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Jiaying Huang

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Relative clauses in Cantonese Chinese :
treatment and analysis
(Les propositions relatives en chinois cantonais:
le traitement et l'analyse)

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Thèse de doctorat de Linguistique Théorique et Descriptive

Dirigée par **Caterina DONATI**

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Abstract

This thesis explores the processing mechanisms underlying relative clauses in Cantonese Chinese, which involves an atypical combination of head-initial VP and head-final NP. The starting point of this study is to investigate whether there is a subject-object asymmetry in the processing of relative clauses in this language. Two elicited production experiments and two corpus studies were run. Their results show, on one hand, a structural bias during the processing of relative clauses and a related subject advantage and on the other hand, an impact of the featural (dis)similarity between arguments in object relatives, which aligns with the featural intervention hypothesis (featural Relativized Minimality): subject relatives are easier due to the local structural relation holding between the subject head and the gap; object relatives are more difficult due to an intervention of the subject but only insofar as the intervening subject shares the same features as the head; if the subject and the object mismatch in features, the intervention effect of the subject is reduced or absent.

In order to explain the details of intervention effects in Cantonese Chinese, the structure of nominal expressions (e.g., bare noun, CI-N phrases, Num-CI-N phrases and Dem-CI-N phrases) and the derivation of relative clauses were then investigated. The structure of nominal expressions is closely related to their interpretation: different functional projections beyond the NP (i.e., classifier, numeral and demonstrative) assign different interpretations. Relativizer *ge3*, being a classifier, functions as a ι operator, which change type and interpretation of the head noun. The results of an acceptability judgment test show that relative clauses in Cantonese (with and without relativizer) are derived through head raising. Moreover, in the relative constructions with a demonstrative and a classifier preceding the NP, both are part of the head and contain a functional feature that is taken into account for the intervention effect.

To sum up, featural intervention in Cantonese involves a multi-featural calculation system. The processing load of an object relative (due to the intervention effect of the subject) increases with the degree of featural similarity between the arguments.

Key words: relative clause, Cantonese Chinese, subject-object asymmetry, production, featural Relativized Minimality, derivation of relative structure.

Résumé de thèse

Cette thèse explore les mécanismes sous-jacents le traitement des propositions relatives en chinois cantonais, qui implique une combinaison atypique de tête-initiale dans le syntagme verbal (VP) et tête-finale dans le syntagme nominal (NP). Le point de départ de cette étude consiste à déterminer s'il existe une asymétrie sujet-objet dans le traitement des propositions relatives. Deux expériences de production et deux études de corpus ont été menées à ce propos. Les résultats montrent, d'un côté, un biais structurel dans le traitement des relatives, de l'autre côté, un impact de la (dis)similarité des traits des arguments des relatives objet, ce qui est conforme à l'hypothèse de la Minimalité Relativisée aux traits: les relatives sujet sont plus faciles puisque il y a une relation structurelle locale entre la tête sujet et la lacune; les relatives objet sont plus difficiles en raison d'une intervention du sujet, mais uniquement dans la mesure où l'intervenant sujet partage les mêmes traits avec la tête objet; si le sujet et l'objet ont des traits dissimilaires, les effets d'intervention du sujet sont réduits ou absents.

Afin de mieux expliquer les détails des effets d'intervention en Cantonais la structure des expressions nominales (noms nus, syntagmes CI-N, syntagmes Num-CI-N et syntagmes Dem-CI-N) et la dérivation des relatives ont été examinées. La structure des expressions nominales est liée à leur interprétation: différentes projections fonctionnelles au-delà du NP (classificateur, numéral et démonstratif) attribuent des interprétations différentes. Le relativiseur *ge3*, en tant que classificateur, fonctionne comme un opérateur ι , modifiant le type et l'interprétation de la tête. Le résultat d'un test de jugement d'acceptabilité que nous avons conduit montre que les relatives en cantonais (avec et sans relativiseur) sont dérivées par une opération de montée (*raising*) de la tête. De plus, dans les constructions relatives avec un démonstratif et un classificateur précédant le nom (NP), ceux-ci font partie de la tête et contiennent un trait fonctionnel qui est pris en compte pour estimer l'effet d'intervention.

En résumé, l'effet d'intervention relativisé aux traits en cantonais comporte un système de calcul complexe qui implique plusieurs traits nominaux. La difficulté du traitement d'une relative objet (déclenchée par l'intervention du sujet) augmente avec le degré de similarité des traits entre les arguments.

Mots clés: proposition relative, cantonais, asymétrie sujet-objet, production, dérivation.

Introduction

This thesis aims at investigating the relativization system in Cantonese Chinese. Cantonese, like Mandarin, is an SVO language with prenominal relative clauses, hence involves a combination of head-initial VP and head-final NP, which is typologically rare among world languages (Dryer 2013).

This atypical combination makes relative clauses in Cantonese a particular case to test different theories of language processing in the psycholinguistic domain; and different theories about the derivation of relative clauses in formal syntax.

Theories of language processing often presuppose a bias on either linear order or hierarchical order. The processing issues arising in relative clauses mainly concern the subject-object asymmetry, namely whether subject relatives are easier to comprehend and produce than object relatives; or the opposite. The main factor influencing the processing of relative clauses is the filler-gap distance. For SVO languages with postnominal relative clauses like English and French, given that the filler-gap distance is linearly **and** hierarchically shorter in subject relatives, an advantage towards subject relatives is expected. For SVO languages with prenominal relative clauses, like Cantonese, analyses including different biases have different predictions: **linear-distance** based analyses (Gibson 2000) predict an advantage towards object relatives, whereas **structural-distance** based analyses (Keenan & Comrie 1977, O'Grady 1997) predict a universal subject preference.

In addition to the filler-gap distance, some theories (Mak, Vonk & Schriefers, 2002, 2006; Gennari & MacDonald, 2008; Traxler, Morris & Seely, 2002; Traxler, Williams, Blozis & Morris, 2005) also take into account the **features** (such as animacy, number, person, etc.) of the head (filler) and the gap. Others associate the processing difficulty of object relative clauses with the **intervention** effect, which refers to a (hierarchical) syntactic phenomenon by which the relation between the head and the gap is “disturbed” by another element, which is similar in the internal constitution to the head and can be a candidate for the relation (Friedmann et al. 2009; Villata et al. 2016, Rizzi 2018). Testing relative clauses in Cantonese will help us better understand how different factors (linear vs. hierarchical) act and interact during processing.

The issue of relative clauses in formal syntax mainly concerns their structure and derivation. There is a long debate concerning this issue in the framework of generative grammar. The essential questions are 1) where the head is generated; and 2) how the relative clause derives, more precisely how the superficial word order of a relative clause derives. Theories supporting a **raising** derivation assume that the head originates within the relative clause and undergoes a movement to achieve the superficial word order. Among them, the Antisymmetry theory (Kayne 1994) suggests that head-initial and head-final relative clauses are derived from the same underlying structure. The **matching** analysis assumes that the head noun is base-generated outside the relative clause and that a matching element is moved in the clause itself. Relative clauses in Cantonese, which involve a superficial head-final order, may serve to test these theories.

The thesis is organized in two parts for a total of twelfth chapters: in the first part, we investigate the processing issues about relative clauses in Cantonese: is there a subject-object asymmetry in Cantonese relative clauses? Which factors affect the processing asymmetry? In chapter 1, we first review three main analyses in the literature concerning relative clause processing, each of which is based on different factors: the linear distance-based analysis (Gibson 2000), the structural distance-based analysis (O'Grady 1997) and the intervention hypothesis (Friedmann, Belletti and Rizzi 2009; Villata et al. 2016, Rizzi 2018). In Chapter 2, we review previous researches on the processing of relative clauses in Cantonese. Previous studies in the psycholinguistic domain show valuable data and interesting analyses. Nevertheless, they mainly concern acquisition and comprehension; a study on production is necessary. We then ran two elicited production experiments and two corpus studies in order to verify the presence of a subject-object asymmetry in production and investigate the possible factor influencing production. These empirical studies are respectively presented in four chapters. We summarize this empirical part in Chapter 6 and present the key questions that we will discuss in the second part.

In the second part, we inspect the structure and the derivation of relative constructions. We begin with the structure of nominal expressions in Chapter 1. In Chapter 2, we come back to the discussion about the featural intervention effect (i.e., features Relativized Minimality) in taking the structures of nominal expressions into account. We then turn to the discussion about the nature of the relativizer (i.e. *de* in Mandarin and *ge3* in Cantonese) and the structure of nominal modifications in Chinese in Chapter 3, which is crucial to understand the derivation of relative constructions. The discussion is based on two representative proposals: the determiner analysis proposed by Simpson

(2001) and the classifier analysis proposed by Cheng and Sybesma (2009). In Chapter 4, we investigate the distribution of the different relative constructions that are possible in Cantonese in the two elicited production experiments already presented in the first part. After, we discuss the derivation of relative constructions in Cantonese in Chapter 5. In section 5.1, we first briefly present three main analyses concerning the derivation of relative clauses in the framework of generative grammar: the Raising derivation, the Matching derivation and the double-headed derivation. The essential differences between them are that the head noun can reconstruct within the relative clause under the raising derivation and the double headed-derivation but not under the matching derivation and that the relative constructions correspond to a complementation structure in the raising derivation but to an adjunction structure in the matching and double-headed derivation. We then review how these analyses adapt to (Mandarin) Chinese and propose an extension to Cantonese in section 5.2. In order to verify whether the hypothetic derivations based on the analyses for Mandarin are correct and whether there are reconstruction effects in Cantonese relative clauses, we ran an acceptability judgement test whose results are presented and discussed in section 5.3. A conclusion is given at the end of this chapter (section 5.4). A general conclusion closes the thesis in chapter 6.

Part I: subject-object asymmetry in relative clause processing

Chapter 1 Relative clauses processing

As far as relative clauses processing is concerned, filler-gap distance is always a main factor in the subject-object asymmetry discussion. In a psycholinguistic perspective, different hypotheses have different analyses and predictions. Some are based on the linear order of the constituents in the clauses (Gibson 2000); some are based on the syntactic structure (e.g. O'Grady 1997). On one hand, linear distance-based hypotheses predict that the shorter the *linear distance* between the filler and the gap, the easier the relative structure to be processed. On the other hand, structure distance-based hypotheses predict that the shorter the *structural distance* (fewer nodes) between the filler and the gap, the easier the relative structure. Structural distance-based hypotheses predict a universal subject advantage/preference since the basic clause structures are assumed to be universal according to Universal Grammar. Linear distance-based hypothesis has different predictions for different languages.

In this chapter, we are going to review three hypotheses that are representative in the literature concerning the relative clauses processing: 1) Gibson (2000)'s Dependency Locality Theory; 2) O'Grady (1997)'s syntactic development proposal; 3) Intervention hypothesis based on the framework of Relativized Minimality (RM) (Friedmann, Belletti et Rizzi 2009, Villata, Rizzi et Franck 2016, Rizzi 2018).

1.1 Linear factor (Gibson 2000: dependency locality theory)

One of the most well-known hypotheses based on linear distance is the Dependency Locality Theory (henceforth: DLT) by Gibson (1998, 2000).

DLT is a theory of human computational resources in sentence parsing that relies on performing structural integrations and keeping the structure in memory, which includes keeping tracking of incomplete dependencies. One of the main ideas of DLT is locality. The structural integration complexity depends on the distance or locality between the two elements being integrated¹.

¹ Distance-based theories of linguistic complexity: Wanner and Maratsos 1978, Joshi 1990, Rambow and Joshi 1994, Hawkins 1990, 1994

In this subsection, we are going to review Gibson's argumentations for DLT. Before presenting his own proposals, he presents some empirical observations concerning processing complexity in previous researches. Nesting complexity is a phenomenon that is well-observed not only in SVO languages (English) but also in SOV languages (Japanese). A *nested* (or *center-embedded*) structure occurs when a syntactic category A contained in another category B such that a constituent of B (X) is to the left of A and another constituent of B (Y) to the right of A.

(1) [BP X [AP] Y]

- (2) a. The reporter disliked the editor.
b. The reporter [_S who the senator attacked] disliked the editor.
c. #The reporter [_S who the senator [_S who John met] attacked] disliked the editor.

