was surprised to discover Reiko's bones in the "library": Wow, so this is Reiko! She is still here in PRI... somehow - I thought. In fact, morphologists use the bone library for their studies. A Professor at PRI, who conducts non-invasive research with chimpanzees, once made a clear point during an informal discussion: Even in an enriched setting for chimpanzees, we cannot forget that we are using life. Why did you bring them? You should not just be friends with them but take responsibility for using life, that means, do research!

Indeed, in ways I could not foresee, the ethical implications of becoming an experimenter would creep up on me. At a certain point of my stay, I had become friends with primatologists of other sections, whom I admired on an intellectual but also on a personal level. In one of our many discussions, a friend, field primatologist, voiced that she did not agree with the rationale for maintaining chimpanzees in captivity, even if it were for studies, and she called the validity of experiments into question. We usually had more philosophical conversations about primatology, and so, likely, my friend voiced her strong opinions without immediately picturing that I, too, was an experimenter just like the others.

In reality, during a great part of our conversation, I did not put myself in those shoes either. We long debated many points, and some I found compelling. At a certain point, I understood that some primatologists also had strong positions against captivity and experiments with chimpanzees, even if non-invasive. I could relate to her feeling, which I mentally paraphrased as "how could they?"; "even if it is for science?!". I have had this feeling many times about invasive neuroscientific work on primates. I recalled once during my master's degree, to have met an Italian PhD student in neurosciences, who trained two macaques to perform the same action using a joystick in order to understand what happens in their brains when they coordinate action. Fair enough.

The *bémol*, as French speakers say, is that her research involved inserting an electrode into an animal's brain while alive. She took care of explaining that after they healed from the surgery to maintain a precise part of the brain constantly exposed, there would be no pain because the area is not irrigated by nerves. However, due to such exposure, the macaques could not be socially housed and had to be kept in individual cages. Furthermore, she had to eliminate the influence of social factors in her experiment (Isn't isolating social primates the true bias, instead? - I pondered quietly). As to how the monkeys were convinced to work, dehydration was the solution, otherwise - she lamented - they would not perform the experiments. And while she felt she would like to interact with them, she also had warnings from others and from herself not to grow attached to them.

To be fair, as an anthropologist, I should be able to tackle neuroscientists' practices, their paradigms and values, before providing any professional assessment; after all, many consider they ought to balance our moral obligations to animals and the benefits that invasive research can bring to humans,^{4,5} although primatologists evaluate that this claim is not justified on several grounds.^{6,7} This endeavor moves the discussion from "the bad guys *versus* the good guys" to "what motivates people to conduct acts that are morally repugnant to others?". At PRI, entering neuroscientists' world was an anthropological task I could not pursue further, although the topic was never my focus, only a growing interest of mine. Again, as my friend heatedly criticized captivity and non-invasive experiments with chimpanzees, I too could relate to a strong emotional reaction elicited by certain scientific practices, although the content differed.

During my stay at PRI, I revived the "how could they?" feeling when, in the hall, I encountered a monkey being transported in a restraining box. "It" looked at me very curiously and I immediately wanted to interact but I realized the human in charge of it did not like much. Then, it hit me; this monkey is likely a subject in invasive research. My heart sank. I had just gotten out of a full day of experiments with our beloved chimps, of whom I knew each of their names, personalities, tricks and all. No wonder Jane Goodall received such a backlash when she first named the chimpanzees she studied. Naming is powerful, it is deeply personalizing. Even in the famous Koshima island, cradle of cultural primatology, primatologists do not name individuals before a certain age, because many infants are likely not to survive.

I thought about the nameless monkey in the hall with which I could not interact, and our chimpanzee "persons" in South Play Room. I had just opened one door, and it felt like another world. In my early days as a social sciences student, I was impacted by Bauman's book "Wasted lives" where he describes the process of how humans become waste for others.⁸ Sure, chimpanzees are cognitively more complex than monkeys but are monkeys the "primate waste" of research? As an anthropologist, I had no real knowledge of the practices in invasive research, therefore I had no intellectual answer for this question. Yet, again, I, too, could relate to my friends' feeling of "how

could they?". Indeed, this was a very pure emotional response. I felt it every time we smelled the melted flesh of monkey corpses being flushed through the connecting pipes in South Play Room. It was visceral. I was deeply grateful that, at least for chimpanzees, invasive research has been banned around the world.

The discussion my friend and I had went on for some time, and, her position in the heat of the moment was that chimpanzees are prisoners, and they are prisoners of our experimental research as well. I tried to fully grasp her perspective and dwell on the points of her argument with which I agreed, or at least, related. This "they are the bad guys" feeling; "how could they?"; I knew from somewhere. Except - and then it hit me - now, I was the bad guy. I was the experimenter. At this moment, I did not have any anthropological leverage to think from outside. It was like going from conducting war studies to raging war.

Of course, this does not mean that anthropologists do not engage in the natives' practices and do not have ethical concerns about their own anthropological practices; but "going native" was another level of liability. I had never thought naïvely about the ethical implications of chimpanzee research, even in an enriched environment. However, I had never felt as if I were responsible for it neither. I would have to switch the question from "how could they?" to "how could I?". Even if perhaps unaware of it, this dear friend, by addressing me as an outsider, forced me to go beyond my anthropological duty of making sense of other experimenters' ethics, to start addressing my own ethics as an experimenter on a deeper level.

Another profound facet of the experiment was its interspecies social aspect. This aspect would necessitate considerable time to be fully developed, and would contribute to the long preparation time, before we could officially start by late May 2015. In my inexperience as a chimpanzee researcher, I was very enthusiastic the first time we had figured out all the elements for the preference test and the test phase; participants, stimuli, randomization, design, orders, positions, verbal praises, food rewards, so on and so on. "It has been quite a journey but the protocol is done and we can soon start once all the minor practicalities are dealt with", or so I thought.

My *senpai* brought me back to reality, twice. The first time, she informed me that I would need to have more experience with chimpanzees and build up a good relationship with them. This meant going through the first phase of feeding duty training, that is, watching others feed the chimpanzees dinner. Especially because my setting was semi face-to-face this was important. For several months, I would accompany dinner feeding in the basement, and in the beginning, almost every week day. First, I would follow a particular person, asking to "stalk" in advance, but once familiarized with the basement, I could move freely and watch several human-chimpanzee pairs. Yet, being both an anthropologist and an experimenter was proving to be ruthless; I squeezed dinner feeding into the schedule just after the last session of a full day accompanying others' experiments and just before the multiple seminars occurring in the evening for researchers.

In the end, I was not required to feed chimpanzees but, somehow, having had the opportunity to regularly attend dinner feeding (not just once or twice) made all the difference in both my work as an anthropologist and experimenter. It was also a time in which, research personnel, tired from a full day of obligations, would sometimes stand by just a bit more to observe chimpanzees, as if we were inebriated by their interesting acts and our own sleep at the same time. In fact, it was sheer contemplation. A last gift from attending dinner feeding, was the opportunity to become acquainted with the chimpanzees not tested in South Play Room, that is, Akira, Puchi, Popo, Mari and Gon, who each had their own persona, which I was eager to meet.

My second reality check was the "training phase". My *senpai* was clear: You need to train chimpanzees to come to your experiment. Raising an eyebrow, I questioned: What do you mean? Don't they already come to other experiments in the lab? If they will already be here, can't we just take it from there? - or so I imagined. Well, in fact, no. And like this, I would come to know the slow pace of the so-called "training phase". In general, training phase is a series of sessions run to make chimpanzees understand the setting before the test phase *per se* starts. This means that how chimpanzees will accomplish a task needs to be very clear for them before they can answer the task in itself. In the same way, human participants of cognitive experiments and exams in general are also given instructions, such as "press this button when you see this or that", or "write the test with pen and not with pencil", and so on. Except, this time we cannot rely on extended verbal instructions but only on a sort of "trans-species pidgin", to quote Kohn's term.⁹

However, when you have more to say than your communicative repertoire in interspecies pidgin or when you need to rely on consistent action, operant conditioning will serve experimenters well; not as means to solve a task, but as means to inform about a task. As such, our team would proceed to engage in a long training to make chimpanzees understand the "know-how" aspect of the experiment, before we could test their "know-what" of the task. The first part of the training was to condition chimpanzees to be tested separately. This was necessary because although for the

computer experiments each chimpanzee has her or his own booth, they come to the laboratory in dyads, with one exception. Our sessions were the following: first in the morning, Ai and Ayumu, followed by Chloe and Cleo; in the afternoon, Pan and Pal, followed by Pendesa. The training was multifold; they had to learn that another "event" would take place after the computer experiments, that they would do it separately and that they needed to use the apparatus in a certain way. In addition, they had to get used to me just being there, as part of the setting.

To this purpose, after the computer experiments chimpanzees would be called into the entrance. One of the lab members would go inside the first booth and place a treat on the floor in front of the apparatus. I would then sit inside the cabin and the members would ask the youngest chimpanzee to proceed to the booth first. This is not necessarily an easy task because some scenarios can arise. At times, chimpanzees (a) want to go together, or (b) the requested chimpanzee does not want to go but the unrequested does (c) none of them are agreeable. Thus, two people separate the dyad; one takes care of entertaining the chimpanzee staying in the entrance, either with treats or simply by playing, while the other gestures and verbalizes for the "target" to move. When the requested chimpanzee is next to the door and the other is paying close attention to a human, the door is opened. The youngest one will come into the booth, find the treat, eat and head back to the entrance. Then, the procedure is repeated for the older chimpanzee. Afterward, the training session is over and chimpanzees leave the laboratory for good.

This is repeated over several days until chimpanzees get more used to being separated in such way. Note, they are not asked to merely come to the booth, stay in a designated spot and stare at the experimenter in the cabin; instead, a positive stimulus, a treat, is placed where they will manipulate objects in the future, and the experimenter being there is just another fixed factor in this configuration. This can be referred to as locale enhancement: they come to associate the place positively. With time, they anticipate the full sequence and configuration; that an event occurs after computer experiments, that the youngest will go first, that everybody will have their share, that there will be a person in the cabin, not anyone, but that one specific person, and so on.

Of course, this does not mean they comply with our schedule all the time. However, in this way, first, they have a clearer understanding of what we, humans, want and when they are cooperative they proceed without much instructions on our part, or sometimes, none. Secondly, this implies that when they are uncooperative, they are so with a clearer picture of what is intended for them instead. A behaviorist might oppose: What has been described simply means that behavior

is shaped by doing the same actions over and over again associated with a positive stimulus; we can pass without the explanation that they understand humans' mental states. However, the converse also applies because, in the process, shaping does not preclude some level of theory of mind (i.e., attribution of mental states to humans) or metacognition (awareness of one's own behavior). In addition, not all interspecies communal actions are shaped.

Now, back to the training sessions, once a specific spot was enhanced in certain constant configuration, our next step would be to make chimpanzees understand how to use the apparatus. It was vital to make them grasp that they had to give the experimenter the objects encountered on the floor. And this, one by one. Our initial experiment counted with twenty-five stimuli, therefore, we divided the training session into small steps. We bought several wooden, uncolored balls of three centimeters each to serve as items for the training phase. It was important that these were (a) different from the stimuli (colors and objects) of the test phase (b) small enough to fit the hole and (c) small enough to give chimpanzees the chance to make mistakes, that is, to deliver two or more at the same time, since this would be a real situation faced during test phase.

This official training session consisted of five steps to be accomplished over time: five balls; ten; fifteen; twenty; twenty-five balls. Whenever chimpanzees would enter the booth, now they would see balls scattered next to the apparatus, instead of a treat. They would all begin with five balls and pass to the next steps depending on how well they performed. Our protocol allowed me to say a common husbandry word they know well, that is, "chōdai", or 'give me'. In addition to the verbal request, I would concomitantly knock three times on apparatus. The knocking was always on the same spot, that is, the translucid protective cover facing the hole where chimpanzees were supposed to deliver the items (named object hole).

These details were important because relying on multimodal communication (verbal plus gestural) to convey the same message seems to be more effective in reinforcing meaning.¹⁰ In addition, the precise spot of the knocking indicated that they were supposed to deliver it through the object hole, not the food hole. In sum, the formula was: $ch\bar{o}dai + 3$ knocks next to the object hole. Then, for each ball delivered a praise would follow: "sō", that is, 'yes'. Moreover, we had also planned to signal when they made a mistake, in which case, the experimenter had to say "chigau", also a husbandry word, which indicates loosely the idea of 'otherwise' or 'it is different' or 'that is not it'. The protocol was to say "chigau" and return the items to the participant. In case of destructive behavior, the stronger "dame" would be used (no good).

After all items were returned, the experimenter would check them and reward the chimpanzee for accomplishing the task by saying "erai" (good job) and by providing a food reward. The chimpanzee would pass to the next stage (e.g., from five to ten balls) when all the balls were successfully given one by one without any damaging actions, like biting. Chimpanzees quickly understood which hole they were supposed to deliver with near perfection. Also, the food hole was, in fact, inverted so that things would drop from the top of the experimenter's side to the bottom accessible to chimpanzees. Yet, the reverse, that is, giving the experimenter an object from bottom to top, was not possible. Thus, they swiftly grasped the mechanics of the apparatus. Having a few sessions as exception, chimpanzees were performing well and delivering the balls one by one when they could have simply thrown a bunch through the hole. In such sessions, I would see myself flooded with balls on the human side, cumbersomely trying to pick them up for return. Indeed, the balls proved not to be a very experimenter-friendly object. Curiously, the defiant Ayumu would occasionally vent some frustration at a ball, throwing it against the floor vigorously while we watched it ping-pong from floor to ceiling.

I could extend myself to describe in precision all the protocols for each phase of the experiment, but there are indeed several scientific journals as space for such facet of the scientific work. However, to the best of my knowledge, what lacks in terms of publishing venues are journals in which other aspects of experimental work are contemplated seriously: such as etho-ethnographic aspects of an experiment, its social interactions entailed, and so on. Recently, a replicability crisis in cognitive psychology has been evoked, supported by a large-scale study,¹¹ although the study itself has been criticized as well.¹² Regardless of which side of the debate is most accurate, the truth is that, in scientific journals, more detailed social aspects allowing us to move beyond standard words, such as "enculturated", "socially housed" and "language-trained", have no formal, institutional space. This occurs even when authors have the best intentions of elaborating and reflecting upon the context of studies themselves.

In mass, experimental scientists have to deal with standardized, air-tight formal structures in their reports. Sure, one could publish books and so on, however, this misses two points. First, other publication types are never as valuable as journal articles for biology-oriented sciences; and in order to receive already scarce grants one must "publish or perish" (obviously, "publish" *sensu* high impact factor journals!). Secondly, by dissociating contextual from other technical details, the reader loses possibly important information that could help their experimental setup or their replication efforts. In this sense, the "contextual" is an important technical aspect.

This necessity of an attention shift occurs not only on a formal ground of how much space scientists are given, but also on an epistemological and methodological level of what counts as data, and what counts as a good report of results. Thus, this parenthesis was meant to convey that, here, we will not dwell on providing readers the same type of information they could read in a possible future publication; luckily, our experiment has continued through collaborative efforts after my departure and we are on the stage of data analysis and conception of follow-up experiments. What I would like to provide readers, instead, are mainly "unofficial" aspects of an experiment, which, nonetheless, are not any less vital. They comprise failures and surprises in which the social aspect of an experiment became paramount to the reflection upon our experimental protocols and practices.

Now, one may ask whether experimenters can be tested by chimpanzees themselves. Chimpanzees are such socio-cognitively complex creatures that those involved in chimpanzee research could likely give a positive answer to the above question without fearing being crucified for the sin of anthropomorphism. Yet, it is not only that chimpanzees can test us but, indeed, they do. This occurs in numerous situations when they try several means, and probe our reactions attentively watching the outcome. In addition, chimpanzees do not necessarily conform to our intended protocols and the task of designing and conducting an experiment goes through a true feedback loop, instead of a top to bottom decision from experimenters to participants.

One of these feedback loops that changed the course of our experiment was an episode occurring during Pan's session, after she had passed the training phase and was just beginning the preference test. Before exploring the case in detail, we should put the session in a bigger context. At this point, we had started the preference test for some chimpanzees, where we would assess whether chimpanzees would spontaneously sort items preferentially by color or by shape. Remember, each item had two features: its shape as an object and its color (e.g., red cup). If a chimpanzee preferentially groups by color, she or he will be more likely to return colors sequentially (e.g., **red** cup, **red** rope, **red** block; then **green** spoon, **green** pencil, **green** block, etc.). On the other hand, if a chimpanzee preferentially groups by object type, then she or he will be more likely to return objects in sequence instead (e.g., red **cup**, green **cup**, yellow **cup**; then white

rope, blue **rope**, yellow **rope**, etc.). Our stimuli were five colors and five objects. However, a problem started to occur in the very first sessions of the preference test.

The first problem was the coding of the videos. After the sessions, I would watch the videos and write down the sequence of the chimpanzees' selections. There, an unforeseen problem occurred: some stimuli like spoons and pencils, and their colors, were becoming too difficult to identify in the videos, even if we had a close view through one of the cameras. We had simulated the experiment before with humans, and even asked them to try to enact chimpanzees' patterns and speed, but no true issue was spotted at that point. When the real preference test with chimpanzees started, action was too fast for coding thin objects and although slow motion essentially improved coding quality, reliable coding was becoming so time consuming as to be impractical. That was a main scientific issue. A second, more practical issue was the destruction of the items. Apart from a few destructive behaviors Ayumu had shown during the ball phase, which improved over training, we did not have major issues with how they treated the items. Yet, this would change with the introduction of real stimuli. Whereas the cups, ropes and blocks were sturdy enough to survive some eventual biting, pencils and spoons were not.

Chimpanzees behaved differently toward the novel items. Ai, in all the sessions she completed for the preference test, manipulated them very carefully. Cleo would spend an immense amount of time playing, and, in the beginning, she would amusingly get very frustrated whenever she did not manage to stack blocks correctly. She also bit a couple of objects. Pendesa, curiously, created a "nest" with the items, exactly as chimpanzees in the basement would do sometimes with the blankets given to them. A few of the items, Pendesa damaged. Pal, Chloe and Ayumu, for various reasons, had their preference test delayed. The quiet, sweet Pan, on the other hand, would be the record breaker for bringing down the house. When trying to make sense of their actions, I realized that, first, they are so much stronger than us, and small objects for human use are designed for human strength and learned delicacy.

Then, I realized they were curious about the stimuli and exploring the affordances of the objects. In fact, during the first sessions we would include a time window in which the experimenter would not ask 'give me' if they were away, in order to allow them to explore the items at will. Yet, exploring also meant breaking! Especially for the super strong chimpanzees. After one of Ai's session, I felt so excited and commented with a technician about Ai's delicacy with the items; 'As expected from Ai', she replied ("sasuga Aichan"). Indeed, it has been evoked

in the laboratory how Ai had a more human mindset. Even though chimpanzees have their own right to act the way they want, I felt deeply grateful for Ai's soft handling of objects; a feature which I infer must have been learned over the course of thousands of close interactions with humans, in the same way human children learn not to destroy their belongings. On the other hand, whenever Ai is curious about something out of reach (like computer cables), if given the chance, she would tear the place apart to gain access to a novel stimulus, so I was told. Anyhow, tough handling was an issue we would have to deal with.

There was still a third difficulty we were facing, which, in theory, could be circumvented by our protocol but, in reality, was making the experiment very challenging. The issue was the multiple returns at the same time. If overall chimpanzees had done great with the balls during training phase, they were now more prone to deliver objects in groups at once, especially the problematic spoon and pencil. This was, in fact, already a function of their preferential categorization of picking up items by shape. Curiously, this facet of multiple returns could not have occurred during the training phase, because the items were all of one shape (i.e., ball) and "colorless" (i.e., non-painted wood).

Thus, during training there were no differences to sort out, and if there were, then, it could not be counted as training but as a test phase. Indeed, we did not want any sorting at that stage, just (a) learning where the object hole was (b) learning not to bite items and (c) to return them one by one. In retrospect, because big items cannot fit together in the hole, the small size of the balls covered only one aspect of multiple returns: its possibility. However, one of the reasons they usually did not return the small balls together, when they could, might have been because they were not categorizing them (there were no categories!). When you add the powerful combo "possibility (i.e., small size) + meaningful grouping (i.e., categories)", then they would return thin objects at once (e.g., group of pencils).

Already during the first sessions of the preference test, chimpanzees were more likely to return items by object category. By design, multiple returns were interdicted given that (a) this would make chimpanzees have to decide clearly how they wanted to group objects (b) this would allow a reliable rewarding system and clear analysis (c) this would allow them to correctly identify which were the items that were rewarded in the test phase, otherwise, they would have a harder time identifying the targets. Suppose a chimpanzee has "red" as a target. If we accepted multiple returns and the chimpanzee delivered at the same time a **red** pencil, **red** *spoon* and yellow *spoon*,

then, two rewards would be given because the target "red" was given twice. However, the target could also have been spoon, correct? In addition, the reward delivery would be much more errorprone because the action happens extremely fast. In other words, we did have strong reasons for organizing the returns in a sequential, one by one manner.

Most of the time, in the preference test phase, chimpanzees returned items according to the protocol. Yet, all of them, at some point, would break the protocol. We assumed that chimpanzees would transfer the *modus operandi* (return one by one) from training balls to experimental items. Mostly, they did. However, when they were not complying to the protocol, they were, in fact, already categorizing. In most of their multiple returns of thin objects, pencils and spoons were grouped apart, although occasionally a mixed grouping occurred (e.g., several pencils and one spoon). In sum, when they were breaking our protocol, they were breaking it because they were smart. In their "failure" in complying with our protocol, they were, in fact, outsmarting our protocol. Testing intelligent animals can be hard, and it can be a blow to a human's ego.

As you can see, little by little, during the very first sessions of the preference test, issues began to accumulate. However, the one specific episode with Pan changed my mindset in a very important way. My relationship with Pan had always been great, and she was one of the first chimpanzees to acknowledge me and show many affiliative behaviors whenever we met. In the presence of her daughter, Pal, she could become difficult because of Pal's defiant character. Yet, Pan is one of the PRI chimpanzees who seems to appreciate humans the most. This includes greeting humans, being curious about our things, using human typical clapping as attention getter, being preferentially interested in human faces when given the opportunity to "surf" the internet, and having some of her vocalizations sound a bit modified (although the topic merits studies). In addition, she had to be hand-raised for a while in Matsuzawa's home after her mother, Puchi, rejected her.

It is true she is not known for being PRI's most performant chimpanzee and, in fact, some experimenters hypothesized she comes to experiments because she likes human interaction, sometimes more than chimpanzees'. When recalling Pan's way of being, a very conspicuous image emerges. Many chimpanzees viciously banged or knocked the panel to warn personnel when there were occasional problems with the automatic feeder or when they had finished the tasks and humans forgot their treats. But Pan was gracious. Indeed, unlike other chimpanzees, her apples had to be frozen for her taste, but the melting fruits occasionally would get stuck in the tube of the

automatic feeder and she would receive no rewards for a while. Despite facing this issue more often than any chimpanzee, Pan would calmly and gently knock to inform us of the problem. Her gestural expressions were often precise, elegantly using one or two fingers to make her point.

Such difference could be due to many factors; because of her personality, because of how she perceives herself in chimpanzee and human hierarchy (among chimpanzees, she is lower ranking), or any other reason. Nonetheless, the difference was so striking. Sometimes we discussed whether chimpanzees think of us as their servants while we are placed next to the feeder, especially because of their impatient, strong attitude to see some results from us. Pan's daughter, the lovely, grumpy Pal, was the most typical example. So was the hilariously gluttonous Chloe. Ai, on the other hand, was usually not boisterous, yet knocked with confidence. But Pan... she was a butterfly. Of course, these are my personal impressions of their patterned behaviors. Their ways are a rich material that merits a full study, but my description suffices for the purpose of understanding Pan's experimental session in context. In sum, from my perspective, Pan was a quiet chimpanzee, who could be influenced by her daughter's behavior and turn more boisterous, but who was overall very tender, whatever that means. I and Pan were on great terms. Nonetheless, one of our sessions together did not go well.

It was the penultimate preference test trial. Pan had done computer experiments for the day and had greeted me beforehand. This episode was documented in a footage of her session (Video Frame 7; Audiovisual Material 7). For clarity, the episode will be retraced in third person. The video starts with Pan already manipulating the items (9s). The experimenter calls her attention by saying "chōdai". Soon, it can be seen that a blue spoon had been given back to the chimpanzee through the food hole (this was an item she had given back together with another). Pan picks up the spoon and tries to insert it into the object hole. As it falls, she picks it up again and her insertion is successful. The experimenter praises "sō, sō, sō, sō, sō, sō". Then, Pan picks up items one by one, and with each return she receives a verbal praise (42s). After having delivered all blocks and cups, some spoons and pencils remain.

With a spoon in her mouth, Pan gathers three pencils (1m1s) and as she is about to insert them in the hole, the experimenter says "chigau, chigau, chigau, chigau, chigau... Pan-chan" (that is not it, little Pan) (1m4s). Some pencils fall on the floor. Rapidly, Pan, still in bipedal position, lifts up her arms and bangs the panels (1m7s). The adjacent panels vibrate as a result. The experimenter says "chigau" once more while giving back a pencil through the food hole. Pan

collects the pencil in the hole and proceeds to collect another pencil on the floor while holding a white spoon. This time, she delivers just one item, the yellow pencil, to which she receives praise. Then, she returns the white spoon (1m16s), and the blue pencil one by one, receiving praise each time.

Next, Pan picks up the red spoon and green spoon (1m24s) and as she proceeds to insert them in the hole, the experimenter utters "chigau". Pan inserts both anyway. The experimenter responds "chigau, chigau". Pan makes a full grin showing her gums and teeth, at the same time the experimenter is saying "Pan-chan". Pan bangs the bottom panel and then the upper panel (1m28s). She screams, bipedally, she quickly glances at the humans to her left, turns her vision to the experimenter again, and claps three times while screaming (1m33s). A white pencil falls from the food hole. The graduate student in charge of the laboratory calls her name: "Pan…" (Pan's scream makes the sentence inaudible); Pan turns to her (1m36s). A red spoon is seen falling from the food hole. Pan's scream increases and she hits the panel of the apparatus with both her hands (1m38s). The student in charge says "Pan, kaerō" (Pan, let's go back). Pan inserts the red spoon into the object hole and receives praise. As the experimenter is praising, Pan resumes screaming. Pan picks up a white pencil and is praised. As she returns the red pencil, she breaks it in half (1m54s) and gives the item back each half at a time. She receives praise. She picks up a green pencil and virtually breaks it in half (1m59s). As she delivers the item, she receives praise.

Now, no more items are seen on the floor. The experimenter asks personnel: "Do you see any objects there?" (Not visible from the camera view but detailed in the lab notes: inside the cabin, the experimenter bends to observe the floor). Pan passes her hand through under the bench (2m3s) and then bends down looking to the floor (2m4s). She turns approximately 90° degrees to her left in a bent position (2m5s midway). At the same time, the observing student bends down as well to look for any objects left on the floor. The student answers: "No". The experimenter confirms: "No?". Next, the experimenter proceeds to the end of the session with the standard verbal formula: "erai ne, Pan-chan" (good job, right, little Pan). As the experimenter is delivering the reward, it falls down on the experimenter's side: "opa" ('oops' in Brazilian Portuguese). The experimenter continues "gomen, gomen, gomen." ('sorry' in informal Japanese). The rewards are finally delivered: "erai ne, Pan-chan" (good job, right?! little Pan). Pan starts eating and the video ends.









1m1s

1m4s











1m24s

1m28s



1m33s

1m36s





1m38s





Video Frame 7 Pan reacting to the protocol of the categorization experiment. From Audiovisual Material 7. Audiovisual Material 7 Pan reacting to the protocol of the categorization experiment, 2015, 2m27s. By Daly.

This episode is interesting on many aspects. First, it clearly depicts some of the most important problems we had been facing, like multiple returns and destruction of the objects. A quick remark on this point is worth mentioning. Note that, when Pan breaks one of the pencils in half, she delivers one half after another. This had been one of the chimpanzees' interesting behaviors during the preference test (later on they would not destroy objects anymore). With some exceptions, when they damaged or tore an item apart they did not intercalate the delivery of the pieces and other items (e.g., a third of a pencil, then spoon, then another third, etc.). Instead, they gave back pieces sequentially, as belonging to a same group (i.e., former unscathed item) even if the pieces were lying on the floor along with other items.

The second interesting point is how, in the end, Pan helped look for the object. By experience, she knew the session was only over once all items were returned. At the same time the experimenter bent over, Pan did the same, and the observing student as well. Action is clearly synchronized (see the video in Audiovisual Material 7 for a powerful visual effect). Taking action to close an experiment was one of the chimpanzees' patterns across all phases. Some situations arose. In the first scenario, the experimenter would timely count all items on her side and give rewards, in which case, no action from the chimpanzee occurred. Note that, by protocol, we did not give rewards before making sure all the items were delivered, but even when this was evident, the experimenter refrained from overlapping the last item given with the reward for accomplishing the experiment.

In the second scenario, while counting items on her side, the experimenter would take a few seconds longer than normal to deliver the final praise and reward. Here, there were several possibilities of response: (a) the chimpanzee would patiently wait for the experimenter (b) would hurry the experimenter up by knocking on the panel right away or at some point (c) would peek at the experimenter's box by leaning over to see the inside (d) would, by her or his own initiative, look for items on the chimpanzee's side (e) would look for items in the booth by request of the experimenter (chōdai). In sum, closing the session entailed coordinated action.

In fact, during the training phase with balls, from time to time, I felt a profound empathy on the part of chimpanzees. Imagine yourself receiving twenty-five balls one after another in high speed. With a footer preventing the correct placement of the receiving box under the object hole, not all items fell properly inside and, sporadically, the tiny balls rolled outside. In such cases, I would not stop the session, obviously, but would quickly remark the experimenter's side was messy. Occasionally, chimpanzees would adjust their speed; while holding a ball right next to hole, they would stop for a split second or more before dropping it. Normally, this occurred when I was repositioning my hands to receive more balls and prevent them from falling outside. I noticed that as the sessions continued, for most of the time there was some kinesthetic empathy to synchronize action in difficult situations.

The third important point regarding the episode with Pan was the impact our communication during the experiment was having on her. Sure, chimpanzees have some understanding of the meaning of husbandry words like *chōdai*, *dame* and *chigau*. In general, such words are somehow supported by communication forms that reinforce their meaning like voice tone, gestural communication, context and so on. *Chigau* was essentially negative: something is not correct. However, much later I reflected upon the full implications of the use of chigau in the sense of signaling to chimpanzees that something was not done correctly (i.e., return one by one). This can be easily translated into Quine's "gavagai" problem or the indeterminacy of translation.^{II} Quine frames the issue as such:¹³ Suppose there is one English speaker and one speaker of an unknown language to the former. Upon seeing a rabbit, the second person utters the word "gavagai".

For the English speaker, some translations appear more obvious and some less, however, without any knowledge of the given language to detail and confirm the meaning with the other speaker, the English native is left with some indeterminate possibilities: "gavagai" may well mean 'rabbit', but it may also mean 'food', or 'let's hunt', and so on. Likewise, in the protocol, "chigau" may indicate that delivering items at once is wrong, but it may also mean that an item *per se* is wrong. Possibly, because chimpanzees heard *chigau* with different items, one meaning becomes more privileged than another. However, in advance, *chigau* is not specific enough to convey precisely what chimpanzees are doing incorrectly. Conversely, *dame* seems somewhat different because the context is always clear: biting. Still, one of the most important features of the experiment we needed chimpanzees to understand, was not being conveyed in the best way.

In Pan's next session, running on the same protocol, after having used the pencils to draw at will on the wall, she chewed them all completely. That was the last straw, and it called for a change. We reformulated the protocol and the stimuli, eliminating pencils and spoons, and therefore, the necessity for any "chigau" of the sorts. This proved to be extremely effective, and

^{II} I thank Nicolas Langlitz for referring to Quine as a possible analogy.
the few preference test sessions that some chimpanzees have had with the old protocol, matched the preference test running with fewer stimuli. In other words, their preferences had not changed once we dropped two stimuli.

As we have seen, issues had been accumulating with the old protocol. Nonetheless, what really motivated me to pursue a change was the increased probability of experimenter's error on spot and, in addition, Pan's reaction (and other chimpanzees' likely reaction in the future). Experimenting was becoming very stressful and requiring so much attention during the return of the objects that I was afraid of not being able to keep up without making mistakes on my side. This may seem pretty straightforward for outsiders: to coordinate receiving items and give back "wrong" returns before the next legitimate, orderly return. However, the task was really challenging because of its speed. First, once falling, the incorrectly returned items could be mixed with the correct ones in the box or even fall outside. In this way, I had to distinguish what was correct, what was wrong, pick them up, and return them to the food hole within seconds, before the chimpanzee could make the next move. Secondly, if this was already challenging during the preference test, imagine during the test phase, when a target is rewarded with food. The protocol was becoming too hard for *my* motor and cognitive abilities!

Then, on the top of that, I was extremely saddened by the fact that I had caused Pan frustration in such way. This was likely to become systematic and, perhaps, more chimpanzees would eventually feel the same way. Some collaborators evoked the fact that she was on estrous and more sensitive to being reprimanded, according to people's past experience. Regardless, I did not want to have any openings where our social relations could deteriorate. I have had chimpanzees showing agonistic behaviors toward me, however, it had never been because of something I intentionally provoked, or of which I was aware.

This problem, on the other hand, was different. I felt personally responsible for her frustration and guilt sank in. No matter what, the protocol had to be changed and my most driving motive was not science but the type of social relation that was unfolding in the experiment. Luckily, our good relationship was not changed and she continued to show affiliative behaviors as she did in the past. I recall that once, when I went to observe dinner feeding in the basement, I dropped by next to Ayumu's room to greet him after meals were over. Next door was Pan, but, because I could only see through small openings, I was unaware that she was still in that room. When she heard

my voice while talking to Ayumu, she clapped to call my attention and when I came close to the perforated window, she greeted me enthusiastically with an onion breath. *This* was Pan.

Afterward, our new protocol would still be put to the test by chimpanzees' intelligence. Fortunately, this time, it involved no such reactions and our protocol would prove to be chimpanzee-cheat proof. Now that the protocol had been changed, chimpanzees completed all the preference test sessions and they demonstrated to be shape biased when no items were food rewarded (Graph 5).^{III} This means, concretely, that chimpanzees preferentially grouped by shapes than by colors. Now, in the test phase, we wanted to address whether and how they would change their patterns if one category or another was targeted. In other words, comparatively, we wanted to investigate the structure of their actions when certain features were highlighted.



Graph 5 Results of object and color categorization, preference test.

^{III} For reference: p = .0002, repeated measures ANOVA.

In the test phase, whenever chimpanzees returned a target, regardless of the position of the return, she or he would receive a reward (Figure 1). In addition, we expected that if chimpanzees were explicitly aware of the targets, they would deliver it in the first three positions in order to obtain the rewards earlier. Note that the amount of food chimpanzees received in all phases never changed, only the moment when they would receive it. Thus, whatever rearrangement might exist in the structure of the sequences, it cannot not be attributed to a differential amount of food reward.

During the test phase, by and large, Pendesa was my best and most motivated "student". Pendesa was a curious chimpanzee. She was easily recognizable by her constant sideway swings. Usually, in a chimpanzee, repeated movements as such might be a sign of stereotypy, which is not a good welfare indicator. However, because Pendesa has her vision partially damaged in one side, it seems that this is more likely a way to compensate for her vision loss, especially as she is well integrated into the group. Pendesa's typical move



Figure 1 Example of target in the object and color categorization experiment.

GRope

9th

whenever coming to South Play Room is pant-hooting and eventually hitting the panels. As I first came to PRI, I was impressed by her vigorous kicks and punches, and assumed that she was an aggressive chimpanzee but I came to realize that this was a sort of ritual of her own. Other researchers believe that these repeated actions are meant to signal the group where she is because, apparently, in the other laboratories further away from the outdoor enclosure, she seems to be quieter when entering.

Pen-*chan*, as we call her, had been randomly assigned to "cup" as first target. The criterion to move to another target was to give the experimenter the targeted items back in the first three positions - but that - across three consecutive sessions, to make sure results could not be attributed to chance. From session ten, she started to meet our criterion and in thirteen sessions she was done with her first target. Then, Pendesa would be tested with "rope", her next randomized target. This time, it took her only two sessions to grasp her new target, and in a total of five sessions she completed her second target. This was impressive, especially considering chimpanzees were tested only once a day for this experiment, not the nearly hundred trials per day of computer experiments.

Unfortunately, Pendesa would never grasp her third randomized target, yellow. And future sessions (and subsequent follow-up experiments) revealed that the color condition for real, 3D items would be extremely difficult for all chimpanzees, even for Ai. They never got it once! True, chimpanzees have not been tested yet with the same setting in a computer version. Still, it is remarkable that whereas they excel in difficult 2D computer tasks such as color categorization by symbols, when confronted with real, 3D items, the color aspect is hindered. Likely, this occurs due to the affordances of the objects, that is, what chimpanzees can do with real objects (e.g., stacking, nesting etc.). We are designing new experiments to tackle the issue, given that it is not a matter of inability to categorize colors, a well-known capacity in their species. Instead, the difficulty revolves around how features of the real and virtual world impact the structure of chimpanzees' actions and categorization; and, in addition, how our experimental protocols can embody the right features to bring preferential color categorization to life in a real-world setting.

Pendesa, however, presented strategies to try to evade difficulties in solving the task. She began to present what shall be dubbed here as "testing behavior". Recall that her first target was cup and that from session ten she started meeting our criterion. Well, in the ninth session, she first started to probe whether her "hypothesis" was right. By protocol, the experimenter verbally says "sō, sō" when a target is delivered, along with a food reward. Therefore, in anticipation, instead of dropping an item through the object hole, Pendesa would insert the item through the opening, as if she meant to drop it on the experimenter's side - but then she would wait. In the absence of a response (sō, sō), she would take the item back and try another. This was her strategy to circumvent the forced choice we had imposed upon her. Like this, she could "try" several objects and only make up her mind once she was certain to have chosen the correct one. Moreover, Pendesa could be clearly seen looking at items and hesitating to choose among them.

I was very much surprised when I saw she was passing the items to my side but not dropping them. This sent chills down my spine; we had defined that in the test phase the verbal praise would only be given after the chimpanzee dropped the targeted item. I was being particularly careful about this; however, I was not expecting such "testing behavior" the first time this occurred. Had I not been quick to grasp her "cheating" intentions, I might have broken the protocol and said 'yes', when, in fact, she was just testing to see whether her choice was correct... not making a real choice. Luckily, I was firm. Even when she tested me with the correct item, I did not give a verbal praise until she dropped it.

In total, Pendesa showed this testing behavior twelve times. This occurred once during her first target, cup, and she tested it against yellow block. Parenthetically, blocks and cups were the objects that had more mixed grouping. Next, Pendesa repeated this behavior three times more for her second target rope: twice against green cup and once against red cup. Note that her testing was likely based on her previous target, cup. In other words, she might have wanted to verify that the target had changed indeed. At last, for her subsequent target, yellow, she would show this behavior eight more times (yellow block 2x; green cup 2x; yellow cup 1x; red cup 3x). Probably, Pendesa was testing the third target against her first one (*Cf.* the possibility of grouping by colors: 3 times yellow; 2 times green; 3 times red *vs.* the possibility of grouping by objects: 2 times block; <u>6 times cup</u>). With time, she abandoned the strategy, likely because she noticed it was ineffective. In sum, there are reasons to believe that Pendesa was not only testing the experimenter by fishing for a positive feedback before making her choice, but that she was doing so in a strategic manner, basing it on her previous experiences.