In (2b), a relative clause intervenes between the NP *the reporter* and the verb *attacked*. The relative clause is thus nested between the NP and the verb. In (2c), there is another relative clause *who john met* which is center-embedded (i.e., nested) in the relative clause *who the senator attacked*: this is a case of doubly nesting. Increase of the number of nesting makes sentence structure more difficult to process (Chomsky 1957, 1965; Yngve 1960; Miller and Chomsky 1963; Miller and Isard 1964). This difficulty is probably caused by the quantity of resources required during processing.

Early studies about nesting complexity suggested that the difficulty is associated with the number of incomplete dependencies during the processing of a sentence (Yngve 1960; Miller and Chomsky 1963; Miller and Isard 1964; Bever 1970 among others). The more the incomplete syntactic dependencies during processing, the more difficult the sentence is. This is called the incomplete dependency hypothesis.

Although these theories of nesting complexity seem to explain certain cases of processing complexity (e.g. (2c)), there are still some empirical problems observed by Gibson (2000). The first problem is that theories relying on incomplete dependencies do not predict any complexity differences in nested relative clause structures where features of subject arguments are varied. According to previous experimental studies, however, features of the most embedded subject NP can influence the complexity of the nesting structure. When the most embedded subject NP is a pronoun (Bever 1970, Kac 1981), especially first or second person pronoun (Warren and Gibson

1999), the structures are significantly easier than structures with other types of most embedded subject NP. The following hierarchy recapitulates the observations of Warren and Gibson (1999), as well as Gibson (2000) about the influence of the most embedded subject NP in processing complexity.

(3) 1st, 2nd person pronoun > proper name > definite NP > indefinite NP

According to Gibson (2000), the difficulty to process an NP depends on the accessibility of its referent in the discourse (Haviland and Clark 1974; Haliday and Hasan 1976; Garrod and Sanford 1977,1982): the more referential the NP is, the fewer resources are required during the processing; therefore the easier the NP is to process. The complexity difference between NPs can influence the complexity of the whole structure.

Another problem with incomplete dependencies hypotheses is that it does not provide any account of the asymmetry between embedding a relative clause (RC) inside a complement clause (CC) of a noun, as in (4a), and embedding a CC within an RC, as in (4b).

(4) a. *Complement clauses, then relative clause (CC/RC)*

The fact that the employee who the manager hired stole office supplies worried the executive.

b. *Relative clause, then Complement clauses (RC/CC)*

#The executive who the fact that the employee stole office supplies worried hired the manager.

The processing complexities of (4a) and (4b) are different: (4a) is easier to understand than (4b). However, the incomplete dependencies hypothesis cannot predict this difference, since the number of incomplete dependencies is identical in both cases.

Considering the problems of the hypotheses discussed previously, Gibson (2000) put forward the Dependency Locality Theory. DLT is a theory using computational resources in sentence comprehension. Two main ideas of the DLT are: 1) during language processing, computational resources are required for storing the structures and integrating the new appearing word into the appeared structures; 2) *The structural integration complexity depends on the distance or locality*

between the two elements being integrated (Gibson 2000: 102). As far as the first idea is concerned, there are respectively two different units to calculate the integration cost and the storage cost. Integration cost is calculated with *energy unit* (EU). Storage cost is calculated with *memory unit* (MU).

Integration cost is affected by several factors: the frequency of the lexical items being integrated, structural complexity, contextual plausibility², discourse integration cost and structural integration cost. In Gibson (2000)'s proposal, only the last two factors are counted in the calculation for the sake of simplification. Integration cost is then obtained by summing structural integration cost and discourse cost. The structural integration cost is calculated by the total of new discourse referents³ during the formation of the current structure (a newly input head adjoins/merges to the existing projection). Every new discourse referent in the intervening region between the newly input head (arguments/adjoints) and the current projection (XP) consumes 1 EU. The longer the distance between the new head and the existing projection, the more EUs costs, this derives with the *locality principle* in the DLT. Discourse integration means *constructing or accessing a discourse referent in the discourse model* (Gibson 2000:102). The more accessible the referent of the word in the discourse, the less it costs during the processing, as we mentioned previously for the NP processing difficulty. Therefore, a new element without any referents in the discourses costs the most resources during processing. In order to simplify the calculation, Gibson (*ibid.*) proposed that *only the processing of new discourse referents consumes resources* (1EU).

With the DLT, the empirical problems of the incomplete dependencies hypothesis can be solved, since different types of NPs and different levels of embedding will both trigger different calculations. As for the subject/object asymmetry, according to the DLT's calculation, object extraction should cost more resources than subject extraction. Gibson and Ko (1998)'s self-paced reading experiment aligns with the DLT's prediction.

Storage cost is associated with syntactic expectation. Each syntactic head required to complete the current inputs as a grammatical sentence cost 1 memory unit (MU).

² Contextual plausibility means that the plausibility of the combination of a certain component in a certain context.

³ A discourse referent is an entity that has a spatiotemporal location so that it can later be referred to with an anaphoric expression, such as a pronoun for NPs, or tense on a verb for events. Processing the head noun of an NP that refers to a new discourse object consumes substantial resources, and processing the head verb of a VP that refers to a new discourse event (also a discourse referent) consumes substantial resources, but processing other words does not consume substantial resources in the discourse processing component of structure building. (Gibson 2000: 103)

(5)		Input word												
		The reporter who the senator attacked dislikes the editor												
Storage cost (in MUs)		2	1		3	4	3		1		1		1	0

For example in (5), in order to complete a grammatical sentence, the initial word *the* need at least two syntactic heads: a noun and a verb. Therefore the storage cost at this point is 2 MUs. For the next word *reporter*, the need of a noun is fulfilled, only one head is needed at this point; therefore, the storage cost is 1 MU. As for the pronoun *who* in the relative cause, two syntactic heads (an empty category associated with *who* and a verb) are required within the RC, and at least a verb is required in the matrix clause, therefore three heads in total are required at this point, the storage cost is 3 MUs. For the next word *the*, a supplementary noun is required for *the*, therefore four heads are required at this point, the storage cost is 4 MUs. As for *senator*, since the need for a noun is fulfilled, the storage cost is 3 MUs. At the point of processing the verb *attacked*, only an empty category associated with the relative pronoun is left within the RC, therefore the storage cost is 1 MU. Similarly, the storage cost of the matrix verb *dislike* is 1MU, since an object noun is required. As for *the* in the matrix object position, a noun is required and therefore the storage cost is 1MU at this point. As for the noun *editor*, the sentence is complete, and there is no more storage cost.

As for the case of ambiguous constructions, Gibson puts forward a DLT ambiguity resolution hypothesis (Gibson 2000: 115 - 116):

(6) *Ambiguity resolution hypothesis*

In choosing among ambiguous structures, two of the factors that the processor uses to evaluate its choices are DLT storage and structural integration cost (in addition to informational constraints, such as lexical frequencies, plausibility and context).

Let us consider the following sentence as an example:

(7) The bartender *told* the detective that the suspect *left* the country *yesterday*.



In (7), the adverb *yesterday* can be attached either to the verb *left* in the subordinated clause (low attachment) or to the verb *told* in the matrix clause (high attachment). In the two cases, the storage costs are the same, however the structure integration costs are different: the low attachment only

crosses one new discourse referent (*country*), whereas the high attachment has to cross four new discourse referent (*detective, suspect, left, country*)(cf. footnote 3 for the definition of new discourse referent). Hence, the low attachment involving lower integration cost is strongly preferred. Another ambiguity discussed in Gibson (2000)'s work involves syncretism in verb paradigms.

(8) The evidence **examined** by the lawyer turned out to be unreliable.

In (8), a temporary ambiguity arises at the point of processing *examined*, since this very same verb can be interpreted either as a main verb (MV) with past-tense or as a past-participle reduced relative (RR). In both cases, the structural integration costs are the same since both constructions are local, but the storage costs are slightly different: for the main verb (MV) interpretation, only a object noun is needed to complete a grammatical sentence; whereas for the reduced relative (RR) interpretation, two categories are needed (a modifier in the reduced relative clause and a main verb in the matrix clause). Under this spirit, the MV interpretation is supposed to be more preferable than the RR interpretation. However, the RR interpretation is preferred in (8) due to the large plausibility difference according to Gibson. Such a discrepancy is even larger in a more complex ambiguous construction (cf. 9).

(9) The witness who the evidence examined by the lawyer implicated seemed to be very nervous.

As in (8), a temporary ambiguity involving MV or RR interpretation arises at the point of processing the word *examined* in (9). The integration costs at this point for the two interpretations are identical. As for the storage cost, unlike the difference in (8) which is minimal (MV: 1 head, RR: 2 head), the difference in (9) is much larger: to complete the MV structure to a grammatical sentence, only a main verb is needed (1 head); whereas, to complete the RR structure, four heads are needed including a modifier in the RR, an empty NP referring to the RC pronoun *who*, a verb in the RC and a main verb. The interpretation of RR costs three more heads than the interpretation of MV, but still only the RR interpretation is correct. On one hand, this shows that the calculations of storage costs and integration costs are not enough for correctly processing an ambiguous construction. Other factors must have a role in the processing. On the other hand, if the storage cost is taken into account for ambiguity resolution, an MV/RR ambiguous construction with RR interpretation (as 9) should be more difficult.

Result of a self-paced, word-by-word reading experiment⁴ supports this hypothesis: the reading time of the critical zone ‘*the evidence examined by the lawyer*’ is positively correlated to the storage cost difference of the ambiguous construction. The larger the storage cost difference, the longer the reading time. Moreover, the prepositional modifier (*by the lawyer*) is processed more slowly in the ambiguous construction (reduced relative) than in the unambiguous counterpart (passive) which is coherent with the prediction of the DLT: the difficulty of the construction increases as the storage cost increases. The results above indicate that the *syntactic storage cost complexity as measured by the DLT appears to be an independent factor involved in ambiguity resolution that is not reducible to frequency and plausibility* (Gibson 2000: 119).

To conclude, the Dependency Locality Theory provides a unified analysis for processing embedded clauses (mainly relative clauses) based on two computational resources: 1) structural integration cost, which is positively correlated to the distance of attachment between a gap and its dependent head; and 2) storage cost, which is associated with the upcoming syntactic categories. When processing a complex structure, the more resources are required in storage, the slower the integrations occur, the more difficult the structure is. Moreover, when processing an ambiguous structure, more factors (such as lexical frequencies, plausibility, context) other than the DLT storage cost and integration cost should be taken into account.

Although the DLT gives a global account of the factor affecting processing, including the impacts of the lexical features of arguments and ambiguity resolution, some practical details seem to lack in the current article (2000). Gibson does point out that features of the most embedded subject influence processing of complex embedded structures, but he does not explain how they associate with the calculations in the DLT. Similarly, according to Gibson, the DLT *per se* does not seem to be enough for ambiguity resolution, although it does predict the difficulty of this type of construction. In consideration of the characteristics of relative clauses in Cantonese, applying the DLT in Cantonese might face several problems: for structures with relativizer, since relativizer is not a relative pronoun and can be applied in other gapless construction, there is no dependency between the relativizer and the gap, and a problem arises in the calculation of storage costs. For the structure with demonstrative and classifier, object relatives in a sequence of [NP V gap] NP are

⁴ Four conditions were tested in this experiment: Large storage costs difference, ambiguous (as 9), large storage cost difference, unambiguous; small storage cost difference, ambiguous, small storage cost difference, unambiguous.

superficially isomorphic to a main clause, and a temporary ambiguity occurs. The DLT predicts a processing difficulty in such case but cannot distinguish this ambiguous construction.

1.2 Structural factor (O'Grady 1997)

O'Grady (1997)'s work is about first language acquisition by monolingual English children. In Chapter 9 *Relative Clauses and Clefts* of his book, he reviews and reanalyses the results of previous works about the acquisition of relative clauses and cleft structures, and puts forward a conclusion: for structures like relative clauses and clefts, involving a gap which must match with a nominal outside its clause, the difficulty of the structure depends on how deeply the gap is embedded.

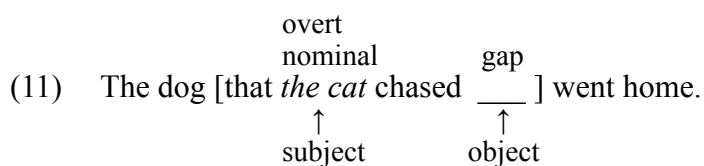
Early studies of relative clauses acquisition gave controversial results: Limber (1973), Hamburger (1980), Flynn and Lust (1980) claimed that relative clauses produced by young children do not possess a lexical head, they are either headless or combined with a *wh*-word as in a free relative. Relative clauses with lexical head appear in a later stage. Limber (1973) also claimed that children initially do not produce relative clauses structure in subject position. However, later, Kim (1987) reported counterexamples in developmental spontaneous data: headed relatives emerged before headless and free relatives; relative clauses in the subject position were observed in early speech.

Due to the rareness of relative clauses in spontaneous production, experiments became soon a more practical way to study the acquisition of relative clauses. Experimental researches have usually focused on the grammatical role of both the head of the relative clause in the matrix clause and the gap within the relative clause, as well as their correlation. Four types of configurations were tested the most in early studies: 1) the SS type: *subject head, subject gap*; 2) the SO type: *subject head, object gap*; 3) the OS type: *object head, subject gap* and 4) the OO type: *object head, object gap*.

Sheldon (1974) ran a comprehension experiment (act-out task) and reported that the structures in which the head and the gap share the same grammatical function are easier to process than the ones in which different grammatical functions are involved. Tavakolian (1978) obtained a similar result in a similar task (comprehension and act-out task). Moreover, he found a more precise processing hierarchy among the four types of structure:

(10) SS > OO > SO > OS

O’Grady pointed out that for the study of the acquisition, *the most valuable information about children’s knowledge of relative clauses* comes from their errors rather than from their correct productions. According to him, there are two steps involved in a relative clause processing: step one: identify the grammatical role of the gap in the relative clause; step two: determine its reference (identify the head of the relative). The act-out task aims to observe whether children can determine the correct grammatical role of the gap (and the overt nominal) within the relative clauses and match the gap to the correct nominal (head) outside the relative clause. The act-out task can reflect not only children’s competence but also the way they process relative clauses.

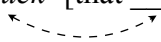


Reexamining the results of Tavakolian’s experiment, O’Grady found that a direct object gap is more difficult than a subject gap for children to interpret, since children often reverse the grammatical roles between the gap and the overt nominal in the SO type structures (cf. (9)). He suggests that *“the difficulty of a gap increases with its degree of embedding”* (O’Grady 1997:179). Subject gaps are therefore easier than object gaps, since the later are embedded more deeply. Furthermore, O’Grady also predicts that gaps embedded in PP within a VP should be even harder to process. This prediction has been supported by a study by de Villiers et al. (1979), in which gaps embedded in a PP within a VP, regardless of their grammatical role in the main clauses, were associated with a difficulty. On the other hand, the use of resumptive pronouns also supported his suggestion about the relation between the difficulty of a gap and its degree of embedding. In Pérez-Leroux (1995:121)’s studies on English and Spanish, resumptive pronouns were found to be more frequent in object relatives and in prepositional relatives than in subject relatives. O’Grady crucially predicts his hypothesis to hold universally. However, some results were found in other studies suggesting some cross-linguistic variation (Limber 1973, Hamburger 1980, Kim 1987, Fox 1987).

The second step in processing a relative clause is to determine the reference of the gap. An interesting tendency concerning this step in children has been observed in previous researches: Tavakolian (1978) observed that errors of reference to the head noun were found most commonly in OS relative clauses. Children attempt to refer the gap to the subject of the sentence.

(12) *Test sentence and intended interpretation:*

The lion stands on *the duck*⁵ [that ____ bump into the pig].



Child's interpretation:

The lion stands on the duck [that ____ bump into the pig].



Such a tendency appears to align well with Sheldon (1974)'s proposal that where the head and the gap share the same grammatical function, the relative clause is easier to process. Tavakolian explains that children interpret the OS structure as two conjoined clauses structure as in (11). He calls this the Conjoined Clause Strategy.

(13) *Child's interpretation:*

The lion [_{VP} stands on the duck] and [_{VP} bump into the pig].

Although Conjoined Clause Strategy seems to be consistent with the previous observations and to be plausible, Lust (1995) argued against this point of view and claimed that the error of reference is rather due to a mis-attachment of the relative clause.

O'Grady underlines that in addition to the grammatical role of gaps and the reference of the gap, there are also other factors affecting the interpretation of relative clauses. Word order could be one of them, especially in SOV languages. A significant advantage for relative clauses in subject position (high accuracy in SS and SO structure, poor performance in OS structure) has been observed in a comprehension experiment in Korean (Clancy, Lee et Zoh 1986: 241).

Moreover, the superficial resemblance of relative clause pattern to the word order template of main declarative clauses is also an interesting factor, since it has different impacts in different languages: in SOV languages, like Korean (Clancy, Lee et Zoh *ibid.*) and Japanese (Hakuta 1981), more errors were found in the OS⁶ structure with an NP-NOM NP-ACC V sequence which is superficially similar to the SOV word order template; as in SVO languages (de Villiers et al. 1979), the matrix clause resemblance template, the OS structure with a NP V NP sequence, seems to be a positive factor in

⁵ NP in italic represents the head noun of relative clause.

⁶ Object head subject gap type

increasing the accuracy of responses. The superficial resemblances in SOV languages and SVO languages were both found in the OS structure, what causes the different impact in the processing? Is it related to the canonical word order (OV vs. VO) or the position of the relative clause (pre-nominal vs. post-nominal)? Interestingly, Cantonese displays a superficial resemblance of object relative to a declarative main clause. It has been observed to have different impacts in the acquisition of relative clauses: the superficial resemblance seems to increase the processing difficulty in the comprehension, but to facilitate the production (see Lau 2016). Remember that Cantonese is an SVO language with pre-nominal relative clauses. It is tempting to infer that the different impacts of the superficial resemblance do correlate with the canonical word order and the position of the relative clauses. A more detailed discussion will be given in section 2.4 (Lau 2016) and section 5.4 (general discussion about our experiments).

Other factors that might influence relative clauses processing are the features of the arguments and the argument structure of the verbs involved. Goodluck and Tavakolian (1982) varied the features in OS relative clauses and observed that children acted out more (no matter is correct or not) when the object of relative clause was animate and tended to attach the (subject) gap to the higher subject of the sentence instead of the higher object (which is the correct head noun). This is reminiscent of the Conjoined Clause Strategy. Moreover, children were more accurate when a relative clause contained an inanimate direct object and even more when a relative contained an intransitive verb. This result can be summarised as follows:

(14) RC with intransitive verb > RC with inanimate DO > RC with animate DO

Similar results have been found with cleft structures with a subject advantage in English (Lempert & Kinsbourne 1980) and in French (Hupet & Tilmant 1989).

To sum up, by reexamining previous experimental data, O'Grady (1997) generalises the procedure in processing a relative clause: 1) identify the grammatical role of the gap; 2) determine its reference. He also observed different factors influencing the processing of relative clauses: a) grammatical role of the arguments; b) the embedding degree of the gap; c) word order; d) feature of arguments and argument structure of verbs. Among all these factors, the embedding degree of the gap seems to be most crucial in influence processing. O'Grady concludes that *in all cases* (gap-containing constructions including RC, cleft, *wh*-question, etc.), *the acquisition device prefers*

structure in which the gap corresponding to the ‘missing’ element is less deeply embedded [...]
(O’Grady 1997: 191).

1.3 The intervention hypothesis

In formal syntax, intervention (particularly involving A’-dependencies, c.f. (16)) is a fundamental concept of the theory of locality (Rizzi 2018). Intervention arises in a local movement (no matter it is A-movement or A’-movement) when an element having the same nature (or maybe the same features) of the moving element locates in an ‘intervening’ position that c-commands the origin of the head but does not c-command the landing site (i.e. a specifier position). Intervention is claimed to cause degradation or ungrammaticality of the sentence. Psycholinguistic studies (Friedmann, Belletti et Rizzi 2009, Bentea, Durrleman et Rizzi 2016, Villata, Rizzi et Franck 2016 among others) showed empirical evidence in both adult’s processing and the acquisition in different languages.

(15) What do you think John bought ____ ?

(16) * What do you wonder who could buy ____ ?
 +Q +Q

(Rizzi 2018: 340)

Relativized Minimality (RM) approach aims to provide a grammatical basis and a unified analysis for intervention effect. RM is: *a principle barring local relations (such as links of movement chains) across an intervener of the same type as the target of the relation, given the appropriate typology of positions.* (Rizzi 2018: 340)

(17) Relativized Minimality:

In the configuration ... X ... Z ... Y ...

a local relation connecting X and Y is disrupted when there is a Z such that

- i. Z is of the same structure type as X, and
- ii. Z intervenes between X and Y

(18) Z intervenes between X and Y if Z c-commands Y and Z does not c-command X.

(Rizzi 2018: 341-342)

According to Rizzi (2018), the intervention effect is rather hierarchical instead of linear. But he also mentions a recent proposal by Kayne (2018) that *syntactic representations involve linear as well as*

hierarchical organization (i.e. linear order results not only from a post-syntactic linearization operation, but directly from core syntactic operations like merge) (Rizzi 2018: 342) as well as the works of Franck et al. (2006) in which both linear and hierarchical interference effects were observed in elicited production of agreement. Considering the lack of sufficient evidence, Rizzi maintains the discussion of hierarchical intervention but does not deny the existence and the influence of factors of linear intervention.

In this subsection, we are going to review three articles concerning the intervention hypothesis: in 1.3.1, Friedmann, Belletti and Rizzi (2009)'s experimental work testing the intervention effect in the acquisition of (object) A'-dependencies in Hebrew; in 1.3.2, the recent works of Villata, Rizzi et Franck (2016) and of Rizzi (2018) which investigate the Featural Relativized Minimality in object A'-dependencies with different types of intervention configuration; then some concluding remarks about the (featural) intervention hypotheses will be given in 1.3.3.

1.3.1 Intervention in the acquisition of A'-dependencies (Friedmann, Belletti et Rizzi 2009)

Based on the empirical evidence of the intervention effect observed in other languages:

the A' dependency fails (in young children)⁷ and is harder (in adults)⁸ when the terms to be connected in the dependency are separated by an intervener, a position which could potentially be involved in the A' relation: typically the subject position, which would be a potential site for the variable. (Friedmann, Belletti et Rizzi 2009 : 68)

The article aims at verifying whether the features of the intervening subject are responsible for the difficulty of object dependencies based on data from Hebrew. Six experiments were conducted in order to test the intervention effect in two types of A' dependencies (RCs and *wh*-questions) with different lexical restrictions of arguments during acquisition. The first four experiments were about the comprehension of SRs and ORs in Hebrew, whose participants were the same 22 native speakers of Hebrew aged from 3;7 to 5;0 (mean age: 4;6). The tasks were either sentence-picture matching or sentence-scenario matching. The first experiment was about the comprehension of headed SRs and ORs; the second was about ORs involving a resumptive pronoun instead of a gap;

⁷ See Adams, 1990; Berman, 1997; Brown, 1972; Correa, 1982, 1995; de Villiers et al., 1994; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981

⁸ See Cook, 1975; Ford, 1983; Frauenfelder et al., 1980; Hakes et al., 1976; and also "active filler" effect: Crain and Fodor, 1985; Frazier and Clifton, 1989; Frazier and Flores d'Arcais, 1989; Frazier et al., 1983; Stowe, 1986

the third was about free SRs and ORs; the fourth was about ORs with an impersonal arbitrary *pro* subject (and resumptive pronoun). The fifth experiment was about the comprehension of another type of A' dependencies: *wh*-questions, including *who* question and *which* question, with another group of participants (same number, similar age: from 3;7 to 4;10, mean age: 4;3). The last experiment was a scenario-elicited production of RCs with the previous group of participants (as in Experiment 1 to 4).