Now, we shall explore a video compilation of some of Pendesa's instances of "testing behavior" to ground the points discussed (Video Frame 8; Audiovisual Material 8). The video starts with a session during Pendesa's first target, rope. Pendesa comes to the booth, sits down (3s), glances at the items and picks up "green cup". She introduces it through the hole (4s) but takes it back (5s). She puts the cup on the floor, swiftly touches "red cup" but pushes items away with one hand (yellow block, yellow cup, and red cup roll). Then, she picks up the red rope and introduces it into the hole, letting it drop. As rope was her target, she receives praise "sō, sō, sō, sō, sō, sō" and a food reward. Next, the video cuts to another session. This time Pendesa's target is yellow. Pendesa is seen picking up the yellow rope (14s), introducing it into the hole and letting it drop. Because her target was yellow, she receives praise (sō, sō, sō, sō, sō, sō, sō) and a food reward that she readily eats.

Next, Pendesa looks at the objects on the floor. Only cups and blocks remain. She gently touches a group of items with her hand (red block, green block, and red cup) and they become slightly more scattered. Pendesa picks up the slow rolling red cup next to her and proceeds to insert it in the hole (28s). However, she withdraws and positions it next to her mouth (30s). She puts the red cup down and this time picks up the yellow block. As she puts it in her mouth she slightly rotates it (33s) and then she passes it through the hole (35s), but she takes it back. Pendesa puts the block into her mouth again, rotating it, and proceeds to put it down (39s). Next, Pendesa picks

up the green cup and places it halfway through the hole (42s) but takes it back, placing it in her mouth (45s). She seemingly licks the cup while rotating it. Afterward, Pendesa inserts the green cup into the hole, holds it on the experimenter's side (48s), until she finally drops it and the video ends.





28s

30s



Video Frame 8 Pendesa's testing behavior during the categorization experiment. From Audiovisual Material 8. Audiovisual Material 8 Pendesa's testing behavior during the categorization experiment, 2015, 51s. By Daly.

What is most impressive in Pendesa's case is that the final amount of food reward is the same. What would she lose if she had just dropped an item that was not correct? Sure, chimpanzees are very impatient regarding food and usually precipitate to receive it as soon as possible. Yet, her strategy also took time she could just have spent delivering items in an increased speed, which was Chloe's strategy, for instance. Thus, Pendesa's motivation for going as far as probing the responses must have lied elsewhere. It looks almost as if she were completely "in the game"; by the way she moved items, by the way she carefully went across them, and so on. Interestingly, one day, Pendesa

even waited for this experiment despite our otherwise instructions. On that particular day, I was in South Play Room accompanying my colleagues' computer experiments but it had been decided that my experiment was not going to take place this once. So, after the computer experiments, Pendesa was called to the chimpanzees' entrance to leave the lab. Yet, no matter how we would tell her to go back (by verbal and gestural communication), she remained there, swinging her way as usual.

We insisted for some time until my *senpai* asked me to head to the back of the lab, out of her sight. I stood there but to no avail. We had to turn the lights of the laboratory off for her to leave. I was curious of the possible explanations for it and asked my *senpai*. She said chimpanzees knew they had to accomplish my task after the computer experiments, in other words, it was simple reinforcement. Nonetheless, none of the other chimpanzees had done so in the sessions I had to cancel. Whatever confirmation bias it might be, I felt my experiment was appreciated by Pen-*chan*. Curiously, Pendesa might not respond in the same fashion to all experiments. A professor at PRI once commented how they had to stop a certain experiment with Pendesa, because they discovered that before Pen would be called in, she was hiding, trying to avoid going to the respective laboratory. Whereas this experiment was very amusing to other chimpanzees, Pendesa seemed not to be enthusiastic about it.

When my stay was coming to an end, I had accumulated considerable experience when looking back in retrospect. I had even become a *senpai* myself. I had never pictured myself in this place before Matsuzawa specifically pointed it out, on the occasion my *senpai* was absent and I was the more experienced one in the laboratory (even if the experience difference was not so large). In fact, at times, I would be the only experimenter in South Play Room, an irony for an anthropologist studying others' relationship to chimpanzees, although, true, there would always be at least one experienced technician to help with the experiment and ensure safety. This opportunity, too, proved to be enriching on an anthropological level because I had to be even more aware of my duties and make an experimenter's responsibilities explicit to myself, in terms of both science and safety.

During the last months of my stay, we had plans to continue the experiment: I would still be responsible for analyzing the data and correlates but a graduate student of the laboratory would take my place *in locu*. I trained my "successor" the best I could. I wrote down all the details I could remember and, most importantly, all the details that were not in the protocol but that were

nonetheless vital. This included how to keep your cool when facing heated agonistic reactions, how not to be "cheated on", and so forth. We simulated the experiment beforehand, but just among humans, so that the specifics could be passed on. I even imitated some of chimpanzees' worst reactions to make my point.

But it was not until I had to "pass the torch" that I realized one of the most important features of the experiment: it was ingrained in me. My body knew the experiment by heart; in the way I moved, in the way I would almost ritualistically cross-check the steps, in the way I positioned myself in the cabin, in the way I kept distances, in the way I mastered its temporality... This semi-face-to-face experiment was, in a certain way, like a musical instrument I knew how to play. And I could play several songs with it. Or better, the experiment was a duet between I and the chimpanzee. Indeed, there was so much implicit knowledge that I had a hard time figuring out what was meaningful to pass down, and what was just idiosyncrasies of my own.

Yet, during this transition phase I would still learn another lesson on what experimenting with chimpanzees truly means. By the end of my stay, I was still a very pragmatic person, perhaps, too pragmatic despite my previous lessons. Once most essentials of how my colleague would take over had been cleared out, I wanted her to start the sessions with chimpanzees before I would leave. This way, I could help the transition and supervise the details. In my everlasting naïve imagination, she could start right away with the next test phase. Once again, my *senpai* brought me back to reality. Now, for the third time. She informed me that the training phase would have to be reinstalled. Whaaat??!! - I thought. Training phase? But don't they already know the apparatus and all that jazz? Isn't our colleague already an experimenter? Aren't they already used to her as an experimenter? Why then?? - I asked, anxious. My *senpai* was simple and compelling. It was because chimpanzees had to be used to our colleague being *the* experimenter for her own computer task - but as the experimenter of the categorization task. In other words, they had to acknowledge our colleague in her new position as my substitute.

Indeed, when connecting the dots, a similar case had been evoked in the past. In another PRI lab, it was not without resistance on the part of chimpanzees that a new experimenter started to alternate days with the old one. And this took place in an automated, computer setting with less social interaction. However, perhaps this occurred simply because this other colleague was a newcomer. Instead, my lab colleague was already an experimenter in South Play Room, so our

case seemed more dramatic to me. But then, again, it is true that the setting was comparatively more dangerous, therefore, even more experience was required. In a very synthetical form, my *senpai* referred to the training phase specifically as "relationship training". Chimpanzees would have to be tested again with non-meaningful items for the experiment, but this time, not because they did not know the protocol, but because the social relations *per se* had to be put to the test. In this sense, the "social" was part of the experimental setup all along, much more than I could have envisioned.

Testing chimpanzees and being tested by them had proven to be one of the most enriching experiences I had ever had. Also near the end of my stay, the experiment would be the object of a series of shootings and Professor Hayashi and I were invited for an interview to discuss the experiment. The interviewer was a long-term collaborator of South Play Room, who was a biological anthropologist and film maker. She was there on my first day at PRI and she was well aware of the fact that I was a social anthropologist focusing on studying human-chimpanzee relationship in Japanese primatology. Yet, she was interested in how I crossed the bridge from human-chimpanzee interactions to chimpanzees *per se*.

As I was describing how I viewed chimpanzees, the portrayal felt, in a way, very much anthropological and she proposed me the following analogy: It is as if chimpanzees were an unknown tribe, with their own language, and culture, but whose lives I still knew very little and, thus, was fascinated to study. At a first glance, I thought that this could sound like the anthropological cliché of the exoticism of the "primitives", but on a second thought, she was correct; it was exactly how I felt it. However, not because chimpanzees are "primitives" or akin to "primitive" humans - but in the sense that the effort to understand chimpanzees' own terms was already an essentially anthropological adventure. Except that, this time, the "natives" were of another species. And with that feeling, I somehow reconciled the experimenter and the anthropologist in me.

3.1 Practices Structuring Chimpanzee Care and Research

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3.2 Computer and Face-to-Face Settings

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3.3 Coproducing an experiment with chimpanzees

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⁸ Zygmunt Bauman, Wasted Lives: Modernity and Its Outcasts. (Cambridge: Polity Press, 2004).

⁹ Eduardo Kohn, *How Forests Think. Toward an Anthropology Beyond the Human.* (Berkeley: University of California Press, 2013), 145.

¹⁰ For discussions on multimodality, see Katja Liebal et al., *Primate Communication. A Multimodal Approach*. (New York: Cambridge University Press, 2014).

¹¹ OpenScienceCollaboration, "Estimating the Reproducibility of Psychological Science.," *Science* 349, no. 6251 (2015), doi:10.1126/science.aac4716.

¹² Daniel T. Gilbert et al., "Comment on 'Estimating the Reproducibility of Psychological Science'.," *Science* 351, no. 6277 (March 4, 2016): 1037, doi:10.1126/science.aad7243.

¹³ Willard Van Orman Quine, Word and Object, 2nd ed. (Cambridge: MIT Press, 2013).

Chapter 4 Symbolic Boundaries The Subtle Line between Humans and Chimpanzees

4.1 Linguistic Practices on Nonhuman Personhood

You should not count chimpanzees like humans! So said my Japanese language teacher, a peaceful, kind old woman whom I visited during my stay in Japan hoping to improve my skills... Once a week after a full day of experiments and participant observation I would pick up my bike and rush up late at night to Inuyama's International Center for an intensive Japanese session with no English translations granted, as my teacher knew all about Esperanto but nothing about English. That late at night, I usually felt brain-dead trying to communicate fully and effectively in Japanese but our warm-up was usually amusing and I sometimes would tell the chimps' shenanigans of the week. So, there I was describing the entertaining events of that day, talking effusively about "everybody" and how Pendesa and Pan did this and that, and how the "two" were so unalike during my experiment when I noticed she looked puzzled. She patiently asked me; This "everybody" you mentioned, would it be the chimpanzees? Pendesa and Pan are chimpanzees, right? Yes – I replied, as if it should have been obvious so far. She smirked and said – So, you should use *nihiki* to count them instead.

At that moment, my linguistic world turned upside-down. I have been talking about chimpanzees exactly in the way people referred to them in the lab, or have I not? But wait – I insisted – I always hear "nin" in the Institute. She elaborated – chimpanzees are animals and they are smaller than humans, so you should use *hiki*. Indeed, I had studied some of the numerous Japanese counters for beings and objects but before coming to PRI I had never really considered which counter applied to chimpanzees. Intrigued, I retorted – But is not *hiki* a suffix to count cats and other small animals? Chimpanzees are much bigger! Ah – she said – some people use $t\bar{o}$ which counts large animals... but what is the size of a chimpanzee? As I stood up and demonstrated, she confirmed – still smaller than us, so *hiki*. Then she added – Maybe in the Institute they use the human counter for chimpanzees but this is unusual. After that, the teacher invited me to tell the story again but I could not bring myself to call them *hiki*. In the end, I gave up and said –Would you mind if I call them *nin*? As chimpanzees are "like people" to me (hito to onaji $\land \& \square$ \circlearrowright)... In Japanese, the linguistic counting of animals and other beings is not as straightforward as one may imagine, and they depend upon the feature of what is being counted. In addition, since Japanese is composed of three main writing systems (i.e., kanji, katakana and hiragana) certain groupings or rather categorizations become more evident than in the languages that have a single writing system. A typical example is imported words such as chimpanzee. The origins of this word are said to be traced back to Vili, a Bantu language of Congo, ¹ and the name first appeared in Europe in the London Magazine of 1738, having been glossed as "mockman".^{2,3} In Japanese, the word chimpanzee goes by its phonetics, being "Japanified" to *chinpanjī* (\mathcal{FVNVV}). As it is traditional for species, animal names and foreign words, it is written in a phonetic syllabary named katakana instead of the alternative phonetic syllabary hiragana or the Sino-Japanese characters called kanji.

In Japanese, as in Chinese and Korean, whenever one wishes to count beings, events and objects a suffix called counter or numeral classifier follows the number. There are numerous different counters varying from gathering very specific groups to more general ones. There are approximately 150 Japanese numeral classifiers, however, only thirty are most commonly used.^{4,5} They specify the combined nouns in terms of attributes such as animacy, shape, size and so on.⁶ For instance, objects have precise counters like the one for long, cylindrical shapes such as pencils (hon 本) or thin, flat materials like paper (mai 枚), among many others.⁷ There are also some apparently odd groupings like birds and hares, counted both as *wa* (羽),⁸ perhaps because a hare's ears might resemble the shape of feathers, the meaning of the counter.⁹ Likewise, humanoid forms such as corpses, mannequins and images of Buddhist and Shinto deities – but also ashes – are counted as *tai* (体),¹⁰ in other words, body. However, gods as well as Buddhist mortuary tablets are *hashira* (桂), or pillar, while the deceased spirits are counted by *i* (位), also applied to rankings.¹¹

Numeral classifiers do not match the counting structure of languages like English or even broader Germanic and Latin languages^{1,Note12} because it is ungrammatical to simply add a number to a noun; thus, instead of saying directly <u>No.</u> + <u>Noun</u>, one must employ <u>No.</u> + <u>Counter</u> + <u>no \mathcal{O} </u> + <u>Noun</u> as in "7 (counter) of something", or likewise,

¹According to Gil (2013), from 400 studied languages numeral classifiers are absent in 260, optional in sixty-two and obligatory in seventy-eight, the latter being mainly concentrated in East and Southeast Asia.

<u>Noun + No.</u> + <u>Counter</u> as in "something 7 (counter)".¹³ In fact, item and piece would be the words in English to resemble classifiers the most.¹⁴ However, given that numeral classifiers refer not to measures but to the qualities of the addressee, their function is usually considered to be categorization.¹⁵

Humans, who are called *ningen* (人間), are counted by the suffix *nin* (人), the default human classifier, ¹⁶ whereas in the realm of possible counters traditionally attributed to primates we should distinguish three. First, the already mentioned *hiki* (匹). This counts small animals¹⁷ and might be applied to smaller monkeys fitting well within the category,^{II,Note 18} as for instance, marmosets (*Callithrix* spp. 3° approx. 18.8 cm, 256 g)¹⁹. Yet, it might be noted that any animal physically smaller than humans can be counted as *hiki*.^{III,Note 20} In fact, linguists detail that even though *hiki* is originally intended for small animals, it has gradually been used more and more as a default animal classifier that children start acquiring from around age five.²¹

The second counter to be highlighted is $t\bar{o}$ (). This one designates large animals like cows and horses,²² a category where gorillas fit well (*Gorilla* spp. \mathcal{J} approx. 1,70 m, 180 kg)²³. In terms of language usage, this category is applied to count bigger macaques such as Japanese macaques (*Macaca fuscata*; \mathcal{J} approx. 11 kg, 57 cm)²⁴. It is reported that in the Primate Research Institute keepers of this species employ *tou*.²⁵ Furthermore, this seems to be the case for experimenters working with macaques in the same place,²⁶ and $t\bar{o}$ is observed in broad media articles referring to Japanese macaques.^{IV,27} Likewise, some interlocutors, like Professor Matsuzawa, remark they used to regularly employ $t\bar{o}$ to count chimpanzees before starting chimpanzee research.²⁸ For a pictorial representation, refer to Table 1. In addition, counters *nin*, *hiki* and $t\bar{o}$ are compared up to five individuals and have their kanji structure and pronunciation discriminated.

Now, a third option to name primates is *kotai* (個体), that is, individual.²⁹ This is considered to be a more neutral counter and is regularly used in scientific publications regardless of the primate's size. At this point, a fourth – unusual – possibility should be added, as previously hinted. In the section of Language and Intelligence at the Primate

^{II} For instance, Matsumoto (1987) uses monkeys as familiar *hiki* category in his experiment with children, although the species names are not provided. Other animals in the same category are dogs, snakes and grasshopers. For unfamiliar *hiki* category, Japanese sables and marmots were used.

^{III} In discussing language usages with Professor Hayashi, she recalled how a journalist writing on chimpanzee research at PRI emphasized that human size should be the threshold between using *hiki* or *tou* counters.

^{IV} I thank Sayuri Takeshita for bringing this point to my attention.

Research Institute (i.e., the section responsible for chimpanzees) most researchers, although not all, reported to use the counter *nin* while in the laboratory. In other words, they employ the counter traditionally and grammatically attributed to humans to refer to chimpanzees.



Table 1 Japanese counters for humans, small and large animals.^{30,31}

Matsuzawa considers that due to striking phylogenetic and behavioral similarities between humans and chimpanzees the use of such counter is justified. One of his books explaining chimpanzee research to lay audiences is even entitled "*chinpanjī wa chinpanjin*" (*sic* チンパンジーは ちんぱんじん),^{32V} creating a neologism derived from the kanji character Λ , which has as reading both *nin* and *jin* (the Sino-Japanese on'yomi reading). Matsuzawa voices that "based on the evidence you say it is chinpanjīn".³³ He believes the word might be appropriately translated as "chimpanzee being",³⁴ rendering the translation of his book "the chimpanzee(s), chimpanzee being(s)".

In fact, while humans are called *ningen* (人間), the character 人 alone designates person.³⁵ This character has three readings: when isolated it takes up the native kun'yomi reading as *hito*; when combined with other kanji characters, it might be read as *hito*, or

 $^{^{}V}$ NB., the first term "chimpanjī" is written in katakana, as is the rule for this type of word; the second one, the neologism "chinpanjin", is in hiragana, denoting the peculiarity of this word.

follow two Sino-Japanese readings, that is, *nin* or *jin*. One finds the *jin* reading of this kanji when designating nationalities (e.g., nihon**jin** 日本人, Japanese) or inhabitants of a specific planet (chikyū**jin** 地球人, earthling; kasē**jin** 火星人, Martian), among other examples (see Table 2 for a summary).

Default Personhood Marker			
人			
Kun'yomi Reading		On'yomi Reading	
Hito	Ri	Nin	Jin
Person: hito 人		Human: nin gen 人間	
Homo sapiens: hito ヒト in katakana		Martian: kasē jin 火星人 Japanese National: nihon jin 日本人	
Counter: 1 person hitori 一人		Counter: 3 persons Sannin 三人	
Neologism: chinpan jin ちんぱんじん in hiragana (Matsuzawa 1995) ³⁶			

Table 2 Human numeral classifier in Japanese.³⁷

Indeed, the space-analogy³⁸ might be a proper tool to exercise our anthropological imagination and convey the meaning of personhood in a phylogenetic argument: Science fiction green Martians with antennae are indeed not earthlings; but in our imaginary, they interact with us in a much more human-like manner than, for instance, earth insects. They are not humans, yet they have crucial human-like features. While chimpanzees are individuals (i.e., kotai 個体) just like any other specimen in the biological realm, their cognitive capacities are equal to what is expected from beings that are yet different from humans but nonetheless still intelligent and sentient enough to be grouped together under the title of "persons". Even more; unlike the hypothetical science fiction aliens, humans and chimpanzees do have a common ancestor. Thus, the personhood argument on behalf of nonhuman animals becomes more striking in the chimpanzees' case due to phylogenetic proximity.

True be told, there are other ways of conceptualizing personhood without necessarily passing by cognitive capacities. This can be found in in other ontologies, that

is, in other forms of relating to animate and inanimate nonhuman entities. Modern science has emerged in the context of what is labeled naturalism, which, according to Descola, posits a physical continuity of beings within the biological realm, while setting apart human properties loosely gathered under the notions of mind or consciousness (e.g., intentionality, reflexivity, subjectivity and so on).^{39,40} Animism, on the other hand, can be considered the structural inversion of naturalism, because in animism these human-typical properties are shared across (certain) beings while their physicality differs.⁴¹

Thus, we fail to see the animals' humanity because bodies, understood not just as a morphology but as an ensemble of affections and habits, have particularities of their own, becoming the source of different viewpoints; while colonizers doubted Amerindians had souls, Amerindians were eager to discover whether the white men had the same body as theirs, in other words, whether the foreigners' body was capable of the same affections and perspective.^{42,43} Viveiros de Castro sustains that Amerindian words commonly translated by human being, instead of denoting humanity as a natural kind, represent the social condition of personhood.⁴⁴

Viveiros then questions, would the Amerindians be anthropocentric for hominizing animals? Not quite – he answers; because the human body, the culture, the modes of perception and action change with the beings' point of view. To be "human" for an animal is to be exactly as the animal is. The tag "human being", therefore, indicates – not a noun – but a personal pronoun marking of the point of view of the one who talks, that is, an "I", a perspective. Animals see themselves as humans because "Humanity" is the general marker of the "Subject". This occurs, at least, in the complementary side of animism just described, called perspectivism, which is present in many Amerindian ethnicities and attributed to animals like important human predators and preys and, to a lesser extent, to the florae in societies making use of hallucinogenic plants.⁴⁵

In the Japanese context, Jensen and Blok defend that Japanese possess a "different sensibility towards hybrids".⁴⁶ Nature-culture entities that would commonly be separated in what Latour calls the Great Divide between Nature and Culture ⁴⁷ are in fact acknowledged and play an explicit role. Grounding the reasons of this particularity in Buddhism and to a greater extent in Shinto practices, Jensen and Blok stress the "radical 'personalization' of the universe" where "[h]uman beings, ancestors and more-or-less anthropomorphized gods can be kami [spirit beings], but so too can foxes, trees, thunder, rice, stones, mountains and waterfalls".⁴⁸

To the best of my knowledge, no ethologist would publicly argue in favor of attributing personhood to inanimate beings or spirits because such attribution is not foreseen in the premises of scientific naturalism and encounters no argument to be supported, given that, on evolutionary grounds neither cognition nor sentience are attributable to beings such as rocks, meteorites and rivers, which is not the case of other modes of relationship with nonhumans. Therefore, in case of Japanese primatology, this sensibility towards hybrids is channeled to the attribution of personhood based upon biological commonalities from which even cultural behaviors arise, as expected in naturalism. This receptivity is reflected in the linguistic practice of their scientific community.

At the Primate Research Institute, even the exception to their linguistic pattern insists upon the continuity between humans and chimpanzees given proper context: A professor at PRI who reports to employ the counter individual (kotai) not only in scientific presentations and articles but also in the laboratory, makes clear that he uses the human counter *nin* in some public talks as a means to remind the audience that chimpanzees "are in the same biological category as we humans".⁴⁹ Another professor, who works at Kumamoto Sanctuary, PRI's sister institution, stresses that personhood should be based on "evolution" and not on a "social contract".⁵⁰ Furthermore, all interlocutors who commented on the *nin* usage for chimpanzees informed it to be based on our evolutionary proximity.

In fact, based on this premise, the Great Ape Project (GAP), founded in 1993 by Peter Singer and Paola Cavalieri ⁵¹ and the Nonhuman Rights Project (NhRP) founded in 2007 by Steven Wise ⁵² have advocated the change of the legal status of great apes and other cognitively complex animals, like cetaceans and elephants, to that of nonhuman persons.^{VI,Note 53} GAP's "Declaration on Great Apes" endorses (1) the right to live (2) the protection of individual liberty (3) the prohibition of torture, and it has been supported by a series of primatologists and academics including Jane Goodall, Nishida Toshisada, Roger and Debora Fouts, Francine Patterson, Richard Dawkins, among others. ⁵⁴ Moreover, the NhRP has been on a legal battle in the United States on behalf of certain chimpanzees in particularly dire situations, petitioning for an habeas corpus, a legal

^{VI} The focus of the legal battle has been so far on chimpanzees and is brilliantly illustrated by the documentary on the NhRP "unlocking the cage" (Hegedus and Pennebaker 2016), which interestingly features Ayumu's famous performances on cognitive tasks.

procedure that until recently was only granted to humans.^{VII,Note 55} Indeed, Matsuzawa filled an affidavit (i.e., a written sworn statement) in support of the NhRP's case on behalf of chimpanzee Kiko, presenting scientific findings on chimpanzees for that matter.⁵⁶

For these primatologists and supporters, it seems we might be risking repeating history, as Nishida Toshisada powerfully conveys:⁵⁷

The 'Declaration' at the beginning of this book [The Great Ape Project] proposes the inclusion of chimpanzees, gorillas and orang-utans in 'the moral community of equals'. Such an attempt is long overdue, given the similarity of humans and the other great apes, but it demands courage. Many people will protest against this proposal: some will say that human affairs are more important than anything else, while others will argue that the logical extension of including the great apes in the community of equals is the inclusion of all other life forms into that community. I think we should extend the right of membership to other life forms where and when that becomes possible. But we can and should include the great apes in our moral community immediately, as a first step. Remember that for a long time people did not consider that even their neighbours belonged to their own kind. The concept of 'people' was applied only to members of one's own tribe. A British traveller who roamed around the Malay peninsula in the early 1900s believed that the naked indigenous hunter-gatherers he watched were not human beings, but a kind of anthropoid ape. He held to this belief, despite having watched these hunter-gatherers walking on two legs and using blow-guns as a hunting weapon. You might laugh at this British gentleman, saying that he lacked common sense. But can you really laugh? After another century has passed our descendants might laugh at those who hesitated to give basic moral rights to the great apes.

Who is entitled to personhood and who is not differs according to particular ontologies. More precisely, personhood attribution depends on how the thresholds are set in the spectrum of possibilities allowed by the premises under which these forms of relationship operate.

We shall now ask how researchers at PRI refer to chimpanzees in different contexts. In order to systematically assess the research personnel's linguistic practices at the Primate Research Institute interlocutors were asked, either by personal communication or by email, to report which counter they use for chimpanzees while in the laboratory (**Linguistic Study 1**). The total number of native Japanese speakers who worked with chimpanzee cognitive experiments during the period of this ethnography (October 2014-December 2015) was analyzed (N = 13; Professors = 5; Postdoc = 1;

^{VII} According to NhRP (Ynterian 2017), in 2017 in Argentina, an habeas corpus was granted for the first time in the world to a chimpanzee called Cecília; she was transferred from a "jail-like zoo" to a sanctuary in Brazil.

Technicians = 3; Students = 4 incl. a native bilingual). From thirteen, eleven reported to employ the counter *nin* (人) for chimpanzees during their work. The exceptions were, a technician, who reported to use $t\bar{o}$ (頭) and a professor, who employs *kotai* (個体). Thus, nearly 85% of the native speakers working with chimpanzees at PRI in the period of the study reported to employ the counter *nin* while approximately 15% make use of other counters (Graph 1).



Use of Japanese Counters by Native Speakers Chimpanzees in the Laboratory Context KUPRI

Graph 1 Linguistic Study 1. Counter uses when referring to chimpanzees during work.

In addition, two other native speakers not belonging to this group participated: A professor at Kumamoto Sanctuary, who is a chimpanzee experimenter and former experimenter at PRI, and a PhD student at PRI, who conducts experiments with monkeys. The professor answered *nin* regarding reference to chimpanzees during his work, while the student reported to "use *nin* more frequently when indicat[ing] the number of chimps". For his test animals, he reports using $t\bar{o}$ for macaques while in the laboratory.

These results show the linguistic pattern followed by chimpanzee research personnel at the Primate Research Institute of Kyoto University (KUPRI) in the laboratory context; most part of the personnel make use of the counter for humans to refer to chimpanzees. As discussed in the previous section, this pattern is justified in relation to the behavioral and phylogenetic proximity between humans and chimpanzees. Moreover, it should be noted that this usage seems to be encouraged by professor Matsuzawa, as a few interlocutors indicated. Nonetheless, the respondents' strong belief in the importance of stressing the continuity between humans and chimpanzees makes it unlikely that these results are an artifact of power relations. Moreover, this study raises the possibility that, among native speakers, individuals who are in contact with chimpanzee research at KUPRI follow the same pattern.

One objection that could be raised is that, by relying on self-reports, this study might not be reliable or might not capture the true nature of how people actually speak in practice. Indeed, a systematic analysis of recorded naturally occurring conversations can unveil subtleties that are perhaps of high importance to linguists as, for instance, preferences in syntactical structure and other issues frequently debated when addressing numeral classifiers. Such follow up is to be commended. However, regarding the usefulness of self-reports, it should be cautioned that this study is better understood in the context of a broader long-term etho-ethnography of interspecies interactional practices.

Before written or verbal questionnaires were in place, I had been working for nearly a year as part of this scientific community, thus, these results not only match my ethnographic observations, but the study *per se* arose from the confrontation of how these practices influenced me as a foreign learner to the point I did not notice they were unusual in a lay context. In other words, I had been socialized into PRI linguistic practices of chimpanzee research to the point they seemed so natural that I never imagined otherwise, motivating further investigations. For that reason, these results are – in my role as a social anthropologist – not surprising, although quite interesting.

The previous study addressed the linguistic usages in oral conversations during laboratory work. However, because technical writings belong to a different contextual dominion a second study was conducted (**Linguistic Study 2**), prompted by remarks that in scientific writings interlocutors preferentially use the counter *kotai* (個体), that is, individual. In order to understand how experimenters in chimpanzee cognitive research employ Japanese counters in their writings, I conducted an analysis of publications in Japanese written by actual and past experimenters at PRI, who are native Japanese speakers. The articles of this study are not specified so as not to directly disclose individual preferences not informed by questionnaires or personal communication. Thus, only the general reference of each issue is given. An inevitable exception is single authored books and one important reference to Matsuzawa's usage.

I have analyzed one issue of ten different publications, specifically screening for the uses of counters to designate chimpanzees. The screening occurred for the full text-length. The material was chosen and grouped based on the varying technical levels and audiences, observed by the inclusion of detailed scientific information, the overall display of the material (such as precise graphs, etc.) and the presence and extent of furigana, that is, the reading aid placed next to kanji characters. I have specifically aimed for counters, excluding phrases where a word was not used for its numeral classifier function but used as a general statement. For example, "two individuals" serves the counting function for *kotai* (個体) but not "individual" alone (also kotai 個体).⁵⁸ This selection was considered to be a stricter and clearer marker for the linguistic (non)attribution of personhood. Yet, general words such as *kotai* were rarely observed, with the word "chimpanzees" simply being preferred instead. Some types of publications were checked for editorial recommendations to investigate whether results could be explained in terms of instruction to authors.

The analyzed material consisted of journals (n = 2),^{59,60} scientific magazines (n = 2),^{61,62} books $(n = 5)^{63,64,65,66,67}$ and a magazine for general audience (n = 1).⁶⁸ One scientific magazine (Ecosofia) was excluded from the analyses due to counter words for chimpanzees being seemingly absent to the best of my efforts, likely because numeral classifiers are mostly used when reporting experiments and not needed to generally write about chimpanzees (thus N = 9).

From these nine publications, the total number of first authors meeting the criteria was eleven, that is, authors who are (a) Japanese native speakers (b) were/are PRI experimenters in chimpanzee cognitive research, and (c) who employed counters in their piece of writing. Their composition was precisely (a) all current professors at PRI [n = 5] (b) past experimenters at PRI [n = 3] (c) graduate students at PRI in the publication date [n = 2] (d) post-doc at PRI in the moment of the publication [n = 1]. In terms of authors, they did not appear evenly spread across the material analyzed, meaning, some publication types had more matches than others and most authors did not appear in all publication types. All observations are of single authorship except when stated in the description. However, the most technical publication and a book for broad audience had high number of authors. All publication names have been translated and abbreviated. For full reference of the issues, please see the citations in the description of the material analyzed. Note, also, that a few publications have official English translations that may not be literal.

The results are described in Graph 2 in terms of which counters were used in each publication and by how many authors. The most important information is the type of counter according to the technicality of the publication type, ordered from greater (left) to minor (right). The number of authors was provided as a means to inform readers of sample size. The first publication, "Primate Research" (rēchōrui kenkyū 霊長類研究), is by far the most technical publication, and the issue analyzed represents abstracts from the meeting of the Primate Society of Japan (PSJ) in 2015. There, seven authors consistently employed the counter for individual (kotai 個体). The next publication, "KAGAKU" (科学), is a science journal, however, much closer to a scientific magazine than "Primate Research". Here, Professor Matsuzawa amongst others also employed the *kotai* counter.



Counters by Type of Publication in Japanese

Graph 2 Linguistic Study 2. Counter uses when referring to chimpanzees in Japanese publications.

Next, the scientific magazine abbreviated "Monkey Studies" (nihon no sarugaku no ashita 日本のサル学のあした) is an issue in a broader scientific series (WAKU WAKU) and is quite precise in its reports, nonetheless, it includes first person descriptions of the research process. In "Monkey Studies" the counter for individual was also observed. In the next category, the book "Cognitive Development and Evolution" (ninchi hattatsu to shinka 認知発達と進化) is the most technical of one. Here as well, the counter for individual was regularly applied to chimpanzees by two co-authors, and, furthermore, while describing a third-party experiment where humans and chimpanzees played a role, the *nin* counter was clearly attributed to humans whereas *kotai* was used for chimpanzees.

From then on, all the publications consistently made use of the counter for humans $(nin \ \Lambda)$. The book "What is Human?" (ningen to wa nanika $\ \Lambda$ $\ \Lambda$), edited by Matsuzawa, consists of short articles by a series of authors, where the overall results of experiments are shaped in a more narrative style or where interesting episodes of chimpanzees' lives are described. In this book, five different authors employ *nin*. Next, all the books described are authored by Matsuzawa and vary to some extent in their language-level to the audiences. The book abbreviated "Human Mind" summarizes Matsuzawa's life-long research (lit., Human Mind taught by Chimpanzees, chinpanjī ga oshietekureta ningen no kokoro $\mathcal{FV}\mathcal{NV}\mathcal{V}$ — \mathcal{N} 教えてくれた人間の心).

The results found go in accordance with what has been reported by the interlocutors given that the uses of *nin* and *kotai* seem to vary as a function of the technicality of the publication. Therefore, for publications that are more scientifically detailed and intend to be more "neutral", the *kotai* counter is employed. On the other hand, when a publication is more accessible to the public, *nin* is used consistently. Within a publication no cross usages have been observed among the analyzed authors (e.g., kotai and nin in the same issue). In other words, each single publication represented one counter category only, despite having been written by different authors who matched the criteria in the same issue.

In terms of native experimenters that were active during this etho-ethnography (N=10), this study covered 80% of them, who appeared at least once in one of the publication types. However, it had some important limitations. Ideally, this study should have presented a more even number of issues per category. It would have also profited from a balanced design (i.e., equal number of observations), and a within-subject design (i.e., the same authors in all publication categories), although such designs are optional. Due to the fact that not all articles specifically describe the number of chimpanzees (thus, absent counters), the number of observations was drastically reduced.

Likewise, it becomes difficult to analyze the usages of the same authors across all publication categories because it might be that even if an author appears in all issues selected this author will, not necessarily, make use of a counter in each one of them, therefore, the number of issues within each publication category should increase considerably in order to account for the occurrence of the same authors in all publication categories. Larger sample sizes might unveil subtleties not shown by the present study. Notwithstanding, given that this study mirrors what has been indicated by several interlocutors, these issues are likely not compromising.

At this point, one may ask the role such study plays in the larger ethnographic analysis given the small sample size of the publications. The answer is quite straightforward. First, our objective here is to confirm a phenomenon hinted by interlocutors; not to make any claim beyond sample. In this point, this study has accomplished its purpose. Secondly, the study should inspect another realm of linguistic practices which may undergo important changes when passing from oral to written accounts. Thus, qualitatively speaking, an investigation on oral practices and on written ones are not equal. Thirdly, such a study should point out a concrete pathway regarding how to investigate personification techniques and their developments throughout written accounts.

To conclude the analyses on Japanese language use when referring to chimpanzees, two remarks should be made. The first one is in regard to oral presentations. During the SAGA meeting (Support for African/Asian Great Apes) in 2015, an event mainly conducted in Japanese, as far as I could observe, lecturers made use of the counter *nin* to refer to chimpanzees. This is consistent with one of the ultimate goals of SAGA, a consortium originally created in 1998 to bring to an end invasive research on great apes in Japan, which finally occurred in 2006.⁶⁹ Moreover, when commenting on language usages, some interlocutors indicated to use this counter in oral presentations as well,

especially in not so technical ones. Interestingly, during internal presentations at PRI, the chimpanzees of the Institute occasionally figured among the acknowledgement-slides.^{VIII} This is also a habit I learned by imitation from the senior student in charge of experiments in Matsuzawa's laboratory, or my *senpai*.

The second remark is in regard to the distinction between participant and subject. In the context of this linguistic study, one interlocutor commented on an important trend in cognitive psychology Japanese publications: ⁷⁰ In Japanese, the word "participant" is named by *sankasha* (参加者) and is applied to humans but we may as well distinguish two words for "subject". The first one is *hikensha* (被験者) traditionally applied to human subjects, whereas *hikentai* (被験体) is reserved to animals. It seems that, among researchers, not only the word participant (sankasha) by also the word subject in the human sense (hikensha) has been adopted by some to refer to chimpanzees.

If the kanji characters are decomposed a finer understanding of these differences may be grasped. Now, if we decompose the kanji characters we might grasp a finer understanding of these differences. The suffix *sha* 者 designates someone of a certain nature or someone doing a certain work.⁷¹ Besides, the same kanji has a native reading *mono*, meaning someone, person.⁷² In other words, this kanji, as observed with *nin/hito* (人), is related to the characteristics of a person. Thus, *sankasha* literally means participat(ing) person (or sanka, i.e., participation 参加 + sha 者)⁷³. Hence, when turning to the word subject, it becomes clear why there are two separate forms in Japanese.

Hikensha (被験者) points to the idea of tests, as it is similar to *hikenyaku* (被験 \overline{X}) or test drug.⁷⁴ With the suffix *sha* it becomes glossed as "test-person". Note that, the one who tests instead of being tested upon is the experimenter, a *jikkensha* (実験者) or "experiment-person". It is true that it does not always seem very logical where the active and passive voices lie, after all, a *hikensha* could be the person doing the test, just as a *jikkensha* is the person doing the experiments. Nonetheless, when comparing the two forms of saying subject in Japanese there is a striking difference in agency.

To recap – as readers not acquainted with Japanese might find the descriptions cumbersome – in Japanese writings in cognitive psychology, there are two forms of conveying the word subject: *hikensha* and *hikentai*. The first one is employed to humans,

^{VIII} I.e., presentations in the conjoint psychology seminar of the section of Language and Intelligence (roughly, the chimpanzee section) and the section of Cognition and Learning (roughly, part of experimental monkey research).

the second one, to animals. So far, I have argued that *hikensha* conveys the meaning of "test-person" in a literal translation. Now, the second one, *hikentai*, is composed of the suffix *tai* (体). Its original meaning is simply "body", ⁷⁵ and when used as a counter it designates humanoid forms such as corpses and statues.⁷⁶ Thus, the translation of *hikentai* can be glossed as "test-body". It appears reasonable that due to the differences in suffix form (person [sha 者] and body [tai 体]), one word emphasizes agency while the second focus on the materiality. Thus, when *hikensha* is applied to chimpanzees it seems to concede the same type of agency that humans are granted.

In fact, it is the term used for animals, *hikentai*, that may be closer to the etymological meaning of the term subject in English/Latin. The word subject as a noun appears in early XIV century in Old French (suget), meaning "person under control or dominion of another", which in turn derived from the Latin *subicere*, that is, "to place under, to subordinate".⁷⁷ From the 1590s the term seems to have acquired a softer tone to mean "person or thing regarded as recipient of action, one that may be acted upon",⁷⁸ closer to the modern usage in psychology. Overall, even though in its Latin origins the word subject denotes a person, its meaning points at passivity and subjugation, thus, it would be more akin to the Japanese "test-body" (hikentai) than "test-person" (hikensha).

Indeed, psychology as a discipline is gradually moving on from the term subject to the term participants and already back in 1999 English speaking authors encouraged the use of the word participant for humans, given that the term subject may carry a demeaning connotation.^{79,IX} We shall also see, in English publications, that Japanese researchers seem to emphasize chimpanzees' agency by preferentially employing participants instead of subjects. As we have observed, in primate research the usage of certain terms and not others are part of a boundary work regarding which beings are entitled to personhood, or the least, agency as opposed to passivity. Instead of focusing on erudite details which were, in fact, exposed only to substantiate and support the argument, the message to keep in mind is that, firstly, there are certain linguistic markers of personhood derived from grammatical formalities and people's usage and, secondly, that these personhood markers are permissible in a scientific community's linguistic practices to a greater or lesser extent according to species and context.

^{IX} NB., the word subject is used in specific statistical terminology such as a "within-subject" or "betweensubject design", and so on, not being related to the intention of the authors.

At this point, we may ask how researchers at PRI refer to chimpanzees in other languages. Once again, when reporting cognitive psychology experiments, a subtlety to be noticed is the difference between "participants" and "subjects". According to the guideline of the American Psychological Association, the famous APA style that dictates most of the English publications in psychology, while the use of subjects for humans is not formally discouraged, it is enforced that one should "[u]se *who* for human beings; use *that* or *which* for nonhuman".⁸⁰ However, the guideline concedes that whenever animals have been named, instead of the neuter pronoun "it", the appropriate pronouns corresponding to the animals' sex should be used.⁸¹ Not surprisingly, most researchers at PRI make use of the term of participants to describe their test subjects.

PRI researchers, as most researchers in biologically-oriented sciences, publish their detailed experimental results preferentially in English, be it in international journals or in the Japanese journal - Primates (in English). I have conducted an analysis of publications in English (**Linguistic Study 3**) in order to understand how Japanese native speakers address chimpanzees in the language most used by the international scientific community. I have screened for articles (a) authored PRI experimenters (b) in chimpanzee cognitive research (c) with first authorship (d) ranging from 2013 to Mid July 2017. In these articles, I screened for the use of participants or subjects to refer to chimpanzees, and in addition, to the use of the pronoun "who" whenever the term subject was used. The screening occurred for the full text length.

For this manuscript, an analysis of publications in English (Linguistic Study 3) has been conducted in order to understand how Japanese native speakers address chimpanzees in the language most used by the international scientific community. I have screened for articles (a) authored by PRI experimenters (b) in chimpanzee cognitive research (c) with first authorship (d) ranging from 2013 to Mid July 2017. In these articles, I screened for the use of participants or subjects to refer to chimpanzees, and in addition, to the use of the pronoun "who" whenever the term subject was used. The screening occurred for the full text length.

As search tool, I made use of the latest publications page in the website of the Section of Language and Intelligence.⁸² I also made use of the website of the journal Primates⁸³ and, in addition, of the personal website of potential authors. Note that five is the number of Japanese native speakers who are professors in PRI chimpanzee cognitive research (i.e., at an advanced stage of opportunities for publication). The journals were screened for instructions to authors regarding the use of participant and subject, however,

despite all the efforts none were found. The name of the journals is provided to aid in the interpretation of the results, but no articles are cited so as not to directly disclose information on an individual level.

PRI experimenters had an extensive list of publications, however, not all fit the criteria: studies on different species, co-authorship instead of first authorship, reviews with no description of subjects, non-cognitive studies (e.g., physiological, genetic studies etc.), fieldwork (where primates are usually described in terms of members of a community instead of participants/subjects of an experiment), articles where neither participants nor subjects were used, etc. The exclusion of these other studies, despite strict, was intended to provide a direct comparison across all above-mentioned linguistic studies.



Graph 3 Linguistic Study 3. Japanese speakers referring to chimpanzees in English publications.

Eight publications written by four different first authors met the criteria. Four of these publications were co-authored by one of the first authors of the other publications. From these four authors, author A had one article that met the criteria; author B two articles; author C two articles; author D three articles. The publications were spread across five different journals: i-Perception (n = 1); Peer-J (n = 1); PLOS ONE (n = 2); Primates (n = 1); Scientific Reports (n = 3). In six out of eight, that is, in 75% of the publications the word participant is used to refer to chimpanzees, appearing at least once in all five journals. In the remaining 25% the term subject is employed (Scientific Reports and PLOS ONE) but is followed by the personal pronoun "who" instead of "that" or "which"

(Graph 3). Out of these four authors (i.e., 25%), one never employed the word participant, but subject followed by the pronoun who.

Albeit the small sample size, this study indicates that also in English these researchers' linguistic practices emphasize chimpanzees' agency. In the cases where the word subject is used, it is not employed according to APA formal writing guidelines that strictly separates pronouns attributed to human and nonhumans, even though the articles are in APA style. Furthermore, the use of participant or subject does not seem to depend on journal, although only larger sample sizes can establish if there is a trend or significant difference across journals.

Notwithstanding, in order to have a greater understanding of how the use of participant and subject occur in a greater context, it will be valuable to contrast publications on chimpanzees with other species, and also the usages of non-native Japanese speakers. In the future, a broad international comparison crossing species and international authors should be of interest to determine worldwide, recent trends in primatology, however, for the time being we can address a few examples close to PRI authors' main network.

Within the same time frame (2013 - Mid July 2017), the word participant is also used by a Japanese native speaker who is PRI experimenter in chimpanzee cognitive research to refer to different species, namely, dolphins (*Tursiops truncates*) in the journal Scientific Reports and horses (*Eqqus caballus*) in Biology Letters. Although this matter has not been systematically tackled, as means of comparison, it was possible to observe in a recent 2017 PLOS ONE publication by Western authors not collaborating with PRI that the word participant was employed to refer to another cetacean, the beluga whales (*Delphinapterus leucas*). Regarding horses, a recent 2016 article in Applied Animal Behavior Science by Western scholars, who were also not collaborating with PRI, referred to this species as simply "horses", not making use of the terms participant or subject despite the experimental character of the study. In sum, the use of participants for a non-primate species or the simple designation of the subjects by the species name do not appear far-fetched in publications authored by Westerns.

When we move on to monkeys, a Japanese native speaker and PRI experimenter in chimpanzee cognitive research, who worked with monkeys as well, used the term participant to refer to Japanese macaques (*Macaca fuscata*) in the journal Primates. In contrast, a Japanese native speaker at PRI, not involved in chimpanzee research, clearly refers to humans as participants and monkeys (*Saimiri sciureus*) as subjects in the journal Animal Cognition. Note though, that following the pattern of chimpanzee researchers who employ subject for chimpanzees, this monkey researcher uses the term subject followed by the pronoun who to refer to monkeys. In other words, in the same institute, Japanese native speakers differed when referring to monkeys, with the chimpanzee researcher employing participant where the monkey researcher employed "subject" + "who".

Interestingly, a Western experimenter in PRI chimpanzee cognitive research, who worked with monkeys as well, refers to monkeys (*Sapajus apella*) as participants in a 2016 publication in Primates and the paper is coauthored by both a Western and a Japanese researcher from PRI chimpanzee section. In contrast, two first authors, who are Western researchers at PRI and are mainly involved in monkey research, referred to monkeys as subjects. For both the 2014 study in Animal Behavior (on *Callithrix Jacchus*) and the 2015 study in Biology Letters (on *Macaca fuscata fuscata*), no relative pronouns (who; which; that) were linked to the word subject. In sum, in the same institute, foreigners differed when referring to monkeys, with the chimpanzee researcher making use of participant, when monkey researchers made use of the term subject.

As for foreign collaborators, a Western first author collaborating with PRI chimpanzee section refers to chimpanzees as participants in a 2016 publication in PLOS ONE, whereas Western authors collaborating with Kumamoto Sanctuary, PRI's sister institution, use both participants and subjects followed by the relative pronoun who, in a study published in Science in 2016. On the same note, a 2015 article of Scientific Reports published solely by Westerns not collaborating with PRI used "who", "participants" and "subjects" interchangeably for humans, chimpanzees and capuchins.

In sum, it seems that the uses of participant and subject for nonhuman animals regardless of the species are not yet stabilized as a linguistic practice within a broader scientific community. However, the increasing presence of the relative pronoun "who" instead of "that" or "which" enforced by the latest APA guidelines⁸⁴ suggests that there might be a major trend towards emphasizing the agency of nonhuman animals, although this remains to be confirmed by systematic studies with a large sample size. In conjunction with the analysis of other aspects of human-animal relations in research, studies on linguistic practices of scientific communities are likely to provide a more precise picture of scientists' attitudes toward the nonhuman animals of their studies.

A caution note should now be added. Whereas "participant" vs. "subject" and "who" vs. "which/that" point at traditional divides between humans and animals, we should not infer that they are directly translatable to any other language, or Japanese, for that matter. If English became the *lingua franca* of science, it does not mean that its usages will be the same across the globe, because some national, or even institutional scientific communities may weigh in words differently. Likewise, in languages with similar divides, it does not follow that the act of shifting categories (or crossing linguistic boundaries) will be weighted the same.

This seems to be the case in Japanese, where the divide between the counters *nin* and *kotai* is likely much greater than participants and subjects. Once again, in Japanese, when one wishes to count humans a particular suffix, *nin* (人), follows the number, whereas, to count individuals in general and regardless of species, the suffix *kotai* (個体) is used. In technical scientific publications in Japanese, the counter *kotai* is preferred, however, in daily usage in the laboratory chimpanzee researchers count chimpanzees by *nin*. For researchers at PRI, evolutionary proximity is the reason for the attribution of *nin* to chimpanzees. However, this is a very rare usage outside the context of chimpanzee research, and laymen will likely call this species by the counter for large animals, that is, $t\bar{o}$ (頸).

Jumping from *tou/kotai* to *nin* might be a greater move than jumping from *subject* to *participant*. If we observe, for example, one of the above-mentioned articles by a Japanese native speaker on Japanese macaques we might notice that while the author cites the macaques as participants, in the Japanese abstract of the article the same author employs *kotai*. Given that the journal was a technical one (Primates) and the species a macaque, this is the expected outcome according to what we have seen. However, if the terms participant and subject in English had the same value as the *nin/kotai* divide then we would expect the author to readily use the human counter *nin* to count Japanese macaques, a species that is, after all, much "closer to home" than the African, non-indigenous chimpanzees. We may also wonder, why are chimpanzees who are preferentially called participants in English (Linguistic Study 3), not counted by the suffix *nin* in technical publications (Linguistic Study 2)? It is likely that comparatively speaking, *nin* can be viewed as human marker or rather a personhood marker in a much stronger sense than the emphasis on agency of the word participant when opposed to subject.

If we now analyze how foreign PRI researchers count chimpanzees in their own classifier languages it becomes clearer that the semantic hierarchy across languages is not equal. Like Japanese, Chinese and Korean also have counters. In the chimpanzee section there were three native speakers of these languages who were regular experimenters during this ethnography (two Koreans and one Chinese). Therefore, the question of how chimpanzees are addressed in those languages arose.

Regarding Korean, I first sought a Korean researcher from another section, who works with bonobos in the wild and who kindly provided me information on how animals are counted in this language along with a few more details: in general terms, people are counted by *myeong* (\mathfrak{B}) while in modern speech *mari* (\Box $|\Xi|$) is used for all animals, including chimpanzees.^{X,Note 85} I then proceeded to ask how Korean experimenters addressed PRI chimpanzees in Japanese and Korean, given that both of them could speak Japanese. One was native monolingual and the other was Korean-Japanese native bilingual. In Japanese, the first interlocutor informed to likely have employed *nin* for chimpanzees in the laboratory but was not completely sure of this habit, stating to prefer to specify chimpanzees by their names. The second informant, the native bilingual, detailed to remember to make use of $t\bar{o}$ when first arriving at the institute, shifting thereafter to the *nin* counter in the laboratory context but not outside.

As for Korean, the first interlocutor reported to use *mari* for chimpanzees and pets as well. The second, likewise, reported to use *mari* for chimpanzees, also in scientific articles. This Korean-Japanese case is interesting because even though both were experimenters in the chimpanzee section at PRI they did not generalize the learned linguistic practices into the other language. This, again, brings us to pragmatics, that is, in which context people are using language. The Korean fieldworker, when asked whether *myeong* could be used for chimpanzees at any rate, quickly laughed it off, stating other people might think it is not sensible. Yet, could it not be that experimenters would – at the Institute – cross linguistic boundaries in Korean? Perhaps this would require a much stronger socialization into this linguistic practice to overwrite the conceptual categories in their native languages.

Now, if we inspect Chinese, we find that, originally, the Japanese kanji system is derived from the Chinese characters, which in Mandarin are called hànzì (thus, kanji in Japanese pronunciation).⁸⁶ To have an overview of Chinese counters, I first turned to my co-worker in Matsuzawa's laboratory. The experimenter explained that for animals, in relation to what we observe in Japanese, Mandarin native speakers mostly discriminate

^x For detailed information, Unterbeck (1994) provides a linguistic overview of Korean numeral classifiers. For instance, she describes four classifiers for people that cover three speech levels: neutral, honorific and depreciative.
three counters: $zh\bar{i}$ (只), tou (头)^{XI,Note 87} and $p\check{i}$ (匹) with no special counters for birds and hares as in Japanese.⁸⁸ She carried on: $zh\bar{i}$ counts animals in general, like sheep, rabbits, but also insects as well as tigers. *Tou* is used for cows and elephants whereas $p\check{i}$ is used for horses and donkeys. Humans, on the other hand, are counted by $g\grave{e}$ (个). However, in formal occasions, people (such as professors) are counted by $w\grave{e}i$ (位). In the realm of Mandarin counters, chimpanzees and monkeys belong to $zh\bar{i}$, which groups most animals.

Numeral classifiers have developed differently in Chinese and in Japanese. Indeed, linguists warn that there might not be a one to one mapping in these languages, as for instance, counters might vary in syntactic structure (i.e., word order) and, in addition, the same character might be applied to different beings such as \mathbb{Z} , which in Japanese is applied to small animals and is also a general animal classifier (hiki), but in Mandarin is used to count horses (pĭ).⁸⁹ Once again, this points to the importance of analyzing pragmatics or how people actually speak in contexts. Chinese language, here, provides another interesting point in the comparative usages of the human counters.

In a study comparing Japanese and Chinese classifiers, sentences from Mainichi Shinbun newspaper were analyzed according to how they were translated from Japanese to Chinese, amounting to 243 sentence pairs where at least one of the sentences had a classifier (either Chinese or Japanese).⁹⁰ In these real-world sentences, the default human classifier (Nin/ hito Λ) was translated into one of the three possible person classifiers in Mandarin Chinese, varying according to formality and status of the people addressed. The differences in these counters are explained by Zhang:⁹¹ the first one, as we have seen, is $g\dot{e}$ (个) and is formally regarded as a neutral and unmarked way of addressing people. The second one, also mentioned above, is $w\dot{e}i$ (位), which pays respect to the person addressed. The third human counter translatable from Japanese is ming (名), which is, in fact, formal and used in written format.^{XII,Note 92,93}

^{XI} NB., the Chinese character *tóu* (头) has as older, non-simplified form 頭 (Collins 2017), which is the same character for the Japanese counter for large animals, $t\bar{o}$.

^{XII} *Mutatis mutandis*, the Mandarin character denoting respect, i.e., $w \hat{e}i$ (位) is used in Japanese for rankings and deceased spirits as i (位) (Trussel 2017). Furthermore, the formal and written Mandarin ming (名), when in Japanese, counts people as $m\bar{e}$ (名) in the honorific language $sonk\bar{e}go$ (Ahlström, Ahlström and Plummer 2017).

However, Mandarin Chinese has a particularity:⁹⁴ the neutral counter for humans, $g\dot{e}$ (\uparrow), is also a general classifier, which, when translated in this sense into Japanese, is more equivalent to the counter tsu (\bigcirc) for general inanimate beings.^{XIII,Note 95,96,97} In addition, $g\dot{e}$ might actually count animals as well.⁹⁸ In other words, the same counter can be used in a specific form or extended as a general counter for beings. Many linguists support that the use of the general counter $g\dot{e}$ is arbitrary; however, this view has been challenged by a recent study correlating people's perception of animals and the usages of numeral classifiers.⁹⁹ Based on previous studies, seventy-five monolingual Chinese were surveyed to rate seventy-six animals in terms of their distance to humans, where "distance to humans" was deliberately vaguely explained in a short introduction, which stated that behavior, appearance or possibility to identify the animal could be criteria to determine distance and that the decision should be intuitive.¹⁰⁰

Participants had overall similar attitudes to animals: orangutans had the highest rating (8.56 of 10 [it was not detailed whether chimpanzees figured among the tested species]) and monkeys scored higher than other animals (over 6).¹⁰¹ Then, these ratings were contrasted to a corpus of 370 million words from modern written and spoken Mandarin Chinese (CCL-Corpus) and, in addition, Google searches. They examined the usages of five classifiers that might appear with animals: the classifiers already discussed, that is, $g\dot{e}$ (\uparrow), $zh\bar{i}$ (\square), tou (\clubsuit) and $p\check{i}$ (\square), and a fifth one, $ti\acute{ao}(\cancel{R})$, used for long shaped entities (e.g., snakes, fishes, etc.).¹⁰²

The results showed that the frequency of words had no effect whether an animal would be classified as the counter $g\dot{e}$ or not. In fact, the results support that "[a]nimate nouns are more often associated with the classifier 个 $g\dot{e}$ if the signified living being is very close to (e.g. 猴子 *hóuzi* 'monkey') or, on the contrary, very far away from human beings (e.g. 牡蛎 *mŭlì* 'oyster')." This means that animals which had "medium humanness value", that is, that were rated in the middle, like birds and fishes, rarely took up the counter $g\dot{e}$.¹⁰³ The authors explain this outcome as two different processes being in place: on the one hand, the classifier $g\dot{e}$ is used as a general classifier for "very unhuman living beings" like mollusks and insects.¹⁰⁴ On the other, the same character is being used

XIII Note though, that the $g e(\uparrow)$ character, is originally written as 個 (Collins 2017), which currently exists in Japanese as a counter for general articles such as goods, small artifacts, etc. (Trussel 2017), although the Japanse *tsu* (つ) is the default general counter for inanimate things. On the other hand, it has been argued that $g e(\uparrow)$ is historically older than $g e(\Subset)$ (Wang 2008).

by analogy in the sense of the human classifier, being applied to animals "very close to human beings in terms of behavior and appearance".¹⁰⁵

In this study, it was not clear how the participants who rated animals were selected, and, as in many studies in cognitive sciences an urban bias might have occurred. If so, this type of study should be expanded to include a more diverse sample of Mandarin Chinese speakers. Nonetheless, the results are revealing when we take into account the pragmatics of the linguistic boundary work and our modes of relation to nonhuman animals. A word of caution is that, again, the shifting of categories might not be identical in all languages: if in Mandarin the counter for humans is also employed to describe many other beings, then, the speaker who employs this counter in an analogy to humans might not sound so strange in comparison to a Japanese native speaker who uses the default human counter with much more precision. In Mandarin Chinese, would a chimpanzee be seriously addressed as the respectful w i ((\pm) ? Or figure in a publication as the formal written ming ((\pm) ? Pragmatics requires empirical research, yet, the odds are that the answer is no.

All in all, it is possible that first, in contrast to the English pairs "participantsubject" and "who-which/that" observed in the scientific literature, numeral classifiers categorize personhood more markedly. Second, that within classifier languages some numeral classifiers might denote personhood more distinctly by being traditionally employed with more precision to human beings and human qualities. So far, the Japanese usages of the human counter *nin* appear to have high specificity so that these utterances have strong connotation when applied to chimpanzees in adult speech. However, we currently lack information on whether chimpanzee researchers in Korea and China would follow the same linguistic pattern observed in Japan, which, in Asia, is considered to be the country with the strongest tradition in the area so far. Only future comparative studies on linguistic practices within the chimpanzee-research community (in English and in classifier languages) will provide us a conclusive picture of these usages, which is of importance to assess emerging models of nonhuman personhood in science.

As a final point on linguistic usages, it could be argued that the attribution of the human counter nin (\wedge) to refer to chimpanzees is an artifact derived from mere familiarity with the test subjects. Indeed, one professor explicitly stated that he also uses nin in the context of testing nonprimate species and with pets as well, as a sign of intimacy. If one regards how chimpanzees are addressed in the laboratory beyond the case of

numeral classifiers, one may find all intimacy markers such as "chan" (-ちゃん), "chin" (-ちん) to denote diminutive and even "kun" (君), used to address men younger or of the same age as the speaker. Thus, chimpanzees are addressed mostly as Aichan, Penchan, Panchan, Paruchin and so on. Matsuzawa, for instance, frequently addresses Ayumu as Ayumu-kun. In addition, chimpanzees might be called by a nickname like the case of Cleo who is Coo(chin) and sometimes *ojōsama* when acting princess-like, refusing to do experiments before someone spoils her.

Chimpanzees may also be addressed by the suffix san $(\grave{>} \&)$ equivalent to Mr. and Mrs., although the diminutive use is more common. Ohnuki-Tierney while analyzing the symbolism of the monkey in Japanese society stresses that the monkey, being the animal closest to humans in Japanese culture, is the only one addressed and referred to as *san* in adult language, the exception being children.¹⁰⁶ Here as well, we observe how linguistic practices in the laboratory context push these linguistic boundaries forward; from monkeys to chimpanzees.

Nonetheless, the familiarity argument misses out the point that researchers' linguistic practices are grounded in scientific reasons, namely, the willingness to emphasize our phylogenetic common ground. If researchers do not treat chimpanzees as *nin* in technical publications, they do so in broad-reach publications. Even in TV documentaries and in some public talks it is possible to observe this usage. In fact, researchers want to be taken seriously in these utterances, not as a matter of how a given researcher is familiar with a given chimpanzee but in the sense of how we humans are close to chimpanzees, all of them, not just PRI chimpanzees.

 process taking place which is very distinct from the type of categorization followed by researchers.

Indeed, it is important to argue that those are two different processes and they should be understood differently if practices in Japanese primatology are to be taken seriously. Especially given that much of Pamela Asquith's seminal work on anthropomorphism in Japanese primatology¹¹⁰ has been detoured to indicate a cultural bias to be wary of, when, to the best of my knowledge, within primatology itself the Western dualistic biases are not mentioned to the same extent, at least.^{XIV,111} For instance, Wolfensohn an Honess in the Handbook of Primate Husbandry and Welfare summarize Asquith's work very well: "Western primatologists focus on the study of populations frequently to elucidate species-typical patterns of behaviour, whereas there has been a history among Japanese primatologists of studying primate social behaviour in the context of the interaction of interindividual relationships and personalities in determining the character and nature of social behaviour within a social unit (Asquith 1986)."¹¹²

Nonetheless, the paragraph is ended with no further remarks: "The Japanese approach has often been viewed by Western researchers as overly anthropomorphic and lacking the objectivity that is so highly valued in Western scientific tradition."¹¹³ Seemingly, that is it for Japanese primatology in such accounts. This appears quite crude when analyzing the subject from the point of view of Science and Technology Studies (STS) and anthropology of primatological practices. True, in primatology, anthropomorphism is not the nemesis it once was. In reference to its positive aspects, "strategic" anthropomorphism is usually cited.¹¹⁴ Indeed, as de Waal disentangles, the "bambification" of animals, that is, the "anthropocentric anthropomorphism" is a phenomenon of a different order than the "animalcentric anthropomorphism", which takes upon the animal perspective.¹¹⁵ Notwithstanding, I believe that anthropocentrism as a general term, when applied to the context of Japanese primatology, may be misleading for putting emphasis on different types of processes than those that have been observed in chimpanzee research in Japan in the context of this etho-ethnography.

In fact, Japanese practices in chimpanzee studies could be said to be at the forefront of new models of personhood in science. Thus, it is less about anthropomorphizing than it is about personifying. It is necessary to understand this process not exactly on formal, legal grounds, but rather, on the plane of concrete, daily

^{XIV} NB., thus, this does not imply this issue never conceptualized in Western primatology. See for example, de Waal's account in "The Ape and the Sushi Master" (2001).

interactions; on how scientists actually relate - and are allowed to relate - to test subjects. One can argue whether this is a good model or not. Some practices in Japanese primatology seem to be banned in Western research institutions (although not in all, *vide* the Ape Language Studies) for its potential danger such as face-to-face experiments with adult chimpanzees. Nonetheless, these practices present (in a much greater palette of colors) the dilemmas and prospects of relating to animals in ways other than our traditional divides foresee.

Driving the point home, the anthropological importance of linguistic usages, be it of classifiers or other words, is that they are anchored in the researchers' cultural, scientific and moral worldviews as well as in institutional practices. Thus, when read in the context of their social fabric, they can be considered an index revealing the boundary work demarcating what belongs to the realm of humans and nonhuman animals. Now, we shall turn to another aspect of the drawing and erasing of the boundaries between humans and chimpanzees: its social aspect.

4.2 Animal Perspective and its Becomings

"I'm not a chimp, I'm human, speak human!" Spoken in the chimpanzee section at the Primate Research Institute, this utterance reveals more than the bare eyes can tell. Why would a human at the heart of a research center feel the need to assert one's own membership to *homo sapiens*? And what does "speak[ing] human" mean in this context? Do not all humans speak "human" to humans? To appreciate in which context this sentence bears meaning, we first shall turn again to the notion of an "animalcentric" perspective.¹ This idea, as it has been popularized in ethology and disciplines alike, stems from Thomas Nagel's iconic paper "What is it like to be a bat?".² There, Nagel questions the possibility of accessing the subjective experience of nonhuman animals, especially those with a perceptual world quite distant from human experience, like sonar-using bats. In Nagel's account, there are fundamental challenges in conceiving the conscious experience of nonhuman animals:³

It may be easier than I suppose to transcend inter-species barriers with the aid of the imagination. For example, blind people are able to detect objects near them by a form of sonar, using vocal clicks or taps of a cane. Perhaps if one knew what that was like, one could by extension imagine roughly what it was like to possess the much more refined sonar of a bat. The distance between oneself and other persons and other species can fall anywhere on a continuum. Even for other persons the understanding of what it is like to be them is only partial, and when one moves to species very different from oneself, a lesser degree of partial understanding may still be available. The imagination is remarkably flexible. My point, however, is not that we cannot *know* what it is like to be a bat. I am not raising that epistemological problem. My point is rather that even to form a *conception* of what it is like to be a bat (and a fortiori to know what it is like to be a bat) **one must take up the bat's point of view**. If one can take it up roughly, or partially, then one's conception will also be rough or partial. Or so it seems in our present state of understanding.

Regardless of how well we are capable of fathoming an animal's point of view, in order to understand an animal's subjective experience, we are encouraged to shift perspectives. In fact, primatologists from different nationalities and studying different primates have pointed out that researchers might start resembling the species they investigate. During this ethnography, people's behavior was sometimes explained (in either a jesting or indignant manner) in terms of similarities shared. For instance, a boastful individual who cannot handle confrontation, cannot handle a stare just like the Japanese macaques this person studies. Likewise, researchers would occasionally use the studied species as a self-reference. In addition, "high" and "low-ranking", which are terms used to analyze nonhuman primate societies, frequently crossed the boundaries to explain not only primate-primate and human-primate interactions but also human-human hierarchy ("I know I'm low-ranking, but..."; "It's because he is high-ranking...."; and so on).

These examples are epiphenomena of a much deeper issue, namely, that the identification with a studied species occurs on many layers of "entanglements".⁴ They entail emotional aspects, passing by interspecies communication forms up to the ultimate challenge of understanding nonhuman minds. All these factors have their share of a shift in perspective so crucial for the animalcentric point of view: to comprehend another's feelings, to feel the way someone feels; to recognize another's codes, to use someone's codes; to understand someone's mind, to put yourself in the mind of this person. Shifting perspectives is not an all-or-none deal but appears in nuances and shades.

This effort might prove incredibly valuable in a laboratory context as well. During one of Ai's session in the laboratory, Professor Matsuzawa took the opportunity to advise me on experimental matters. He first talked long about the importance of precision to make good science and of understanding an episode within the greater context. His examples were simple but powerfully convincing. I was attentively following his logic until a statement caught me off guard: we should turn to "become chimpanzee". He elaborated: you should pay attention to tiny things. Ok – I thought to myself – I grasp the resemblance, after all, chimpanzees are usually much more aware of the surroundings than we are (I cannot help but recalling how once Pal noticed the tube of the air conditioner in the ceiling was changed when I had been in the room the whole morning and failed to do so). Making a mental note, I concluded: I should pay attention to things like chimpanzees do. In other words, I should imitate their ways for certain matters. So far so good...

However, a later episode in the same morning refuted the idea that my interpretation of "becom[ing] chimpanzee" should stop there. It was Chloe and Cleo's session, yet, on that day, Chloe came alone. At this point, it is worth recounting the events recorded during that experimental session and to provide their time frame to best capture the tempo of the activity (for a map, see Figure 1). Indeed, Chloe's coming in these circumstances was particular and, as a result, on that day we inverted the order of the experiments, and my experiment was conducted first. As soon as Chloe got into booth

one she quickly started to give me the objects through the exchange apparatus and, as it is usual for her, the experiment was quickly finished, this time, in less than a minute (54s). With the door fully open so that she could pass on to the second booth to perform another researcher's experiment, we started to verbally encourage her and tease her with food items in a bowl (1m9s). Showing signs of anxiety, she scratched herself thirteen times before moving to the second booth (1m11s-1m28s).

When Chloe was already in booth two, the guillotine door started to close, as usual, however; this time Chloe was not pleased by this action and began crossing back to booth one (1m39s).



Figure 1Schematic representation of Matsuzawa's laboratory. By Daly.

When Chloe was just in between booths, Matsuzawa asked the technician to completely open the door, verbally encouraging Chloe to come back to booth two (1m41s). With the door fully open (1m50s), Chloe began to move back toward the computer, again, accompanied by Matsuzawa's words of support (1m51s). Finally, Chloe started her task in booth two (2m6s), succeeding in four trials, failing in one and then succeeding in another.

After this last trial, Chloe interrupted the task and headed to booth one once more, prompting Matsuzawa to ask her to come back by saying "Kuroe, oide!" (Chloe, come!) and by preparing some treats to be delivered next to the computer (2m45s). In booth one, Chloe inspected the feeder and the exchange apparatus bipedally until she finally crossed the door back to booth two (2m52s). Then, Matsuzawa said "stay quiet"; he turned to Chloe and encouraged her to approach the computer once again ("Kuroe, oide") (3m1s). Finally, Chloe moved on to the computer and Matsuzawa praised her by saying "sō da!" (that's it!) (3m39s). Chloe resumed the task, and as before, she was praised by Matsuzawa ("sō da!") (4m6s). Right after, Matsuzawa voiced to all lab members in both Japanese and English: "don't move" (4m8s). Differing from regular sessions, he cheered her in almost each correct trial ("sō da!"). Likewise, when Chloe received a buzzer sound for an incorrect answer, Matsuzawa frequently said "daijōbu da yo!", or something like 'it will

be ok'. Chloe continued to do the task consistently. At a certain point, she pant-hooted to chimpanzees outside the laboratory room (4m34s), however, she did not stop the task until she finished it. At this moment, she was greeted by Matsuzawa's effusive hand clapping and praise ("sō da!") (7m46s). At last, Chloe received some pieces of fruits, as protocol, given after the end of each set of trials or at the end of the experiments.^I

There are many interesting points about this eight-minute episode, the most conspicuous being the social support given to the chimpanzee accomplish the task. This usually occurs when a chimpanzee is either hesitating or ignoring the tasks (and us). Although unusual and employed in very difficult cases, from time to time a lab member will "coach" a chimpanzee through almost every correct trial, bearing in mind each set has about a hundred trials depending on the experiment. Yet, the most thought-provoking point of this episode was made explicit only after Chloe's session was over, when Matsuzawa gave the laboratory members some recommendations.

Matsuzawa started the talk by reminding us that that day was Chloe's first time in our laboratory without her daughter Cleo and, therefore, we needed to motivate her. Looking at us, he stated (as if addressing Chloe): we do the shortest experiment, then one more experiment and you can go. He continued: you see, she did not do three sets as usual but just one. We want her to feel it is safe, enjoyable. Usually, she allows us to close the door when Cleo is there; today I said no, because she looked anxious. Right after, Matsuzawa pointed out the moment a lab member headed to check the video cameras in the back of booth two, when he told people not to move. He then evaluated that the lab member just followed a habit out of regular duties but that, in fact, we should have better paid attention to the novelty of the situation. He added: we need to keep quiet so that Chloe will focus on her task. As if he was about to make a very specific point, he turned to me and the other experimenter: to become top students... you are good... So, use your capability – he shook his open hands near his head – "become Chloe".

His hand gesture was telling. In fact, next, Matsuzawa encouraged us to put ourselves in Chloe's position and then think about what we had to do as experimenters. He complemented: every day is new; not routine work as many people say. As a final point on this topic, noting the rare character of the conversation, he concluded: Japanese

¹NB., only correct answers receive verbal praise, which overlaps with the chime sound signaling a correct answer. Otherwise, the praise would conflict with the meaning of the buzzer signaling incorrect answers. The most common verbal praises are $s\bar{o}$ (yes) and $s\bar{o} da$ (that's it) and they seem to be easily recognized by chimpanzees. *Daijobu* is not a word used in positive reinforcement at PRI. Its literal meaning is 'alright'.

learn by master-apprenticeship, just watching, so usually, I do not explain these things, only to foreigners... After the talk, it was made clear that "becom[ing] chimpanzee" far surpassed a sheer, detached imitation of perceived qualities; the task was even more challenging. It was a matter of trying to perceive the world as chimpanzee Chloe in that particular situation, in other words, it was a matter of changing perspectives. In following *sensei*'s instructions, our own position as experimenters should be enriched; if we learned such mental maneuver, we would respond accordingly, that is, according to her mind, not ours. In this way, we would have understood what was needed for her to feel motivated to perform our experiments in that particular context. Hence, from *sensei*'s point of view, being a good experimenter and putting yourself in chimpanzees' position went hand in hand.

We shall now see how perspective-shift is approached in different disciplines. For researchers from cognitive sciences and from sociocultural anthropology the notion of shifting perspectives is familiar, although for symmetrically opposite reasons. In cognitive sciences, this issue is approached by studies in "theory of mind" (known as ToM), introduced by Premack and Woodruff in 1978 in the seminal paper "Does the chimpanzee have a theory of mind?".⁵ Theory of mind means the attribution of mental states to oneself and to others, be it conspecifics or different species, and the examples of mental states comprise purpose or intention, beliefs and thoughts, among others.⁶ In the 1990's, theory of mind was emphasized as "the major cognitive difference" between nonhuman primates and us.⁷ However, it is important to stress that, even at that point, cognitive researchers (*cf.* behaviorists) did not contend that nonhuman primates had themselves intentions; the question was rather how these animals understand the intentions of others.^{8,II,Note 9}

Theory of mind is clearly associated with perspective taking and is referred to as comprising two levels. "Level 1 perspective taking" means "knowing that others can see things that I cannot and vice versa" whereas "[I]evel 2 perspective taking" equals "knowing precisely what others see, including that they see the same thing I do but from a different perspective".¹⁰ Level one translates into awareness of what is at stake in an "uninformed situation", that is, knowing that the other is ignorant about a certain context.¹¹ In other words, in level one perspective taking, I know that you do not know;

^{II} Similarly, knowledge on your own knowledge is currently approached by research on metacognition. For a recent review, see Beran (2015, 352), which indicates chimpanzees show some degree of "thinking about thinking".

or, I do not know, but I know that you do. Level two, on the other hand, indicates the awareness of a "misinformed situation" in which the chimpanzee would understand – not only that the other does not know something – but that the other has a false belief, meaning, the other thinks to know right when is in fact wrong.¹² Simply put, level two perspective taking could be summarized as I know you think you are right when you are wrong. In a review of the state of the art in the study of theory of mind, Tomasello and Call concluded:¹³

In a broad construal of the phrase 'theory of mind', then, the answer to Premack and Woodruff's pregnant question of 30 years ago is a definite yes, chimpanzees do have a theory of mind. But chimpanzees probably do not understand others in terms of a fully human-like belief—desire psychology in which they appreciate that others have mental representations of the world that drive their actions even when those do not correspond to reality. And so in a more narrow definition of theory of mind as an understanding of false beliefs, the answer to Premack and Woodruff's question might be no, they do not. Why chimpanzees do not seem to understand false beliefs in particular – or if there might be some situations in which they do understand false beliefs – are topics of ongoing research

In sum, as of 2008 research indicated chimpanzees were not able to pass the experimental paradigms testing level two perspective taking, that is, understanding of false beliefs. However, as technology and procedures develop, it becomes possible to test nonhuman animal cognition in ways not previously viable or thought. Instead of relying on paradigms depending on food, a recent study using noninvasive eye tracking technology opened the possibility that apes might, just like humans, possess level two perspective taking. Authored by researchers at Kyoto University, Max Planck and other institutions, the study highlights the importance of investigating this form of perspective taking: "False-belief understanding is of particular interest because it requires recognizing that others' actions are driven not by reality but by beliefs about reality, even when those beliefs are false".¹⁴

The experiments tested the anticipatory looking of three great ape species (chimpanzees, bonobos and Sumatran orangutans) while watching movie clips involving multiple situations where objects were hidden and a second party had to retrieve the objects. Several variables were controlled, including counterbalancing locations to exclude the possibility that apes were reacting to positional cues. The results show that these species "specifically anticipated that the actor would search for the object where he falsely believed it to be". ¹⁵ However, they caution that the results might be the

consequence of "an implicit understanding of belief" given that apes have not yet succeeded in false-belief tasks involving "explicit behavioral choices".¹⁶

Unlike chimpanzees, theory of mind in adult, typically developing humans is conceived as being always "full-fleshed", at least in terms of species capacities (even though individual performances may fall short). However, it is possible that the way humans impute mental states to others varies according to a socially learned knowledge of the human and nonhuman world. This is a point to which sociocultural anthropology turns its attention. Thus, we shall investigate how anthropology deals with the issue of perspective taking in non-Western ontologies. As previously approached in the discussion of linguistic boundaries, there are other forms of relating to nonhuman entities not predicted by the traditional logic of naturalism, the mode of relationship from which science emerged. Animism, in such case, is a privileged example because it overturns the premises of naturalism and opens up for inspection a complex "ecology of selves", or "[h]ow different kinds of beings represent and are represented by other kinds of beings".¹⁷

Perspectivism, which is the Amerindian corollary of animism, provides a striking exemplar of the kind of perspective taking dealt with by sociocultural anthropology.^{III,Note18} In perspectivism, "[a]ny species of subject perceives itself and its world in the same way we perceive ourselves and our world. "Culture" is what one sees of oneself when one says "I"."¹⁹ Viveiros de Castro sustains that perspectivism is a theory of mind applied by natives.^{20,21} However, there are a few idiosyncrasies in the model of theory of mind studied in cognitive sciences and what shall be dubbed here as natives' perspectival theory of mind, given that they seem to presuppose a different understanding of the nature of reality.

Theory of mind in cognitive sciences is based on a multiplicity of views of a single world: level one perspective taking assumes the other sees things I do not (or vice-versa) and level two perspective taking accepts someone has a privileged view of a certain situation, which could be, for instance, the location of an object; in other words, the second person has a false belief while, implicitly, the first person has a correct one. Thus, these are perspectives upon the same world and the world that stands as referee regarding the perspectives. The unicity of the world assures that, provided the right perspective (e.g., information on where an object is hidden or visual access to a previously blocked path),

^{III} It should be noted that the role perspectivism plays in animism and in anthropological theory in general is subject to dispute, as well summarized by Latour (2009) regarding Descola and Viveiros de Castro's debate.

all the subjects will see the same thing or arrive at the same conclusion. The idea of a single invariant nature (read reality) upon which multiple points of view are projected is the formula assumed by the so-called multi-culturalism.²²

On the other hand, Amerindian perspectivism represents a single view of different worlds, so that the world changes with the subject: "What jaguars see as "manioc beer" (the proper drink of people, jaguar-type or otherwise), humans see as "blood." Where we see a muddy salt-lick on a river bank, tapirs see their big ceremonial house, and so on."²³ Thus, Amerindian perspectival theory of mind posits, on the contrary, a multi-naturalism.²⁴ Again, in this ontology, the source of these differences in perspective is the composition and affections of the body. *Mutatis mutandis*, along the lines of naturalism, the closest comparison might be Uexküll's concept of *Umwelt*. An animal's *Umwelt* is a product of the relationship between the animal's bodily dispositions and the external environment.²⁵ To keep Nagel's bat example previously discussed, sonar-using bats inhabit a different *Umwelt* than humans, for their sensory world accesses features not available to *homo sapiens*, although, unlike in multinaturalism, the external environment is supposedly the same.^{IV}

It is not surprising that Uexküll, a zoologist and a forgotten father of ethology, is considered one of the "scientific animists of the twentieth century".²⁶ A more recent scientific approach addressing vital issues in animist ontology is embodied cognition (which, parenthetically, drinks from Uexküll's intellectual heritage), and is sometimes referred to as "anti-Cartesian cognition" due to its rejections of the dichotomy between mind and body and the emphasis on the role the body plays in thinking.²⁷ Overall, it seems that scientific approaches are not all too blind to issues occupying the center of other ontologies. On the other hand, it is important to stress that the nature of reality might be conceived differently in standard animism and in its corollary, that is, perspectivism.