In Experiment 1 in which both arguments of RCs are animate full-NPs, children have a significantly better performance⁹ with SRs than ORs ($p < .001$). Such a result is consistent with previous observations of subject advantage in other languages (see footnote 8). A plausible explanation for this result could be either the intervention effect or the structure distance effect.

- (19) a. Headed subject relative
 ... the cow that _____ kissed the chicken
 ... D NP R... _____ ... D NP ok
- b. Headed object relative
 ... the chicken that the cow kissed _____
 ... D NP R... D NP ... _____ *

As mentioned previously, both arguments of the RCs in the experiment were animate full-NPs, and both arguments contained a lexical NP restriction which corresponded to a nominal introduced by a determiner (abbreviated by D NP). In SR, only a relativizer (abbreviated by R) *that* was situated between the head and the gap, there was no intervener in the construction, no intervention effects arose.

Given a RM perspective, intervention arises only if the intervener is similar in structure to the antecedent of A' dependency. Likewise, if the element intervening is different enough from the antecedent, no intervention effect should arise, and hence ORs should be as easy as SRs. This is the motivation for experiments 3 and 4 in which the lexical features of the arguments of RCs were varied. Before that, the impact of the resumptive pronoun for comprehending ORs was tested in experiment 2.

⁹ The criteria for the evaluation of performance are the accuracy and the number of participants who performed above chance with the SRs and ORs items.

Experiment 2 aimed to investigate whether the presence of a resumptive pronoun (henceforth: RP) could influence the intervention effects displayed in ORs¹⁰. In this experiment, only ORs with RP were tested, where the arguments were also animate full NPs and a RP was found in the object gap position. A similar result to Experiment 1 was observed: the comprehension of headed ORs even with a RP were also difficult for children. There was no significant difference between headed ORs with and without a RP ($p = .70$), which means RP did not modulate the intervention effects.

Experiment 3 tested the comprehension of free SRs and free ORs. In free relatives, the moving element is a *wh*-operator and not a lexically restricted DP. The results of Experiment 3 indicated that the same group of children well comprehended both free SRs and free ORs. Their performance on free ORs was significantly better than on headed ORs ($p < .001$), whereas free SRs was only marginally significantly better than the headed SRs ($p = .05$)¹¹. These results indicate that the difficulty with ORs is not simply provoked by distance.

- (20) a. Headed object relative
 ... the chicken that the cow kissed _____
 ... D NP R... D NP ... _____ *
- b. Free object relative
 ... who that-the-boy swings _____
 ... WH R... D NP ... _____ ok

Experiment 4 tested the comprehension of headed ORs hence including a lexically restricted DP with an arbitrary impersonal *pro* subject. With the same group of participants, the results of Experiment 4 showed that headed ORs with arbitrary *pro* subject were well-comprehended. Children's performance in this type of ORs was significantly better ($p < .0001$) than in the headed ORs in which both arguments were lexical restrictive NPs, even better than in the free ORs (with higher accuracy and more participants with above chance performance).

- (21) a. Free object relative
 ... who that-the-boy swings _____
 ... Wh R... D NP ... _____ ok

¹⁰ Resumptive pronoun in Hebrew are optional with the type of object relatives used in the current study. (Friedmann et al. 2009:72)

¹¹ However, according to the results shown in the article, children had a higher accuracy performance in the headed SRs (90% vs. 84%), more children performed above chance level in the headed SRs than in the free SRs (22 (all) vs. 17), which is contradictory to what the authors claimed.

- b. Impersonal *pro* object relatives
 the boy who (someobe/they) kiss him _____
 D NP R ... *pro* arb ... pronoun ok

Concerning the sequence of acquisition of the different types of relatives, the headed SR is the first to be acquired among the five relative types tested; free ORs and the ORs with an arbitrary *pro* subject are acquired earlier than the headed ORs.

Experiment 5 aims to test the intervention effect of lexical restriction in two types of *wh*-questions. In this experiment, the comprehension of *who* and *which* subject and object questions were tested with another group of children with a question-picture matching task. It was a 2*2 mixed design, including four types of questions: the subject *who* question, the object *who* question, the subject *which* question and the object *which* question. The results showed good comprehension of all *who* questions and all subject questions versus a poor comprehension of the object *which* questions. There was no significant difference between the performances in the subject *who* questions and in the subject *which* questions ($p = .32$), whereas the performance in object *who* question was significantly better than in object *which* questions ($p < .0001$). Besides, there was no significant difference between subject and object *who* questions ($p = .11$), whereas the performance in the subject *which* questions was significantly better than that in the object *which* questions ($p < .0001$).

These results are coherent with the hypothesis of the RM-based approach: subject questions were easier since there was no element intervening between the landing site of the *wh*-operator and the subject gap; object questions were difficult only if the subject acted as an intervener of the object extraction, namely when the subject and the *wh*-operator shared a similar internal constitution. As a result, the object *which* questions were comprehended worse than the other three types of questions.

- (22) a. Who object questions:
 Who the boy hugged _____
 Wh Q D NP < Wh > ok
- b. Which object questions:
 Which monkey the boy hugged _____
 Wh NP Q D NP < Wh NP > *

The last experiment was an elicited production of RCs with the previous group of participants. This experiment aims to observe whether the production of RCs shared a pattern similar to the comprehension. The results of this experiment indicated that children’s performance in RC production matched the previous observations in RC comprehension. A preference to SRs with respect to ORs were observed, which was evaluated by two measures: 1) there were significantly more target (grammatical) responses produced in SRs than in ORs ($p < .01$); 2) there were more SRs produced in the ORs condition¹² than ORs produced in the SRs condition (54 vs. 1). Regarding the production of SRs in the ORs condition, there were generally three strategies: 1) replacing verbs (e.g. defeat vs. lose); 2) turning verbs into reflexive form (e.g. hid to hid himself); 3) reversing the thematic roles of arguments. As for the production of ORs, there were two strategies applied to avoid the intervention effects: using a free RC form or using an impersonal *pro* subject and a RP in the initial object position, which aligns with the observations in experiment 3 and 4.

The following table recapitulates the results of the experiments:

type of RCs:	configuration of internal structure:	difficulty
1 headed SRs	D NP1 R < D NP1 > ... D NP2	ok
2 headed ORs	D NP2 R D NP1 ... < D NP2 >	*
3 ORs with RP	D NP2 R D NP1 ... pronoun	*
4 free SRs	Wh R < Wh > ... D NP	ok
5 free ORs	Wh R D NP ... < Wh >	ok
6 ORs with <i>pro</i> subject	D NP R <i>pro</i> arb ... pronoun	ok
7 subject who question	Wh Q < Wh > ... D NP	ok
8 object who question	Wh Q D NP ... < Wh >	ok
9 subject which question	Wh NP1 Q < Wh NP1 > ... D NP2	ok
10 object which question	Wh NP2 Q D NP1 ... < Wh NP2 >	*

Table 1. Summary of the experimental results

Subject-related A’ dependencies (cf. type 1, 4, 7, 9 in Table 1) are unproblematic since there is no intervener between target and trace. Object-related A’ dependencies are selectively problematic since there can be a potential intervener (subject) situated between the target and the trace: if the target and the potential intervener are similar in their internal structure (cf. type 2, 3, 10 in Table 1), blocking effect will arise, the structures will be problematic; if the target and the potential

¹² ORs condition: the items which are intended to trigger an OR production.

intervener are sufficiently different in their internal structure (cf. type 5, 6, 8 in Table 1), the blocking effect will not arise, the structures will not be problematic.

Under the RM approach, one critical problem is that the similarity between the target and the intervener lacks a formal definition. Friedmann, Belletti and Rizzi proposed the following definition: “*the typology of positions formalizing “similarity” is expressed in terms of the featural constitution of X, Z and Y (see Rizzi, 2004, for a representational formulation, and Chomsky, 1995, 2000, 2001, for derivational formulations); moreover, only the feature(s) that trigger movement are relevant to define the structural type of a position*¹³ ” (Friedmann, Belletti et Rizzi 2009:82). Authors also assumed that phrasal movement is triggered by an attractor under a featural matching constitution. Therefore, the attractor in headed RCs should be a complex structure containing a relative feature and a lexical restriction [+R, +NP]. The configuration of headed ORs would look like in (23):

(23) target attractor intervener origin/trace
 D NP [+R, +NP] D NP < D NP >

Likewise, the attractor in *which* question is also a complex structure containing a Q feature and a lexical restriction [+Q, +NP]. As for the *who* question, since no lexical restriction is contained in the *wh*-operator, the attractor is with a simple structure [+Q]. This explains why a lexically restricted subject acts as an intervener only in *which* questions but not in *who* questions.

What remains to be explained is why object-related A'-dependencies are problematic for children but not for adults. For this question, *featural* Relativized Minimality (Villata, Rizzi et Franck. 2016, Rizzi 2018) provides a more detailed account.

1.3.2 Featural Relativized Minimality (Villata, Rizzi and Franck. 2016, Rizzi 2018)

Featural Relativized Minimality (fRM) is a more fine-grained version of Relativized Minimality, which argues that the intervention effect is feature-driven: *the local relation between an extracted element and its trace is disrupted when it crosses an intervening element whose morphosyntactic featural specification matches the specification of the elements it separates* (Villata, Rizzi and Franck 2016:76 abstract).

¹³ the features that trigger movement correspond to the term criterial feature in *featural Relativized Minimality*.

The following examples instantiate the featural intervention configurations:

(24)* Combien a-t-il **beaucoup** consulté [___ de livres] ?
'How many has he a lot consulted of book ?'

(25) Combien a-t-il **attentivement** consulté [___ de livres] ?
'How many has he carefully consult of books ?'

(Rizzi 2018: 343, example (7) and (8))

(24) and (25) both involve a *wh*-movement and an intervention configuration: adverbs *beaucoup* (a lot) and *attentivement* (carefully) intervene between the target and the origin, but the intervention effect is only provoked by *beaucoup* (a lot) (as in 24). This is because the intervener *beaucoup* (a lot) and the extracted *wh*-element *combien* (how many) are both quantifiers, they share the same feature class (operator). *Attentivement* (carefully), as a manner adverbial, belongs to the modifier class. Therefore the intervention effect does not arise in (25) since the intervener and the extracted element do not share the same feature class. In this view, Rizzi proposes that *in the calculation of intervention, RM takes into account morphosyntactic features defining syntactic positions (the approach is then sometimes referred to as “featural Relativized Minimality”, or fRM)...* Moreover, *morphosyntactic features are organized into feature classes, such that minimality effects are found within the same feature class, but not across classes.* (Rizzi 2018: 344)

In the spirit of featural Relativized Minimality, Villata, Rizzi and Franck (2016) assume that the locality effect is not absolute, but depends on the relevant features of the target and the intervener. The relevant features (named “Relevant Syntactic Features” in Rizzi 2018) are syntactic features which define syntactic positions, by licensing applications of external and internal merge (movement) (Rizzi 2018: 347).

Based on the work of Friedmann, Belletti and Rizzi (2009), Villata et al. (2016) complete the account with a set-theoretic approach to calculate the featural relations between the extracted element and the intervener. The following configurations represent three possible relations of features, in which Y is the origin of the extracted element, Z is the intervener, X is the landing site/target of the movement; +A and +B represent the morphosyntactic features these elements can be endowed with. In the identity relation, the target and the intervener share *all* the relevant features; in

the disjunction relation, the target and the intervener have *no* relevant features in common; as in the inclusion relation, the target shares *some* features with the intervener.

(26)	X	Z	Y	
a. Identity:	+A	+A	+A	full match: strong violation
b. Inclusion:	+A,+B	+A	+A,+B	partial match: weak violation
c. Disjunction:	+A	+B	+A	no match: wellformedness

Considering the role of relevant features and the three set-theoretic relations, Rizzi (2018) revises the definition of the Featural Relativized Minimality:

(27) Featural Relativized Minimality (revised):

In ... X ... Z ... Y ... a local relation between X and Y is disrupted when

1. Z c-commands Y and Z does not c-command X (intervention configuration).
2. Z matches X in terms of Relevant Syntactic Features (RSF).
3. The degree of disruption is a function of the featural distinctness of X with respect to Z, in accordance with the distinctness hierarchy.