The point is subtle but significant. As Descola exemplifies, in perspectivism, the tapirs attacked by the Amerindians see themselves as humans and Amerindians as jaguars or cannibal spirits; yet, because of their perspective as prey, they cannot perceive the other's humanity.²⁸ On the other hand, in habitual animism, the tapirs - even though they see themselves as humans - understand that the Amerindians also have certain attributes homologous to tapirs but that tapirs and Amerindians distinguish themselves by other

^{IV} I thank Brett Buchanan for discussions on the nature of reality in Uexküll's work.

criteria, such as bodily differences and idiosyncrasies in their *habitus*, like being nocturnal, or being gregarious.²⁹

In this context, it does not seem unreal to take the opportunity to expand the horizon of hypotheses tested in cognitive psychology by taking into account how non-Western populations apply a theory of mind. That is, with the realization that our own scientific conceptions of theory of mind rely heavily on naturalist modes of conceiving reality, so that in fact, what is being investigated is but a small part of the full potential of what inquiries on theory of mind have to offer. When seen under this light, hypotheses like, "are nonhuman animals perspectivists or animists?" do not seem out of place.

First, this position expands the sense of the cognitive theory of mind to include not only purely "cognitive" aspects, in the original sense of the word, but also affections, self-identity, group identity and embodiment. Second, it forces us to reconsider the very sociocultural concepts of animism and perspectivism; what would be animism or perspectivism for an animal, and under which bio-socio-psychological processes would these operate (or not)? Are there cultural or species differences in nonhuman animal animism or perspectivism?

Once our universe of permissible questions in both cognitive sciences and anthropology has been expanded, these are to be answered by empirical research, which would profit from interdisciplinary collaboration. Such collaborative endeavors are likely to strike biology-oriented sciences and humanities at their Achilles' heel, namely, the ethnocentric tendency to privilege hypothesis-testing along the lines of what is foreseen by Western thought and the anthropocentric tendency to let humans have the last saying about animals. There is a deeper point to this statement than what we may notice at first sight.

The fact that cognitive sciences have leaned onto the study non-Western populations is an advancement in comparison to the practice of taking Western samples by human universals. Yet, this is not a safeguard against ethnocentrism if we do not allow the way natives see the world to have the power to reformulate our own science at its presuppositions. This could be equated with just applying Western hypothesis testing to investigate non-Western populations. On the other hand, the fact that humanities are living an "animal-turn" and have, therefore, turned the attention to human and nonhuman entanglements is commendable. However, this is not a safeguard against anthropocentrism either, because we should recall that the study of human representations of animals is not the same thing as an attempt to unveil - concomitantly and in a truly empirical matter - the animals' representations at stake in these encounters. Thus, only *de facto* interdisciplinary queries and methods might be able to tackle questions that fall within the abyss between these major scientific worldviews.^{V,Note30} Now that perspective taking has been detailed to a fuller extent, we shall explore its implications, or stakes, namely, the problem of becoming the other.

At this point, one may ask: Can scientists be "chimpified"? Before diving into scientific practices, once again, a digression away from naturalist ontology might prove useful. One of the challenges for societies bearing a perspectival relationship to nonhuman beings is that by taking upon the point of view of an animal, one risks becoming the very being into whose perspective one shifts. For instance, for the Runa people in the Ecuador's rain forest, dogs are selves whose vocalizations and dreams are the reflection of how these animals see the world, and in this sense, the Runa spend considerable time trying to understand the dogs' point of view, especially as these canines connect them to other beings in the forest.³¹ The Runa make use of special communication forms to relate to them, but not without stakes: "Talking to dogs is necessary but also dangerous; the Runa do not want to become dogs in the process".³² Thus, in the Runa's case, as Kohn summarizes, "[e]ntertaining the viewpoints of other beings blurs the boundaries that separate kinds of selves".³³

The topic of becoming another is constant in animism and appears under the form of the metamorphosis of a human into a nonhuman being, usually an animal, and more rarely, into a plant.³⁴ A subtlety, though, is that in an animist ontology there seems to be no ethnographic accounts of metamorphosis in terms of possession, that is, in the sense of a human soul entering another human's body.³⁵ Therefore, the animist metamorphosis characterizes well the interspecific "becoming". As Descola points out:³⁶

[M]etamorphosis is not an unveiling or a disguise. Rather, it constitutes the ultimate phase in a relationship in which each party, by modifying the viewpoint imposed upon him by his original physicality, endeavors to coincide with the perspective in which he imagines that the other party sees itself. Through this shift in the angle of his approach, in which each party seeks to "enter the skin" of the

^v For instance, investigations in goal attribution can provide us a hint of what could constitute some of the building blocks of such enquiry: in a series of experiments using preferential looking time paradigm, marmosets (*Callithrix jacchus*) attributed goal to a human actor, a conspecific, an unfamiliar monkey-like robot, but not to an unfamiliar moving black box, suggesting that, for marmosets, goal attribution might be dependent on features like face, body or legs (Kuperberg, Glasauer and Burkart 2013). Note though, that a large research program contemplating these interdisciplinary questions cannot entail jut a single aspect or method. Furthermore, dispersed studies helping to solve these puzzles should ideally be gathered under a conjoint effort.

other, by identifying with his supposed intentionality, the human no longer sees the animal as he usually does but, instead, sees it as that animal sees itself, that is, as a human, while a shaman is perceived, not as he usually sees himself, but as he wishes to be seen, that is, as an animal.

Thus, a metamorphosis is the ultimate point in changing perspectives. In an animist ontology, shamans are those who, without losing their condition as subject, communicate and administer crossed perspectives.³⁷ However, this all seems too far from the type of processes one should encounter while doing science, more precisely, "good" science - or does it not? In the book "We have never been modern", Latour argues that modernity never ceases to produce hybrids that are later purified into grand dichotomies such as nature and culture, humans and nonhumans.^{38,VLNote39} More fragrantly, moderns do not allow these hybrids to be formally recognized out in the open, although they are produced by the very moderns who deny them (thus, we have never been modern, because we do not do what we preach).⁴⁰ When hybrids are conceptualized by moderns, they appear as a simple mixture of two forms, that is, as a simple in-between, as intermediaries; however, this act denies hybrids their power as mediators, that is, as something that creates the entities to which they serve a mediating function.⁴¹

Should science, then, be modern in the sense described? Latour suggests that, while the separation of nature and culture is important for experimentation on a large scale and, therefore, is not to be banished altogether, the proliferation of hybrids should not be clandestine but commonly agreed upon production.⁴² It is exactly at this point where Japanese scientific practices seem to show full force. When analyzing scientific practices in a Japanese laboratory specialized in the interaction between genetics and behavioral biology, Houdart comes to a surprising conclusion: the mode of action of the leading figure in that Japanese laboratory is undeniably closer to that of Amerindian shamans than to the director of the French laboratory with whom the Japanese collaborate.⁴³ The peculiarity of the laboratory analyzed by Houdart consists in the fact that the entities traditionally separated by dualistic thought (i.e., hybrids) are allowed to exist with full legitimacy, while the laboratory produces, nonetheless, internationally recognized science.⁴⁴

^{VI} N.B., modernity here is employed *strictu sensu* as two sets of practice, in other words, the work of "translation" (i.e., production of hybrids) and the work of "purification" (i.e., separation into different zones), (Latour 1993, 10).

At this point, a word of caution regarding the crossing of animism, scientific practices and Japanese culture is in order. As a first remark, before conducting this ethnography, a Japanese anthropologist kindly issued a warning against anthropologists' fetishism regarding Japanese animism. In addition, animism has been mobilized as part of a nationalist endeavor to distinguish Japanese specificity, setting this nation apart from the rest of the world. ⁴⁵ Japanologists might recognize this contentious effort in determining Japanese identity as the so-called *nihonjinron* ($\Box \neq \Lambda$), which entails a body of discourses espoused to greater or lesser extent by the population depending on the tenets it embodies (e.g., "Japanese "blood" is essential for mutual communication, mutual understanding, understanding of the culture and appearance as Japanese").⁴⁶ At last, on the other extreme lie the perils of treating Western thought as a monolith and, furthermore, of overestimating the effects of cultural influences, as exemplified by comments on Pamela Asquith's work regarding Japanese primatology.⁴⁷

Having said that, firstly, these issues do not undermine strategic analyses of animism – not as national discourse, but as an ontological practice, a position sustained by Jensen and Blok.⁴⁸ Secondly, even though Western modes of relationship with nonhuman entities vary greatly, the idiosyncrasies of practices should not hinder the observation and study of large-scale commonalities and should not deter scholars from employing analytical tools drawing on generalization even if, for that sake, the details of practices need to be abstracted.⁴⁹ Finally, even if we refrain from a strong culturalist perspective where the modes of explanation consist in justifying that Japanese (or whatever ethnical group) do things as such just because they are Japanese, we should not throw the baby with the bath water, because, in fact, there might be social phenomena arising due to socio-historical specificities. In other words, Japanese are like anyone else, yet, they are like none.

When Houdart brings to the attention the similarities between the Japanese scientist and the Amerindian shaman regarding the act of managing perspectives,⁵⁰ does that mean that the scientist is a shaman? In the reading proposed here, the answer is yes and no. Animism and naturalism, in the condition of socially learned modes of relationship with nonhuman entities, entail a series of social practices. A striking example is food consumption: in animist societies, this is expressed by the act of ritually desubjectifying animals before they are eaten to avoid falling ill as a result of cannibalism, given that animals are persons in potential.⁵¹ Likewise in naturalism, there has been a growing emphasis placed on the need for the welfare and humane treatment of animals in

large-scale dairy and meat production centers and subsequent calls for vegetarian and vegan-based diets.⁵² Granted that ontologies are whole bodies comprising sets of social practices, they seem to be, yet, more than that.

Ontologies comprise cognitive strategies that are socially learned and enhanced. In the process of relating to nonhuman animals and entering in a relationship with them, theory of mind is a crucial strategy. We humans, as a species, possess a full-fledged theory of mind in the sense that there is nothing a typically developing human from one corner of the world could do that another could not, and the fact that certain cognitive processes may have critical learning periods does not invalidate this overall human potential. However, the forms of attribution of mental states will acquire different social values; whereas a naturalist ontology will enforce a stricter attributional strategy, an animist ontology will privilege a more liberal, or even a perspectival one. Can the scientist, then, be a shaman? In the sense of deeper social practices foundational to animist ontologies – no. In the sense of cognitive strategies socially nourished and supported – *yes*.

As we have seen in the ethnographic episodes when experimenters were urged to "become chimpanzee", a perspective-shift strategy was employed in order to prompt students to become more skilled experimenters. As argued, becoming chimpanzee means not only imitating certain chimpanzee characteristics but imagining the world as a chimpanzee (coming to an experiment under certain circumstances) would. Thus, a situated practice reaching at last a level two perspective taking in cognitive sciences term, that is, understanding that others see things from a different viewpoint and act according to these beliefs. Perhaps, this would suffice to make sense of the utterance "become chimpanzee", yet, it seems that it does not capture the full dimension of the phenomenon. Another utterance hints this; "speak human to me". Again, how could a *homo sapiens* not speak "human" to our own species? This is the point where sociocultural anthropology opens up our concepts for inspection by exploring the plurality of ways in which the relationship between humans and nonhuman animals is conceived.

As previously detailed, in animist ontologies the notion of metamorphosis as well as the danger of becoming an animal by diving too much into the animal's perspective occur frequently. *Mutatis mutandis*, a researcher who, at a certain point, does not speak human to a human is likely a researcher that temporarily lost the sensitivity to the codes of the human social world as a function of becoming too sensitive to the animal perspective. In other words, instead of becoming chimpanzee to better communicate and interact with chimpanzees, a human may start acting like a chimpanzee toward humans, or at least, being perceived as such in certain occasions to a greater or lesser extent. Lestel argues that processes of becoming like an animal are fundamental to our opening to animals as beings, and even more, they are vital to the quality of ethological studies.⁵³ It seems that such perspective-shift is indeed a powerful tool to achieve a truly animal-centric perspective so vital for ethology and related disciplines. However, a subtlety should be noticed.

The managing of crossed perspectives and the act of becoming another are two different processes. Recalling Kohn's words about the perspectival viewpoint, "[t]alking to dogs is necessary but also dangerous; the Runa do not want to become dogs in the process".⁵⁴ This concern seems to hold true not only in ethnographies of animist societies but in the present ethnography as well. Thus, unlike the shaman, who can administer crossed perspectives without losing one own's subjectivity,⁵⁵ the "chimpified" researcher may not switch back when context calls. What shall be dubbed as the "chimpification" of a human in a scientific setting can be perceived as a cost by interlocutors. We could define this neologism, *grosso modo*, as the intention or the process of being able to shift into chimpanzees' perspective on a personal level. In this sense, chimpification coincides with the ability to have an animal-centric perspective and is positively rated in the field.

However, *strictu sensu*, chimpification might be defined as the intention or the process of modifying one's behavior to match other species-specific patterns, in this case, chimpanzees'. Whereas this is advantageous when dealing with this species, it is perceived as a disadvantage when dealing with humans. Yet, it should be noted that although the human use of chimpanzees' social patterns with other humans is perceived as existent it remains fairly limited, whereas human use of chimpanzees' social patterns with other humans is perceived as existent it remains fairly limited, whereas human use of chimpanzees' social patterns with chimpanzees is extensive and supported. In other words, behaving in chimpanzees' terms toward humans (or being perceived as doing so) is less common and negatively view, whereas behaving in chimpanzees' terms toward chimpanzees is widespread and encouraged. In fact, in communities where humans and nonhuman animals share strong ties, power relations across species become fairly blurred. Consequently, the process of "chimpification" might extend not only to individuals but to social relations in general, as we shall see next.

"Come on; I'm human". As an exclamation uttered in the chimpanzee section, this sentence, as the others already discussed, is not as self-evident as one might suppose. The context of this utterance is related to the power conferred to chimpanzees in the humanchimpanzee community of PRI. On the one side, research personnel and keepers constitute the human part, on the other, the thirteen, now twelve chimpanzee living members, form the nonhuman animal counterpart. Yet, instead of regarding these groups as two separate and isolated poles, the approach followed here will focus on looking at their intersection, that is, at the interspecific level and then question how human-chimpanzee relations might affect or shape the relationship within-groups, that is, at the intraspecific level; in other words, we departure from a human-chimpanzee perspective to human-human/chimpanzee-chimpanzee one.

The human-chimpanzee focus is well expressed by the concept of hybrid communities, in which, interests, affects and meaning are shared in a living space.⁵⁶ Lestel sustains that, in fact, hybrid communities turn animals into people.⁵⁷ In the Primate Research Institute, personification acquires many forms and is conducted on many layers. Note, and this is important to stress, the term employed here is not anthropomorphization but personification. Personification may include anthropomorphization, however; personification has the potential to embody an animal-centric perspective, where the animal is understood in its own terms or, at least, where humans put considerable effort into such perspective-shift. Moreover, personification describes a particular phenomenon; it consists of the turning of nonhuman entities into legitimate social actors. An episode occurring during an experimental session in Matsuzawa's laboratory supports and illustrates well the point of how chimpanzees are social actors to humans and how humans seem to be social actors to chimpanzees as well.

It was early morning, Ai's session in Matsuzawa's laboratory, and on that day Professor Matsuzawa was in Inuyama and came to the laboratory with visitors; three high school students and a past PRI experimenter. Unlike her usual, Ai was quite aroused during the session and paid constant attention to the sounds of the outdoor enclosures. The experiment of which I was in charge was the last one of that day's session. The episode was recorded in video and is presented in a clip, which starts when Ai gets in the booth for this last experiment and ends when she leaves it (see Audiovisual Material 1);^{VII} its details are summarized next, along with video frames of strategic moments (Video Frame 1). For reference, "Gabriela" refers to the author and experimenter and, for clarity, the episode is described in the third person. Video frames with reference beyond seconds were timestamped using the software ImageGrab. The additional digits represent frames, for example, 1m9s17frames (30 frames per second).

VII I thank Pedro Baptista da Silva for the editing of this video material.

The remaining objects, belonging to other colors, are not targeted and, thus, must not be followed by praise and food reward. After having given the third object, Ai starts moving around the booth again (1m25s), dropping food rewards on the floor (the recorder captures faint outdoor vocalizations at 1m30s). Ai starts pant-hooting (1m32s-1m39s) and after she ends the long-distance call to conspecifics outdoors, she bears a grin-full-open,⁵⁸ revealing her teeth and gums (1m39s-1m40s). Ai starts stepping on the bench with a grinfull-open (1m40s) and, while closing her mouth, she approaches Professor Hayashi, who observes from the experimenter's upper left side (1m41s). Ai descends right away but does not resume the experiment. The experimenter calls Ai's attention again ("Aichan, chōdai" [knocks three times]; little Ai, do it for me; 1m44s). Ai continues to move around the booth. The experimenter repeats the same request (2m) but Ai, once more, moves from one side to another. Matsuzawa points in the direction of the experimental apparatus and says in Japanese: 'Ai, go, sit down!' ("Ai, itte, suwatte!"; 2m10s). Ai seems to head to the apparatus when Matsuzawa adds; 'that's it!' ("sō da!"; 2m11s), however, she turns away with pouted lips and then pant-hoots (2m12s-2m23s).





2m25s



2m37s21frames



2m38s15frames



2m39s7frames



2m38s9frames



2m38s19frames



2m40s14frames



Video Frame 1 Ai and the use of social relations during experiment. From Audiovisual Material 1. Audiovisual Material 1 Ai and the use of social relations during experiment, 2015, 3m20s. By Daly.

Matsuzawa points again in the direction of the apparatus and says in English; "Ai, sit!" (videoframe 2m25s). Ai starts moving and Matsuzawa exclaims "sō da!" (yes!; 2m26s). Ai inserts green rope (2m32s). Then, her next choice is red rope, however, in this insertion, a peculiar event happens. Ai inserts the rope into the hole where the experimenter will receive the object (videoframe 2m37s21). The experimenter's hand is positioned palm open to wait for the drop. Chimpanzee Ai lets go of the rope; most of the rope is on the experimenter's side but a few centimeters remain in the chimpanzee's size (videoframe 2m38s15). Within a second, the experimenter pulls the rope that was dropped by Ai (videoframe 2m38s19; 4 frames difference, 133 milliseconds). As a consequence, Ai inserts her hand into the hole, showing her upper, lower teeth and gums while producing a waa bark, ⁵⁹ a vocalization given in agonistic contexts (videoframe 2m39s7frames; 2m40s14frames).^{VIII,60} Matsuzawa warns the experimenter in Japanese: 'Putting the hand out is no-good, Gabriela' ("te dashita, dame, Gaburiera"; videoframe 2m41s9frames).

^{VIII} Alternatively, Ai's vocalizations can be categorized as "scream" instead of "waa bark". I thank Catherine Hobaiter for discussions on this video material. However, any possible mis-readings are mine to bear.

Ai vocalizes again while walking bipedally in the direction where Matsuzawa (standing) and a technician (sitting) are (videoframe 2m42s12frames). Although not visible in the recording, from the experimenter's front view it was possible to observe that Ai's eye gaze was directed at Matsuzawa. Ai's head stretching up toward Matsuzawa is slight but visible (at 2m42s-2m43s). Furthermore, while staring at Matsuzawa, chimpanzee Ai fumbled her nipples, a behavior conspicuous from the experimenter's frontal perspective but also noticeable in the recording by her arms movement, although less clearly. "Fumble nipple" is a behavior observed in cases of anxiety when a dominant individual is close-by, and it acts as self-reassurance or self-stimulation.⁶¹

When Ai is silent and still in bipedal position, Matsuzawa tells the experimenter in English: "It was completely wrong" (2m43s). As Matsuzawa is finishing his sentence, Ai starts turning around (videoframe 2m44s16frames) and then quickly resumes the experiment, picking up the next object (2m47s). Ai proceeds until the end; she inserts the last object (2m55s) and then silently shows a grin-full-open (2m56s) turning her full body 180° (where humans are present) with grin face while quickly fumbling her nipple (2m57s). Ai moves around (2m59s). At last, the experimenter ends the session with the standardized word ("Aichan, erai!"; little Ai, good job!; 3m1s) and the food reward signaling the end of the session is given (pick up at 3m4s). By the end of the session there are no food rewards left in the booth.

This episode was carefully detailed because it is a powerful experience in the life of a *Pan-Homo* hybrid community. We should start precising the context. Ai is a very experienced chimpanzee in the laboratory setting, she usually has a calm demeanor and, unlike Chloe, has no problems with coming to the laboratory in the absence of her son, Ayumu. Yet, that day she seemed particularly aroused about the social life in the outdoor enclosures, which is evidenced by her constant moving around and her pant-hoots, that is, long distance calls to other chimpanzees. Professor Matsuzawa, who sometimes has to stay long periods absent due to travelling and fieldwork, was present, along with visitors. For several interlocutors, including myself as an experimenter, sessions where both professors and visitors are present introduce a change in the social dynamics of the experiment.

In Matsuzawa's laboratory, visitors appear a couple of times a month but approximately twice a year the laboratories are open to high-school student trips in the form of educational programs, the busiest time in terms of the number of visitors per session (approx. ten visitors was the maximum observed). The impact of visitors and its affluence is an issue occasionally brought up among PRI experimenters regarding chimpanzees' performance and anxiety, with no consensus found. For instance, a professor considered an increased number of visitors as a factor in a mild accident during a face-to-face experiment. However, in what concerns Ai, she is mostly curious of and seems to be well habituated to an occasional large number of people given that it is during her session that most visitors are brought in Matsuzawa's laboratory. Yet, if there is no consensus on the impact that visitors have for chimpanzees in the laboratory life, interlocutors consider that the presence of visitors accompanied by the head of the laboratory change human-human social dynamics, although this is not an opinion shared by Professor Matsuzawa. In this sense, visitors are outsiders in comparison to the habitual human-chimpanzee community.

Now, considering the events described the first conspicuous point is the human authority. Humans are not all equal to chimpanzees – an observation that might sound obvious to primatologists and keepers. In this situation, the requests of a "low-ranking" experimenter, who has no long history of relationship with a given chimpanzee do not bear the same power than requests from an individual with whom she has a life-long relationship. The experimenter's three requests were met with failure, whereas Matsuzawa's rephrased request was readily met in a second. In Ai and Matsuzawa's face-to-face experiments during this ethnography, the only time Ai was observed completely ignoring Matsuzawa's repeated requests was when she was interacting with visitors. True, human authority might not be the only issue at play regarding why a chimpanzee responds to a human; as Matsuzawa once explained to his students, one needs to call in the right timing, reading the context to maximize your chances of a response. In sum, the coupling of who speaks and at what time are factors to consider when addressing chimpanzees.

The second noticeable point is, the recruitment of humans, in other words, to whom a chimpanzee turns when in distress. In order to understand this point, we shall first examine the exact behaviors on the part of the experimenter that set out Ai's chain reaction. In this episode, the trigger for Ai's heightened behavior was the pulling movement. In this experiment, the experimenter waits until the objects completely fall into the experimenter's side, including the long-shaped rope segments. However, in this session, when Ai released the rope and most of it was in the experimenter's side, the experimenter pulled the segment, instead of waiting for it to naturally fall. In terms of safety procedure, the experimenter made an important mistake. Ai had never shown agonistic behaviors toward the experimenter, this time being the first and only. Yet, as it would later have been made clear, Ai is particularly sensitive to pulling movement, and although she had already let go of the object, due to her prior state she reacted with a full bare-teeth face and waa barks/screams while inserting her hand vigorously into the hole.

At this moment, Matsuzawa warned the experimenter that putting the hand out was not good. In fact, a misunderstanding later clarified occurred; Professor Matsuzawa considered that that experimenter had forcefully taken the object from Ai, as in a tug of war style. If that was the case, first, this would be a severe breach of the safety protocol, given that, due to chimpanzee's strength a serious accident could happen. After the session, Matsuzawa recollected how he witnessed chimpanzee Sarah breaking a student's bones in the same way in Premack's laboratory, back when he was a postdoctoral researcher. Secondly, incidents like that could jeopardize the future of the Ai Project, prompting one more reason to be extra cautious.

Thirdly, a tug of war with Ai would mean a breach of the experimental protocol; a violation of the experiment's principle of chimpanzees' own free choice of objects, and thus, a mistake on a scientific level. At last, such a behavior toward a chimpanzee should not be acceptable and could be considered as a mistreatment. Misunderstandings cleared up after video analyses; the experimenter was still at fault for poor adherence to safety rules. This episode also made clear how adhering or breaching safety rules while dealing with chimpanzees could be a matter of a split-second mistake (in this case, an astonishing 133 milliseconds).

After having explored the trigger to Ai's reaction, we can focus on how the chimpanzee dealt with humans in what, for her, was an agonistic situation. In the event involving the rope, first Ai acted toward the "aggressor", that is, the experimenter. Right after, Ai vocalized while walking bipedally toward Matsuzawa, fumbling her nipples at the same time. Although it is difficult to ascertain what were the chimpanzee's intentions, based on her behavior a hypothesis seems plausible; Ai was recruiting Matsuzawa in her defense in an agonistic context. First, the fact that she was walking toward, standing bipedally while slightly stretching her head and gazing at a standing Matsuzawa is an element. Second, Ai did not seek the other professor whom she previously sought before the incident happened, nor did she gaze at the technician sitting just next to Matsuzawa. Third, Ai was fumbling her nipples in his presence, likely for self-reassurance after the incident. In fact, it is usual that Ai would fumble her nipples when Matsuzawa is just about to get into the booth for a face-to-face encounter. According to Nishida and colleagues, this behavior has been observed when dominant individuals are nearby.⁶²

Now, consider the intensity of Ai's reaction. Before the incident, not only had she shown signs of arousal such as moving around but she had borne a full grin. It is not farfetched to assume she was dissatisfied. Inside the cabin, the experimenter's lateral view is somewhat limited, contributing to an incomplete assessment of her previous facial expressions. Adding up to her dissatisfaction, the experimenter makes a move that she does not encounter in this experimental setting and which she usually displeases, to the ignorance of the experimenter. Ai, who, at the beginning of the morning was pressing her lips against the panel to prompt the experimenter's "kiss" in return, is now showing her impressive grin, screaming and vigorously reaching the experimenter's side, like never before. A heightened reaction toward the "aggressor" seems to be perfectly understandable, especially as a means of venting out present and previous frustration. Yet, afterward, she stands bipedally, seemingly to decrease the distance between her a standing Matsuzawa and vocalizes again while holding a stare. Would it be odd to be suspicious she was overreacting? Why did Ai turn to Matsuzawa, after all?

Studies on chimpanzee social behaviors provide us with a bigger picture; captive chimpanzees that are victims of aggression by conspecifics solicit support from individuals that are more likely to back them up than the aggressor.⁶³ Likewise, in the wild, investigations in chimpanzee vocalizations support that chimpanzees may exaggerate the level of aggression as communicated by their screams, when within the audience there is an individual who matches or surpasses the aggressor's rank.^{64,65} These studies, however, were conducted analyzing Pan-Pan situations. The peculiarity of this case study lies in that it exemplifies in a detailed manner a dynamic well known, but little studied in primatology; the fact that primates mobilize humans not only to their own benefit and even to alter their interactions with conspecifics. Although human cooptation by chimpanzees is a topic that merits systematic studies, the phenomenon seems real, and it is possible that Ai was coopting Matsuzawa as a partner in what she considered to be an agonistic situation.^{IX,66} However, it is not clear whether this behavior was based on egocentric heuristics (I'll turn to whom I know is my strongest ally) or whether it is also supported by a triadic awareness of relationships⁶⁷ (I know human Matsuzawa is higher ranking than human aggressor Gabriela; I know Matsuzawa is more likely to support me than her). At any rate, if translated grosso modo in plain English; Ai seems to have snitched on the experimenter and it worked.

^{IX} Hobaiter points out that a better indicator for recruitment would be the increase in scream while looking at Matsuzawa, although she considers that Ai is capable of recruiting the professor in other situations.

This long case-study serves to support and illustrate how in the laboratory life experienced by humans and chimpanzees, chimpanzees are social actors for humans and, in turn, humans seem to be social actors for chimpanzees as well, in the sense that humans may be mobilized to alter interactions chimpanzees experience with others. Even if there is still an exciting and largely unexplored field of research regarding human-chimpanzee interaction, the existence of certain phenomena is highly supported by anecdotal accounts and case studies of this type: Chimpanzees are capable of recognizing idiosyncrasies among humans and act accordingly, they sustain differential relations with individual members of our species, and they seem to recruit those individuals to alter their social relations with others.

Note, however, that chimpanzees interact with humans not in the sense of the use of an inanimate object (e.g., a tool) but in the sense of the previous history of relationship with a human with high emotional entanglement. If we were to talk about humans, the appropriate term for these processes would be personification. Overall, not only are chimpanzees persons for humans, or at least, treated as such, but a closer look at how chimpanzees interact with humans seems to support that humans are also persons for chimpanzees, even if chimpanzees might lack a formal, conceptual understanding of personhood, an issue that remains to be tested.

Moreover, participant observation in the laboratory clearly supports that chimpanzees in PRI distinguish humans as social partners; in contrast to the automated computer apparatuses they work on daily, as a function of how they mobilize humans when the computer fails (even according to humans' roles). This apparent distinction occurs even if these apparatuses show animacy (e.g., automatic feeder). Nonetheless, it is possible that different responses might be elicited with humanoid or chimpanzee-like robots (can a robot be considered a social partner for a chimpanzee?). The yet unexplored issue of how chimpanzees might conceptualize personhood, or what might constitute personhood in their terms is a full venue for collaborative research among the fields of philosophy, primatology and anthropology of life (the latter because the topic likely includes the perception of certain life processes). Now, we shall turn to the last point where the line between humans and chimpanzees is more complex than predetermined species boundaries. We shall investigate the meanings involving the life and death of a chimpanzee.

4.3 Life and Death of Nonhuman Persons

At the Primate Research Institute, the importance of chimpanzees' life and the meanings of their death can be witnessed through a series of events. One of these moments has been previously explored through the narrative of chimpanzees' birth and the process of learning to mother (see "building a community"); however, some points are yet to be addressed. We shall start with the most conspicuous one, that is, the celebration of chimpanzees' birthday. In PRI, captive-born chimpanzees who have precise birth dates receive regular birthday parties in the laboratory or in the feeding area of the basement. These parties are events in which personnel prepare rare, highly enjoyable food for the birthday chimpanzee. The food items are healthy and non-processed: the standard "cake" observed in 2015 consisted of a watermelon presented in a box and/or wrapped, along with additional treats provided.





Photo 1 Mother Chloe gets most of Cleo's birthday present, 2015. By Daly.

Photo 2 Chloe uses the wrapping as napkin, 2015. By Daly.



Photo 3 Pal's birthday is interesting also for humans, 2015. By Daly.



Photo 4 Ai takes interest in the wrapping paper, 2015. By Daly.



Photo 5 Mother Ai monopolizes Ayumu's presente, 2015. By Daly.

If occurring in one of the laboratories, these parties are squeezed into the experimental schedule. Chimpanzees will be called into the laboratory, as usual, and someone will place the birthday "present" or "cake" in the booth. In addition, some keepers and research personnel from other laboratories will gather. Interlocutors consider it a birthday celebration; however, the most exciting moment consists in watching the birthday chimpanzee's behavior to a novel stimulus. Many bring their camcorders and cell phones to record the moment. There is an overall cheerful spirit because chimpanzees show interesting behaviors in such contexts.

It is of particular amusement when a birthday chimpanzee comes with the mother, who, in these cases, is a higher-ranking individual and, consequently, will tend to monopolize the food. In 2015 this was Ayumu and Cleo's fate, whose mothers took advantage of the situation (Photo 1, Photo 2, Photo 4 and Photo 5). Personnel playfully discouraged the mothers and encouraged the offspring but to no avail. Pal, on the other hand, enjoyed her meal alone due to being previously separated from her mother's group, therefore, coming to the experiments by herself (Photo 3).

In Cleo's birthday, personnel tried to prompt Cleo to go alone to the booth; however, once there, Cleo became too wary of the wrapping so finally the mother Chloe was allowed into the room and the daughter had to satisfy herself with her mother's leftovers. When Cleo tried to approach the watermelon while Chloe was feasting on it, Chloe kept turning her back every time her daughter came closer. At a certain point, a foreign researcher sarcastically sang "happy birthday to Chloe", given she was the only one really enjoying the present. On Ayumu's birthday (Audiovisual Material 2; Video Frame 2), personnel tried to separate the son and the mother without success; after having eaten Ayumu's treats in the first booth, as soon as the door to the second booth opened, the mother Ai headed directly to the gift box. When the mother opened the box (29s), the son did not dare to grasp the food and, afterward, Ayumu could be seen occasionally scavenging for the leftovers (48s; 2m55s). During the whole process, people would frequently point (1m7s) and effusively root for Ayumu to do his best ("Ayumu, ganbarē!").



29s

48s



1m7s

2m55s

Video Frame 2 Ayumu's birthday. From Audiovisual Material 2. Audiovisual Material 2 Ayumu's birthday, 2015, 3m11s. By Daly.

parties Birthday sound irrevocably human and a sheer act of anthropomorphization given that nonhuman animals cannot grasp its true meaning; that is, the celebration of their lives. Still, we should perhaps approach the subject from a different perspective. First, such events serve as another means for the much striven enrichment, in the sense of a change in chimpanzees' regular schedule and dietary routine. Thus, even if these celebrations do not denote the human concept of "birthday" to them, they do bear some meaning to chimpanzees. Secondly, we should take into account that personnel, who works under a demanding timetable, spend considerable time to craft and be present at an event that might take up to one hour, depending on how far the group is willing to stimulate chimpanzees to own their own gifts.

These are moments when personnel can observe chimpanzee behavior beyond the tight, standardized schedule of experiments and feeding. Nothing is at stake, no stress of data collection; just the humble pleasure of observing chimpanzees being chimpanzees for the sake of it; and not just any chimpanzees, our own familiar individuals. At last, even when formal birthday parties cannot be organized, keepers usually prepare healthy treats and food surprises for the birthday chimpanzee. In other words, in PRI, celebrations may be amusing for humans but the center spot is still them, not us.

A case at the Japan Monkey Centre (JMC), which is just a fifteen-minute walk from PRI, may help to bring the hidden meaning of this activity into light. In 2015, at JMC, a one-year old siamang, Suika, ¹ had a carefully prepared birthday party in his honor (Symphalangus syndactylus; i.e., a type of Beyond being gibbon). а museum and a research facility, JMC is also a zoo, so the announced event gathered many visitors. The birthday party was somehow similar to PRI's but flashier, and



Photo 6 Suika's birthday "cake", JMC, 2015. By Daly.



Photo 7 People start gathering for the little siamang's birthday, JMC, 2015. By Daly.

vegetables were thoroughly arranged in a cake format with Suika's name carved on it (in katakana $\forall \forall \forall \forall$; Photo 6). Before the event, visitors gathered next to the siamangs' outdoor enclosure, which displayed a banner wishing Suika a happy birthday (Photo 7). Then, in the empty enclosure, a JMC employee gave a short presentation on siamangs; their natural behaviors, types of food eaten, and above all, information on Suika and his family group (Photo 8 and Photo 9). When the time came, the gate to the outdoor

enclosure opened and Suika and the others started to enjoy the meal, occasionally sharing food among themselves.

Although the event appears as quite anthropomorphic, it is in contrast with former goals set by of visitors' zoos in terms experience. Interestingly, a Japanese keeper at Yokohama zoo, program coordinator for gibbon species at the Japanese Association of Zoos and Aquariums, shared her frustration regarding some visitors' expectations:²

[Some in] the old generation come to the zoo and say:

- I want the monkey to dance.
- No, we do not do that.
- But I have seen it on TV. or [they say]
- I have seen it as a child.

- We do not do that anymore, because we now understand that they are wild animals and we want them to behave the way they are supposed to behave.

But not everyone understands... [They say]

- That is not interesting, it is boring!



Photo 8 Suika (center) and her family group, JMC, 2015. By Daly.



Photo 9 Little siamang Suika, JMC, 2015. By Daly.

What is noteworthy about the case at JMC is that the event consisted in watching siamangs' behavior just like in PRI. Yet, in the JMC's counterpart, due to the nature of this institution, contextual information on both the species and the story of that specific group was provided. This idiosyncrasy helps to make certain overlooked features explicit: a birthday party as such, beyond the logical goal of increasing the number of visitors, hopefully, does not only function as a short, enjoyable outdoor session educating the public on siamangs' natural behaviors but it also, at the same time, anchors abstract information in real flesh and blood individuals. These individuals have names, family ties,

stories and they are sensory accessible to people while they watch their actions, their gestures, see they brachiate from one place to another, hear their vocalizations, and so on.

These type of birthday celebrations are not based on animal performances where primates are obliged to comply with typically human behaviors like prolonged bipedalism, which may even alter animal morphology with considerable consequences such as human-like lumbar lordosis.^{3,4} It is true that the educational efficacy of such short public exposés could be subject to evaluations,^{5,6} however the crucial point of this argument remains unaltered. Are such events a simple matter of anthropomorphism?

The fact that they are labelled birthday parties might be misleading; the phenomenon is of another level. In the examples discussed above, a human-centric perspective (or the "bambification" of animals⁷) does not take the center stage but rather the emphasis on what nonhuman primates naturally do, except that now species-specific behaviors have bodies, names and stories. When there is an attempt to address nonhuman primates by their own terms and when their individuality provides an anchor to concretely ground public awareness into something, or rather, "someone" people can see, then the process seems to be no other than personification.

Their lives are being celebrated not only because of how *human* in their behaviors they are (and this might often be the case simply because, indeed, we share many similarities with other primates, not because we anthropomorphize); their lives are being celebrated also because of how *nonhuman* they are, because of their species specificities, because of their individual, meaningful stories. Whenever the attribution of emotions, individuality, history, stories and social agency is accompanied by an animalcentric perspective, that is, an attempt to understand the animal in the animals' terms, then instead of anthropomorphism the phenomenon we encounter is personification, in other words, the makings of a person even if a nonhuman one. Next, we shall see how the level of personification chimpanzees undergo at PRI is profoundly reflected in the decisions regarding the life and death of specific members of the community.

In the Primate Research Institute, as of August 2017, there have been a total of three losses of chimpanzees' lives: PRI's first chimpanzee Reiko, whose life was described earlier in this ethnography; Piko, an infant who suffered from malformation, whose brief stay in the community was retraced through the difficulties her mother, Puchi, had in raising her; and, at last, Puchi who recently passed away. However, before unfolding Puchi's story, we must explore the case of a severely disabled chimpanzee, whose prognosis would have been of euthanasia. As readers might be acquainted with the chimpanzees by now, the chimpanzee in question is Reo.

Reo is Reiko and Gon's son; he was successfully reared by his mother and came to father Cleo. His unfortunate incident started more than ten years ago. One morning during September 2006, the 24-year-old Reo was found immobile on the ground, completely paralyzed below the neck; his condition was discovered to resemble acute transverse myelitis in humans (i.e., an inflammation of the spinal cord).^{8,9} Hayashi and colleagues identified four phases in his recovery:¹⁰ In phase 0, during the first thirteen months, Reo mainly lied on his back whenever caretakers were absent; in phase I, between fourteen and seventeen months, an increase in the upright position occurred; during phase II, from eighteen to twenty nine months, he remained stable 50 to 70% of the time; and in phase III, from thirty to forty one months, his upright posture constantly exceeded 80%. ¹¹ During the two initial months, young researchers, keepers and veterinarians organized round-the-clock care, but by December 2006, Reo had lost forty percent of his body weight and "looked very miserable" (Photo 10).¹² Matsuzawa, however, explains the reasons to opt out of euthanasia in Reo's case.¹³

Given a similar situation in Europe and North America, euthanasia would most likely have been considered the correct course of action, due to the belief that it is not good for animals to experience pain and suffering. Other problems include the cost in terms of time of labor intensive care, along with chronic fatigue experienced by care staff, and the high financial cost of medication (no health insurance being provided for the care of chimpanzees). In truth, I heard hushed voices asking me, as the director of the institute at that time, "How long will you continue to take care of this chimpanzee?" However, not one of the volunteer carers even considered euthanasia as an option. This may, in part, be due to Japanese cultural and religious beliefs, rooted in Buddhism: we should kill no living creatures. However, the most important contributing factor was Reo's demeanor. Even during the most difficult period, he never seemed to show signs of depression.

Matsuzawa, then, details Reo's disposition at that time.

He would pretend to drink water, but hold it in his mouth. When a young person approached him to carry out care tasks, he would suddenly spray them with water. The carers were caught completely by surprise, and Reo smiled. In this sense, nothing had changed between before and after the onset of his illness. Despite the restriction in movement, he was fully "alive" and still "himself."
When Reo became strong enough to be a potential danger to caregivers, a veterinarian and a keeper who had developed stronger ties with the chimpanzee were able to conduct face-to-face physiotherapy sessions.¹⁴ During Reo's face-to-face sessions, the two humans Reo accepted would enter the cage in his rehabilitation room and act as if in play: tickling, scratching, pushing, holding and grooming him in the back of his ears, his favorite spot. One person would initiate the play while the other would try to extend his legs, a movement that appeared to be painful for Reo. Nonetheless, due to play context, Reo gradually accepted the therapy.¹⁵ This can be observed in Audiovisual Material 3 and Video Frame 3.



1m10s

1m16s

Video Frame 3 Reo's face-to-face physiotherapy. From Audiovisual Material 3. Audiovisual Material 3 Reo's face-to-face physiotherapy. 1m46s. By Nakamura in Miyabe-Nishiwaki et al. (2010).¹⁶

In the video, the veterinarian (to the left) and the caretaker (to the right) enter the booth and Reo is seen showing a play face toward the caretaker (15s). The veterinarian manipulates Reo's right foot and the caretaker cleans Reo's ears and eyes with a cloth. The veterinarian, then, flexes Reo's foot (1m), and the humans request from Reo that he extend his right foot by himself; they point, touch the location, say the husbandry word for foot/leg ("ashi") along with 'here' ("kochi"), and place the palm of the hand open where Reo is supposed to stretch (1m10s). They insist as Reo tries to present his other

foot, presumably the one that does not hurt as much, given that this part extends more easily. When Reo meets the request, they verbally praise him ("sō, sō..."; "yoshi") (1m16s). Reo receives a small treat for his achievement. The procedure is repeated with success, and the veterinarian exclaims 'wonderful, right?!' ("sugoi, ne").

At later stages, Reo could move around the room using hanging ropes and bars. In addition, he developed crutch-walking by using his arms as support and, also, bipedal walking supported by his hips, propelling himself through the movement of his torso and legs rather than the extended limbs.¹⁷ Because Reo had previously participated in several cognitive tasks, setting up experiments on his behalf was a strategy envisioned.¹⁸ Automated cognitive experiments requiring Reo to walk were set in place in order to promote the recovery of walking patterns to a point similar to abled chimpanzees and, thus, to enable a future full social reintegration .¹⁹





Photo 10 Reo's acute tetraparesis, 2006. Credit: Matsuzawa (2016, 292).²⁰

Sakuraba and colleagues describe the procedures: ²¹ First, researchers developed easy cognitive tasks in comparison to his previous experiments. They placed the touch-panel where he would conduct the tasks in one extreme of the booth and the automatic feeder to reward his correct responses in another (200cm apart). Eventually, Reo started to "save" his rewards and move only after

Photo 11 Reo continuing experiments, 2015. Courtesy of Nakamura Miho.



Photo 12 Pendesa (left) about to meet Reo, 2015. By Daly.

accumulating a series of treats. As a result, researchers had to increase the interval

between each trial, a change that discouraged this behavior since he would have to wait much longer for the rewards. Later on, the tasks increased in difficulty and the sessions took place four hours a day in total, with an interval of fifteen seconds between trials. In its final stage, Reo participated in the tasks without needing human encouragement, being prompted only by the music signaling the start of the experiments. In sum, these experiments have aided his physical rehabilitation, given that his voluntary participation makes Reo walk distances he would not otherwise.²²

As for social contact, staff has arranged monthly visits from other chimpanzees. In the initial stages, Reiko, his mother, and following her death in 2013, Poppo, his half-sister, visited Reo, although in the long run the personnel's ultimate goal is full social reintegration.²³ As of 2015, visits continued to be arranged, counting with the presence of other members as well, such as Chloe and Pendesa (Photo 12). Furthermore, Reo continued to participate in automated experiments, and, in addition, he participated in an object and color categorization task (Photo 11). Curiously, prior to his illness, Reo was rarely considered to be friendly toward humans, however, after intensive care, he started to show affiliative behaviors to some of the staff.²⁴ In 2015, during this ethnography, Reo seemed to be friendly even with visitors and he was in company of humans several times a day for feeding and care but also for play.

Reo's case support the importance given to a chimpanzee's "self". The intensive care Reo underwent indeed put personnel at true hardship, and it has been noted by a professor at the Institute that Reo's event was likely the most difficult time in PRI's history to what regards chimpanzee personnel. Yet, if "[e]uthanasia is not an option", to quote Matsuzawa,²⁵ is because, primarily, Reo was still there; he was perceived as personality-wise, or rather, person-wise the same. He was immobile but he still retained his former spirit, his former mind. Despite the adversity and the suffering, to PRI personnel, there was something still there to be saved, or better, someone. Unfortunately, Puchi was his symmetrical opposite; whereas her body was "alive", she was brain-dead. Nonetheless, instead of being euthanized, Puchi received the same treatment of human brain-dead patients, as we shall see next.

Puchi (Photo 13) was born is West Africa in 1966 and was one of PRI's oldest chimpanzees, belonging to the first generation and arriving in the Institute after being kept as a pet for twelve years.²⁶ Curiously, her name is, in fact, the Japanese pronunciation of the French word *petit*. Puchi mothered Popo, Pan and Pico and she had been housed in Gon's group. Gon arrived in the Institute the same day she had and fathered her first two

daughters through artificial insemination.²⁷ On the other hand, her youngest daughter, Pico, was fathered by Reo and, unfortunately, passed away in 2003 at the age of two due to malformations during gestation.²⁸ Prior to Puchi's death, Gon's group was composed of Gon, Puchi, her daughter Popo and her granddaughter Pal.

Even though at the top of her 51 years of age, she was an elder, her passing was sudden and not related to any immediately previous and noticeable disease. The handling of Puchi's death is of particular interest regarding the symbolic boundaries between humans and chimpanzees and shall be explored based on internal documents directed to the members of the section of Language and Intelligence, that is, the section in charge of chimpanzees at PRI.^{29,30} Furthermore, personal communications with the members of the



Photo 13 Puchi, 2015. By Daly.

section have enriched this account.³¹ Several technical details in the following description were omitted for ease of reading; this is, thus, a summarized version of a lengthy medical procedure involving the events prior to Puchi's death.

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(8:30) When beginning breakfast feeding, a research assistant finds Puchi collapsed in one of the rooms in the basement. While the assistant reaches for help and compartments are being closed, Popo enters the room where her mother lies unconscious. Soon, other responsible personnel are warned about the situation.

(9:20) Personnel visually inspect Puchi's state, however, because Popo has refused to leave Puchi's side, the mother cannot be retrieved and, thus, it is decided that the daughter has to be anesthetized.

(10:38) As anesthetizing Popo takes time, Puchi can only be moved to the operating room after it is confirmed both chimpanzees are unconscious.

(10:46) After emergency procedures, electrocardiogram monitoring starts and an oxygen mask is put on Puchi.

(10:54) Puchi's body temperature is falling; it is decided a computed tomography (CT) will be performed.

(**11:02**) CT is conducted.

(11:39) A magnetic resonance imaging (MRI) starts.

(11:42) MRI is performed a second time.

(11:49) MRI is performed a third time.

(12:05) Puchi is breathing.

(12:09) MRI is performed a fourth time.

(12:14) MRI is performed a fifth time.

(12:16) Puchi's breathing is weak.

(12:17) Puchi enters cardiac arrest and personnel intubate her.

(12:19) Cardiac massage starts.

(12:24) Cardiac massage is put on hold; Puchi's heartbeat increases from 70 to 110 beats per minute.

(12:28) Cardiac massage is conducted.

(12:57) Puchi's heartbeat has been oscillating.

(13:11) Puchi is connected to an automatic ventilator.

(13:49) Puchi's body temperature is 33.9°C. Heartbeat at 68 to 96. Pupillary reflex is absent.

(14:07) Personnel are unsure whether Puchi's feet slightly moved. Body temperature is 36.7°C.

(14:34) Puchi is connected to a physiologic monitor.

(15:45) Propfol stops (used in sedation).

(15:52) Puchi's feet move.

(15:54) A respiratory stimulant is injected. Puchi's breathing is performed manually through an artificial ventilator pump ("kokyūshudō ni" 呼吸手動に).

(16:12) Enema is conducted for the first time (i.e., bowl cleansing to allow medical procedures).

(18:28) Enema is conducted for the twenty-sixth time.

(18:48) Puchi's heartbeat is at 98, she shows signs of reflexes.

(19:03) Puchi breathing has not been returning, automatic ventilation is put in place.

(19:57) Night shift starts.

(20:30) Puchi shows heart arrhythmia.

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(3:53) Puchi's legs move when touched. Pupils are dilated.

(8:00) New shift starts. No change in Puchi's overall condition.

(8:30) No response from facial nerves and ears when poked.

(8:55) Electroencephalography starts being prepared.

(9:38) BIS output (bispectral index which monitors brain activity).

(9:41) A policy meeting is conducted in the adjacent room (veterinarian staff and professors). As in the diagnosis of human brain death, it is determined that a second judgment should be made six hours after the first diagnosis (i.e., at 14h) and if brain death is confirmed, Puchi will be extubated and her heart will stop naturally. It is decided the body will be donated to the Great Ape Information Network (GAIN) for studies.

(10:00) Ventilator pump is used.

(10:24) Personnel call Puchi's name.

(11:55) Ventilator pump is used, Babinski reflex still occurs (plantar/foot reflex following stimulation).

(12:14) A footage of Pal's pant-hoot is played.

(12:20) Ventilator pump is used.

(12:24) Some regions of Puchi's face can be seen twitching, she is made to hear chimpanzee sounds.

(13:47) When PRI' first keeper touches Puchi's back, her hair becomes ruffled. (13:49) Ventilator pump is used.

(13:55) Puchi's heart rate is at 100 and her temperature is 38.1°C.

(14:01) The veterinarian confirms: pupil and corneal reflexes are absent; face and earholes do not respond to stimulation; laryngeal reflex is also absent, and so on. (14:05) Brain death is determined for the second time.

(14:40) Electrocardiogram is being prepared, imaging starts.

(**14:57**) Scanning.

(15:07) Electrocardiogram and imaging ends.

(15:17) Puchi's pulse is at 108.

(15:28) The use of diprivan (administered to slow down brain activity) and the ventilator pump are terminated.

(15:29) Puchi is extubated. Her pulse is at 99. Members involved in chimpanzee research are gathered in the room.

(15:38) Puchi's pulse drops: 25, 15.

(15:41) Puchi's pulse is zero.

(15:42) Puchi's death is confirmed. Silent prayer.

(15:46) Moving to the dissection room.

(17:32) Craniotomy indicates severe subarachnoid hemorrhage; large clot of blood is found in the heart's left ventricle.

This unfortunate event is marked by a series of important moments, which reveal the meanings surrounding a chimpanzee's death in PRI's community. The first point is Popo's reaction (Photo 14). Puchi and Popo were particularly close and, indeed, for about one hour



Photo 14 Popo, Puchi's daughter, 2015. By Daly.

personnel tried to convince Popo to leave the room before resorting to anesthesia, a procedure that can be stressful for chimpanzees as they need to be shot with a tranquilizer. Popo's reaction was clear; the daughter did not want to leave her unconscious mother. After Puchi's definite removal from Gon's group, Popo and Pal were seen grooming at higher frequencies, yet, Gon was said to appear lonely. Luckily, approximately three months later, it was noted that the group seemed to be handling Puchi's absence well. In fact, primate thanatology, a new area of research which studies primate responses to the death of group members is populated with case studies describing reactions similar to those observed in humans at the loss of a close person.³²

Paralleling Popo's case, Anderson and colleagues describe a daughter's reaction to her mother's peaceful passing away in captivity: "Rosie remained near her mother's body almost continuously throughout the night, on a part of the platform where she had never slept".³³ Indeed, depending on the context of the death, the array of attitudes toward the moribund or the deceased chimpanzee includes pre-death care, testing of signs of life, cleaning of the corpse, later avoidance of the place where death occurred, trouble sleeping, lethargy, and appetite loss.^{34,35} Furthermore, certain behaviors occurring in the wild, such as the carrying of naturally mummified infant bodies by their mothers is considered to be likely socially transmitted, as case studies in Bossou, Guinea support.³⁶ In sum, chimpanzees show signs of what in humans would be labelled as grieving.

The second important moment of this tragic event is when PRI personnel gather to decide the appropriate actions to deal with Puchi's condition. Facing the prospect of lack of improvement in Puchi's overall state, instead of the commonplace option of euthanasia, researchers and veterinarians chose to follow the medical procedure for braindead human patients in Japan. In fact, had euthanasia been conducted, personnel's work would have diminished considerably. Instead, a procedure requiring intensive care was chosen based on people's belief of how a chimpanzee's life should end. Another significant point is the fact that during the two days Puchi was in treatment, she received the visit of all members of the section and the moments before the apparatus that kept her body working was stopped, a gathering of familiar humans was present to send her off.

Had Puchi regained consciousness, one may wonder whether she would perhaps be able to make use of her body again, as there were no apparent damages of the sort that Reo suffered. However, unlike Reo, who was said to have kept his self in the face of a paralyzed body, Puchi was "not there" anymore; people even called her name and played a footage of a familiar chimpanzee's voice in order to bring her back. Unlike in many Western languages where mind, heart and spirit appear as separate words, Japanese language may convey these strikingly powerful concepts through just a simple and unique word; *kokoro* (\dot{U}).³⁷ Whereas Reo's *kokoro* was intact, Puchi's had departed. Yet, it seems Puchi's *kokoro* remained as a legacy as we shall see last.

In a message to all Language and Intelligence members, Professor Tomonaga stressed how euthanasia was a procedure typical for 'laboratory animals' ("jikken dōbutsu" 実験動物).³⁸ In fact, at PRI, a ceremony in honor of the monkeys euthanized in invasive research is held each year.³⁹ Researchers, keepers, assistants of all sections and even

administrative personnel gather for the service; the number of monkeys sacrificed is detailed and the purpose of the research is stated. In the end, each person stands in line to offer a flower and a silent prayer in front of a stone memorial and a carefully prepared altar.

Chimpanzees, on the other hand, are not subjected to invasive research; chimpanzee personnel deal with their deaths in their own way. As a collective means of remembrance, a small memorial with photos accompanied by a short document retracing the chimpanzee's life is prepared and strategically placed. It could be argued that, in Puchi's case, euthanasia would not pose a moral problem given the prospect of non-recovery, a circumstance markedly different from Reo's. Yet, refraining from euthanasia was symbolic: it was meant to send the powerful message that chimpanzee Puchi was no laboratory animal. Even more, on the day of Puchi's death, as the last passage of the email addressed to those involved in chimpanzee research at PRI, Tomonaga, who succeeded Matsuzawa after his retirement, voiced a strong statement: the "[d]eath of chimpanzee should be treated like human death. This must be the last message from Puchi."⁴⁰

Despite the clarity of the statement, there are still nuances to be explored. In English, the wordplay "human being" and "being human" denote two distinct phenomena, as argued by Ingold: whereas the first concept refers to the biological reality of *homo sapiens*, the second translates human reality as social subjects, as persons.⁴¹ Likewise, Japanese language conveys such subtlety through different writing systems, where the same word might be written in different ways (i.e., katakana and kanji). In the Japanese version of Tomonaga's passage, the new head of chimpanzee research at PRI employs the word "*hito*", which appears as 'human' in his English translation of the message.

However, in the sentence, the word *hito* is not written in katakana as \vdash \land , form generally used when denoting humans as a species. Instead, the term *hito* assumes its kanji form \land . In this form, *hito* can be translated as 'human' but it has an additional translation, that is, 'person'. As previously discussed, the same kanji (as *nin* and related flexions) is not only employed to count humans and, more exceptionally, chimpanzees under certain circumstances, but is also used as a marker of personhood, as it has been argued (e.g., as in Martian, kasē**jin** 火星人). Such nuance disappears in the English translation of 'human' as opposed to the Japanese polysemy of *hito* \vdash \land (human species) and *hito* \wedge (human person).^{I,Note 42} A chimpanzee's death should be treated in the same way as that of a human person.

Here, the vital point connecting chimpanzee and human death is personhood not humanity, even if chimpanzees are phylogenetically very close to human species. Puchi is not another laboratory animal that dies and, yet, her case does not seem to be perceived as the simple death of a biologically close specimen; the meaning supersedes the strict biological reading of an organism. The death lived and experienced is that of an individual in the quality of a person, even if such personhood stems in part from a biological reality.

It is true that chimpanzees do share many characteristics with *homo sapiens* and, in general, humans tend to recognize personhood based on comparisons with human features, that is, based on an anthropocentric model of personhood. Nonetheless, chimpanzees possess their own idiosyncrasies that make them obviously not human, and it is the ensemble of how human and how nonhuman chimpanzees are that constitutes their personhood, because chimpanzees are persons like us but they are also persons in their own way. Such approach is likely to render fruitful the conceptualization of personhood not only of great apes but also of phylogenetically distant taxa, at the heart of scientific worldviews. This commitment should be the basis of an animalcentric model of personhood where animal personhood is conceived not as an incomplete human condition but in the animal's own terms. This is a challenge for present and future generations to come.

^I Accordingly, note that when the procedure for human brain death is referred to in the text, the word employed is *ningen*, which more closely specifies a human than the word *hito* ('brain-dead human patient' *"ningen no nōshi kanja"*人間 の脳死患者) (Minamide and Nakamura 2012). The procedure had only been applied to humans so far.

4.1 Linguistic Practices on Nonhuman Personhood

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⁴ Kasumi Yamamoto and Frank Keil, "The Acquisition of Japanese Numeral Classifiers: Linkage between Grammatical Forms and Conceptual Categories.," Journal of East Asian Linguistics 9, no. 4 (2000): 379-409.

⁵ For a comprehensive list with homophones and homonyms, see Steve Trussel, "Japanese Numeral Counters" (Accessed July 18, 2017. http://www.trussel.com/jcount.htm, 2017).

⁶ Hiroki Nomoto, "Number in Classifier Languages. Thesis." (University of Minnesota, 2013).

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¹⁰ David Gil, "The World Atlas of Language Structures Online. Numeral Classifiers." (Leipzig: Max Planck Institute for Evolutionary Anthropology. Accessed July 17, 2017. http://wals.info/chapter/55, 2013). ¹¹ Trussel, "Japanese Numeral Counters."

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¹⁹ Kristina Cawthon Lang, "Primate Factsheets: Common Marmoset (Callithrix Jacchus) Taxonomy, Morphology, & Ecology." (National Primate Research Center, University of Wisconsin, Madison. Accessed July 17, 2017. http://pin.primate.wisc.edu/factsheets/entry/common marmoset, 2005).

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²⁵ Sayuri Takeshita, online personal communication, July 13, 2017.

²⁶ Takeshi Atsumi reported using *tou* for his test subjects; online personal communication, November 10, 2015.

²⁷ See for instance, "Jigokudani Yaen Kōen [Jigokudani Wild Monkey Park]. Wikipedia." (Accessed July 2017 18.

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²⁸ Tetsuro Matsuzawa believes *tou* was his counter of prior use, although not completely sure; personal communication, November 19, 2015.

²⁹ S.v. kotai, Kōsei Minamide and Mitsuo Nakamura, Jīniasu Waei Jiten [Genius JapaneseEnglish Dictionary], 3rd ed. (Taishūkanshoten, 2012).

³⁰ The "conjugation" of the most used counters are easily accessed here: "Punipuni. Website." (Accessed July 19, 2017. http://www.punipunijapan.com/?s=counter, n.d.).

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³⁵ S.v. "hito", Minamide and Nakamura, Jīniasu Waei Jiten [Genius JapaneseEnglish Dictionary].

³⁶ Matsuzawa, Chinpanjī Wa Chinpanjin [The Chimpanzee, Chimpanzee Being].

³⁷ Readings from "hito" under "kanji". NB., the "to" reading was excluded from the table as a less frequent reading, not brought up in the analyses. Kim Ahlström, Miwa Ahlström, and Andrew Plummer, "Jisho Dictionary Online." (Retrieved July 20, 2017. http://jisho.org/, n.d.).

³⁸ McGinn makes use of the alien example, but to evoke when humans are imagined as an oppressed species; Colin McGinn, "Apes, Humans, Aliens, Vampires and Robots.," in *The Great Ape Project: Equality Beyond Humanity*, ed. Paola Cavalieri and Peter Singer (New York: St. Martin's Press, 1994), 146–51.

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⁴⁵ Ibid.

⁴⁶ Casper Bruun Jensen and Anders Blok, "Techno-Animism in Japan: Shinto Cosmograms, Actor-Network Theory, and the Enabling Powers of Non-Human Agencies.," *Theory, Culture & Society* 30, no. 2 (2013): 91.

⁴⁷ Bruno Latour, We Have Never Been Modern (Cambridge: Harvard University Press, 1993).

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⁴⁹ Ikuma Adachi, email, July 15, 2017.

⁵⁰ Naruki Morimura, personal communication, July 29, 2016.

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⁵² "Nonhuman Rights Project. Website." (Accessed July 19, 2017. https://www.nonhumanrights.org/, n.d.).
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⁵⁵ Footnote, Pedro A. Ynterian, "Cecília, First Chimpanzee Released by Habeas Corpus." (Accessed July 19, 2017. http://www.projetogap.org.br/en/noticia/cecilia-first-chimpanzee-released-by-habeas-corpus/, 2017).

⁵⁶ Tetsuro Matsuzawa, "Affidavit of Tetsuro Matsuzawa. State of New York, Supreme Court, Count of Niagara. The Nonhuman Rights Project on Behalf of Kiko.," 2013.

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Conclusion

The gist of this work has been to unfold how humans and, potentially, chimpanzees set and blur boundaries between these two species. We have explored this boundary work through a wide variety of topics that structure human and chimpanzee lives together in a very specific laboratory setting where social relations between *Pan* and *Homo* are prioritized. On the one hand, this work has strived to analyze key aspects of the interspecies dynamics. On the other, it has aimed at pinpointing directions for future research. In other words, its ambition dwells on the fact that it not only seeks to provide answers but to unveil phenomena at the intersection of disciplinary boundaries, which are, therefore, worthy of a true interdisciplinary effort.

Most of the issues dealt within this scope have not been thoroughly addressed in such fashion and, indeed, when it comes to reciprocal social learning between humans and chimpanzees much is yet unknown. Moreover, the role that artifacts and the material world play should be addressed in conjunction. Only a sound research program is capable of addressing the topic beyond the traditional human representations of animals offered by humanities and beyond the typical airtight hypothesis-testing offered by biology-oriented sciences. The research topic is of importance for a series of reasons.

First, due to phylogenetic proximity between humans and chimpanzees, the subject is likely to provide significant insights into the potential flexibility of social learning in the Hominidae family. Secondly, it can offer us a clearer picture of the mechanisms through which modern humans and chimpanzees interact with each other, and how they take into account and transcend species-specific barriers while communicating and sustaining social interactions. At last, the inspection of how humans and chimpanzees coordinate their lives together, along with the physical world, certainly provides us material through which we are able to rethink and redefine our own conceptions of what constitutes social living and what constitutes science making. Now, we shall recapitulate the key points addressed in each chapter, putting them in perspective, before we address issues for future research.

Chapter one: The first chapter is entitled "Chimpanzee Studies at the Primate Research Institute" and introduces the reader to the history of human-chimpanzee relations at PRI. We first accompany the story of PRI's first chimpanzee, Reiko, before cognitive studies at PRI officially began. Before the beginning of the Ai Project, nearly forty years ago, chimpanzee husbandry was mainly characterized, on the one hand, by lack of conspecifics and, on the other, by interaction

with other primates along with face-to-face caretaking spanning beyond infancy. In contrast, the current husbandry recommendations stress conspecific grouping. In addition, in the eyes of the leading figure of the Ai Project, Professor Matsuzawa, the first studies with Reiko were marked by the absence of the notion of mind or cognition and, in such way, in Matsuzawa's words, the chimpanzee seems to have been regarded as "a big black monkey…who is intelligent".

In the second part of the first chapter, we begin the section exploring why the chimpanzee is perceived as being particularly different from a monkey, that is, due to a differential motivation to interact with humans and the type of such interaction. Next, we place the Ai Project in the context of the great ape language research of the seventies, with the particularity that its aim has been to investigate the perceptual world of chimpanzees by means of symbolic media; instead of evaluating to what extent chimpanzees were capable of developing human-like language. Then, the logic of chimpanzee studies is explained as being grounded in our evolutionary proximity, which unveils the possibility that common traits shared between our species are, in fact, inherited from a common ancestor, that is, by homology. A caution note is added on the necessity of making some underlying assumptions of this field explicit in order to avoid the anthropological critique that the so-called "primitive" human populations would implicitly represent, in such studies, an intermediary mental stage between apes and humans imbued with a technological world.

At this point, it is proposed that primatology might be less committed to a general abstraction of cognitive processes across species (of the type operated by cognitive sciences) than it is committed to its medium, that is, the ecological, social, and perceptual reality of the primates it studies. Whereas both aspects are not mutually exclusive, primatology would greatly resemble, in such sense, the sociocultural anthropological effort of understanding "the native's point of view". However, species barriers between humans and nonhuman primates impose constraints to how this point of view is accessed. Then, we proceed to understand how chimpanzees' perceptual world is tackled by the experimental setting at PRI.

Step-by-step, we retrace how the main subject of the Ai Project (i.e., chimpanzee Ai) learned to perform experiments. By operant conditioning, Ai learns the setup of the experiment, that is, the stages required to solve tasks. However, through a matching-to-sample paradigm, Ai is tested on a series of experiments addressing chimpanzees' cognition. In sum, the coexistence of cognitive paradigms and of behaviorist practices, whose philosophy concedes minimal mental

capacities to animals, is not contradictory *per se* due to the fact that shaping procedures are used as a means to end only.

Moreover, by looking into Ai's learning history, we tackle how chimpanzees are capable of transferring what they have learned to novel stimuli, and how they learn how to learn. Afterward, chimpanzees' learning idiosyncrasies are discussed in terms of how the first three participants in PRI's chimpanzee research, the infants Ai, Akira, and Mari, reacted to the same experimental procedure and apparatus. The section concludes with the issue of whether the laboratory is akin to school situations. At PRI, in chimpanzee research, the school analogy is put forward on purpose when addressing the public in order to avoid the association between laboratory work and invasive research. Furthermore, in experiments that require learning, research personnel appear truly invested in chimpanzees' progress. Nonetheless, unlike the school context, researchers primarily teach to learn from chimpanzees and the type of relationship sustained is conceptualized more in terms of scientific partnership than in terms of a tutor-student relation.

The third part of the first chapter approaches how the chimpanzee community expanded and it explores the interspecies social practices that supported this growth. We begin this section by addressing whether chimpanzees are "natural" mothers, comparing Reiko's acceptance of her son Reo with Puchi's difficulties in raising her offspring. We provide an overview of the existing hypotheses regarding how chimpanzees become successful mothers, and we point out that although research tends to support the importance of direct hands-on interactions, motherhood seems to be overdetermined by a number of factors. Then, by retracing Matsuzawa's hand-rearing story of Puchi's rejected infant, Pan, we pin down the lessons that PRI researchers learned and the shift in the research paradigm from year 2000 on, when three babies were born, namely, Ayumu, Ai's son; Pal, Pan's daughter; and Cleo, Chloe's daughter. The three infants were successfully mother-reared, thus, from then on, "participant observation" was the research paradigm implemented, whereby, through unbarred face-to-face interactions, a researcher assesses the infants' cognitive development with the help of the chimpanzee mothers, as in human child development studies.

Next, we discover the techniques through which humans prepared Ai, Pan, and Chloe to be successful mothers. The program included teaching chimpanzees the correct body techniques toward the infants, given that newborn chimpanzees, unlike monkeys, need to be actively cradled. Thus, picking up, embracing, putting the infant in the correct position, and allowing suckling are not necessarily evident steps for captive chimpanzee mothers. Right after, the context of Ayumu, Cleo, and Pal's birth is explored. The highlights comprise (a) Ai's untaught behaviors that enabled Ayumu to breath, and Matsuzawa's imitation of cradling to Ai (b) Chloe's training with a chimpanzee plush toy; her initially unsuccessful learning-to-mother; the strategy implemented to fix Chloe's nonfunctional positioning for breastfeeding, and (c) Pan's body positioning, which was more akin to human parenting and consonant with her hand-rearing history.

In such experiences, "social learning" involved active teaching on the part of the humans, along with observational learning, learning by doing, and social facilitation on the part of the chimpanzees. After having considered the body techniques for mothering, which were supported by humans, we make the point that the constant cradling of a newborn is a species-specific feature of chimpanzees, and that the full support for breastfeeding is a common pattern in great apes. Thus, the techniques of the body learned are both ape and chimpanzee. In sum, species-specific patterns might require social learning in order to be developed, and such learning might be derived from conspecifics or from an allospecific group, in this case, humans who bear particular traditions (e.g., face-to-face interactions spanning beyond infancy).

Diving into the more exploratory subject of whether humans become mothers to nonhuman apes, we investigate an episode in which a gorilla, who learned American sign language, refers to the death of his biological mother and labels the caretaker as his new mother instead. We briefly discuss attachment patterns across great apes. While leaving the issue open of whether and to which extent great apes conceive specific humans as fulfilling a role analogous to a chimpanzee mother, we pinpoint that humans do perceive themselves as fulfilling a parenting role to another species. The next point addresses whether there are differences between the former research paradigm, in which infant chimpanzees performed experiments without other conspecifics, and the new research paradigm, in which infants come to experiments with their mothers. We argue that, in the first case, the know-how for performing an experiment is "shaped" and, in the second, it is socially scaffolded by conspecifics. In this sense, juveniles are careful observers of the mothers.

This point is made by retracing Ayumu's story of how he first came to make use of the experimental apparatus while accompanying his mother during her daily computer tasks; little by little, Ayumu mastered the steps of the procedure. Qualitatively, this context differs from the way in which his mother learned her first computer task, whereby she would enter the booth alone and face the machine setting. Even if the setting is a laboratory, Ayumu's case is more naturalistic than

his mother's, because his grasping of an experimental procedure relied on the same type of social learning that chimpanzees use in the wild. In addition, by retracing social learning studies at PRI, which depict how mother-infant pairs were tested together, we point out to what extent the solution to an experimental task might be socially learned. Nonetheless, the subtle point is not that there is a vertical and horizontal transmission of knowledge among chimpanzees during experiments, but that infants tested in such social settings (as opposed to individual-testing protocols) ultimately learn how to be laboratory chimpanzees from their own community. In other words, the knowhow of an experimental setting introduced by humans is transferred to the next generation by chimpanzees themselves through chimpanzees' typical social learning patterns.

In addition, in the type of experiments where humans enter the booth with a mother-infant pair, it is likely that infant chimpanzees learn to give a social value to humans as a result of the triadic interaction in which the mother trusts the human with her infant. Then, we briefly illustrate this point through an examination of Ayumu's social smiling toward a familiar human. We conclude the section with the outreach that chimpanzee research has to the greater public in terms of media appearances, scheduled visits to PRI and, in addition, the status that Ai and Ayumu acquired as ambassadors for chimpanzees in Japan.

Chapter two: The second chapter is entitled "Physical Boundaries: The Architecture of Dangerous Social Interactions" and it introduces the readers to the present daily life at PRI by exploring how the infrastructure of chimpanzee research and interspecies social relations intermingle. We start by presenting one of the specificities of working with common chimpanzees, that is, the increased danger it entails in comparison to other great apes and to monkeys. Next, chimpanzees' living area and the system through which chimpanzees come to the laboratory is presented.

We tackle how space is socially organized and we pay particular attention to permeable interface areas for human-chimpanzee interaction; spaces where, by architectural design, both species may trespass physical borders while still being separated. Throughout the chapter, eight points are highlighted as being vital to the interspecific social organization of space, namely: (a) the architecture of interface areas (b) the physical structure of the apparatuses (c) the surroundings immediate to one's body (d) the context of the activity being undertaken (e) chimpanzee behavior and individuals' abilities (f) human-chimpanzee relationship on a dyadic basis (g) group dynamics among humans and chimpanzees (h) safe body techniques. First, the general architecture of human and chimpanzee flow in the same space is described, such as the use of human exclusive spaces and chimpanzee spaces and the structural differences they comprise. In addition, the coordination of humans and chimpanzees in space is analyzed through the safety protocols set in place to move chimpanzees into the laboratory. Some past incidents are evoked in order to substantiate how safety assessment involves an ability to read the infrastructure and link it to certain types of actions that are either defined by protocol or by an evaluation of the context. Afterward, we approach the architecture that supports the feeding duty activities, one of the most potentially risky situations personnel encounter. We point out how the feeder apparatuses embody different risk levels according to its material design and chimpanzees' frequency of approach.

Then, we inspect how humans move safely through the basement area by paying attention to the surroundings of one's body, to the context allowing or interdicting chimpanzees to roam in certain areas, and by taking into account chimpanzees' reach within main human spaces. For this purpose, with the aid of measurements of the infrastructure, we concretely simulate how a human would position his or her own body when crossing the basement in different contexts. In order to approach how chimpanzees' behavior and idiosyncrasies shape our risk assessment, the readers are invited to discover other infrastructures of chimpanzee research, more precisely, the architecture of Kumamoto Sanctuary, partner institution of PRI. This point is made explicit though ethnographical *faux-pas* while moving within a new architectural space and facing chimpanzees and bonobos' unforeseen behaviors. As a result, body positioning in space changed as animal behavior unveiled new perceived affordances, that is, alternative usages of the surroundings by another species. At last, this time, inspecting PRI's setting, it is argued that knowing chimpanzees' individual abilities - not just general chimpanzee behavior - is tantamount to humans' safe placement in space.

Now, reaching the last three points laid down as vital to risk perception, we address humanchimpanzee relationship and group dynamics. The perception of interlocutors capable of unbarred face-to-face interaction at PRI and Kumamoto Sanctuary indicates that time spent building up a good relationship with chimpanzees is key to enable physical proximity. However, it is pointed out that the context may change with the introduction of a third party due to dominance roles. In sum, in unbarred situations, the physical boundaries between humans and chimpanzees depend on the social idiosyncrasies of each dyad and group. At last, we address what constitutes safer body techniques when dealing with captive chimpanzees and bonobos, that is, internalized ways of being and behaving in space. This is reflected into how distances are kept and felt and, to illustrate this point, a subjective assessment of three margins of safety in the laboratory is provided. Overall, safe locomotion in space is oriented by the act of reading in conjunction the architecture, the context and the inter/intraspecific social relations involved in each situation.

The chapter approaches its end with an assessment of the physical boundaries in the wild. This section focusses on the specific context of the Japanese field station of Bossou, addressed by a short-term ethnographic work. Moreover, this part is complemented by a discussion of the literature on human-ape encounters. In the wild, the architectural features of captivity that, to some extent, guarantee human safety are absent. Thus, such context proves to be an interesting counterpoint. However, as different as they appear, similar issues arise. First, one needs to pay heed to an animal's personal space to avoid surprise attacks, although the threshold depends upon context. Secondly, the configuration of bordering areas between the forest and heavily anthropogenic habitats seems to play a role in avoiding human-chimpanzee conflict (e.g., visibility, buffer zones, etc.). Thirdly, whenever physical barriers are envisaged, their materiality needs to be addressed (types of fencing, canals, biological barriers, etc.) because apes may intelligently detour them.

Then, regarding the habituation of animals to humans, human-chimpanzee interaction needs to be considered on an individual and multiparty basis, especially because chimpanzees are capable of identifying humans. Some, like local guides, seem to sustain a differential relationship with chimpanzee groups. In addition, certain group compositions (e.g., women and children) appear to have increased chances of experiencing agonistic encounters with a certain parcel of chimpanzee population, namely, males. However, people's attitudes and the absence or presence of controlled locomotion also contribute to how chimpanzees deal with the situation at hand (e.g., humans fleeing or screaming). In sum, who attacks, who is attacked, when, and the reactions to an encounter are vital points to the outcome of unbarred interspecies social interactions.

Next, we explore how chimpanzees might possibly perceive highly anthropogenic areas in their habitats. It seems that chimpanzees consider such areas in terms of increased risk. The first example is how chimpanzees undertake crop-raiding. In the existing literature, this is examined in terms of anxiety indicators, where they eat the crops, and at what time they enter the human fields. We add that the relationship chimpanzees sustain with such activity may vary historically, and

may be dependent upon changing human-chimpanzee relations over time. For instance, in Bossou, there is an ancient practice which consists of leaving part of the harvest to chimpanzees, who are considered the local totem.

The second example to draw attention to chimpanzees' perception of human spaces is based on their behavior while crossing roads. Studies support that chimpanzees are not only individually vigilant when crossing high-speed traffic but that a protective socio-spatial organization takes place while crossing these roads, in order to guarantee the safety of more vulnerable chimpanzees. Thus, wild chimpanzees modify how they socially occupy spaces as a matter of the probability of interaction with humans and human-made threats, like automobiles. To ground this point concretely, we analyze one episode of road crossing in Bossou, which was recorded during a short-term fieldwork and analyzed systematically through video coding. The episode illustrates well the differential social organization in space; however, the analysis conducted proposes a simple way to take into account the presence of researchers when assessing chimpanzees' danger perception. This analysis is a result of the assumption that the habituation level does not preclude increased attention to researchers, especially when danger is enhanced. We conclude the chapter discussing to what extent introducing the researchers' presence as a factor in such studies is important to assess the nonhuman animals' perception.

Chapter three: After having addressed the dynamics of physical boundaries between humans and chimpanzees, we turn to the third chapter, "Experimental Boundaries: Testing and Being Tested by Chimpanzees". In this chapter we address the fundamental elements at stake to conduct chimpanzee research at PRI, we investigate the meanings of experimenting with chimpanzees and how their abilities can decenter human perspective and, in addition, provide a feedback loop in experimental research. Several important features constitute the core of chimpanzee research at PRI. First, we should consider its holistic approach to chimpanzee care and research.

This point is translated into the parallel effort of conducting experiments in the laboratory and fieldwork in the wild. Moreover, it is expressed by the increased participation of research personnel in duties traditionally allocated to keepers, and by the effort to understand chimpanzees as a whole; both in terms of how their wild behavior can be fostered in captivity and in terms of chimpanzees' personal idiosyncrasies. Secondly, the other vital features structuring chimpanzee research at PRI are face-to-face caretaking practices, face-to-face experiments spanning beyond chimpanzees' early age, and personalized feeding. At last, mutual trust in contrast to positive reinforcement is evoked as being at the core of human-chimpanzee relationship.