Concerning the characteristics of the features that provoke the intervention effect, Villata et al. (2016) indicate that *the typology of positions responsible for intervention effects is determined by the morphosyntactic features that define the different positions with respect to the local relation which is checked. As we are looking at local relations determined by movement, the relevant features will be those that participate in the triggering of movement.* (Villata et al. 2016: 3).

The distinction of *riterial feature* and *non-criterial feature* is then introduced: *A criterial feature is a feature able to trigger movement alone (i.e., +Q, +R(el), +TOP, +FOC); a non-criterial feature (i.e., +N), although contributing to the fine identification of the landing site of movement, is not able to trigger movement on its own. Building on the idea that only features triggering movement are predicted to generate intervention effects, the fRM system could be further modulated by introducing a hierarchy among those features which are able to trigger movement alone (i.e., criterial features) and those able to trigger movement only if accompanied with a criterial feature (i.e., non-criterial features). In this perspective, only an overlap with criterial features would determine the perception of marginality, while an overlap with non-criterial features would be*

perceived as fully acceptable by adults. (Villata et al. 2016: 3, footnote 2)¹⁴. Following this idea, the feature +A in (26) is the criterial feature, while +B, the non-criterial feature¹⁵.

An advantage of featural Relativized Minimality is that it does not allow only binary grammar divides (‘grammatical’ or ‘ungrammatical’), but also a more fine-grained gradation. Considering the distinction between criterial and non-criterial feature, Rizzi (2018) refines the set-theoretic features relation and divides inclusion relation into criterial inclusion and non-criterial inclusion.

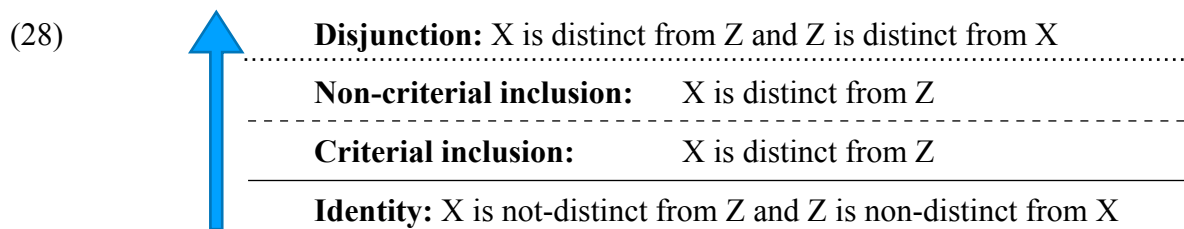


Figure 1. The distinctness hierarchy

This refined distinctness hierarchy explains the discrepancies between adults and children and the discrepancy between the two types of inclusion relation in adult grammar. A²-dependencies involving object extraction such as object relative clauses and object questions are known to be difficult for children but fully acceptable and applicable for adults. Rizzi argues that *the grammatical structure underlying these locality effects is exactly the same: there is a single version of RM, operating through the same distinctness hierarchy* (Rizzi 2018: 358). The difference between adult’s and children’s systems is that children’s system only tolerates the optimal degree of distinctness in the intervention configuration, which is the disjunction relation; whereas adults’ system also tolerate the inclusion relation. Therefore, in cases of object extraction across a nominal

¹⁴According to Villata et al. (2016), animacy which is not a criterial feature in syntactic computation, is an independent source of difficulty in A²-dependencies. Besides, Villata et al. (*ibid.*) also test another factor D(iscourse)-linking, which has been reported to facilitate the A²-dependencies (particularly weak island violation). The result of an acceptability judgment shows that D-linking is not a dependent factor to the amelioration in wh-island, it is rather the lexical restriction [+NP] who play a role in the amelioration of the wh-NP [+wh, +NP].

¹⁵ another type of inclusion is that:

	X	Z	Y	
(non criterial) inclusion	+A,+B	+B	+A,+B	partial match: full accessible for adults

In Villata et al. (2016), a third type of inclusion is discussed:

	X	Z	Y	
Inverse inclusion	+ A	+A,+B	+A	= full match: strong violation

In inverse inclusion relation, the relevant features of the intervener properly includes the one of the target, the result of acceptability judgement (Villata et al. 2016) shows a strong degradation. The reason is that in such case, the target is not distinct from the intervener (as in the Identity relation), so that a disruption arises. This shows that the featural distinctness between the target and the intervener is directional: the calculation of distinctness is based on the target with respect to the intervener. This directionality is very crucial in the calculation.

In (31), the flash indicates the direction of the accessibility: configuration with disjunction relation is the most accessible among the four relations in the intervention configuration (for both children and adult); non-criterial inclusion marked the full accessibility for adult; degradation begins at criterial inclusion, once the intervener and the target share a criterial feature in common, the configuration becomes less accessible; the intervention effect arises in the case of identity.

1.3.3 Concluding remarks of the intervention hypothesis and some further questions

In conclusion, Featural Relativized Minimality approach provides a unified analysis for the intervention effects observed in A'-dependencies in both adult's and children's grammar. The intervention discussed in this approach is hierarchical (structural) and based on c-command (the intervener c-commands the trace, but the intervener does not c-command the target).

In the featural perspective, the most 'effective' factor in an intervention configuration is the criterial-featural similarity of the target with respect to the intervener. Object relative clause, since the subject intervener does not contain the criterial feature [+R(ell)], are fully acceptable for adults. However, in comparing with subject relatives, which do not involve any intervention configuration, they are still more difficult to process. Although object relative clauses involve neither identity nor criterial inclusion, they are still consistent with the hierarchy between disjunction and non-criterial inclusion: disjunction configuration is more accessible than non-criterial configuration. (32) illustrates the set-theoretic configurations in object relatives.

(32)	head noun	subject	object trace
a. identity	+R,+NP	*+R,+NP	+R,+NP
b. criterial inclusion	+R,+NP	*+R	+R,+NP
c. non-criterial inclusion	+R,+NP	+NP	+R,+NP
d. disjunction	+R,+NP		+R,+NP

The facilitation effect of a pronominal subject in an object relative clause can be explained by the hierarchy between disjunction and non-criterial inclusion. Since pronominal subjects are not lexically restricted, an object relative with a pronominal subject involves a disjunction configuration (34). On the other hand, an object relative clause with a lexical restricted subject corresponds to a non-criterial inclusion configuration (cf. 33).

- (33) Show me the elephant that the lion is washing _____ (Rizzi 2018:356 example (35))
 +R,+NP +NP
- (34) Show me the elephant that someone is washing _____ (Rizzi 2018:356 example (37))
 +R,+NP

As (32) to (34) show, lexical restriction [+NP] is a crucial factor influencing the intervention effect in object relative clauses. For the languages like English and French, the lexical restriction can be morphologically marked by an article; but for languages like Mandarin and Cantonese which lack morphological markings and in which the lexical restriction is rather contextual, how can one detect the lexical restriction and capture the relevant set-theoretic relations? Another question is that under the framework of Featural Relativized Minimality discussed in this chapter (Friedmann et al. 2009, Villata et al. 2016, Rizzi 2018), it seems that only lexical restriction [+NP] is taken into account as the non-criterial feature in the calculation of intervention effect, while other features such as animacy are considered as an independent factor for the difficulty (Villata et al. 2016). Do they have an impact on the intervention configuration and enter into the calculation of the featural Relativized Minimality? Or do they have another independent calculation system?

1.4 Summary

In this chapter, three hypotheses concerning the processing of RCs have been reviewed. Dependency locality theory (Gibson 2000) argues that sentence processing (or sentence parsing) is based on integrating words into a structure and keeping the integrated structures in memory. The computational resources consumed in these two components are converted respectively into integration cost and memory cost. The structural integration cost is associated with the distance of attachment; the storage cost is associated with upcoming syntactic categories. These two components are also related to two types of processing difficulties: *dependency locality* and *ambiguity*. To process a sentence containing a dependency, the longer the linear distance between the two elements in the dependency relation, the more the integration costs, the more difficult the sentence is. To process a sentence containing an ambiguous structure, the larger the storage cost difference between the possible interpretations, the more difficult the sentence is. Frequency and plausibility are irreducible factors in ambiguity resolution.

Under the structural distance hypothesis (O’Grady 1997), the processing complexity is due to the embeddedness of the gap in the syntactic structure: the more deeply the gap is embedded in the

structure, the more difficult the structure is. An asymmetry between subject relatives and the other types of relatives containing a gap in more deeply embedded positions is predicted under this account. Furthermore, the lexical featural endowment of arguments (animacy) and the nature of the verb (transitivity: number of the arguments assigned by a verb) are also important factors influencing the processing of RCs.

The intervention hypothesis (Friedmann et al. 2009, Villata et al. 2016, Rizzi 2018) can be considered as a sub-category of the structural-based hypothesis since it is consistent with syntactic locality and (featural) Relativized Minimality. Under this account, it is not the structural-distance between the gap and the antecedent *per se*, but the intervention of the subject whose features are similar to the ones involved in the dependency that make object A'-dependency difficult. Moreover, the processing difficulties associated to object A'-dependency are gradational and depend on the degree of featural similarity: identity will cause ungrammaticality; partial similarity (inclusion) of non-criterial features is fully acceptable but difficult for adults, and unacceptable for children; as for partial similarity (inclusion) of criterial features, it gives rise to degradation.

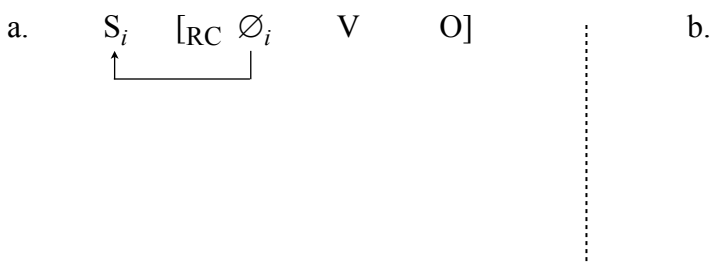
In comparing the hypotheses above, we observed that although these hypotheses were put forward under different perspectives, they shared some common points: 1) object-gap dependency is the main issues in RC processing; 2) empirically, lexical features of the arguments in RCs is an important factor during the processing. In the light of these three hypotheses, what predications will they give to the relative clause processing in Cantonese?

1.5 Predictions for Cantonese relative clauses

As we mentioned in the introduction, Cantonese, being an SVO language with pre-nominal relatives, displays a mismatch between VP, which is head-initial, and NP, which is head-final¹⁶. Remember that for an SVO language with head-initial VP and NP, both linear distance-based hypotheses and structural distance-based hypotheses predict a subject advantage/preference: the distance between the head and the gap is both linearly and structurally closer in subject relatives. Two examples corresponding to subject relative and object relative in English are given below:

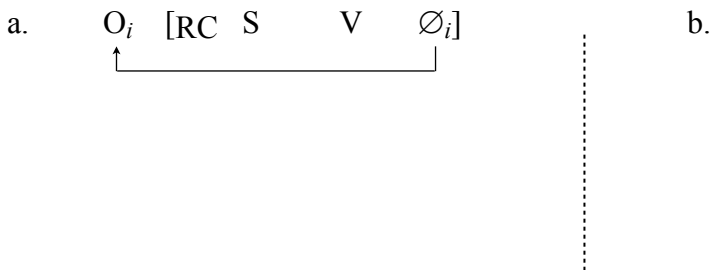
subject relative:

(35) the *firefighter*_i [RC who \emptyset_i is greeting the sailor]



object relative:

(36) the *sailor*_i [that the firefighter is greeting \emptyset_i]



linear distance

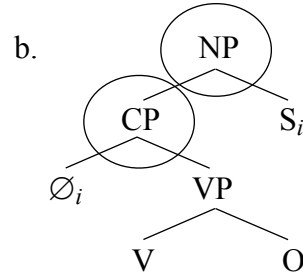
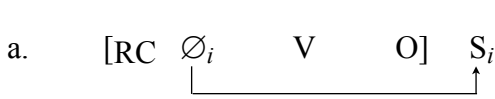
structural distance

For a SVO language with post-nominal relative, like Cantonese, the different hypotheses make different predictions: a linear-distance based hypothesis predicts an object advantage/preference, since the distance between the head and the gap is shorter in object relatives with respect to subject relatives (37a); vice versa, a structural-distance based hypothesis predicts a subject advantage/preference, because by definition the subject is always structurally higher than the object (35b & 37b). The mismatch of linear and structural distance in RCs in Cantonese is illustrated below.