After having outlined PRI's characteristics, we put them in perspective regarding other institutions in Japan and worldwide. The one to resemble PRI's structure the most is its partnering institution, Kumamoto Sanctuary: As at PRI, strategic face-to-face caring of chimpanzees take place, and researchers participate in personalized and scatter feeding, although only during weekdays. However, as of 2015, at the Sanctuary, face-to-face practices were more intensive in terms of the number of humans and chimpanzees co-present in the same booth for experiments. The other Japanese institution that has sustained face-to-face practices beyond infancy is the now deactivated GARI. Nonetheless, this institution is viewed by interlocutors at PRI as the extreme case of human-chimpanzee interaction for its co-feeding and co-sleeping practices. Lastly, interlocutors at PRI stress how their institution should be differentiated from a zoo setting, where interspecies social relations are feeble.

Next, by drawing on discrepant work experiences of a keeper worldwide, we signal how at other Western institutions, human-chimpanzee interaction is to be avoided, in order to allow animals to be animals. Yet, the interlocutor contends that the no-touch policy is also related to the fact that such institutions draw heavily on volunteering. In addition, a study in a Catalonian sanctuary supports that refraining from being too close to humans is viewed as important in other cultural and institutional contexts. In contrast, at PRI, as long as chimpanzees are able to express their species-specific repertoire with conspecifics, human interaction does not alter chimpanzees' status as real chimpanzees. Rather than denying humans to be part of chimpanzees' social ecology in captivity, the issue becomes how to administer the process.

Afterward, by means of a questionnaire sent to particular interlocutors, we concretely address the specific point of face-to-face and feeding practices in some of the most reputable research institutions for chimpanzee research, namely, the Max-Planck Institute and the Leipzig Zoo in Germany, Saint Andrews University and the Edinburgh Zoo in Scotland, and the Yerkes National Primate Research Center in the United States. According to the interlocutors mobilized, in none of these institutions research personnel are officially relied upon for feeding duty, but they might occasionally join the activity. In addition, the feeding system is a mix of scattered and personalized, with the exception of the Edinburgh Zoo, reported to be mainly scattered. At last, no unbarred face-to-face interactions with adult chimpanzees are observed in these institutions.

Then, we proceed to remark how, despite these observations, unbarred face-to-face practices with apes seem not to be exclusive to the Japanese case. This is mainly because of their conspicuous presence in the ape language research of the seventies. However, we contend that, unlike bonobos and gorillas, the picture is not so clear when considering the age of common chimpanzees, as many programs ceased when chimpanzees reached maturity, or introduced physical barriers for interaction between species. Therefore, it seems that Japanese face-to-face practices take up the most extreme form of contact, that is, interaction during adulthood, when chimpanzees' strength becomes a potential danger to humans.

After having laid down these critical characteristics, we move on to tackle them concretely. An overview of personnel's duties at PRI is provided and we point out the two most important overlaps in keepers and in research personnel's duties, more specifically, the calling of chimpanzees and feeding duty. We then focus on assessing the importance of feeding duty, especially considering it as an activity in which (a) interspecies relations are tested on a dyadic basis and in which (b) the increased time spent with chimpanzees aids in building a good relationship with each individual. Furthermore, at PRI, all research personnel are required to engage in feeding. As a result of this vital role, we investigate feeding duty by means of a quantitative analysis of this practice conducted over four studies. The results show that, first, the philosophy of building up a good relationship with chimpanzees is reflected in additional twenty hours per month of interaction with chimpanzees in a feeding context, for post-docs, graduate students and research assistants, on the top of interaction hours during experiments.

Secondly, in terms of engagement level assessed as a function of recruitment during weekends and holidays, no significant differences are found between professors and the post-doc, student, and assistant category. Concretely, these two categories spend on average the same amount of time with chimpanzees during weekends and holidays (approx. 7h/month) and spend nearly the same amount of leave days on duty (25% of the total months present at the Institute). At last, although a direct comparison with keepers' interaction hours during feeding was not possible, an alternative design revealed that, at PRI, research personnel not only are expected to engage in feeding, but they take up also the biggest share of this role in comparison to keepers. Whereas post-docs, students, and assistants occupy most of the feeding duty slots, the role which professors and keepers play in this practice in terms of recruitment seems surprisingly similar. We point out that interlocutors regard in high esteem the feeding duty as means to building up and

maintaining a good relationship with chimpanzees, which in turn, helps the smooth carrying out of experiments. Yet, the intensity of the feeding duty is a factor called into question by many due to the fact that research personnel bears other responsibilities that only they can take upon in comparison to keepers.

After exploring PRI's structuring practices, we investigate the points emphasized by social actors when introducing their activities to third parties. We analyze PRI's most viewed promotional video, which features what is likely the most famous experiment of PRI's chimpanzee research, namely, the experiment on symbolic representation and working memory in chimpanzees. The video highlights many of the important points perceived by interlocutors, such as, simulation of nature, trust, voluntary participation of chimpanzees, objectivity of the experimental interface, and chimpanzees as outgroup to understand human mind. However, the strongest message of the video is how chimpanzees' abilities might "decenter" humans' perception of our own abilities. We then tackle the issue by diving deep into the above-mentioned experiment and analyzing the controversies surrounding the study.

In this study, one the chimpanzee participants, Ayumu, Ai's son, outperformed humans in a memory task involving the processing of the ordinal aspect of numbers. Although the study gained an enormous attention, other researchers attempted to replicate Ayumu's performance in humans. They contended that because humans and chimpanzees in the study received a different amount of sessions, if humans were given the same amount of sessions that Ayumu underwent, they could match the chimpanzee's acclaimed performance. However, when scrutinizing the studies, it is possible to observe that the authors did not exactly match the sessions, but introduced an increased, unequal number of trials to obtain Ayumu's results and, yet, claimed that human and chimpanzee performances were equal (Ayumu's 900 trials "advantage" of the original study *vs* human 15,350 trials of training in the critics' study). In addition, we argue that because the task mobilizes not only memory but human invented symbols, humans who are life-long trained in advanced math are already at advantage. Thus, in this case, by keeping the number of sessions unequal, we are indeed making interspecies comparisons more equal.

In the next segment, we address the dynamics of face-to-face experiments, by analyzing the activities that Ai and Matsuzawa undertake in such conditions. We substantiate this point by analyzing sections of videos of their interactions recorded during the ethnography. The first activities we tackle are stacking blocks and nesting cups. These take place as single trials of previously conducted experiments, which traditionally address object manipulation and child cognitive development. Taking this lead, we introduce the concept that an action may be supported by different cognitive strategies that comprise a differential load, and that a hierarchical complexity exists in terms of the sequential codes an individual has to fathom when organizing action (e.g., pot method *vs* subassembly method).

The next activities described of face-to-face are painting, photo taking, health check, husbandry training, play, and grooming. Special attention is given to how humans convey information to chimpanzees. This occurs not only through commonly used husbandry words in Japanese and in English, but also through gestural communication such as pointing, or through specific gestures created to signify a command. In addition, Matsuzawa makes use of Japanese sign language when interacting with Ai. Overall, by ethnographic observations, we remark the powerfulness of multimodal communication for chimpanzees' understanding. Following, we consider some idiosyncratic elements in interspecies form of play and grooming, such as Ai's apparent self-control to adjust strength in interaction and Ai's buttoning and unbuttoning activity, which is perceived by Matsuzawa as a form of grooming a naked ape. All the activities outlined, are next grounded in concrete descriptive cases of ethnographic videos. Conspicuously, in the video pertaining to health check, we observe Ai's first training for blood draw, in which no positive reinforcement through food is used.

After having explored the practices structuring chimpanzee research and care at PRI and some of its most important experiment types, we proceed to accompany, in a first-person account, the conception, implementation, and challenges of an experiment. In this section, we accompany the trajectory of the author of this manuscript from being an anthropologist in the laboratory, to becoming an experimenter in the same laboratory. First, this part retraces the double-bind setting created from having to navigate through disciplines with different research paradigms. In parallel, it explains step by step how the experiment was proposed, conceived, its rationale, and the preparations for its set up. Unlike automated experiments where chimpanzees interact mainly with a computer during the performance, the experiment in question was semi face-to-face in nature, that is, it required social interaction with chimpanzees during the trials but in a mediated form through an apparatus.

By concretely addressing the challenges in its implementation, like assessing chimpanzees' view, camera perspective, design of the apparatus, and so on, we go through the hard issue of the

status of the "social" in an experiment with chimpanzees. Unlike observational studies of the situated cognition type, the experiment requires the control of social elements to keep the conditions equal. We also retrace the formal steps for becoming an experimenter and couple it with the reflection of what it means to become an experimenter in this particular setting. Through ethnographic experiences, the debate on the ethics of doing research with animals in captivity is brought up, along with the contrast between invasive and non-invasive studies with chimpanzees and monkeys.

The second part of this ethnographic account deals with how social relations become a part of the experiment. This leads us back to the importance of spending time with chimpanzees in order to build up a good relationship with them, which concretely, translated into going through an extensive feeding training, accompanying others feeding chimpanzees. The other component of this aspect was the need for a training phase, not only to make chimpanzees understand how the experiment works but to ingrain the experimenter as part of the experimental setting. In other words, to make chimpanzees accept the experimenter as their experimenter, and not only as a regular observer in the laboratory.

The third part of the account focuses on how chimpanzees provoke a constant feedback loop in the experimental protocol. For this purpose, we go through the failures of the experiment instead of its successes. We assess how chimpanzees reacted differently to the protocol when comparing the training phase and the test phase. We show how the failure to comply with the protocol was, in fact, a result of intelligent behavior that had not been foreseen. We concretely exemplify this point through the video analysis of a session that forced the experimental procedure to be changed. In this session with chimpanzee Pan, she showed agonistic behaviors toward the experimenter as a result of failing to comply with what was required by protocol. The event is scrutinized and several aspects are pinpointed, yet, one of the most important facets of the case consists in the role that interspecies communication play and in the problem of the indeterminacy of translation. In addition, the experimental protocol had opened a path for non-positive interspecies social relations, and after all factors were considered, we were forced to re-elaborate our procedure.

Next, we consider how our new protocol would be again put to test by chimpanzees, this time, by Pendesa. Pendesa was the most proficient chimpanzee of this experiment in object and color categorization. However, in what proved to be the most difficult condition for chimpanzees

(i.e., the color target), Pendesa, unable to discover the correct result, resorted to a new strategy which counted upon fishing for the positive verbal feedback of the experimenter before making her final choice (i.e., dropping the item to the experimenter's side). Yet, this time, without even foreseeing the emergence of her testing behavior, the protocol hindered her efforts, given that the positive feedback was only given after items were dropped, never before. An analysis of the items she chose during this testing behavior reveals that she was likely making informed guesses based on her experience with previous targets.

We conclude the chapter retracing the lessons learned from the training of the new experimenter who would continue the work. This process confirmed to what extent, first, the semi face-to-face experiment is embodied into the experimenters' actions which, at the same time, are kinesthetically coordinated with chimpanzees. Secondly, it reiterated how a personalized interspecies social relation is vital: Even though the successor was already a regular experimenter for computer experiments, she had yet to become part of this singular experimental setting through a relationship training with chimpanzees. At last, we remark how the experimental effort to understand chimpanzees' point of view can be considered, by analogy, akin to the anthropological endeavor of understanding natives in their own terms.

Chapter four: The last chapter of the manuscript is entitled "Symbolic Boundaries: The Subtle Line between Humans and Chimpanzees". This section deals - not with the differences in symbol comprehension between humans and chimpanzees - but with the investigation of subtle epiphenomena anchored in and revealing of deeper social experiences. We start the journey with the first-person recollection of a Japanese lesson in which the ethnographer discovered that the linguistic practices she had borrowed from the Institute, were perceived as strange for outsiders.

Japanese language has a different system to count being in comparison to Germanic and Latin languages. This difference is expressed by the use of numerical classifiers, also known as counters. There are approximately one hundred-fifty counters in Japanese and the criteria to employ a certain counter instead of another is derived from the qualities of the noun to which it refers, for instance, animacy, size, and so on. Thus, instead of stating a number and then a noun (e.g., 7 humans), we are obliged to add the appropriate counter as in "7 (counter for humans) humans". Because the counter refers to the attributes of the noun, not to the measure, it is regarded as a tool for categorizing beings. We then explore the grammatical numeral classifiers for primates: for humans (nin), for large primates like chimpanzees (tō), and for small primates (hiki). Following,

we argue and substantiate that *nin* is, in fact, a marker of personhood and, in addition, we remark that, at PRI, research personnel employ the counters for humans to refer to chimpanzees.

For interlocutors at PRI, the perceived similarities that justify such linguistic practice are based on cognitive complexity and phylogenetic proximity. In fact, such reasons are akin to the argument mobilized by a broader international movement which seeks to change the legal rights of nonhuman apes to the status of nonhuman persons (e.g., the Great Ape Project and the Nonhuman Rights Project). In other words, in the scientific *milieu*, the attribution of personhood follows the premises of naturalism, a mode of relating to nonhuman beings that stresses biological commonalities while, at the same time, putting emphasis on human-like cognitive capacities. Next, we unfold three linguistic studies conducted to assess the linguistic practices of research personnel at PRI.

In Linguistic Study 1, we investigate which counter Japanese native speakers employ to refer to chimpanzees in the laboratory. As a result, 85% of the interlocutors responded to employ the counter for humans, whereas the remaining make use of the counter for large animals and for individuals. In Linguistic Study 2, because the counter for individual (i.e., kotai) is considered as being the most appropriate in scientific communication, we address its usages when publishing in Japanese. We observe that the more technical publications become, the more authors adhere to "individual"; the more publications are accessible to the public, the more authors make use of the human classifier. In addition to this study, we point out other forms of emphasis on chimpanzees' agency through Japanese words in psychology writings.

In Linguistic Study 3, we address how Japanese researchers refer to chimpanzees in other languages. We consider how the word participant, in contrast to test subject, is an indicator of agency. Then, we observe that the publishing guidelines of the American Psychological Association, which dictates the publishing style in psychology, enforces the use of the pronoun "who" for humans and "that/which" for nonhumans. By screening the most recent publications of PRI researchers, we conclude that 75% of the articles refer to chimpanzees as participants instead of subjects, while 25% employ subject, yet, followed by the pronoun "who" instead of "which/that". Complementing this study, we investigate several other publications of collaborators and non-collaborators to PRI. In those, the uses of participant and subject for nonhuman animals does not seem to be stabilized, regardless of the species. Nonetheless, the increasing presence of

the relative pronoun "who" suggests that there might be a major trend towards emphasizing the agency of nonhuman animals in non-invasive cognitive research.

Next, we detail the reasons why the perception of agency in paired English words (participant/subject) might not be the same as in different Japanese counters (counter for human/individual), where the Japanese case appears to indicate a stronger contrast. In addition, given that PRI counts on Korean and Chinese researchers working with chimpanzees, we inspect these two other classifier languages. We point out that Korean native speakers who address chimpanzees in Japanese by the counter for humans, do not generalize this use to their native language, employing the appropriate counter for animals in Korean when referring to chimpanzees.

Whereas for Mandarin, we observe that, if this language has specific counters for animals it also presents a single classifier that is both a general and a human marker (gè). By pragmatics, this counter is used for very "un-human" animals (i.e., as a general classifier) and for very "humanlike" animals (i.e., as a human marker). Therefore, first, the same boundary work which separates how we linguistically address humans and other animals exists in other classifier languages, and secondly, extrapolating common classifier usage might require stronger beliefs when a counter has higher item-specificity to humans, such as the case of Japanese.

To conclude the linguistic discussion, we emphasize that familiarity *per se* cannot justify the crossing of linguistic boundaries because researchers place such usages in the context of the broader chimpanzee category, not only of familiar individuals. We then take this lead to evoke the distinction between anthropocentric anthropomorphism, in which animals are apprehended in the terms of how human they can be, and animalcentric anthropomorphism, in which a considerable effort is placed at understanding animals in their own terms. Next, we call for a second difference; that between anthropomorphism and personification, understood in the sense of how other types of beings become social actors one to another.

We address the topic of social "becomings" between species based on selected ethnographic episodes. The first one describes a teaching context, namely, when experimenters had to become chimpanzees in order to be better scientists. "Becoming chimpanzee", in this sense, surpasses the sheer imitation of chimpanzees' perceived qualities from which humans can profit through reenactment. Rather, it constitutes the effort of seeing the world as a certain chimpanzee experiences it in a given context. Following, we approach the issue of shifting perspectives from two different disciplinary backgrounds, namely, cognitive sciences and social anthropology. In cognitive sciences, theory of mind is referred to as the attribution of mental states to others and, in this conception, it exists a multiplicity of views of a single world. However, in other modes of conceptualizing nonhuman animals, as Amerindian animism and perspectivism, animals are perceived as sharing human qualities and, in its most extreme view, as identifying themselves as humans. Thus, in such case, humanity is, in fact, a marker of personhood. In the perspectivist corollary of animism, there are multiple worlds to a single point of view. Following, we discuss the points to gain in addressing the traditional cognitive sciences' perspective and the socioanthropological one in conjunction.

By taking up another philosophical and socio-anthropological argument, the one of metamorphosis, we address the issue of the "chimpification" of humans who work with chimpanzees. First, we explore the Amerindian the endeavor of taking up the perspective of an animal, while, at the same time avoiding the risk of becoming one due to a complete shift in perspective. Arguing along these lines, we reconnect with the idea that as a matter of working intensively with a given species, certain characteristics of this privileged other are imbued into our own behaviors. We argue that chimpification is composed of two levels. The first one is the intention or the process of being able to shift into chimpanzees' perspective on a personal level, which is positively rated by interlocutors. The second is the intention or the process of modifying one's behavior to match the other's species-specific patterns; whereas this is perceived as being advantageous when directed toward chimpanzees, it is perceived as a hindrance when dealing with humans (thus, the utterance "speak human to me!").

A third aspect of the chimpification process is observed when chimpanzees acquire considerable power in human-chimpanzee relationships. We hint this phenomenon by exploring a troubled experimental session conducted by the ethnographer. In the session, a chimpanzee appears to mobilize a "higher-ranking" observer after an action conducted by the experimenter triggered a heightened reaction from the same chimpanzee. If humans are capable of treating chimpanzees as legitimate social actors, we indicate the importance and necessity to pursue studies on what would constitute persons for chimpanzees or what would a person be in chimpanzees' own terms. Heading toward the end of the chapter, we approach the meanings surrounding chimpanzees' life and death as perceived by PRI personnel.

First, we inspect the celebration of chimpanzees' birthdays. While comparing it with the birthday celebration of a gibbon in Japan Monkey Centre, we argue that instead of reading such

events as an act of sheer anthropocentric anthropomorphism, these events may be subject to a different reading; personification processes. We indicate a shift in the rationale of animal viewing; from animal performances of human-like activities to focus on natural behaviors and information on individuals' stories and history. Unlike the celebration of human behaviors, this move opens up space to recognize animal specificity on both the species and individual level. We conclude that whenever the attribution of emotions, individuality, history, stories, and social agency is accompanied by an animalcentric perspective, that is, an attempt to understand the animal in the animal's terms, then, instead of anthropomorphism the phenomenon we encounter is personification, in other words, the makings of a person - even if a nonhuman one.

Next, we inspect to what extent personification is taken up at PRI. The second topic on chimpanzees' life and death addresses the debate surrounding the euthanasia of a severely disabled chimpanzee, Reo, who suffered from sudden tetraplegia as a result of an inflammation of the spinal cord. Yet, because Reo kept his "self" and was still fully alive despite his movement restrictions, PRI personnel consider that euthanasia was not an option. His partial rehabilitation occurred through face-to-face physiotherapy and an experimental setting in which Reo walked a certain distance to receive the food rewards for the trials.

The third case brought to light is the symmetric opposite of Reo's. Puchi, one of PRI's eldest chimpanzee, was found one day lying unconscious on the floor. Here, we accompany the events surrounding her medical treatment, the response of Puchi's daughter and, how, after Puchi's brain-death was diagnosed, personnel chose to follow the same procedure used for human brain-dead patients. This call was based on their belief that Puchi could not be treated as a laboratory animal; for interlocutors, Puchi's last message consisted in affirming that a chimpanzee's death should be treated like human death.

Yet, a subtlety is to be noted. When this message was conveyed in written form in Japanese, the word "human" did not appear in its connotation of human species (i.e., in katakana), but in its the connotation as human person (i.e., in kanji). Thus, beyond phylogenetic proximity, this chimpanzee's death is experienced not in the quality of a biological specimen, but in the quality of a person. We conclude the section with the importance of committing to animalcentric perspectives on personhood, whereby animal personhood is conceived not as an incomplete human condition but in the animal's own terms.

General conclusion: There are four major topics which appear as a result of each chapter and that are, in addition, recurrent across all of them. They emerge from a plural analysis of how humans and chimpanzee construct social relations at the Primate Research Institute of Kyoto University. These are:

- Interspecies socialization
- Embodiment of interspecies relations in space
- Interspecies social relations in scientific settings
- Animalcentric perspectives on personhood

For each of these topics, the etho-ethnographic work supports a general conclusion. Regarding the first point, we support that social learning between species occurs in a fluid manner, maintained by multiple relationship histories and learning mechanisms. In addition, the technical and material world scaffolds the construal of such relationships by constraining or allowing certain interactions to occur. Although we wish to dwell on a robust understanding of ideas and concepts instead of terminological details, we should notice that the word employed to highlight this *leitmotif* is socialization, not sociality nor social learning. Even though socialization entails both, their usages point at different focusses and methodologies.

Sociality more strongly refers to the evolutionary pressures; its incrementation, prosociality, is generally regarded at a species level; then, social learning hints more specifically at psychological processes. Socialization, which is traditionally employed in social sciences, shifts our focus to the process of how individuals internalize that which is from others in a given recurrent context. Overall, although not mutually exclusive, socialization is more holistic than the other terms commonly used by other disciplines, thus, unfolding debates not only at species level but on idiosyncratic constructions of the self, along with related issues.

Now, assessing the second point, we support that interspecies relations, especially dangerous one, unfold particularly mindful of space and the surrounding material world. Therefore, interspecies social relations are embodied in space and through space. First, each social relation between a human and a chimpanzee will generate a specific body technique and social organization of space. Interspecies social interaction is subjected to how humans and chimpanzees own spaces

taking each other into consideration and to how these spaces are customized. Secondly, according to how the material world and space are construed, certain interactions are enabled or hindered. In this mediation, relationships develop and are put to test so that the architecture of such spaces plays a considerable role in how humans and chimpanzee unfold relations.

Regarding the third point, we support the importance of the specificity of interspecies social relations and its inscription into the experimental setting. In other words, the personalized relationship between the experimenter and the chimpanzee participant needs to be introduced in the experimental setting and be put to test. In addition, chimpanzees provide a feedback loop in the experiment either by means of using alternative ways to circumvent the experimental protocol or by outsmarting it. At last, it should be noted that this point not only reflects epistemological considerations but it can be considered a fairly technical issue worthy of addressing when reporting an experiment. Nonetheless, it remains largely cast aside in technical publications.

When considering the fourth point, we support that anthropomorphization and personification are different processes and that the social phenomena observed in chimpanzee research at the Primate Research Institute owes more to personification processes than to anthropomorphization. Moreover, we signal that the conceptualization and constitution of nonhuman animals as persons would benefit from the development of animalcentric perspectives in which considerable interdisciplinary effort is put into understanding an animal in his or her own terms, instead of carving nonhumans out as an incomplete vision of humanness.

Prospects: Given that an interdisciplinary approach to human-chimpanzee social relations is still incipient, research desiderata abound. In each of these above-mentioned axes there are several questions to be addressed in an interdisciplinary fashion, which have been pinpointed throughout the manuscript. However, in this general conclusion we must highlight that a similar approach making use of plural methods should be taken to explore human-chimpanzee relationship in other research institutions throughout the world as well as the sensitive human-chimpanzee encounters in the wild. In addition, a systematic, standardized approach to human-chimpanzee interaction in several sites has the potential to render a comparative endeavor fruitful and sound.

Likely, the most important legacy of this manuscript is not the questions that it was capable to answer but those that it was not; not the phenomena that it explained, but those that it was capable to bring to life. The reason for this statement lies in the belief that it is crucial to foster an interdisciplinary research program which tackles at its core how to move beyond human
representations of animals (commonly mobilized by humanities) and air-tight hypothesis testing (traditionally employed by biology-oriented sciences). Anthropology of primatology and ethnoprimatology are able to address many of human-animal relationship issues in a competent manner, but not in the most interdisciplinary way they could, which limits the potential of questions and phenomena we can make emerge. Note that, by interdisciplinarity, we refer not to bridges between related disciplines such as history and philosophy or genetics and cognitive psychology, because each of these sets embraces common overall paradigms upon which the different disciplines can agree. Here, we refer to the true schism between biology-oriented sciences and humanities in terms of researchers' academic backgrounds and beliefs.

This endeavor, though substantial, is promising. It has the potential to create true boundary objects that are robust enough to accommodate disciplinary emphases and sensibilities, yet, maintain integrity across disciplines; as a sort of *lingua franca* spoken with different accents. When considering primatology and ethnoprimatology, we are yet to fully develop ways to fathom what humanities group under the name of "meaning". What does it mean for a primate to be in interaction with humans, with conspecifics and with the environment? How do primates make sense of the world beyond explanations traditionally foreseen by biology-oriented sciences? What are their practices of "othering" and the makings of a "self"? How do primates make sense of life processes? What does it mean to be a chimpanzee for a chimpanzee, or even, what does it mean to be a chimpanzee of a particular community with a particular history of relationships? How can these questions be answered without assuming human cognitive "machinery"? Do we dispose of a methodology that is phenomenologically sensitive but empirically grounded in animal behavior? Are any of such "chimpanzee meanings" relatable to "human meanings"? In other words, although the concerned fields have increasingly advanced toward this range of investigation, a deeper conceptual work is still required.

Mutatis mutandis, when considering anthropology and related subfields such as anthropology of nature, anthropology of life and anthropology of primate studies, at an interspecies level, an approach grounded in animal behavior offers the possibility of unveiling a completely different perspective than human conceptualizations of nature and of life processes offer; both sides being, nonetheless, intrinsically intertwined. However, to accomplish this goal, an expertise on the animals in question is required. Moreover, because standard methodologies relying on verbal accounts will greatly fail to address nonhuman perspective, humanities would profit from being able to mobilize methodological tools typically employed in the study of animal behavior and cognition and, in turn, re-signify them.

With a keen eye on the usages and misusages of the quantitative, but setting any methodological insularity aside, humanities should fully claim this realm. The main reason for it resides in the fact that, although qualitative studies can be systematic, quantitative studies better capture patterns of behavior and interactions, especially in the case of non-verbal beings. Patterning is crucial to fathom the meaning of actions. Instead of adopting a defensive position toward typical objects of other sciences, position better understood in the context of a reputation and funding drain toward natural and biological sciences, humanities would largely gain from developing the expertise required to operationalize such objects and methods. Deep conceptual understanding of an object (or subject) does not equal competency in mobilizing the tools an object provides. This is vital in order to re-elaborate these tools under the light of values that are crucial to a given academic culture, or perhaps, in order to cultivate new values along the way.

At last, we should consider the role of Science and Technology Studies (STS) in such adventure. STS, as a meta-analysis of science, has an important role to play in the founding of new sciences. First and foremost, it has long pointed out that interdisciplinarity is but a pretty, fundcatching word, achievable in practice with much difficulty. The second point, however, bring us closer to solutions; by studying such paradigms and making them explicit, the ultimate values at stake for actors become clear enough to allow the problematization of one's own socialization into an academic culture. The third point brings us to what perhaps could be considered the rewards for STS scholars working in related topics to venture in such endeavor: the science of complex socio-cognitive beings cannot be produced without considering the feedback loop of these same beings in science making. Therefore, when considering anthropology in general, the same argument applies. Only an exploration grounded in an expertise of animal behavior on an empirical level is capable of revealing the animal perspective of what we humans call science making. Whereas seeds have been planted, this is a project yet to mature.

Overall, these crossings point at the need to legitimize new developments in each of these fields, and to legitimize fields in the eyes of neighboring disciplines. Legitimation in the sense employed here means a common exploration of the world. In this process, the conceptual and methodological developments in one discipline go hand in hand with that of the significant others. The process of creating disciplinary significant others is not straightforward for there is a

difference between talking about a field, or looking at it; and making science in conjunction with this field. In the end, this is a skill perhaps better developed when submitting researchers through somewhat painful double bind experiences where one must fully take into account two valid *modus operandi* that appear irreconcilable. There is no arguing from an "outside", only arguing from a "within". Except that, in this case, the within is the way out of the double bind, which must be created.

Ultimately, the blurring of the boundaries between disciplines will lead us to legitimize some uncanny, eerie arrangements popping up everywhere, namely, a primatology of human beings instead of human species; a sociocultural anthropology of nonhuman primates; and an animalcentric Science and Technology Studies. Concretely, we need a vision and we need goals. While goals are tangible steps measurable and achievable, a vision is an intangible ideal carried out generation after generation. As for our goals, ideally, we should strengthen and multiply creative collaborative networks to be able to produce new scientific objects and address existing ones. As a second step, it is imperative to form a new generation of researchers under two different (sometimes competing) traditions and provide training and access to multiple methodologies. Thirdly, it is important to strengthen and multiply institutional venues (courses, conferences, bilateral programs, double certifications, training, publishing venues, outreach venues, centers and so on).

Following, we shall confront the most difficult task, that is, harnessing funding from local institutions and major funding agencies for long-term programs (e.g., ERC grants of the European Union). At last, we should grow a support system to groom current and next generations and foster talent, in particular, by implementing affirmative actions to support students of vulnerable backgrounds (i.e., attending to gender, economic position, ethnicity, and so on). In such way, we may promote a better access to science as a profession and, at the same time, enrich science making with different social experiences. These are goals that can only be reached in the long run, likely, in many decades, yet, co-joint efforts will potentialize the result.

However, as a kick off action supporting this plan, I would like to point out the creation of the first encyclopedia on cross-cultural human-chimpanzee social interaction. The encyclopedia is intended to be released as an applied audio-visual methodological guide to study interspecies socialization. This funded project, to be pursued in the coming years, will be conducted by the author in collaboration with Dr. Catherine Hobaiter and colleagues. Hopefully, the output will be a resource for researchers of various disciplines to mobilize tools and concepts from different disciplines to tailor their own research projects in interspecies related topics.

Empirically, this work will be the result of a comparative research conducted at different institutions studying captive chimpanzees around the world. Methodologically speaking, the project integrates and re-elaborates multiple methods, making use of multi-sited ethnography, participant observation, surveys, interviews, visual methods, interaction-time comparisons, ethological observations, microanalysis of behavior, focal and scan sampling, compilation of activity budgets and, at last, quasi-experiments of human-chimpanzee interaction to support the observational work. Further in the future, a similar project should envisage wild settings. Year by year, we expect to produce and bring together worldwide clusters of researchers in primatology, sociocultural anthropology and STS around the topic of interspecies socialization (i.e., Homo \rightarrow Pan, Pan \rightarrow Homo, Homo x Pan); as a first step.

Although ambitious, this endeavor will not be conducted individually but as a collective enterprise based on perceived common goals; to which an individual can serve only as a catalyst. In practice, *Pan-Homo* social relationships constitute a privileged object in the understanding of the radical otherness, of natures-cultures, and of evolution. However, such an object may perhaps be only fully grasped through a vision that goes beyond the object *per se*. That is, the vision that we should profoundly re-conceptualize the ways in which we make science.

Appendix

Great Ape Information Network Chimpanzees' Registration Number

Chimpanzee	GAIN Nr	Subspecies	Name origin and pronunciation
Ai	0434	P.t. verus	Means 'Love' in Japanese Pronounced "eye" in English
Akira	0435	P.t. verus	
Ayumu	0608	P. t. verus	Means 'to walk' in Japanese Pronounced "eye-you-moo"
Chloe	0441 (EAZA Nr 11892)	P. t. verus	Typical French name written as Chloé Called "Kuroe" in Japanese
Cleo	0609	P. t. verus	Called "Kureo" in Japanese Also called by her nickname "Coo"
Gon	0437	P. t. verus	
Mari	0274	P.t. verus	
Pal	0611	P.t. verus	Pal as in English Pronounced "Paru" in Japanese
Pan	0440	P.t. verus	Pronounced 'pun' in English
Pendesa	0095	Hybrid	Means 'lovely' in Swahili
Pico †	0662	P.t. verus	Pronounced "pee-coo"
Роро	0438	P.t. verus	From tanpopo meaning 'dandelion' in Japanese
Puchi †	0436	P.t. verus	Japanese pronunciation of <i>petit</i> Pronounced "poo-chee"
Reiko †	0432	P.t. verus	From <i>rei</i> chōrui meaning 'primate' in Japanese
Reo	0439	P.t. verus	

Source: GAIN database https://shigen.nig.ac.jp/gain/

Obs: By tradition, the offspring's name begins with the first letter of the mother's name

Glossary and Acronyms

GENERAL TERMS

AFFILIATIVE: Relative to the strengthening of bonds between individuals

AGONISTIC: Related to fighting (e.g., aggression or conciliation)

ALLOPATRIC: Occurring in separate geographical areas (cf. sympatric)

CONSPECIFIC: Belonging to the same species

EPISTEMOLOGY: Theory of knowledge

HUSBANDRY: Care, management and breeding of nonhuman animals

INTERSPECIFIC: Between species

INTRASPECIFIC: Within species

ONTOGENETIC/ONTOGENY: Related to the development of an organism (*cf.* ontology)

ONTOLOGY: Socially learned modes of relationship with nonhuman entities (*cf.* ontogeny)

PANT-HOOT: Chimpanzees' long distance, contact call (see Nishida et al. 2010)

PARADIGM: A set of theories and methods but also values and worldview in science (*sensu* Kuhn 1970)

PHYLOGENETIC: Related to the evolutionary history of an organism

SYMPATRIC: Occurring in overlapping geographical areas (*cf.* allopatric)

TAXON/ TAXA (pl.): Group of organisms

TAXONOMY

GREAT APES: Humans, chimpanzees (Africa), bonobos (Africa), gorillas (Africa) and orangutans (Asia)

LESSER APES: Gibbons (Asia)

NEW WORLD MONKEYS: Occupy mostly tropical regions of the American continent (e.g., capuchins and marmosets)

OLD WORLD MONKEYS: Occupy mostly Africa, South and East Asia (e.g., baboons and macaques)

SP: species

SPP: plural of species

SSPP: subspecies

INSTITUTIONAL STRUCTURE

CENTER FOR HUMAN EVOLUTION MODELING RESEARCH: Center responsible for keepers and veterinary personnel; In Japanese, *jinrui shinka moderu kenkyū sentā* 人類進化モデル研究センター (*cf.* Language and Intelligence)

KEEPERS: Caretakers mainly responsible for chimpanzees' care (*cf.* research personnel)

KUPRI: Kyoto University - Primate Research Institute (i.e., PRI); In Japanese, *Kyōto Daigaku Rēchōrui Kenkyūjyo* 京都大学霊長類研究所

PERSONNEL: Refers to all those involved in chimpanzee research and care

PRI: Primate Research Institute of Kyoto University (i.e., KUPRI)

RESEARCH PERSONNEL: Professors, post-docs, graduate students and research assistants (*cf.* keepers)

SECTION OF LANGUAGE AND INTELLIGENCE: Section at PRI responsible for chimpanzee research; formed of professors, students and technicians. In Japanese, *shikō gengō bunya* 思考言語分野 (*cf.* center)

LANGUAGE

SAN: Used after a person's surname as an honorific in Japanese, it translates as Mr., Mrs., Miss or Ms.

SENPAI: Refers to one's senior in a professional category (e.g., senior student)

SENSEI/ SENSĒ: Used after a person's surname as an honorific in Japanese, it generally means professor, teacher or master

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French Summary

French Translation Required by the Transdisciplinary Graduate School in Humanities and Sciences of École Normale Supérieure

Terrains et méthode

Nous avons élaboré ce travail à partir d'un terrain de quatorze mois au *Primate Research Institute* de l'Université de Kyoto (KUPRI). Ce séjour s'est déroulé entre le 1^{er} octobre 2014 et le 15 décembre 2015. Le KUPRI est situé dans la ville d'Inuyama, au sein de la préfecture d'Aichi. L'objet de cette ethnographie fut d'étudier la vie quotidienne au sein du laboratoire dirigé par le professeur Matsuzawa Tetsuro, l'un des représentants les plus éminents de la recherche sur les chimpanzés au Japon et dans le monde. En outre, cette recherche ayant une ambition comparative, nous nous appuyons sur une ethnographie dite multi-sites, à travers laquelle des points précis sont explorés à partir de données récoltées sur plusieurs lieux au cours de séjours plus brefs.

Nous avons en effet visité tous les laboratoires du PRI consacrés à la recherche sur les chimpanzés. De plus, nous avons séjourné dans d'autres centres de recherche en primatologie, parmi lesquels (cf. figure 1 ; section en anglais) : le centre Onobora du KUPRI, consacré à la reproduction de macaques en semi-liberté ; l'écurie du KUPRI consacrée à la recherche en cognition ; le sanctuaire Kumamoto dans la préfecture de Kumamoto, qui accueille chimpanzés et bonobos ; le *Japan Monkey Centre* à Inuyama et le Zoo de Kyoto, où se trouvent des représentants de plusieurs espèces ; le zoo d'Higashiyama à Nagoya, dans la préfecture d'Aichi ; l'île de Kôjima/Koshima à Miyazaki, où se trouvent des macaques japonais ; Cape Toi dans la préfecture de Miyazaki, où se trouvent des chevaux en liberté ; Shodoshima dans la préfecture de Kagawa, où se trouvent des cerfs Sika. Dans les zoos de Kyoto et d'Higashiyama se trouvent des ordinateurs semblables à ceux utilisés au sein du PRI afin de conduire des expériences avec des chimpanzés et des représentants d'autres espèces. C'est également le cas de l'écurie du KUPRI, où les expériences en sciences cognitives sont menées sur des chevaux.

Enfin, nous avons séjourné trois semaines en République de Guinée entre juin et juillet 2016. Le centre de recherche japonais de Bossou a été l'un des sites privilégiés pour l'étude de la

culture chimpanzée en milieu naturel. L'activité de ce centre a commencé sous la direction du professeur Sugiyama Yukimaru, auquel a succédé le professeur Matsuzawa - raison pour laquelle nous l'avons inclus dans cette étude comparative. En outre, afin d'enrichir notre ethnographie, nous avons participé à la conférence « *Chimpanzees in Context* » (*Understanding Chimpanzees IV*), qui a lieu tous les dix ans, ainsi qu'à la réunion de la Société Internationale de Primatologie, qui a lieu deux fois par an, en 2016 aux Etats-Unis. L'institution qui a accueilli cette réunion, le *Lincoln Park Zoo*, met en œuvre un dispositif assisté par ordinateur très semblable à celui utilisé par le KUPRI pour mesurer les capacités cognitives des grands singes ainsi que des macaques japonais. Ce zoo propose en outre des sessions ouvertes au public.

Ainsi qu'il est d'usage en ethnologie, ce travail a reposé sur des questionnaires, des entretiens semi-directifs, des communications personnelles et sur une observation participante de longue durée dans un seul centre de recherche, le KUPRI. Nous avons joint à cela l'approche plus récente de l'ethnographie multi-sites, qui use de méthodes similaires, mais avec l'ambition d'analyser la manière dont des problématiques soulevées lors de notre ethnographie de longue durée peuvent émerger en d'autres localités. Des éléments de la Théorie de l'Acteur-Réseau (ANT), mobilisée au sein des *Science and technology studies* ainsi que les controverses entourant les usages de cette grille d'analyse, ont constitué une ressource méthodologique supplémentaire.