¹⁶ In the perspective of the antisymmetry (Kayne 1994), the head-final configuration is rather superficial, since all languages are head-initial at underlying level, the superficial head-final configuration derives by movement(s).

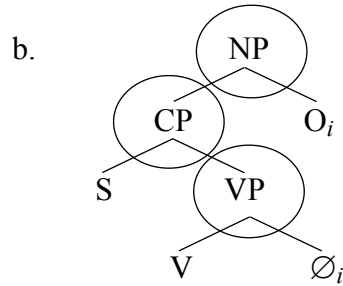
Subject relative:

(37) [RC \emptyset_i 照-住 水手 嘅] 消防員_i
 ziu3-zyu6 sei2sau2 ge3 siu1fong4jyun4
 light-ASP sailor REL firefighter
 ‘(the) firefighter who is lighting the sailor’



Object relative:

(38) [RC 消防員 照-住 \emptyset_i 嘅] 水手_i
 siu1fong4jyun4 ziu3-zyu6 ge3 sei2sau2
 fire-fighter light-ASP REL sailor
 ‘(the) sailor that the firefighter is lighting’



linear distance

structural distance

This mismatch makes Cantonese very crucial to test different hypotheses: if Cantonese RCs display a subject advantage, it means that structural distance is the key factor in RCs processing; if object advantage or preference is shown, it means that linear distance is the key factor; if the processing difference between subject RCs and object RCs is not significant, it might denote that linear and structural distance both get involved and a processing conflict arises due to the mismatch of linear and structural distance in RCs in Cantonese. If an intervention effect is observed, it means again that the nature of this effect is structural rather than linear, since the subject does not linearly intervene between the head and the gap in object relatives in Cantonese. The structural intervention effect is established on the c-command relation: subject c-commands the gap but does not c-command the head.

Other predictions for Cantonese relative clauses include the processing difficulty of the object relative with demonstrative and classifier predicted by the Dependency Locality Theory (Gibson 2000, see section 1.1) and the processing discrepancies of object relative predicted by featural Relativized Minimality (Villata et al. 2016, Rizzi 2018, see section 1.3.2). Object relative with demonstrative and classifier is predicted to be difficult since such a structure is superficially isomorphic to a declarative main clause in the language. According to the DLT, processing difficulty increases as the storage cost difference increases: processing an object relative involves more storage cost than processing a simple declarative main clause.

Object relative clause:

(39)[RC 消防員 照-住 \emptyset_i] 嗰 個 水手_i 拎-住 張 氈。
 siu1 fong4jyun4 ziu3-zyu6 go2 go3 seoi2sau2 ling1-zyu6 zoeng1 zin1
 firefighter light-ASP Dem CL sailor hold-ASP CL blanket
 ‘The sailor that the firefighter is lighting is holding a blanket.’

Declarative main clause:

(40) 消防員 照-住 嗰 個 水手。
 siu1 fong4jyun4 ziu3-zyu6 go2 go3 seoi2sau2
 firefighter light-ASP Dem CL sailor
 ‘The firefighter is lighting that sailor.’

The featural intervention hypothesis predicts that object relatives are fully acceptable for adults but problematic for children since object relatives involve non-criterial inclusion. In consideration of the semantic difference between the two types of relative structures in Cantonese: the one with *ge3*, is indefinite and the one with demonstrative and classifier is definite (see Cheng and Sybesma 1999, 2009), object relatives with different markers might involve different featural configurations.

However, nominals are not a simple case in Chinese: there is a huge debate about the nature and the structure of nominals in Chinese (NP or DP) in the literature. On one hand, lexical restriction [+NP] in the framework of featural Relativized Minimality is a D lexically restricted by an NP. However, whether there is a D in Chinese and which element (e.g. demonstrative, classifier, *de/ge3*) occupies this position is still under discussion. It might not be wise to directly adopt this feature into account in Cantonese where this feature is not even clearly marked. On the other hand, the relative markers in Cantonese are nominal (nominalizer *ge3*, classifier, demonstrative), do their features participate in the featural intervention? If yes, how? Given the complexity of relative clauses in Cantonese, two

essential questions should be answered before adopting the featural intervention hypothesis in this language: a) What are the nominal structure in Cantonese? And b) what are the structures of relative clauses? What is the nature of the relative markers?

In the next chapter, we are going to review some previous researches on Cantonese relative clauses to see what kind of results they obtained and which factors emerged. As for the discussion about whether there is a featural intervention effect and how it affects relative clauses processing in Cantonese, we leave it in Part II after discussing the structure of nominal and the structure of relative clauses.

Chapter 2 Previous researches on processing of relative clauses in Cantonese

In the literature concerning processing of relative clause in Cantonese, most experimental researches about are focused on language acquisition, and they yielded contradictory results: Lau (2006, 2016) reports a subject advantage for the acquisition of RCs by monolingual children (comprehension in 2006, production in 2016); Yip and Matthews (2007) report an object advantage for the acquisition of RCs by bilingual children in a diary study. Kidd, Chan et Chiu (2014) report an overwhelming subject advantage for bilingual children whose dominant language is English, and a slight object advantage for a monolingual control group.

As for the processing of RCs by adults, Lau (2016) reports a significant subject preference in two production tasks by adults (which is a control group for a monolingual acquisition study). Pozniak et al. (2016, 2017) reported a slight subject advantage in a visual world eye-tracking experiment with 23 native speakers. They also reported that the subject advantage varied in relative clauses with *ge3* (*ge3*-RCs) and those with demonstrative and classifier (*dem-cl*-RCs). The subject advantage was much stronger in *dem-cl*-RCs. In this subsection, we are going to review these works: Yip and Matthews (2007) in subsection 2.1; Kidd et al. (2014) in 2.2; Lau's works (2006, 2016) in 2.3 and 2.4; and Pozniak et al. (2016, 2017) in 2.5. A summary and some discussions are given in 2.6.

2.1 Yip & Matthews (2007): the acquisition of RCs by Cantonese-English bilingual children

Based on a diary study on three siblings, Yip and Matthews observe the acquisition of relative clauses by Cantonese-English bilingual children (Yip & Matthews 2000). Being the dominant language of the three children, Cantonese has a positive cross-linguistic influence on English in the acquisition of relative clauses. Besides, they also observe object relatives emerged earlier than subject relatives in both languages.

RC type	Cantonese ^a			English		
	Timmy	Sophie	Alicia	Timmy	Sophie	Alicia
Prenominal						
Subject	2;04;28	—	4;08;13	—	3;10;09	3;08;01
Object	2;04;28	2;09;05	2;01;01	2;07;03	3;03;12	3;05;06
Postnominal						
Subject	n/a	n/a	n/a	3;10;23	5;04;19	4;05;03
Object	n/a	n/a	n/a	3;04;07	4;10;28	5;02;17

^aClauses with relative marker *ge3* and those formed with a demonstrative and classifier immediately preceding the noun.

Table 2 Age of first emergence of subject and object RCs in Cantonese and English in three bilingual children

According to the diary data, among the three siblings, one acquired SRs and ORs in Cantonese simultaneously, another acquired ORs much earlier than SRs (2 years and 7 months). For English relative clauses, as a result of the transferring influence from Cantonese, pre-nominal relative structures were found in English, moreover, even earlier than the grammatical post-nominal structure.

For the early acquisition of ORs in Cantonese, three factors are considered to be primary: *Isomorphism between pre-nominal RCs and main clause*; *Internal-headed Analysis of early ORs*; *RCs as isolated NPs and attributed clause*.

Yip and Matthews (2002) suggest that ORs should be acquired earlier owing to the similarity to the canonical word order: ORs (particularly direct ORs) in Cantonese is in a sequence of NP V NP which is similar to the canonical SVO order. ORs with demonstrative and classifier are even superficially isomorphic to a canonical declarative main clause.

Object relative clause:

(41)[RC 消防員 照-住 \emptyset_i] 嗰 個 水手_i
 siu1 fong4jyun4 ziu3-zyu6 go2 go3 seoi2sau2
 firefighter light-ASP Dem CL sailor
 ‘the sailor that the firefighter is lighting’

Declarative main clause:

(42) 消防員 照-住 嗰 個 水手。
 siu1 fong4jyun4 ziu3-zyu6 go2 go3 seoi2sau2
 firefighter light-ASP Dem CL sailor
 ‘The firefighter is lighting that sailor.’

	消防員 firefighter	照-住 light-ASP	\emptyset	嗰個 水手 Dem Cl sailor
object relative	subject	verb	object gap	head noun
main clause	subject	verb		object

Table 3. Configurations of ORs and main clauses

The second factor the authors claim that might favour ORs in the acquisition is the possibility that ORs in Cantonese might be internally-headed RC. One piece of evidence comes from some ill-formed (for adults) RCs by children, in which relative markers (neither classifier nor *ge3*) are absent and their surface form is main clause-liked (cf. (43)).

(43) Ngo5 sik6 joek6 aa3. [_{NP/S} Ngo5 sik6 joek6] hai6 ni1 zek3.
 I eat medicine SFP I eat medicine is this CL
 ‘I’m taking medicine. The medicine I take is this one.’ (Alicia 2;08;10)
 (example (42) of Yip & Matthews 2007)

Moreover, children’s early ORs are frequently found being isolated NPs which form a sentence *per se* (44) (Diessel and Tomasello 2005: 882). In associating with the previous factor, canonical word order, ORs in isolated NPs is even easier since they have superficially the same form of an SVO clause.

(44) [_{NP} jan4dei6 bei2 ngo5 go2 go3] aa3.
 people give me Dem Cl SFP
 ‘The one (candy) someone gave me.’

(example (43) of Yip & Matthews 2007)

The other factor who might result in an object preference, according to the authors is the possibility that RCs in Cantonese are attributive clauses, which are gapless (Matthew & Yip 2017). The authors argue that the relationship between the head noun and the predicate in Cantonese RCs is semantic or pragmatic rather than syntactic, based on the existence of the following type of clause.

(45) Ngo5 soeng2 tai2 [NP[S keoi5 waat6syut3] go2 zoeng1 soeng2].
 I want see he/she ski that CL photo
 “I’d like to see the picture of her skiing.”

(example from Matthew & Yip (2013))

In example (45), there is no direct relation between the attributive clause “*he/she skis*” and the head noun “the picture”. The connection between the clause and the head noun is purely semantic. The attributive clause is structurally complete, therefore gapless.

Further argumentations which support gapless attributive clause assumption are given in Matthews and Yip (2017). First, no explicit indication (e.g. case-markings, relative pronoun) indicating the grammatical or semantic relationship between the head noun and the modifying clause is displayed in Cantonese. Second, modifying clauses (including relative clauses and complement clauses) have identical forms (clause-ge3-N or clause-dem-cl-N). Third, Cantonese allows null subjects and null objects rather freely and therefore has low referential density.

Noun-modifying clauses in Cantonese and those in Mandarin share similar characteristics. Gapless RCs are also found in Mandarin (Cheng & Sybesma 2005b, Zhang 2008, Pan 2018, among others).

(46) 他 唱歌 的 聲音
 [ta chang-ge de] shengyin
 he sing song DE voice
 ‘the voice he has while singing’ (Cheng and Sybesma 2005b)
 ‘the voice with which he sings’ (Matthews and Yip 2017)

In gapless RCs, the head and the modifying clause are also connected on a predication relation (Cheng & Sybesma 2005b, Zhang 2008). However, the predication relation in gapless RCs is different from that in the regular RCs¹⁷: in regular relative constructions, the relative clause is the predicate of the head noun (Simpson 2001); whereas in gapless relative constructions, the relative

¹⁷ In regular RCs, the relative clause is considered as the predicate of the head noun (according to Simpson 2001).

clause is clausal subject, and the head noun is the predicate. Moreover, in gapless RCs, the relative clause is an external argument of the head noun; as in complement clauses of NP, the complement clause is an internal argument of the noun (Zhang 2008). This distinguishes gapless RCs from regular gapped RCs as well as complement clauses¹⁸.

To sum up, in this study, early acquisition of object RCs in Cantonese is observed in Cantonese-English bilingual children. Authors argue that this is the result of three factors: first, object RCs superficially resemble canonical word order of the main clause. Second, object RCs might be internally-headed. Third, RCs in Cantonese might be gapless. The first factor has been discussed in other studies about the acquisition of RCs in Cantonese (Lau 2006, 2016), and we also believe that the resemblance with main clauses might have an influence in processing by adults. For the two other factors, they seem to be restricted to acquisition. On one hand, the internally-headed construction is observed only in object relatives, and constructions like (43) are ill-formed for adults. On the other hand, while in languages where internally-headed RCs are attested, an external marker is usually found at the periphery of the whole relative clauses (including the internal head), this is not the case of RCs in Cantonese. As for the third factor, gapless RCs do exist in Cantonese but are very different from regular gapped RCs. Therefore, it does not seem appropriate to analyse subject or object relative as gapless RCs in Cantonese.

¹⁸ According to Cheng & Sybesma (2005), *the reason why a gapless relative can exist is due to the combination of having a generalized λ -abstraction operator (de) and an event variable [...] head noun is base-generated external to the relative clause, and that there is no empty operator movement within the relative.* (p. 75)

According to Zhang (2008), *the Head noun of such relative clauses are relational nouns, and the clauses are their licensors. Syntactically, the Head nouns are predicates and the clauses are subjects. Compared to regular relative clause constructions, gapless relative clause constructions denote a reversed predication relation between the Head nouns and the clauses. Compared to complement clauses of nouns, gapless relative clauses denote external rather than internal argument of nouns.*(p.16)

According to Pan (2018), *gapless relative clauses are not complement clauses, but RCs licensed by a covert semantic variable. [...] no syntactic or semantic gap in the clause that is related to the head noun, in addition to a condition on the relationship between the clause in question and the head noun.* (https://aims.cuhk.edu.hk/converis/portal/Publication/84312788?auxfun=&lang=en_GB)

2.2 Kidd, Chan and Chiu (2014): the comprehension of RCs by Cantonese-English bilingual children

The study of Kidd et al. (2014) aims to investigate cross-linguistic influence in the acquisition of relative clauses by Cantonese-English bilingual children. In this study, two similar experiments were run out with Cantonese-English bilingual children and Cantonese monolingual children (as a control group) to test the comprehension of relative clauses in both languages. Concerning the stimuli, relative types (subject vs. object), relative forms (classifier-RCs¹⁹ vs. *ge3*-RCs in Cantonese) were taken into account. As for the two RCs forms in Cantonese, the authors simply claim that classifier-RCs were pragmatically “most common” in spoken language, and consequently considered less formal; semantically, CL-RCs entailed specific reference; syntactically, object CL-RCs might be processed as internal RCs by children owing to their similarity to canonical SVO main clause (following Yip & Matthews 2007a). As for *ge3*-RCs, they are considered as the formal version; semantically, they are claimed to be able to “quantify over a set of entities and allow both singular and plural readings of the head”, but not specific referencing.

The authors investigate whether the structural overlap between the two languages would influence the children's comprehension of the two forms of RCs (CL vs. *ge3*) and hypothesised that a better English level could cause more difficulties in Cantonese comprehension when the test sentences could have more than one interpretation. By consequence, they predict Cantonese object RCs with a classifier to be more difficult for children due to both in the structural ambiguity (the isomorphism with SVO clauses) and the cross-linguistic influence from the English post-nominal RCs. There should be a less negative influence for the other RCs in Cantonese, since for ORs with *ge3*, the particle disambiguates ORs, and for SRs there is no structural ambiguity, whatsoever.

In these two contrastive experiments, there were 40 children participants, 20 for each experiment. The children in the bilingual group were aged from 4;10 to 11;11 years (Mean = 8;11, SD = 2;6 years), lived in Australia, their dominant language was English. The monolingual children were aged from 5;2 to 9;2 years (Mean = 6;4, SD = 1;3 years), and lived in Hong Kong. Although there was a disparity between the ages of the two groups, the Cantonese vocabulary competence of the two groups is claimed to be equivalent.

¹⁹ Classifier/CL-RCs in Kidd et al. (2014) are actually with demonstrative, therefore equal to dem-cl-RC in other discussions.

Concerning the design, it was a 2 (group: bilingual/monolingual)*2 (structure: *ge3* - / CL - relatives)*2 (extraction: subject / object) mixed design. There was a total of 24 test sentences of Cantonese relatives (12 SRs, 12 ORs; 12 *ge3*-relatives, 12 CL-relatives), and 12 test sentences of English relatives (since only one structure is counted in English RCs) only for the bilingual group.

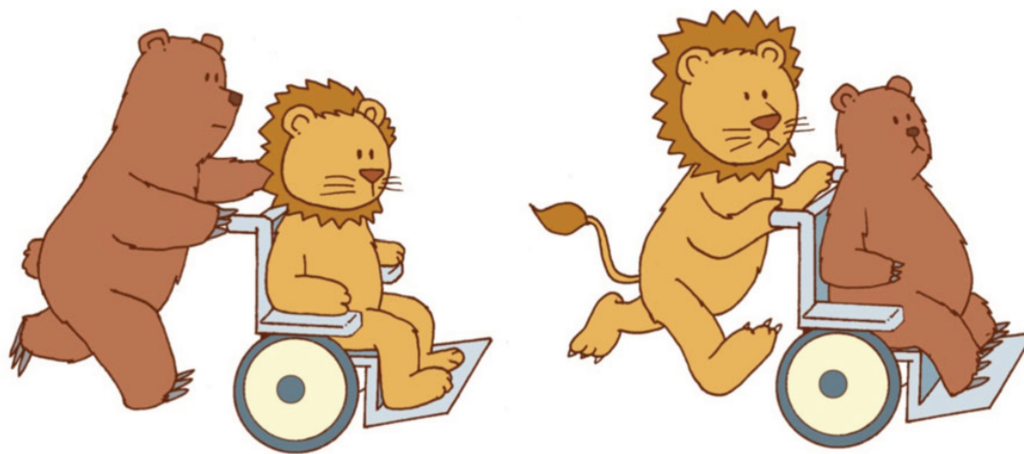


Figure 3.

image (a)

image (b)

(figure 1 in Kidd et al. 2014:6)

The experiment was a picture-pointing test based on 36 pairs of images. In each pair, there were the same two animals (e.g. a bear and a lion) and the same action (e.g. push) in each image, alternating their roles (e.g. a bear is pushing a lion in image (a), a lion is pushing a bear in image (b)); in total there are 15 animals (pig, horse, elephant, tiger, mouse, cow, duck, bear, lion, cat, chicken, sheep, monkey, rabbit and giraffe) and 4 actions (push, feed, kiss and hug). All the test sentences had animate subject and object since the animacy mismatches modulate the processing of object RCs (Brandt, Kidd, Lieven & Tomasello, 2009; Kidd, Brandt, Lieven & Tomasello, 2007). There were also 12 fillers in Cantonese test and 6 in English.

The pointing was triggered by the questions in Table 4. Before asking the question, the experimenter explained the background scenes of the pair; then children were asked to point at the correct animal.

<i>Sentence type</i>	<i>Example</i>					
Sub-Eng	Where is the mouse that is kissing the chicken?					
Sub-Ge	餵緊	貓仔	嘅	鴨仔	喺	邊度呀?
	Feeding	cat	ge	duck	is	where?
Sub-CL	攞緊	長頸鹿	嗰隻	獅子	喺	邊度呀?
	Hugging	giraffe	that CL	lion	is	where?
Obj-Eng	Where is the rabbit that the sheep is pushing?					
Obj-Ge	公雞	餵緊	嘅	兔仔	喺	邊度呀?
	Chicken	feeding	ge	lion	is	where?
Obj-CL	豬仔	攞緊	嗰隻	馬仔	喺	邊度呀?
	Pig	hugging	that CL	horse	is	where?

Table 4. Example of the trigger questions for each condition

The results of pointing were classified into 4 categories: (i) *Correct*; (ii) *Head error*: for the cases in which children pointed to the correct picture but the incorrect animal; (iii) *Reversal error*: for the cases where children pointed to the correct animal but in the incorrect picture (in which the role of agent and the patient were reversed); (iv) *Other error*: for the cases in which children pointed to the incorrect animal in the incorrect picture.

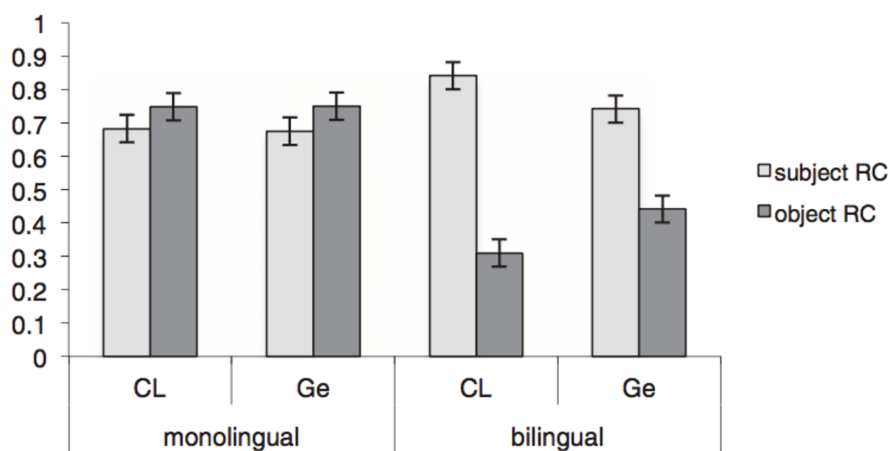


Figure 4. Accuracy for bilingual and monolingual children on *ge3*-RCs and CL-RCs

Concerning the result of the experiment, a slight object RC advantage was found in the monolingual children's performance in both type of relatives (*Ge*: $M_{\text{ObjRC}} = .75$, $M_{\text{SubjRC}} = .68$; *CL*: $M_{\text{ObjRC}} = .75$, $M_{\text{SubjRC}} = .68$); while a significant subject RC advantage was found in the bilingual children's performance in Cantonese part (*Ge*: $M_{\text{SubjRC}} = .74$, $M_{\text{ObjRC}} = .44$; *CL*: $M_{\text{SubjRC}} = .84$, $M_{\text{ObjRC}} = .31$) as well as in English part ($M_{\text{SubjRC}} = .93$, $M_{\text{ObjRC}} = .63$). In addition, the bilingual children had a better performance in English RC than in Cantonese RC.

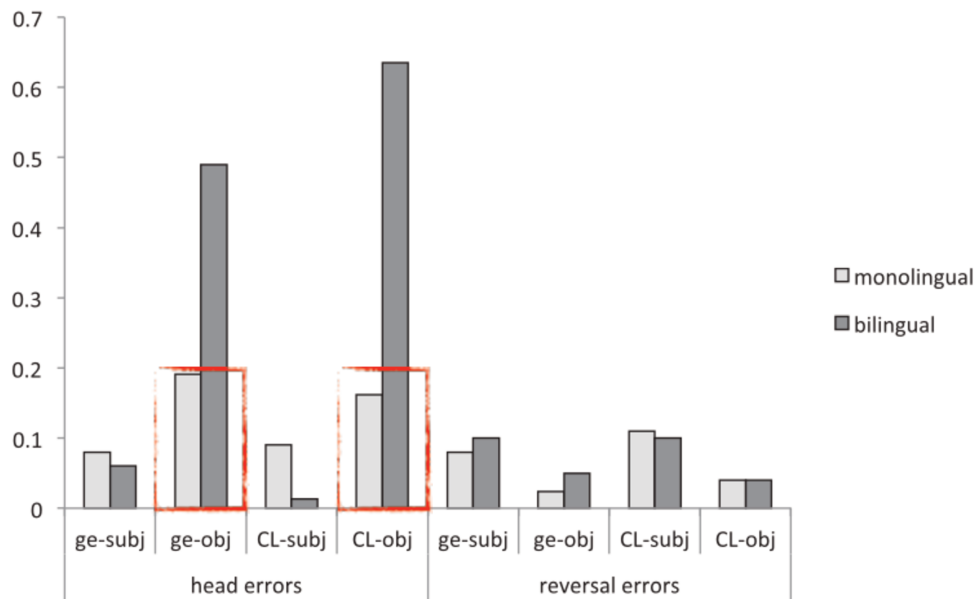


Figure 5. Distribution of error types for bilingual and monolingual children for Cantonese RCs

As for the errors, head errors (monolinguals: 16.1%; bilinguals: 29.6%) were the most frequent versus reversal errors (monolinguals: 7.9%; bilinguals: 5.6%) and other errors (monolinguals: 4.3%; bilingual: 6.6%).