En accord avec les pratiques de l'analyse de conversations et les études ethnométhodologiques, ainsi qu'avec les pratiques de l'éthologie, nous avons mis en œuvre des études comportementales minutieuses, réalisées à partir d'enregistrements vidéos, afin d'analyser des interactions image après image, ou sur des périodes espacées de deux secondes (© Solomon Coder; © ImageGrab). En ce qui concerne ce type de descriptions, nous en avons réduit l'extension dans le but d'en rendre la lecture plus aisée et nous avons choisi de ne faire apparaître qu'un résumé de leurs aspects les plus significatifs. Dans les cas où nous avons voulu coder les vidéos, c'est-à-dire en catégoriser les différentes étapes, nous avons opté pour des découpages par séquences de deux secondes. Dans les rares cas où il a été nécessaire d'analyser les interactions en présence à l'échelle de la milliseconde, nous avons opté pour l'analyse image par image.

Nous n'avons pas utilisé la notation habituellement présente dans l'analyse de conversation, en raison de la difficulté pour un lecteur non averti de les déchiffrer et donc de comprendre le déroulement des interactions. Concernant les pratiques ayant cours en éthologie, nous avons élaboré un compromis entre trois types de description : celles en termes de structure

(c'est-à-dire de posture et de mouvements), celles en termes de conséquences (c'est-à-dire présentant les résultats de l'action en fonction de catégories) et celles en termes de relations spatiales (où il s'agit de savoir vers quoi ou vers qui l'action est orientée). À chaque fois que la signification d'un comportement s'avérait difficile à saisir, nous avons privilégié une approche par la structure ou la spatialité. Nous avons cependant accompagné notre manuscrit des vidéos correspondantes afin de laisser la possibilité au lecteur d'élaborer ses propres interprétations des comportements observés.

De plus, nous avons utilisé ©SPSS 24 dans le cas des études pour lesquelles un traitement statistique des données pouvait être mis en œuvre. Cette recherche comporte en effet un certain nombre d'analyses quantitatives, en plus des descriptions ethnographiques, dont les protocoles et les méthodes de collecte de données seront explicités en détail chaque fois qu'il y sera fait référence. Nous nous contenterons donc ici de remarques générales sur la méthodologie employée.

Enfin, un dernier outil méthodologique, que nous employons tout au long de ce travail, est le récit à la 1ère personne, qui renvoie à l'expérience singulière de se trouver dans la position d'expérimentateur, là où l'anthropologue conduit lui-même l'étude des relations entre chimpanzés et humains. Ainsi, il s'agissait non seulement d'une immersion dans un champ où les questions de sécurité sont cruciales et où l'art de se tenir dans certaines limites spatiales s'apprend, mais aussi d'une réflexion incarnée sur les points de convergence et l'existence d'idiosyncrasies entre différentes disciplines, dans le but d'élaborer un programme de recherche commun.

En conclusion, nous devons avertir le lecteur que ce manuscrit visant à être compris, nous avons cherché autant que possible à éviter l'usage d'une écriture assimilable à un jargon disciplinaire et nous avons privilégié en tout point la clarté du propos. La raison en est qu'il s'adresse à des lecteurs provenant de diverses disciplines, et ne partageant donc pas la même culture universitaire. Il se peut donc qu'aux yeux de certains spécialistes, certains passages puissent paraître simplistes, répétitifs ou trop expliqués, tandis que d'autre leur apparaîtront plus difficile à saisir. Nous avons tenté de faire le lien entre différents styles d'écriture académique, du champ littéraire au champ scientifique, afin d'atteindre à un objectif pédagogique et permettre à des praticiens de différentes disciplines de s'emparer de cette recherche. De plus, cette thèse a privilégié autant que possible la nouveauté du matériel ethnographique en lieu et place de longues élaborations théoriques. En d'autres termes, nous avons usé de l'analyse théorique avec pragmatisme, dans le but d'ouvrir la voie à une discussion de questions d'ordre général ; non parce qu'elle constitue une fin en soi.

L'objectif visé par cette recherche ayant été de présenter des réflexions qui puissent circuler entre les différentes disciplines, et non de confronter des auteurs, le lecteur devra s'attendre à ce que certains canons de la bibliographie disciplinaire n'aient pas la place centrale qui aurait dû leur revenir. Cependant, si nous voulons réellement établir des ponts entre les disciplines, là où les ressources d'une seule sont insuffisantes au traitement de certaines problématiques, nous devons user de procédés capables de rendre compte de concepts ou d'idées centrales selon une approche pluraliste. Curieusement, cette tâche ressemble précisément à la manière dont l'usage des multiples modalités de la communication permet l'élaboration de significations pour des esprits (ou des disciplines) reposant sur l'idiosyncrasie.

Conclusion

L'enjeu de ce travail était de démontrer comment les humains et, potentiellement, les chimpanzés fixent et brouillent les frontières entre leurs deux espèces. Nous avons exploré la manière dont fonctionne cette frontière au travers des problématiques très diverses qui structurent la cohabitation des humains et des chimpanzés dans un contexte de laboratoire très spécifique, où les relations sociales entre *Pan* et *Homo* sont la priorité. Il s'agissait d'une part d'analyser les aspects principaux de cette dynamique inter-espèces. D'autre part, nous avons souhaité indiquer des voies possibles pour de futures recherches. L'ambition de cette thèse a été non seulement d'apporter des réponses mais également de mettre en évidence des phénomènes à l'intersection des frontières disciplinaires, qui réclament ainsi un véritable effort d'interdisciplinarité.

La plupart des problématiques que nous avons abordées dans ce cadre n'avaient pas été rigoureusement traitées de cette manière auparavant, et beaucoup de questions restent en suspens lorsque l'on s'intéresse à l'apprentissage social réciproque inter-espèces entre humains et chimpanzés. En outre, il faudrait également s'intéresser au rôle joué par les artefacts et le monde matériel. Seul un programme de recherche exigeant serait en mesure d'aborder ce sujet, en dépassant à la fois les représentations anthropocentriques des animaux qui caractérisent les

humanités et les hypothèses restreintes proposées par les sciences du vivant. Quant à nous, nous considérons qu'un tel programme est primordial pour un certain nombre de raisons.

D'abord, en raison de la proximité phylogénétique entre humains et chimpanzés, ce type de recherche pourrait nous permettre d'acquérir une meilleure connaissance de la flexibilité potentielle de l'apprentissage social chez les hominidés. Deuxièmement, elle nous permettrait d'avoir une vision plus claire des mécanismes d'après lesquels humains et chimpanzés interagissent, communiquent et entretiennent des relations sociales, en tenant bien sûr compte des contraintes indépassables propres à leurs espèces respectives. Enfin, l'examen de la manière dont humains et chimpanzés ajustent leurs modes de vie, en tenant compte du monde matériel qui les entourent, constitue un matériau nécessaire à la pensée et à la compréhension de ce qui tient à la coexistence des membres des deux espèces et de ce qui tient à la pratique de la science. Nous allons maintenant récapituler les acquis de chacun des chapitres, afin de les mettre en perspective avant d'adresser les problématiques que nous pensons utiles à toute recherche future.

Chapitre 1: Le premier chapitre, intitulé « Etudes des chimpanzés à l'Institut de Recherche sur les Primates », présente au lecteur l'histoire des relations entre humains et chimpanzés au PRI. Dans la première section, nous retraçons l'histoire de Reiko, première femelle chimpanzée résidente au PRI, présente avant même que les études sur la cognition des chimpanzés n'y démarrent officiellement. Avant le commencement du projet Ai, il y a une quarantaine d'années, la gestion des chimpanzés y était caractérisée par l'absence de congénères, par des interactions avec d'autres primates, et par des soins en contact direct même auprès de chimpanzés adultes. Aujourd'hui, on y souligne au contraire la nécessité de maintenir les individus au milieu de leurs congénères. En outre, aux yeux du Professeur Matsuzawa, qui dirige le projet Ai, les premières études menées sur Reiko était marquées par l'absence de toute notion d'esprit (*mind*) ou de cognition, le chimpanzé étant assimilé à un « grand singe noir… qui se trouve être intelligent ».

Dans la seconde partie de ce premier chapitre, nous commençons par explorer les raisons pour lesquelles les chimpanzés sont perçus comme étant différents des autres singes, principalement du fait qu'ils démontrent plus d'intérêt à interagir avec les humains et en raison du type d'interactions auxquelles ils participent. Nous replaçons ensuite le projet Ai dans le contexte des recherches sur le langage des grands singes qui se sont développées dans les années 1970. Le projet Ai avait la particularité de tenter de saisir le monde perceptuel des chimpanzés en usant de moyens symboliques, au lieu de chercher à savoir dans quelle mesure les chimpanzés étaient capables d'adopter un langage similaire à celui des humains. La logique des études sur les chimpanzés telles qu'elles sont menées au PRI repose en effet sur leur proximité phylogénétique vis-à-vis des humains, qui implique la possibilité que des traits communs partagés entre nos espèces soient hérités d'un ancêtre commun, selon un principe homologique. Il nous a fallu ajouter à cela une remarque de précaution sur la nécessité de rendre explicite les présupposés sous-jacents à une telle interprétation de l'évolution, dans le but d'éviter la critique anthropologique selon laquelle de telles hypothèses pourraient en venir à suggérer que des populations humaines « primitives » puissent représenter un état intermédiaire entre des humains évoluant dans un monde technologique et des grands singes.

Nous faisons alors l'hypothèse que la primatologie s'engage moins dans des hypothèses abstraites et générales sur la cognition qui seraient valables quelle que soit l'espèce concernée (telles que les formulent les science cognitives) que dans son un *medium* spécifique, c'est-à-dire dans la réalité écologique, sociale et perceptuelle des primates auxquels elle s'intéresse. Tandis que ces deux attitudes ne s'excluent pas totalement, la primatologie demanderait toutefois le même effort de compréhension que celui qui vise à comprendre « le point de vue de l'autochtone ». Il faut noter cependant que les barrières qui subsistent entre espèces, entre primates humains et primates non humains, imposent des limitations à l'accès à ce point de vue. Nous abordons ensuite la manière dont le dispositif expérimental du PRI traite concrètement le monde des chimpanzés.

Nous rappelons ainsi, étape par étape, que le principal sujet du projet Ai, Ai le chimpanzé femelle, a appris à réaliser les tâches demandées au cours des expériences. Par le conditionnement opérant, Ai s'est familiarisée petit à petit avec le dispositif de l'expérience, c'est-à-dire avec les étapes requises pour la résolution des tâches.

Néanmoins, suivant un principe d'identification d'échantillons, Ai a également été le sujet d'une série d'expériences sur la cognition des chimpanzés. En réalité, que coexistent des paradigmes cognitifs, sous-jacents aux expériences ainsi menées, et des pratiques behavioristes, qui concèdent le minimum aux animaux en termes de capacités mentales, n'apparaît pas ici comme une contradiction en soi, dans la mesure où les protocoles qui consistent à former Ai à l'utilisation du dispositif ne sont utilisés que de manière pragmatique, comme moyens en vue d'une fin.

De plus, en nous intéressant à l'histoire de l'apprentissage d'Ai, nous nous interrogeons sur la capacité des chimpanzés à transposer ce qu'il viennent d'apprendre à des stimuli inédits, c'est-à-dire sur leur capacité d'apprendre à apprendre. Nous analysons ensuite les habitudes
d'apprentissage propres aux chimpanzés, à travers la manière dont de jeunes chimpanzés - Ai, Akira, et Mari, les trois premiers participants aux recherches du PRI - ont réagi aux mêmes protocoles expérimentaux et aux mêmes dispositifs. Nous concluons cette partie par la comparaison du contexte du laboratoire avec celui d'une école. Au PRI en effet, les chercheurs ont recouru à cette comparaison lorsqu'il s'adresse au public, afin d'éviter toute suggestion de recherche invasive, dont le soupçon pèse sur les expériences menées en laboratoire. Dans les expériences qui requièrent de l'apprentissage, les chercheurs apparaissent réellement investis dans les progrès des chimpanzés. Néanmoins, à la différence d'un contexte scolaire, les chercheurs enseignent aux chimpanzés afin d'en apprendre davantage sur ces derniers, et la relation entre les membres des deux espèces y est conçue davantage comme un partenariat scientifique que comme un rapport de maître à élève.

La troisième partie du premier chapitre aborde la manière dont s'est constituée la communauté des chimpanzés résidant au PRI et les pratiques sociales inter-espèces qui ont soutenu sa croissance. Nous commençons pour nous demander si les chimpanzés femelles qui y sont présentes sont des mères naturelles, en comparant la relation de Reiko à son fils Reo, aux difficultés de Puchi à élever sa progéniture. Nous parcourons les hypothèses existantes sur la manière dont les chimpanzés deviennent des mères accomplies ; bien que la recherche tende à souligner l'importance des interactions directes pour apprendre de telles capacités, la maternité chez les chimpanzés semble surdéterminée par un certain nombre de variables. En retraçant l'histoire de Puchi et du nouveau-né qu'elle a rejetée, Pan, racontée de première main par Matsuzawa, nous rappelons les leçons apprises par les chercheurs du PRI et le changement de paradigme dans leur méthodologie survenue dans l'année 2000, lors de la naissance de trois chimpanzés : Ayumu, le fils d'Ai, Pal, la fille de Pan, et Cleo, la fille de Chloe. Après qu'ils sont parvenus à faire que les mères élèvent ces trois nouveau-nés, les chercheurs ont adopté le principe de « l'observation participante », selon lequel un chercheur évalue en contact direct avec la mère et l'enfant le développement cognitif du jeune chimpanzé, dans les mêmes conditions que pour les études qui concernent le développement des enfants humains.

Nous explorons ensuite les techniques à travers lesquels les humains s'occupaient d'Ai, Pan et Chloé afin qu'elles soient de bonnes mères. Le programme consistait en effet à apprendre aux chimpanzés les techniques du corps à adopter vis-à-vis de leur progéniture étant donné que les chimpanzés nouveau-nés, à la différence des autres singes, ont besoin d'être tenu en permanence. Ainsi, soulever l'enfant, le prendre dans ses bras, le mettre dans une bonne position et permettre la tétée ne sont pas des étapes évidentes pour des mères chimpanzés captives. Nous détaillons ensuite le contexte de la naissance d'Ayumu, Cleo et Pal. Nous insistons notamment sur un comportement qui n'a pas été enseigné à Ai, et qui a permis à la jeune mère de réanimer son fils Ayumu, sur la manière dont Matsuzawa enseigne par le mime le geste de bercer son enfant à Ai, sur la préparation de Chloe à la maternité à l'aide de chimpanzés en peluche, sur les échecs dans son apprentissage de la maternité et sur la stratégie mise en place pour corriger sa position incorrecte pour l'allaitement, et sur la posture de Pan qui s'apparente davantage à une posture humaine, ce qui est cohérent la manière dont elle-même a été élevée.

Dans ces expériences, l'apprentissage social a consisté en un enseignement actif de la part des humains, ainsi qu'en un apprentissage par l'observation, un apprentissage par la pratique, et une facilitation sociale de la part des chimpanzés en question. Après nous être intéressés aux techniques du corps dans l'apprentissage de la maternité assisté par des humains, nous abordons le fait que le portage permanent du nouveau-né est un trait spécifique aux chimpanzés, tandis que le maintien de l'enfant pendant l'allaitement est partagé par tous les grands singes. Ainsi ces techniques du corps apprises sont à la fois le fait des grands singes et des chimpanzés seulement. Les schèmes comportementaux propres à chaque espèce requièrent un apprentissage social pour être développés, et la source d'un tel apprentissage peut être trouvée soit chez des congénères de la même espèce ou chez un groupe d'une autre espèce, dans ce cas précis des humains, qui en déploient des formes particulières (c'est par exemple le cas des interactions en face-à-face qui se prolongent au-delà de la toute petite enfance).

Nous posons alors une question plus spéculative : les humains peuvent-ils devenir des mères pour les grands singes ? Pour y répondre, nous nous intéressons à un épisode dans lequel un gorille ayant appris la langue des signes américaines évoque la mort de sa mère biologique et se réfère à son éducatrice humaine comme à une nouvelle mère de substitution. Nous abordons alors la question de l'attachement chez les grands singes. Alors que reste en suspens la question de savoir dans quelle mesure les grands singes perçoivent certains humains comme jouant un rôle analogue à celui d'une mère, il arrive cependant que les humains se voient remplir un rôle parental à l'égard de membres d'une autre espèce. Nous abordons ensuite les différences entre l'ancien paradigme de recherche dans lesquels de jeunes chimpanzés participaient à des expériences sans la présence d'autres membres de leur espèce, et la nouvelle méthodologie, au sein duquel ils sont

accompagnés de leurs mères. Le savoir-faire que nécessite la réalisation d'une telle expérience est dans le premier cas informé de l'extérieur, tandis que dans le second cas, il est élaboré à partir d'une interaction sociale avec d'autres membres du groupe. Les jeunes sont en effet des observateurs attentifs de leurs mères.

Nous proposons cette interprétation après avoir retracé l'histoire d'Ayumu et de son usage du dispositif expérimental pendant les moments où il accompagne tous les jours sa mère, Ai, dans l'accomplissement de ses tâches sur ordinateur. Petit à petit, Ayumu finit par maîtriser les étapes de la procédure. Le cas d'Ayumu diffère de celui sa mère, qui a elle-même appris à réaliser ces tâches en entrant seul dans la cabine où se trouve l'ordinateur. Le cas d'Ayumu est ainsi plus proche de la « nature », bien qu'il s'agisse de l'espace du laboratoire, car son apprentissage du protocole expérimental repose sur le même type d'apprentissage social que celui que les chimpanzés mettent en œuvre lorsqu'ils sont à l'état sauvage. De plus, en convoquant des études sur l'apprentissage social qui décrivent comment des couples mères-enfants ont été soumis à des tests ensemble au PRI, nous montrons que la solution à une tâche expérimentale peut être apprise socialement. Néanmoins, le plus intéressant n'est pas qu'il y ait des transmissions horizontales ou verticales de savoir entre chimpanzés pendant les expériences, mais que de jeunes chimpanzés soumis à des tests dans des cadres sociaux, par opposition aux protocoles conçus pour des individus isolés, apprennent de leur congénères à se comporter comme des chimpanzés de laboratoire. Ainsi, le savoir-faire nécessaire à l'effectuation d'un protocole expérimental introduit par les humains se transmet à la génération suivante par les chimpanzés eux-mêmes, à travers des modes d'apprentissage social qui leur sont propres.

De plus, dans les expériences au cours desquelles des humains se trouve dans la même cabine qu'un couple chimpanzé mère-enfant, il est fort probable que les jeunes chimpanzés apprennent à attribuer une valeur sociale aux humains du fait de cette interaction triadique, au cours de laquelle la mère fait confiance à l'humain en présence de son enfant. Nous illustrons ceci par l'exemple des sourires de sociabilité (*social smiling*) qu'Ayumu adresse à un humain qui lui est familier. Nous concluons dans cette section par l'examen de l'impact de cette recherche sur le public, particulièrement à travers les interventions dans les médias, les visites organisées au PRI, et le statut de véritables ambassadeurs des chimpanzés au Japon acquis par Ai et Ayumu.

Chapitre 2: Le second chapitre s'intitule « Frontières physiques : l'architecture des interactions sociales dangereuses » et présente au lecteur le déroulement de la vie quotidienne au

PRI à travers l'exploration de ses infrastructures, qui allient préoccupations scientifiques et attention aux relations inter-espèces. Il s'agit de souligner un trait particulier de la recherche sur des chimpanzés, c'est-à-dire le danger qu'ils présentent pour les humains, par comparaison à d'autres grands singes ou de plus petits primates. Nous présentons ensuite l'aire de vie des chimpanzés et le système qui leur permet de se rendre au laboratoire.

Nous abordons ainsi l'organisation sociale de l'espace et attirons l'attention du lecteur sur les interfaces perméables qui permettent les interactions entre humain et chimpanzés, et dans lesquelles le design architectural permet aux deux espèces de dépasser certaines frontières physiques tout en étant maintenues séparées. Tout au long de ce chapitre nous soulignons huit facteurs cruciaux de l'organisation de l'espace (a) l'architecture des zones de contact (b) la structure physique des dispositifs (c) l'entourage immédiat des corps (d) le contexte des activités (e) les comportements et les caractéristiques des chimpanzés (f) les relations interpersonnelles entre un humain et un chimpanzé particulier (g) les dynamiques de groupe entre humains et chimpanzés (h) les techniques corporelles permettant de se protéger.

D'abord il s'agit de décrire l'architecture générale des espaces accueillant des flux d'humains et de chimpanzés, l'usage exclusif de certains espaces par l'une ou l'autre espèce ainsi que les différences structurelles qui les caractérisent. De plus, nous analysons la coordination des humains et des chimpanzés dans l'espace au travers de l'examen des protocoles de sureté mis en place pour permettre les déplacements des chimpanzés dans le labo. Nous évoquons également des incidents passés, dans le but de montrer que l'évaluation de sa propre sécurité nécessite de savoir lire une infrastructure et de la lier à certaines actions qui sont soit dictées par un protocole soit le résultat d'une évaluation du contexte. Ensuite, nous nous intéressons à l'architecture qui permet le nourrissage quotidien des chimpanzés, l'une des situations où le risque est le plus élevé. Nous montrons comment ce dispositif répond à différents niveaux de risque d'après sa conception matérielle et la fréquence des approches des chimpanzés.

Nous procédons ensuite à l'examen des déplacements des humains dans l'espace du soussol, de la manière dont ils assurent leur sécurité en prêtant attention à leur environnement direct, du dispositif qui permet ou non aux chimpanzés de s'aventurer dans certaines zones et de la portée des gestes des chimpanzés au sein de certains espaces humains. À cette fin et à l'aide de mesures des infrastructures, nous simulons le positionnement d'un humain qui traverse le sous-sol dans ces différents contextes. Dans le but d'aborder le comportement des chimpanzés et la manière dont leur particularités individuelles transforme notre évaluation du risque, les lecteurs sont amenés à découvrir d'autres infrastructures liées à la recherche sur les chimpanzés, en particulier celle du sanctuaire Kumamoto, institution partenaire du PRI. Nous illustrons notre propos par le récit d'un « faux-pas ethnographique » alors que nous nous déplacions dans cet espace nouveau et que nous avons dû faire face à des comportements inédits de la part de chimpanzés communs et de bonobos. Ainsi, le positionnement de notre corps dans l'espace s'est trouvé modifié, tandis que le comportement des animaux nous révélait de nouvelles affordances perçues, nous dévoilant là un usage alternatif de l'environnement par une autre espèce. Enfin, revenant aux installations du PRI, nous montrons que la connaissance des capacités individuelles de chaque chimpanzé et non pas simplement de leur comportement d'espèce, est essentielle à l'adoption par l'humain d'un positionnement dans l'espace qui garantisse sa sécurité.

Concernant les trois derniers aspects vitaux pour la juste perception du risque, il s'agit maintenant de considérer les relations entre humains et chimpanzés, ainsi que les dynamiques de groupes. D'après nos interlocuteurs, parmi ceux capables d'interactions directes avec des chimpanzés adultes au PRI et au Sanctuaire Kumamoto, le temps passé à construire une bonne relation est essentiel pour qu'une telle proximité physique soit possible. Il faut cependant noter que ce contexte peut changer avec l'introduction d'un tiers et l'échange des rôles dominants. En fait, dans de telles situations, les frontières physiques entre humains et chimpanzés dépendent des particularités sociales de chacun au sein de la relation dyadique et au sein de leur groupe. Enfin, nous revenons sur l'acquisition de techniques corporelles sûres vis-à-vis de chimpanzés et bonobos maintenus en captivité, c'est- à-dire des conceptions internalisées qui dicte des manières d'être et de se comporter dans l'espace. On en trouve une illustration dans le maintien et le ressenti des distances; pour exemplifier ceci, nous utilisons une évaluation subjective de trois seuils de sécurité à l'intérieur du laboratoire. Ainsi le déplacement protégé dans l'espace dépend-t-il la capacité à lire ensemble une architecture, un contexte et l'état des relations sociales inter et intra-spécifiques impliquées dans chaque situation.

Ce chapitre se conclut avec une comparaison de ces frontières physiques avec celles que l'on rencontre à l'état sauvage. Il se focalise sur le contexte spécifique de la station japonaise de Bossou, cas abordé par un travail ethnographique de courte durée et complété par une discussion de la littérature scientifique sur les rencontres entre humains et grands singes. Dans un environnement naturel, les structures architecturales qui caractérise la captivité et qui garantissent dans une certaine mesure la sécurité humaine sont absentes. Ainsi, les arrangements entre espèces que l'on y observe sont un contre-exemple intéressant dans le cadre de notre étude. Cependant, si différent que ces contextes puissent paraître, des problématiques similaires s'imposent. Tout d'abord, il s'agit de tenir compte de l'espace personnel d'un animal afin d'éviter des attaques surprises, bien que le seuil d'approche soit dépendant du contexte. Deuxièmement, la configuration des zones limites entre forêts et habitations humaines (par exemple les zones de visibilités, les zones tampons etc.) joue un rôle dans l'évitement des conflits entre humains et chimpanzés. Enfin, chaque fois que des barrières physiques sont considérées, leur matérialité doit être attentivement analysée (type de grillages, canaux, barrières biologiques etc.) car les singes peuvent toujours les détourner habilement.

Ensuite, concernant l'habituation des animaux vis-à-vis des humains, les interactions entre humains et chimpanzés doivent être abordées de manière individuelle comme multipartite, particulièrement parce que les chimpanzés sont capables d'identifier les humains. Certains humains, comme les guides locaux, ont l'air d'entretenir une relation particulière avec certains groupes de chimpanzés. En outre, certaines compositions de groupe (par ex., ceux qui comprennent exclusivement des femmes et des enfants) semblent favoriser les rencontres agonistiques avec certains membres de la population des chimpanzés, en particulier les mâles. Les comportements individuels et l'existence ou non de déplacements contrôlés contribueront aussi à la manière dont les chimpanzés vont agir dans un contexte donné (par ex., face à des humains qui s'enfuient ou poussent des hurlements). En résumé, qui attaque, qui est attaqué, quand, et comment réagissent les uns et les autres, sont des dimensions vitales qui déterminent le résultat de ces rencontres inter-espèces en l'absence de barrières.

Nous explorons ensuite la manière dont les chimpanzés pourraient percevoir les zones fortement anthropisés se situant sur leur habitat naturel. Il semble que les chimpanzés perçoivent le risque accru que constituent ces zones. Le premier exemple concerne les raids des chimpanzés sur les récoltes. Nous analysons cette activité en fonction d'indicateur d'anxiété, du lieu où ils mangent les récoltes et à quel moment ils pénètrent dans les champs. La relation des chimpanzés à une telle activité présente également des variations historiques, qui dépendent de l'évolution des relations entre les humains et les chimpanzés. C'était notamment le cas de cette pratique ancienne à Bossou qui consistait à laisser une partie des récoltes aux chimpanzés, considérés comme un

totem. Le second exemple, qui attire notre attention sur la perception que semblent avoir les chimpanzés de l'espace humain, est le comportement qu'ils adoptent en traversant les routes.

Les études montrent que les chimpanzés ne sont pas vigilants qu'à leur échelle individuelle en traversant des routes fréquentées, mais qu'une organisation socio-spatiale visant à protéger l'ensemble du groupe se met alors en place dans le but de garantir la sécurité des plus vulnérables. Ainsi les chimpanzés sauvages modifient leur positionnement vis-à-vis des uns et des autres en fonction de la probabilité d'une interaction avec des humains ou en fonction de menaces anthropogéniques dont les voitures en mouvement sont un exemple. Pour illustrer concrètement ce point, nous analysons une séquence vidéo dans laquelle des chimpanzés traversent une route, que nous avons enregistrée lors de notre séjour à Bossou et que nous avons systématiquement analysée à travers son codage. Cet épisode illustre bien l'organisation spatiale en fonction du statut des individus du groupe ; cependant, notre analyse propose une méthode simple pour tenir compte de la présence des chercheurs au moment d'évaluer la perception du danger chez les chimpanzés. En effet, nous prenons pour l'hypothèse que le degré d'habituation des chimpanzés vis-à-vis des chercheurs qui les observe n'exclut pas que les premiers prêtent davantage attention à ces derniers, surtout lorsqu'il y a imminence du danger. Nous concluons ce chapitre avec des préconisations concernant l'introduction de la présence des chercheurs comme variable afin d'évaluer correctement la perception des animaux non humains.

Chapitre 3 : Après avoir traité de la dynamique des limites physiques entre les humains et les chimpanzés, nous passons au troisièmes chapitre, « Frontières expérimentales : mettre à l'épreuve et être mis à l'épreuve par des chimpanzés ». Dans ce chapitre, nous considérons les éléments fondamentaux en jeu dans la recherche sur les chimpanzés au PRI. Il s'agit de s'interroger sur ce que signifie réellement que de faire des expériences avec des chimpanzés. Leurs aptitudes peuvent en effet décentrer la perspective humaine et fournir un feedback à la recherche expérimentale. Il faut maintenant souligner plusieurs aspects qui caractérisent la recherche sur les chimpanzés telle qu'elle est menée au PRI, et en particulier l'approche holistique qui englobe soin et protocole de recherche.

Cela se traduit d'abord par l'effort conjoint qui consiste à mener à la fois des expériences en laboratoire et des observations sur le terrain, à Bossou. Il s'agit en effet de comprendre les chimpanzés de ce point de vue global et interpréter leur comportement en captivité comme une expression de leur comportement à l'état sauvage, tout en incluant dans cette compréhension leurs histoires personnelles. Nous soulignons aussi la participation accrue des chercheurs à des tâches traditionnellement attribuées à des soigneurs. De plus, la dispense de soins en contact direct avec les chimpanzés adultes, les expériences menées elles aussi en contact direct et l'adaptation de l'activité de nourrissage à chaque individu sont des aspects cruciaux de la recherche au PRI. Enfin, ces recherches se fondent davantage sur la confiance mutuelle que sur un renforcement positif par un système de récompense. On touche là au cœur de la relation qui s'établit entre humains et chimpanzés.

Après avoir souligné ces caractéristiques, propres au PRI, nous les mettons en perspective avec les pratiques d'autres institutions au Japon et dans le monde. C'est le sanctuaire Kumamoto, institution partenaire du PRI, qui adopte les pratiques les plus ressemblantes. Comme au PRI, une stratégie de soins en contact direct avec les chimpanzés a été mise en place, et les chercheurs participent aux activités de nourrissage personnalisé comme général durant la semaine. Il faut noter qu'en 2015, les pratiques qui s'établissaient en contact direct avec les animaux étaient plus intensives, en termes du nombre d'humains et de chimpanzés présents dans le même espace dédié aux expériences. Le GARI, institution désormais disparue, avait également mis en place des pratiques qui supposaient l'interaction sans barrières avec des chimpanzés adultes. Cette institution est cependant perçue par nos interlocuteurs au PRI comme un cas extrême dans les relations entre humains et chimpanzés, à cause de ses pratiques de nourrissage et de couchage en commun. Ces derniers soulignent également leur différence avec les pratiques des zoos, où les relations interespèces sont rares.

À partir des expériences éclectiques d'un soigneur ayant travaillé dans plusieurs institutions dans le monde, nous montrons qu'au sein des institutions occidentales, les interactions humains-chimpanzés sont soigneusement évitées dans le but de laisser l'animal être un animal. Cependant, notre interlocuteur concède que cette politique de non approche est aussi liée au fait que ces institutions font largement appel à des bénévoles. De plus, une étude menée dans un sanctuaire catalan montre que le refus de la proximité inter-espèces est important dans d'autres contextes institutionnels et culturels. Au PRI, au contraire, tant que les chimpanzés sont capables d'exprimer les spécificités de leur répertoire comportementale auprès de leurs congénères, les interactions avec les humains ne sont pas perçues comme capables d'altérer leur statut de vrais chimpanzés. Plutôt que de dénier aux humains la capacité de faire partie de l'écologie sociale des chimpanzés en captivité, il s'agit davantage de s'interroger sur la bonne manière de le faire.

À l'aide d'un questionnaire que nous avons envoyé à des interlocuteurs de différentes institutions, nous rendons compte de la manière dont les pratiques en interaction directe avec les chimpanzés et les activités nourrissage se déroulent au sein de ces centres les plus réputés en matière de recherche sur les chimpanzés : l'institut Max Planck et le zoo de Leipzig en Allemagne, l'Université Saint-Andrews et le zoo d'Edimbourg en Ecosse, et le Centre National de Recherche sur les Primates Yerkes, aux Etats-Unis. Selon nos interlocuteurs, aucune de ces institutions ne fait officiellement appel aux chercheurs pour nourrir les chimpanzés, mais ceux-ci peuvent néanmoins participer à ces activités. Le système de nourrissage est à la fois général et personnalisé, à l'exception du zoo d'Edimbourg, où il est principalement uniformisé. Enfin, il n'y a dans aucune de ces institutions d'interaction directe avec des chimpanzés adultes.

Nous faisons ensuite remarquer qu'en dépit de ces observations, les pratiques d'interaction directe sans barrières physiques avec des grands singes ne se limitent pas au cas japonais. Ceci notamment parce qu'elles avaient cours dans les recherches sur le langage des grands singes telles qu'elles se sont déroulées dans les années 70. Cependant il faut noter que, au contraire des bonobos et des gorilles, il n'est pas évident que ce fut le cas pour les chimpanzés commun au delà d'un certain âge, étant donné que de nombreux programmes se sont arrêtés lorsque les sujets avaient atteint leur maturité ou introduisaient des barrières physiques lors des interactions entre espèces. Ainsi, il semble que ce soit au Japon que les pratiques en contact direct prennent leur forme la plus radicale, c'est-à-dire au travers d'interactions durant l'âge adulte, quand la fore des chimpanzés devient un danger potentiel pour les humains.

Après avoir esquissé ces traits généraux, nous allons maintenant les aborder concrètement. Nous présentons ainsi un aperçu des tâches quotidiennes au PRI et montrons que deux types de tâches incombent à la fois aux soigneurs et aux chercheurs: appeler les chimpanzés et les nourrir. Nous nous évaluons ensuite l'importance de la tâche de nourrissage, dès lors qu'il s'agit d'une activité dans laquelle les relations inter-espèces s'expriment de manière interpersonnelle, et où passer plus de temps avec les chimpanzés permet de construire une bonne relation avec chaque individu. Ainsi, au PRI, tous les chercheurs sont incités à participer au nourrissage. Étant donné l'importance de cette activité, nous explorons le nourrissage au moyen d'une analyse au cours de quatre études différentes. Nous montrons par ce biais que le désir de construire une bonne relation avec des chimpanzés se reflètent dans les vingt heures supplémentaires par mois que les doctorants, post-doctorants et assistants de recherche passent à interagir avec les chimpanzés dans un contexte de nourrissage, en plus des heures passées à interagir avec eux dans le contexte des expériences.

Deuxièmement, si l'on évalue leur investissement en fonction de l'effectuation de ces tâches durant les week-ends ou les vacances, on ne trouve aucun écart significatif entre les professeurs et les post-doctorants, les étudiants ou les assistants. Concrètement, ces trois dernières catégories passent en moyenne la même durée avec les chimpanzés pendant les vacances et les weekends (environ 7h/mois) et à peu près le même nombre de jours de congés affairés à ces tâches (25% du nombre total des mois passés à l'Institut). Enfin, bien que nous n'ayons pas pu mener une comparaison avec les interactions entre soigneurs et chimpanzés pendant le nourrissage, nous avons pu établir que les chercheurs du PRI ne sont pas seulement fortement incités à participer au nourrissage, mais qu'ils sont parfois plus actifs dans ce rôle que les soigneurs. Tandis que les postdocs, les étudiants et les assistants de recherche sont ceux qui s'engagent le plus dans cette tâche, le temps qu'y est dévolu par les professeurs et les soigneurs est curieusement très semblable. Nous montrons que nos interlocuteurs tiennent en effet en haute estime les activités de nourrissage, et qu'ils les voient comme un moyen de construire et d'entretenir une bonne relation avec les chimpanzés, ce qui en retour permet le bon déroulement des expériences. Cependant, l'intensité de ces tâches de nourrissage est remise en cause par beaucoup, étant donné que les chercheurs ont aussi des responsabilités qui ne peuvent incomber qu'à eux, et non aux soigneurs.

Après avoir exploré les pratiques propres au PRI, nous nous interrogeons sur la manière dont ses membres présentent leurs activités au public. Nous analysons la vidéo de présentation la plus vue, qui présente l'expérience la plus célèbre menée au PRI, sur la représentation symbolique et le fonctionnement de la mémoire à court terme chez les chimpanzés. La vidéo montre nombre des aspects fondamentaux soulignés par nos interlocuteurs tels que l'imitation de la nature, la confiance, la participation volontaire des chimpanzés, l'objectivité de l'interface expérimentale et les chimpanzés comme perspective extérieure sur l'esprit humain. Le message le plus significatif de cette vidéo est que les capacités mentales des chimpanzés puissent décentrer du point de vue qu'ont les humains de leurs propres capacités. Nous abordons ensuite cette question en nous plongeant dans ces expériences et en analysant les controverses qui leur sont liées.

Dans cette étude, un des participants, le chimpanzé Ayumu, fils d'Ai, fait mieux que les humains dans une tâche de mémoire impliquant de ranger dans l'ordre des numéros ordinaux. L'étude ayant bénéficié d'une attention soutenue, d'autres chercheurs ont tenté de répliquer chez des humains les performances d'Ayumu. Leur argument était que les humains et les chimpanzés de cette étude ne recevaient pas le même nombre de sessions d'entraînement, et que si les humains participaient au même nombre de sessions qu'Ayumu, ils seraient en mesure d'atteindre les mêmes performances. Néanmoins, en lisant attentivement ces études, on peut observer que les auteurs n'ont pas vraiment fait correspondre la quantité de sessions mais on introduit un nombre accru d'essais pour obtenir les mêmes résultats. Ils ont pourtant affirmé que les performances étaient les mêmes (Ayumu avait accompli 900 essais dans l'étude originale, à comparer aux 15 350 essais accomplis dans l'étude critique). En outre, nous ajoutons que parce que la tâche mobilise non seulement la mémoire mais aussi une symbolique typiquement humaine, les humains, qui ont de ce fait un entraînement à vie, dispose déjà d'un avantage sur le chimpanzé. Ainsi, dans ce cas précis, en conservant le nombre de sessions entre chimpanzés et humains inégal, on rend en fait la comparaison inter-espèce plus juste.

Dans la partie suivante, nous nous intéressons aux dynamiques des expériences menée en contact direct avec les chimpanzés, en analysant les activités qu'Ai et Matsuzawa accomplissent dans ces conditions. Nous analysons ainsi des extraits vidéo de leurs interactions, que nous avons enregistrés durant notre ethnographie. Les premières activités que nous abordons consistent pour les chimpanzés à empiler des blocs d'une part, et des tasses d'autre part.

Il s'agit d'essais à partir d'expériences simples déjà menées auparavant, qui permettent l'étude de la manipulation d'objet et du développement cognitif des enfants. Nous expliquons ainsi qu'une tâche peut-être résolue par des stratégies cognitives différentes, dont chacune va mettre en jeu des capacités mentales plus ou moins grandes. Il existe ainsi une hiérarchie dans la complexité des solutions qui peuvent être proposées par le chimpanzé, au sens où celles-ci peuvent se déployer en séquences d'actions dont l'individu doit saisir l'ordre de réalisation afin de réaliser correctement la tâche demandée (pour illustrer ceci, nous donnons l'exemple de deux méthodes différentes, *pot method* et *subassembly method*).

Les activités menées en contact direct que nous nous attachons à décrire ensuite sont la peinture, la prise de photographies, les bilans de santé, le dressage, le jeu et l'épouillage. Nous portons une attention toute particulière à la manière dont les humains transmettent des informations aux chimpanzés. Il ne s'agit pas seulement d'employer des consignes verbales en japonais ou en anglais, mais aussi de passer par la communication non verbale comme pointer du doigt ou signifier une demande par un geste. En outre, Matsuzawa utilise la langue des signes japonaise

lorsqu'il interagit avec Ai. A travers nos observations ethnographiques, il ressort que la communication multimodale est la plus puissante pour aboutir à une compréhension de la part des chimpanzés. Suivant cette logique, nous nous intéressons à certains traits individuels qui apparaissent dans les jeux ou les épouillages inter-espèces, comme la maîtrise de soi que démontre Ai lorsqu'elle ajuste sa force à l'interaction ou son habitude de boutonner et déboutonner les vêtements, que Matsuzawa interprète comme une forme d'épouillage appliqué à un primate dénué de poils. Toutes les activités ainsi décrites sont ensuite accompagnées d'études de cas à partir de vidéos ethnographiques. Dans l'enregistrement d'un bilan de santé, nous observons ainsi le premier entrainement d'Ai au prélèvement de son sang, au cours duquel aucun renforcement positif par le don de friandises n'a été utilisé.

Après avoir exploré les pratiques guidant la recherche et les soins au PRI ainsi que quelques-unes des expériences les plus significatives, nous présentons, à travers un récit à la première personne, la conception, la mise en œuvre et les défis liés à la conduite d'une expérience au laboratoire. Dans cette section, nous rendons compte de notre parcours en tant qu'anthropologue évoluant dans le laboratoire jusqu'à devenir expérimentatrice. Il s'agit de revenir sur cette situation qui présente double contrainte, puisque nous avons eu à naviguer entre des disciplines dotées de paradigmes de recherche distincts. En parallèle, nous expliquons étape par étape la manière dont l'expérience a été proposée et conçue, sa logique et la préparation de sa mise en œuvre. Au contraire des expériences automatisées où les chimpanzés interagissent surtout avec un ordinateur au cours de leur performance, l'expérience dont il est question a consisté en un contact semi-direct, c'est à dire qu'elle requérait une interaction sociale avec les chimpanzés durant le test, mais toujours au travers d'un dispositif matériel.

En nous interrogeant concrètement sur les défis que présente l'évaluation du point de vue du chimpanzé, la perspective de la caméra, le design du dispositif etc., nous abordons la problématique complexe du statut de la relation interpersonnelle dans une expérience menée avec des chimpanzés. À la différence des études observationnelles qui examinent la cognition située, cette expérience requiert de garder l'élément social sous contrôle afin de rester dans les mêmes conditions. Nous rappelons les étapes requises pour devenir un expérimentateur et nous y joignons des réflexions sur ce que cela signifie pour nous dans ce contexte particulier. Au travers de notre expérience ethnographique, nous soulevons le débat sur l'éthique de la recherche menée sur les

animaux en captivité, ainsi que les différences entre des études invasives et non-invasives menées sur des chimpanzés et des singes.

La deuxième partie de ce récit ethnographique montre comment les relations inter-espèces finissent par faire elle-même partie de l'expérience. Cela nous renvoie à l'importance de passer du temps avec les chimpanzés pour construire une bonne relation avec eux, ce qui se traduit concrètement par un entraînement au nourrissage en compagnie d'autres chimpanzés. Une autre composante est le besoin d'une période d'entraînement, non seulement pour permettre au chimpanzé de comprendre comment l'expérience fonctionne mais aussi de lui permettre d'intégrer la présence de l'expérimentateur comme faisant partie du dispositif expérimental. En d'autres termes, il s'agit de faire accepter auprès des chimpanzés l'expérimentateur en tant qu'expérimentateur et non en tant qu'observateur régulier du laboratoire.

La troisième partie de ce récit se concentre sur la capacité des chimpanzés à fournir un feed-back sur le protocole expérimental. À cette fin, nous évoquons davantage les échecs de l'expérience plutôt que ses réussites. Nous évaluerons comment les chimpanzés réagissent différemment au protocole lorsque l'on compare la phase d'entraînement et la phase de l'expérience elle-même. Nous montrons que l'échec de certains chimpanzés dans l'adaptation au protocole expérimental est en réalité le résultat d'un comportement intelligent que l'on n'avait pas prévu au moment de sa conception. Nous illustrons cette remarque par une analyse de la vidéo d'une session qui nous a contraint à la modification dudit protocole. Dans cette session avec Pan, cette dernière montre des comportements agonistiques vis-à-vis de l'expérimentateur après avoir échoué à effectuer ce que demandait le protocole. Ce moment est analysé et nous en relevons plusieurs aspects dont le plus important est le rôle joué par la communication inter-espèce et le problème de l'indéterminé de la traduction. En outre, le protocole expérimental donné lieu à des relations inter-espèces chargées de négativité ; après en avoir reconsidéré toutes les variables, nous avons dû repenser le protocole.

Nous analysons ainsi la manière dont notre nouveau protocole allait être mis à l'épreuve par les chimpanzés, cette fois en la personne de Pendesa. Pendesa était le chimpanzé le plus performant dans cette expérience qui consistait à catégoriser des objets et des couleurs. Cependant, dans ce qui constitue la tâche la plus difficile pour des chimpanzés (c'est-à-dire cibler des couleurs), Pendesa, incapable d'aboutir au résultat correct, a eu recours à une nouvelle stratégie qui reposait sur la recherche d'un encouragement de la part de l'expérimentateur avant de faire son choix final (c'est-à-dire relâcher l'entité [*item*] du côté de l'expérimentateur). Pourtant, cette fois, sans prévoir l'émergence de son comportement qui visait à « tester » l'expérimentateur, le protocole rendait inutile ses efforts étant donné que le feedback positif n'était donné qu'une fois l'entité (*item*) lâchée, jamais avant. Une analyse des entités choisies durant ce comportement de test révèle qu'elle faisait probablement des suppositions basées sur son expérience avec les cibles adoptées auparavant.

Nous concluons ce chapitre par un rappel des leçons apprises de la formation d'une nouvelle expérimentatrice qui devait poursuive ce travail. Ce processus a confirmé que l'expérience en contact semi-direct s'incarne dans le corps et les actions de l'expérimentateur, qui sont coordonnés de manière kinesthésique avec ceux des chimpanzés. Deuxièmement, cela nous a permis de confirmer que la préexistence d'une relation interpersonnelle entre l'humain et le chimpanzé est vitale pour le succès du protocole. Bien que notre successeuse fût déjà une expérimentatrice habituelle pour les expériences menées sur ordinateur, elle devait devenir une partie de ce dispositif singulier, au travers d'un entraînement à la relation au chimpanzé. Nous avons pu ainsi conclure que l'effort des expérimentateurs pour comprendre le point de vue des chimpanzés peut être saisi plus adéquatement par analogie à l'effort de l'anthropologue pour comprendre les autochtones de la même manière qu'ils se comprennent eux-mêmes.

Chapitre 4 : Le dernier chapitre du manuscrit s'intitule « Frontières symboliques : la limite subtile entre humains et chimpanzés ». Cette partie ne traite pas de la différence entre les humains et les chimpanzés dans la compréhension des symboles mais se concentre sur un épiphénomène subtil, ancré dans des expériences sociales plus profondes et de ce fait, capable de nous révéler ces dernières. Nous commençons cette partie par le récit à la première personne d'un cours de japonais, où l'ethnographe que nous sommes découvre qu'un usage linguistique acquis au sein de l'Institut est en réalité étrange aux yeux de personnes extérieures.

La langue japonaise présente un système de dénombrement qui diffère de celui des langues germaniques ou latines. Cette différence consiste en l'usage de classificateurs numériques, suffixes placés entre le nombre et l'objet du comptage, et connus sous le nom de compteurs. Il y a environ 150 compteurs en japonais et le critère pour choisir celui que l'on emploie dépend de la caractéristique du nom sur lequel le comptage porte, par exemple s'il s'agit d'un animé, sa taille etc. Ainsi, au lieu de juxtaposer un nombre et un nom (par exemple, 7 humains), on intercale le compteur approprié, comme par exemple « 7 (compteurs propre à l'humain) humains ». Parce que le compteur renvoie à des attributs du nom, et non à la mesure elle-même, il s'agit d'un outil qui

sert à catégoriser des êtres. Nous explorons ainsi les compteurs propres aux primates : pour les humains, *nin*, pour les grands primates tels les chimpanzés, *tō*, et pour les petits primates, *hiki*. Nous défendons et illustrons l'idée que *nin* signale en effet une personne, et faisons remarquer qu'au PRI, les chercheurs emploient le compteur propre aux humains lorsqu'ils se réfèrent aux chimpanzés.

Pour nos interlocuteurs du PRI, les ressemblances perçues qui justifient cet usage linguistique reposent sur la complexité cognitive et la proximité phylogénétique. En fait, ces arguments sont semblables à ceux qui sont mobilisés par un réseau international plus large militant pour la transformation et l'attribution aux primates non humains d'un statut juridique de personne non-humaine (on citera par exemple le *Great Ape Project* et le *Nonhuman Rights Projects*). En d'autres termes, dans le milieu scientifique, l'attribution du statut de « personne » suit les prémisses du naturalisme - une manière de se rapporter aux non-humains qui en soulignent les traits biologiques partagés avec les humains et les capacités cognitives semblables à celles des humains. Nous développons ensuite trois études linguistiques conduites dans le but d'évaluer les usages linguistiques des chercheurs au PRI.

Dans la première étude linguistique, nous cherchons à identifier le compteur que les locuteurs dont le japonais est la langue maternelle emploient lorsqu'ils se réfèrent aux chimpanzés du laboratoire. Cette étude rapporte que 85% des répondants ont dit utiliser le compteur propre aux humains, le reste des sondés employant celui destiné aux grands animaux et aux individus. Dans la seconde étude linguistique, dès lors que le compteur destiné aux individus (i.e., *kotai*) est considéré comme le mieux adapté à la communication scientifique, nous rendons compte de son usage dans des publications japonaises. Nous observons que plus les publications sont techniques, plus les auteurs usent de ce suffixe propre aux individus ; tandis que plus les publications sont accessibles au public, plus les auteurs usent du classificateur destiné aux humains. En plus de cette étude, nous donnons l'exemple d'autres formes d'insistance sur l'agentivité (*agency*) des chimpanzés à travers les termes japonais employés dans les écrits de psychologie.

Dans la troisième étude linguistique, nous nous intéressons à la manière dont les chercheurs japonais désignent les chimpanzés dans d'autres langues que la leur. Nous observons ainsi que le terme « *participant* », en lieu et place de « *test subject* », est un marqueur d'agentivité (*agency*). Nous indiquons que les recommandations de *l'American Psychological Association*, qui édicte les normes de publication en psychologie, préconise l'usage du pronom "*who*" pour les

humains et du pronom "*that/which*" pour les non-humains. En passant en revue les publications les plus récentes des chercheurs du PRI, nous montrons que 75% de ces articles désignent les chimpanzés en usant du terme de « *participant* » au lieu de « *subjects* » tandis que 25% usent du terme de *subject*, mais le font cependant suivre du pronom "*who*" au lieu de "*which/that*". Pour compléter cette étude, nous examinons plusieurs publications, dont les auteurs sont des collaborateurs ou non du PRI. Dans celles-ci, l'usage des termes de *participant* et de *subject* pour désigner des animaux non-humains ne semble pas s'être stabilisé, quelle que soit l'espèce considérée. Néanmoins, la présence croissante du pronom relatif "*who*" semble indiquer qu'il y a peut-être là une tendance accrue à reconnaître l'agentivité de l'animal non-humain dans le cadre des recherches non invasives sur la cognition.

Ensuite, nous détaillons les raisons pour lesquelles la perception de l'agentivité qui s'exprime dans les emplois du couple de termes anglais « *participant/subject* » ne sera pas nécessairement assimilable à l'usage de compteurs distincts en japonais (par exemple du compteur pour l'humain ou pour l'individu), dès lors que le cas japonais semble indiquer une plus forte différence dans la connotation de ces compteurs. En outre, étant donné que le PRI comprend des chercheurs coréens et chinois parmi ceux travaillant avec les chimpanzés, nous analysons les usages des classificateurs dans ces deux autres langues. Nous montrons que les locuteurs coréens qui emploient le compteur de l'humain pour désigner les chimpanzés n'étendent pas cet usage à leur langue d'origine, usant alors du compteur destiné aux animaux lorsqu'ils désignent des chimpanzés en coréen.

Quant au mandarin, nous observons que si ce langage présente des compteurs spécifiques pour les animaux, il présente aussi un classificateur unique qui est à la fois un marqueur humain et un marqueur général ($g\dot{e}$). En pratique, ce compteur est utilisé pour des animaux très différents des humains (lorsqu'il est employé comme un classificateur général) et pour des animaux très similaires aux humains (lorsqu'il est employé comme un marqueur humain). Ainsi, le même travail des frontières qui distingue nos manières de traiter linguistiquement les humains et les autres animaux existe dans d'autres langues usant de classificateurs ; de plus, étendre l'usage des classificateurs commun requiert des croyances plus fortes lorsque le compteur présente une spécificité plus grande vis-à-vis de l'humain comme c'est le cas en japonais.

Pour conclure cette discussion linguistique, nous soulignons que la familiarité ne peut suffire à justifier la transgression des frontières linguistiques dès lors que les chercheurs situent ces usages dans le contexte plus large de la catégorie du chimpanzé et non dans celui de l'individu familier. Il nous faut ainsi évoquer la distinction entre un anthropomorphisme anthropocentriste, dans lequel les animaux sont appréhendés en termes de leur capacité à se comporter comme des humains, et un anthropomorphisme zoocentrée, dans lequel existe un effort considérable pour comprendre les animaux dans leurs propres termes. Nous établissons ensuite une seconde différence, celle qui existe entre l'anthropomorphisme et la personnification, processus par lequel d'autres êtres vivants deviennent des acteurs sociaux les uns envers les autres.

Nous abordons les devenirs sociaux entre espèces sur la base de quelques passages ethnographiques choisis. Le premier décrit une expérience d'enseignement, au cours de laquelle les expérimentateurs ont dû devenir des chimpanzés pour être de meilleurs scientifiques. « Devenir chimpanzé », en ce sens, va au-delà de la simple imitation des caractéristiques que l'on perçoit des chimpanzés et dont les humains peuvent tirer partie en les incarnant à leur tour. Cela consiste davantage en un effort pour voir le monde comme un chimpanzé particulier en ferait l'expérience dans un contexte donné. Nous abordons ensuite la problématique du changement de perspective depuis deux disciplines, les sciences cognitives et l'anthropologie sociale.

Dans les sciences cognitives, la théorie de l'esprit désigne l'attribution d'états mentaux aux autres. Selon cette conception, il existe une multiplicité de points de vue sur un monde unique. Dans d'autres manières de concevoir les animaux non humains, par exemple l'animisme amérindiens et le perspectivisme, les animaux sont perçus comme partageant des qualités humaines, et dans les cas les plus radicaux, comme s'identifiant eux-mêmes comme des humains. Ainsi, dans de tels cas, l'humanité est de fait un marqueur de la notion de personne. Dans le corollaire perspectiviste de l'animisme, il y a des mondes multiples qui s'offrent à un point de vue unique. Nous nous intéressons ensuite à ce que l'on aurait à gagner au traitement conjoint de la perspective traditionnelle des sciences cognitives et de la perspective socio-anthropologique.

Reprenant un thème philosophique et socio-anthropologique, celui de la métamorphose, nous approchons la question de « chimpanzéification » des humains qui travaillent avec des chimpanzés. D'abord, nous explorons le processus par lequel les amérindiens adoptent la perspective de l'animal tandis qu'ils évitent en même temps le risque d'en devenir un en changeant complètement de perspective. Suivant ces hypothèses, nous rappelons qu'en travaillant intensivement avec une espèce donnée, certaines caractéristiques de cet Autre privilégié imprègnent nos propres comportements. Nous défendons l'idée que la chimpanzéification est caractérisée par deux niveaux. Le premier est l'intention ou le processus par lequel nous sommes capables d'adopter la perspective du chimpanzé à une échelle personnelle ; il est évalué de manière positive par nos interlocuteurs. Le second est l'intention ou le processus par lequel nous modifions nos comportements dans le but de les faire correspondre aux schémas comportementaux de l'autre espèce ; tandis que ce dernier est perçu comme un avantage lorsqu'on le dirige envers les chimpanzés, il est vu comme un obstacle lorsqu'on s'adresse à des humains (d'où l'expression *"speak human to me*!").

On observe un troisième aspect du processus de chimpanzéification lorsque les chimpanzés disposent d'un pouvoir considérable dans leur relation avec les humains. Nous éclairons ce phénomène en analysant une session expérimentale difficile que nous avons conduite. Dans cette session, le chimpanzé cherche à mobiliser un observateur de plus haut rang après qu'une action conduite par l'expérimentatrice a provoqué une réaction intense de la part de ce même chimpanzé. Si les humains sont capables de traiter les chimpanzés comme des acteurs sociaux valables, nous soulignons alors l'importance et la nécessité de poursuivre les recherches sur ce qui, pour un chimpanzé, constitue une personne ou sur ce que serait une personne dans les termes du chimpanzé lui-même. Nous acheminant vers la fin de ce chapitre, nous nous intéressons à la signification de la vie et de la mort des chimpanzés auprès des membres du PRI.

Tout d'abord, nous examinons la manière dont sont fêtés les anniversaires des chimpanzés. En la comparant avec l'anniversaire d'un gibbon au Centre des Singes du Japon (*Japan Monkey Centre*), nous soulevons l'hypothèse selon laquelle, au lieu de lire ces événements comme la démonstration d'un anthropocentrisme anthropocentré, nous pouvons les interpréter comme faisant partie d'un processus de personnification. Nous indiquons un changement d'attitude vis-àvis d'un animal : d'une attention à ses performances dans la réalisation d'activités similaires à celles des humains, à un intérêt pour ses comportements naturels et pour les histoires et les anecdotes individuelles. Au contraire de la célébration de comportements humains, cette tendance ouvre un espace de reconnaissance de la spécificité de l'animal à l'échelle de l'espèce comme à celle de l'individu. Nous concluons qu'à chaque fois que l'attribution d'émotions, d'une individualité, d'histoires, d'anecdotes, et d'agentivité sociale est accompagnée d'une perspective zoocentrée, c'est à-dire d'un effort pour comprendre l'animal dans ses propres termes, alors nous entrons dans la personnification - dans des processus de fabrication de la personne, fût-elle non humaine - et non dans l'anthropomorphisme. Ensuite, nous examinons dans quelle mesure la personnification est mise en œuvre au PRI. La seconde problématique touchant à la vie et à la mort des chimpanzés concerne le débat sur l'euthanasie d'un chimpanzé gravement handicapé, Reo, qui a subitement souffert d'une tétraplégie après une inflammation de la moelle épinière. Cependant, dans la mesure où Reo conservait sa personnalité et était tout à fait vivant en dépit des restrictions de sa mobilité, les membres du PRI ont exclu la possibilité de l'euthanasie. Son rétablissement partiel a été obtenu par une physiothérapie en contact direct et un protocole expérimental dans lequel Reo devait marcher pendant une certaine distance avant de recevoir la récompense alimentaire suite à ses essais.

Le troisième exemple que nous mettons en lumière est le symétrique inverse du cas de Reo. On a retrouvé un jour Puchi, l'un des chimpanzés les plus âgés du PRI, allongée sur le sol, inconsciente. De là, nous accompagnons le déroulé de son traitement médical, la réaction de la fille de Puchi et la manière dont, après que la mort cérébrale a été diagnostiquée, le personnel a choisi de suivre les mêmes protocoles que pour un patient humain atteint de mort cérébrale. Cette décision était fondée sur la croyance selon laquelle Puchi ne pouvait pas être traitée comme un animal de laboratoire. Pour nos interlocuteurs, le dernier message de Puchi a consisté en l'affirmation que la mort d'un chimpanzé devrait être traitée de la même manière que la mort d'un humain.

Cependant, nous devons faire remarquer une subtilité. Quand ce message a été transmis en japonais à l'écrit, le mot « humain » n'apparaissait pas dans sa connotation d'espèce humaine (i.e., qui s'écrit alors en katakana), mais dans sa connotation de personne humaine (i.e., à travers un kanji). Ainsi, au-delà de la proximité phylogénétique, on a fait l'expérience de la mort de ce chimpanzé non comme celle d'un spécimen biologique, mais en sa qualité de personne. Nous concluons donc à la nécessité de s'engager dans des perspectives zoocentrées sur la notion de personne, où un animal en tant que personne se conçoit non comme un humain incomplet mais dans les termes propres à l'animal lui-même.

Conclusion générale : Il y a quatre thématiques principales, dont chacune est mise en évidence dans un chapitre mais qui les traversent tous. Elles émergent d'une analyse pluraliste de la manière dont les humains et les chimpanzés construisent des relations sociales au sein de l'Institut de Recherche sur les Primates de l'Université de Kyoto. Ces thématiques sont les suivantes :

- La socialisation inter-espèce
- L'incarnation de ces relations dans l'espace
- Les relations inter-espèces dans le contexte scientifique
- Les perspectives zoocentrées sur la notion de « personne »

Pour chacune de ces thématiques, ce travail étho-ethnographique présente une conclusion générale. Concernant la première, nous soutenons que l'apprentissage social entre espèces se déroule de manière fluide, et qu'il est entretenu par des histoires relationnelles multiples ainsi que par des mécanismes d'apprentissage. En outre, le monde matériel et technique structure l'élaboration de ces relations en contraignant ou en encourageant certaines interactions. Bien que nous souhaitons aboutir à une compréhension solide des idées et des concepts plutôt que nous attarder sur des détails terminologiques, nous devons remarquer que le terme employé pour souligner ce *leitmotiv* est celui de socialisation et non de socialité ou d'apprentissage social. Bien que la socialisation englobe ces deux derniers termes, leurs usages font signe vers d'autres aspects centraux et d'autres méthodologies.

La socialité désigne davantage les pressions due à l'Evolution : son déploiement est considéré à l'échelle de l'espèce ; l'apprentissage social cible davantage un processus psychologique. La socialisation, traditionnellement employée dans les sciences sociales, concerne le processus par lequel des individus internalisent ce qui leur vient des autres dans une situation récurrente. Bien que l'usage de l'un n'exclut pas les autres, la socialisation se trouve refléter une approche plus holiste que les termes précédents, plus souvent utilisés au sein d'autres disciplines ; ainsi ce terme situe la discussion non pas du seul point de vue de l'espèce mais au niveau de la construction idiosyncrasique du soi, et des enjeux qui lui sont liés.

Quant au second point, nous défendons l'idée que les relations inter-espèces, particulièrement lorsqu'elles présentent un danger, incite à être davantage conscient et attentif à l'espace et au monde matériel environnant. C'est ainsi que les relations inter-espèces s'incarnent dans l'espace et à travers lui. D'abord, toute relation entre un humain et un chimpanzé génère des techniques corporelles particulières et une organisation sociale de l'espace. Les interactions interespèces sont soumises à la manière dont humains et chimpanzés prennent possession de l'espace en tenant compte les uns des autres, et la manière dont ces espaces y sont adaptés. Deuxièmement, selon la manière dont le monde matériel et l'espace sont conçus, certaines interactions deviennent possibles, et d'autres sont au contraire empêchées. À travers cette médiation, les relations se déploient et sont mises à l'épreuve de telle sorte que l'architecture de ces espaces joue un rôle considérable quant à la manière dont les humains et les chimpanzés développent leurs relations.

Concernant ce troisième point, nous affirmons l'importance des relations inter-spécifiques et de leur inscription dans le protocole expérimental. En d'autres termes, la relation personnalisée entre un expérimentateur et le chimpanzé participant doit être introduite dans le protocole expérimental et mise à l'épreuve. En outre, les chimpanzés fournissent un feedback lors de l'expérience, parce qu'ils usent de moyens détournés soit pour contourner le protocole expérimental ou soit pour le dépasser par leur intelligence. Enfin nous devons faire remarquer que cet aspect ne renvoie pas seulement à des considérations épistémologiques mais que l'on peut le voir comme une question technique qu'il vaut la peine de prendre en compte au moment de faire le bilan d'une expérience. Il reste que cet aspect demeure largement ignoré dans les publications techniques.

En considérant le quatrième point, nous soutenons que l'anthropomorphisation et la personnification sont des processus distincts et que les phénomènes sociaux observés dans la recherche sur les chimpanzés du PRI doivent davantage à des processus de personnification qu'à une anthropomorphisation. De plus, nous signalons que la conception et la constitution des animaux non humains comme étant des personnes bénéficierait d'un développement des perspectives zoocentrées dans lesquelles un effort interdisciplinaire intense est généré pour comprendre un animal dans ses propres termes, au lieu de faire des non humains une version incomplète de l'humanité.

Perspectives et Hypothèses pour l'avenir : Etant donné que l'approche interdisciplinaire des relations entre humains et chimpanzés n'en est encore qu'à ses débuts, les orientations souhaitables pour la recherche future sont nombreuses. Dans chacun des axes susmentionnés, il nous faut considérer plusieurs problématiques dans une perspective interdisciplinaire, telles qu'elles ont été formulées tout au long de cette recherche. Cependant, à l'occasion de cette conclusion générale, nous devons souligner qu'une approche similaire, usant de ressources méthodologiques plurielles, devrait être mise en œuvre pour l'exploration des relations entre humains et chimpanzés dans d'autres institutions de recherche dans le monde, aussi bien que pour l'étude des rencontres entre humains et chimpanzés dans un milieu naturel. En outre, une approche

systématique et standardisée des interactions sur différents sites, aurait la capacité de rendre cette ambition comparative fructueuse et véritablement intéressante.

L'apport le plus important de cette recherche ne réside sans doute pas dans les questions auxquelles elle a été capable de répondre mais dans celles qui demeurent en suspens – non pas dans les phénomènes qu'elle a su expliquer mais dans ceux qu'elle a pu dévoiler aux yeux du lecteur. La raison en est que nous croyons crucial d'encourager un programme de recherche interdisciplinaire qui pourra réellement envisager d'aller au-delà des représentations humaines des animaux (traditionnellement mobilisées par les humanités) et des hypothèses scientifiques restreintes (dont usent traditionnellement les sciences de la vie). L'anthropologie de la primatologie et l'ethnoprimatologie sont capables de traiter nombre d'aspects de la relation humain-animal, et ceci de manière tout à fait compétente, mais pas d'une manière véritablement interdisciplinaire, ce qui limite le nombre de questions et de phénomènes pouvant émerger de ces travaux. Par interdisciplinarité, nous ne nous référons pas à des ponts entre des disciplines déjà proches comme c'est le cas de l'histoire et de la philosophie, ou de la génétique et de la psychologie cognitive, dès lors que chacune de ces paires comprend des paradigmes communs sur lesquelles différentes disciplines peuvent s'accorder. Nous nous référons ici à ces véritables ruptures qui existent entre les sciences de la vie et les humanités, en termes de formation comme de croyances.

Cette tentative, bien qu'ambitieuse, nous semble prometteuse. Il y aurait là la possibilité de créer des objets assez robustes, qui puissent s'adapter aux intentions et aux sensibilités disciplinaires tout en maintenant leur intégrité au fil des approches disciplinaires différentes - comme une sorte de *lingua franca* parlée avec différents accents. S'agissant de la primatologie et de l'ethnoprimatologie, nous devons encore développer une meilleure compréhension de ce que les humanités regroupent sous la notion de « signification ». Que signifie pour un primate d'être en interaction avec des humains, avec des congénères ou avec leur environnement ? Comment les primates donnent-ils un sens au monde au-delà de ce que peuvent en dire les sciences de la vie ? Quelles sont leurs pratiques en termes d'attribution de l'altérité et de fabrications de soi ? Quel sens les primates donnent-ils aux processus vitaux ? Que veut dire être un chimpanzé pour un chimpanzé, ou encore, que signifie d'être un chimpanzé d'une communauté particulière avec une histoire particulière touchant à ses relations sociales ? Comment répondre à ces questions sans mobiliser la « machine » cognitive humaine ? Disposons-nous d'une méthodologie qui puisse être sensible à la phénoménologie mais qui demeure ancrée empiriquement dans le comportement

animal ? Existe-t-il certains aspects dans ces significations propres aux chimpanzés qui les relient aux significations humaines ? Ainsi, bien que les disciplines considérées aient connu des avancées dans ces questionnements, nous avons encore besoin d'un travail conceptuel plus profond.

Mutatis mutandis, en regardant du côté de l'anthropologie et des sous-disciplines qui lui sont liés comme l'anthropologie de la nature, l'anthropologie de la vie et les études sur les primates, une approche des relations inter-espèces ancrée dans le comportement animal offre la possibilité de dévoiler une perspective différente de celle qu'offre la conceptualisation humaine de la nature et des processus vitaux, les deux aspects étant bien entendu entremêlés. Cependant, pour accomplir ce but, une expertise sur les animaux dont il est question est nécessaire. De plus, parce que les méthodologies reposant sur les récits oraux échouent à rendre compte de la perspective non humaines, les humanités gagneraient à mobiliser des outils méthodologiques habituellement employés dans l'étude du comportement animal et de la cognition et, en retour, à leur redonner du sens.

En gardant un œil attentif sur les usages et mésusages des données quantitatives, mais en mettant de côté une tendance à l'insularité méthodologique, les humanités devraient revendiquer de s'aventurer dans un tel domaine. La raison principale en est que bien que les études qualitatives puissent être systématiques, les études quantitatives rendent mieux compte des phénomènes comportementaux et interactionnels structurant surtout lorsqu'il s'agit d'échanges non verbaux. Rendre compte de ces modèles est crucial pour bien saisir la signification de ces actions. Au lieu d'adopter une position défensive envers les objets propres aux autres sciences, position que l'on comprend mieux dans un contexte où les sciences naturelles et biologiques attirent davantage d'attention et de fonds, les humanités pourraient bénéficier du développement d'une expertise capable de rendre opérationnels de telles méthodes et objets. La compréhension profonde, conceptuelle, d'un objet ou d'un sujet ne signifie pas que l'on a toutes les compétences nécessaires à la mobilisation des outils qu'il fournit. Or ceci nous semble crucial afin de ré-élaborer ces outils à la lumière des valeurs qui sont fondamentales pour une culture universitaire donné, ou peut-être dans pour en cultiver de nouvelles.

Enfin, nous devons reconsidérer le rôle des études des sciences (*Science and technology studies, STS*) dans une telle aventure. Les STS, qui sont une méta-analyse de la science, ont un rôle important à jouer dans l'élaboration de nouvelles sciences. L'on a en effet souvent souligné que l'interdisciplinarité était un mot attrayant et séduisant, surtout lorsqu'il s'agit d'obtenir des

financements, mais que l'on atteignait en pratique avec beaucoup de difficulté. La remarque suivante nous mènera sans doute au plus proche d'une solution : en étudiant leurs paradigmes et en les rendant explicites, les enjeux pour les acteurs deviennent assez évidents pour autoriser la problématisation de nos propres processus de socialisation au sein d'une culture universitaire. Enfin, considérons le fait suivant comme une récompense pour les chercheurs des STS travaillant sur des sujets connexes et qui oseraient s'aventurer dans une telle entreprise : la science qui s'attache à la compréhension d'êtres aux capacités socio-cognitives complexes ne peut être produite sans tenir compte des feedbacks que ces êtres nous fournissent au moment même où nous faisons de la science. Ainsi, concernant l'anthropologie, les mêmes arguments s'appliquent : seule une exploration ancrée dans une expertise empirique sur le comportement animal est capable de révéler la perspective animale sur ce à quoi nous donnons le nom de science en action. Tandis que de premières voies ont été tracées, cette direction n'en est encore qu'à ses débuts.

Ces traversées montrent la nécessité de légitimer de nouveaux développements dans chacune de ses disciplines aux yeux des disciplines connexes. La légitimation signifie ici une exploration en commun du monde. Au cours de ce processus, les développements conceptuels et méthodologiques dans une des disciplines vont de paire avec ceux des disciplines compagnes. Ce processus de création de compagnonnage disciplinaire n'est pas évident, dès lors qu'il y a une différence entre parler d'une discipline et l'observer, et produire des avancées scientifiques en coopération avec ce champ. C'est une compétence que l'on développe sans doute mieux en soumettant les chercheurs à des situations parfois douloureuses de double contrainte, où l'on doit prendre en compte deux *modus operandi* valides qui apparaissent en même temps irréconciliables. Il ne s'agit alors pas d'argumenter depuis l'extérieur mais seulement à partir du dedans. Sauf que le dedans consiste ici à trouver la sortie de la double contrainte, c'est-à-dire à inventer une solution à l'aporie disciplinaire.

Enfin, le brouillage des frontières entre les disciplines nous conduit à promouvoir des assemblages étranges, incommodes, qui émergent déjà de toute part): une primatologie des êtres humains plutôt que de l'espèce humaine, une anthropologie socio-culturelles des primates non humains, et des *STS* zoocentrées. Nous avons besoin d'une vision et d'objectifs concrets. Tandis que les objectifs sont des étapes tangibles, mesurables et atteignables, une vision est un idéal intangible, transmis de génération en génération. Concernant nos buts, nous devons idéalement renforcer et multiplier des réseaux collaboratifs créatifs afin de produire de nouveaux objets scientifiques et d'aborder ceux qui existent avec plus d'efficacité. Deuxièmement, il est impératif de former une nouvelle génération de chercheurs qui maîtrisent ces deux traditions différentes (et parfois opposées), et de leur proposer un accès et un entraînement à de multiples méthodologies. Troisièmement, il est important de renforcer et multiplier les lieux de rencontres institutionnels (cours, conférences, programmes bilatéraux, certifications doubles, ateliers, lieux de publication, lieux de communication avec le public, centres, etc.).

Nous devrons ensuite nous confronter à la tâche la plus difficile, c'est-à-dire lever des fonds auprès d'institutions locales et d'organismes de financement pour promouvoir des programmes sur le long terme (à l'instar des bourses *ERC* de l'Union Européenne). Enfin, nous devons faire émerger un système qui puisse soutenir et cultiver les générations actuelles et futures, encourager les talents, en particulier au travers de la mise en place de stratégies de discrimination positive pour soutenir les étudiants venant des milieux les plus vulnérables (en prêtant attention au genre, à la situation économique, à l'origine ethnique etc.). Ainsi, nous pourrions encourager un meilleur accès à la science comme profession et en enrichir les pratiques en les nourrissant de différentes expériences sociales. Ce sont des buts qui ne peuvent être atteint que sur le long terme, sans doute dans plusieurs décennies, mais il est permis de penser que des efforts conjoints pourraient aboutir à un tel résultat.

Dans l'immédiat, pour initier ce projet, je souhaite mener à bien la création de la première encyclopédie des interactions interculturelles entre humains et chimpanzés. Cette encyclopédie sera conçue comme un guide pratique et méthodologique audio-visuel destiné à l'étude de la socialisation inter-espèce. Ce projet est d'ores-et-déjà financé, et sera engagé dans l'année. Il sera mené par l'auteur de ces lignes en collaboration avec le docteur Catherine Hobaiter et ses collègues. Nous espérons que cette recherche produira une ressource pour les chercheurs de différentes disciplines, qui mobilisera des outils et des concepts pluridisciplinaires qu'ils pourront adapter à leur propre sujet de recherche lorsque celui-ci est lié aux relations inter-espèces.

Empiriquement, ce travail sera le résultat d'une recherche comparative conduite au sein de différentes institutions étudiant les chimpanzés dans le monde. D'un point de vue méthodologique, le projet intègre et retravaille de multiples méthodes, faisant usage de l'ethnographie multi-site, de l'observation participante, d'enquêtes, d'entretiens, de méthodes d'analyse visuelle, de comparaisons de la durée des interactions, d'observations éthologiques, de micro-analyses comportementales, d'échantillonnages de séquences précis ou globaux, de compilations des

allocations temporelles des activités des animaux et enfin de quasi-expériences d'interaction entre humains et chimpanzés dans le but de renforcer les observations réaliser. À l'avenir, un projet similaire pourrait être élaboré dans un environnement naturel. Année après année, nous espérons créer un réseau mondial de chercheurs en primatologie, en anthropologie socio-culturelle et en *STS* autour de la question de la socialisation inter-espèce (Homo \rightarrow Pan, Pan \rightarrow Homo, Homo x Pan).

Bien qu'ambitieuse, cette tentative ne sera pas menée individuellement mais comme une entreprise collective fondée sur l'appréhension de visées communes, dans laquelle les ambitions individuelles ne sont qu'un catalyseur. En pratique, les relations sociales entre *Pan* et *Homo* sont un objet privilégié pour comprendre l'altérité radicale, les natures-cultures et les trajectoires de l'Évolution. Néanmoins, un tel objet ne pourra sans doute être complètement saisi qu'à travers une vision qui aille au-delà de l'objet en soi, et qui se donne pour tâche d'élaborer à nouveaux frais nos manières de faire de la science.

Photos by Gabriela Daly



Chloe's hand. PRI, Kyoto University



Chloe. PRI, Kyoto University





Top, Ai. PRI, Kyoto University Bottom, Cleo. PRI, Kyoto University



Outdoor enclosure. PRI, Kyoto University





Pendesa. PRI, Kyoto University



Gon. PRI, Kyoto University



Top, Pendesa. PRI, Kyoto University Bottom, Ai and professor Matsuzawa. PRI, Kyoto University



Chloe receives a food reward after a correct trial PRI, Kyoto University


Pan. PRI, Kyoto University



Pendesa. PRI, Kyoto University





Riki. Higashiyama Zoo, Nagoya



Bonobo's hand. Vjay was born with a slight discoloration. Kumamoto Sanctuary, Kumamoto



Spider monkeys. Japan Monkey Centre, Inuyama



Puchi. PRI, Kyoto University



Rhesus monkey. PRI, Kyoto University



Japanese macaque. Shōdoshima



Japanese macaques. Shōdoshima



Cedar forest. Yakushima



Sika deer. Yakushima Japanese macaque and Sika deer. Yakushima



Daisuke, Japanese macaque. PRI, Kyoto University Japan I thank Josue Pastrana for the identification



Japanese macaque eating sweet potato. Kōshima



Sweet potato washing, Kinoko and her baby. Kōshima I thank Kelly Finn for the identification



Japanese macaque raiding researchers' food. Koshima



Ring-tailed lemurs. Rame is blind in one eye Japan Monkey Centre, Inuyama



Jōji, Lar gibbon. Japan Monkey Centre, Inuyama



Fanwa. Bossou, the Republic of Guinea



Fana. Bossou, the Republic of Guinea

















Velu yawning. Bossou, the Republic of Guinea



Top, Jeje. Bottom, Jeje yawing Bossou, the Republic of Guinea



Memorial in honor of the monkeys sacrificed in experiments. PRI, Kyoto University

Abstract

How do humans and chimpanzees set and blur boundaries between species when interacting with each other? This is the *leitmotif* of this etho-ethnography at the intersection of social anthropology, social studies of science and primatology. This endeavor is based on long-term fieldwork conducted in a cognitive sciences laboratory in Japan, which teaches chimpanzees language-like skills as means to understand their perceptual world. However, in this laboratory setting, the human-chimpanzee relationship is a vital part of the research philosophy and both species constitute a hybrid community of affections, social relationships, and scientific partnering. As a comparative effort, a short-term multi-sited ethnography was conducted following the theme across institutions in Japan of zoo, sanctuary and field-site type, in addition to the Japanese field station for the study of chimpanzee culture, in Bossou, Africa. Moreover, this work draws on the experience of becoming, at the same time, an experimenter in the targeted laboratory. The result is multifold. We shall explore first, the history as well as the caretaking and research practices in chimpanzee studies at the Primate Research Institute of Kyoto University (KUPRI). Then, we shall investigate the dynamics of physical boundaries in dangerous interspecies social interactions; the experimental boundaries of testing and being tested by chimpanzees; and the symbolic boundaries concerning human and nonhuman personhood. As a result, four major points are brought to light in a renewed perspective, namely (a) interspecies socialization (b) the embodiment of interspecies social relations in space (c) interspecies social relations in scientific settings (d) animalcentric perspectives on personhood. We conclude with the hopes and prospects for a fruitful dialogue across disciplines. Overall, the differential endeavor of this work consists in mobilizing concepts and tools from both primatology and social sciences to propose a more symmetric analysis of the human-animal relationship.

Keywords

Etho-ethnography, interspecies social relations, chimpanzee research, symmetrical anthropology, Japanese primatology, hybrid communities