The result of the experiment supported the authors' hypothesis that Cantonese ORs are more difficult for bilingual children. On one hand, the accuracy of pointing by monolingual children in ORs was much higher than the accuracy by bilingual children; on the other hand, the bilingual group produced significantly more head errors in Cantonese ORs.

In conclusion, authors compared monolingual and bilingual children's comprehension of Cantonese RCs with *ge3* and with classifier. Given the combination of SVO canonical word order and the prenominal RCs in Cantonese, different theories had different predictions to Cantonese RCs acquisition and processing. According to the result of their experiments, there seemed to be no asymmetry between SRs and ORs in monolingual children's comprehension (slight ORs advantage). In bilingual children's comprehension, ORs difficulty was observed (even stronger in ORs with classifier) and this, according to the authors, was due to the overlap of the surface form between ORs in Cantonese and the SVO word order in both Cantonese and English: in such case, bilingual children applied the cues from dominant language to interpret the problematic construction.

2.3 Lau (2006): The acquisition of relative clauses by Cantonese children: An experimental approach

Lau's dissertation is an investigation of the acquisition of relative clauses by Cantonese monolingual children. Two experiments have been run out for her study: an elicited imitation task and an act-out task, which covered both production and comprehension. In her two experiments, all the RCs were *classifier-relatives* (also containing demonstrative) for the reason that they are more colloquial and more frequently produced by young children; all the RCs were restrictive since references of the head noun in the experiments were restricted.

Moreover, Lau mentions that young children tended to produce relative clauses in presentational constructions, either with a copular or with an isolated NP. This preference for presentational copular constructions have been documented for English by Diesel and Domasello (2005).

(47) It's the one [you went to ___ last night]. (Peter 2;10)

(48) **The girl** [___ came with us]. (Nina 3;0)

(example (16), (17) in Lau (2006))

The subjects of these two experiments were the same: 31 native and monolingual Cantonese children aged between 4;0 and 6;1. Six types of RC, including Subject relative (S), Agent relatives (A), Patient relatives (P), Indirect Object relative (IO), Oblique relatives (OBL) and Genitive relatives (GEN) were tested in the experiments. Furthermore, relatives were either inserted in a main clause or in a copular construction.

(49) RC in intransitive/transitive main clauses

- a. 企響樓梯上面嗰個男仔舉起咗隻貓貓 S
kei5 hoeng2 lau4tai1 soeng6min6 go2 go3 naam4zai2 geoi2hei2zo2 zek3 maau1maau1
stood at stairs upon that CL boy lift-up-PF CL cat
'The boy that stood on the stairs lifted up the cat.'
- b. 食咗條魚嗰隻貓貓行咗去垃圾桶嗰度 A
sik6zo2 tiu4 jyu5 go2 zek3 maau1maau1 haang4zo2 heoi3 laap6saap3tung2 go2dou6
eat-PF CL fish that CL cat walk-PF at rubbish-bin there
'The cat that ate the fish walked to the rubbish bin.'
- c. 個男仔餵嗰隻大笨象匿埋樹下面 P
go3 naam4zai2 wai3 go2 zek3 daai6ban6zoeng6 nei1maai4 hoeng2 syu6 haa6min6
CL boy fed that CL elephant hide at tree under
'The elephant that the boy fed hid under the tree.'

(50) RC in copular constructions

- a. 呢隻係爬咗上樹嗰隻熊貓 S
li1 zek3 hai6 paa4zo2 soeng2 syu6 go2 zek3 hung4maau1
that CL is climb-PF up tree that CL panda
'This is the panda that has climbed up the tree.'
- b. 呢隻係捉住咗兔子嗰隻獅子 A
li1 zek3 hai6 zuk1zyu6zo2 tou3zai2 go2 zek3 si1zi2
that CL is catch-PF rabbit that CL lion
'This is the long that has caught the rabbit.'
- c. 呢架係長頸鹿踢緊嗰架車 P
li1 gaa3 hai6 coeng4geng2luk5 tek3gan2 go2 gaa3 ce1
that CL is giraffe kick-PROG that CL car
'This is the car that the giraffe is kicking.'

(examples from Lau (2006), chapter 3.6)

There was a total of 48 sentences with 4 tokens for each combination (construction × type : 2 × 6 × 4), 2 tokens for each experiment. Each sentence contained at most 2 animate NPs, but their positions in the sentence were not controlled. The two experiments were carried out together as a session.

The context of the experiments was that Mickey Mouse had just arrived in Hong Kong and that he wanted to learn Cantonese. The participants were asked to teach him Cantonese. They were going to the zoo with Mickey, and they would see some animals and teach Mickey the animal's names in Cantonese. In the elicited imitation task, the experimenter read the sentences and the children were asked to repeat them to Mickey. In the act-out task, the experimenter put two sets of toys in the middle of the table, one was corresponding to the target, and the other was the distractor. Then a test sentence was read aloud by the experimenter, and the children were asked to pick up the set referring to the sentence and act it out.

Concerning the results of these two tasks, a total of 624 responses were collected from 26 participants who have finished both tasks. In order to observe the evolution of acquisition, the participants were divided into two groups by ages: 10 in age group 4;0-4;11 and 16 in age group 5;0-5;11.

In the elicited imitation task, children performed best on subject relatives (S) and Agent relatives (A), Patient (P) and Genitive (G) relatives in the second place. The most difficult type for them were indirect object (IO) relatives, even more difficult than the oblique (OBL). As for the construction of the whole sentence, children performed much better in copular constructions than in verbal main clause constructions, particularly on patient (P) relatives and genitive (G) relatives.

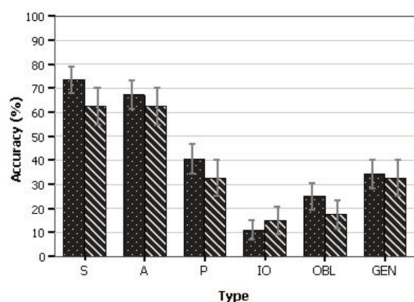


Fig 6 Comparison on overall accuracy in elicited imitation

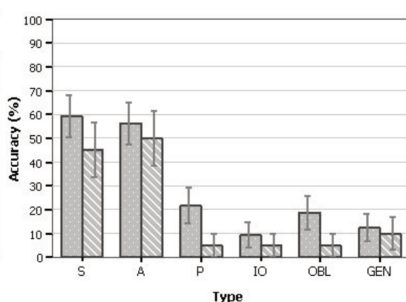


Fig 7 Comparison on accuracy for main clause construction

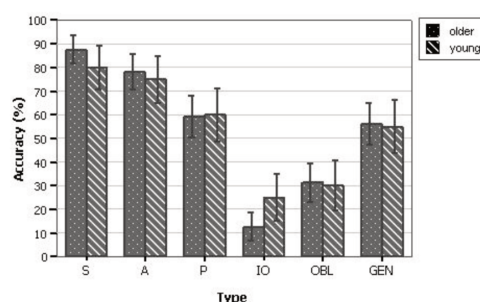


Fig 8 Comparison on accuracy for copular construction

In overall accuracy, children performed better in the act-out task than in the elicited-imitation. In the act-out task, the accuracies for each relative type were all above 60 %. Among the six types of relatives, children had the best performance on subject (S) relatives; genitive (G) relatives and agent (A) relatives in the second place (G even slightly better than A), the poorest performance was found in oblique (OBL) relatives. As for the construction of the whole sentence, the advantage of copular construction was less strong here.

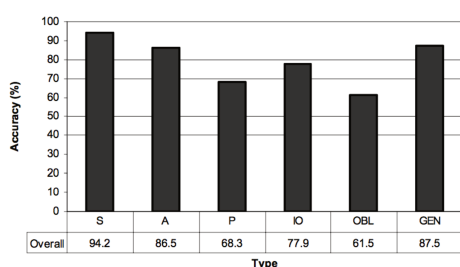


Fig 9 Overall accuracy in act-out

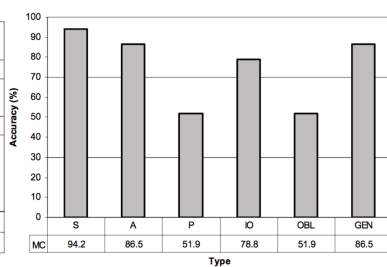


Fig 10 Overall accuracy for main clause construction

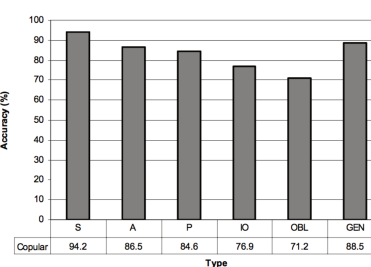


Fig 11 Overall accuracy for copular construction

As for the difference between the two groups of different ages, the older group performed in general better than the young group, except on the oblique (OBL) relatives.

Among the different types of relatives, subject (S) relatives and agent (A) relative had a significantly better performance than the other relatives. Genitive (G) relatives also seemed to be processed differently from the other relatives by children. Many theories (the structural distance-based theories among them) predicted that the S- and A- relatives should be the easiest. However,

neither of them can fully explain the results: the unexpected performance of GEN-relatives in both tasks and the one of IO-relatives in act-out tasks.

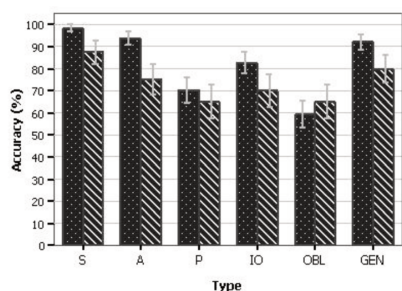


Fig 12 Comparison on overall accuracy in elicited imitation

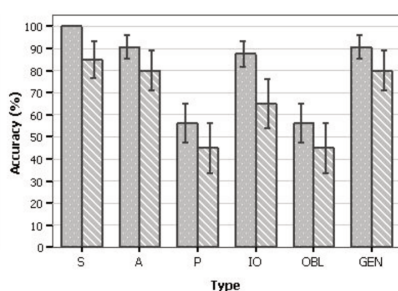


Fig 13 Comparison on accuracy for main clause construction

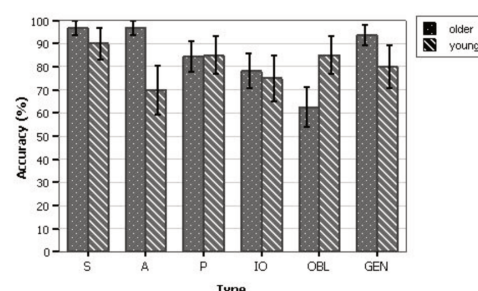


Fig 14 Comparison on accuracy for copular construction

2.4 Lau (2016): The acquisition of relative clauses in Cantonese: A multi-factorial analysis

Lau (2016) continued her investigation about the acquisition of relative clauses (by monolingual children) in Cantonese. The role of animacy and the role of resumptive pronoun were also discussed in her study. Her main conclusions are that: 1) topicality of the subject makes subject more prominent and more available for relativization; 2) word order resemblance is the main strategy for children to construct and process RCs; 3) Animacy of arguments does play a role; 4) resumptive pronoun does not seem to play a facilitating role in Cantonese.

The conclusions above are based on 4 experiments: Comprehension of RCs with animate full-NPs arguments by children (Exp I); elicited production of RCs with animate full-NPs arguments by children and by adults (Exp II). These two experiments aimed to test the role of the grammatical relations (functions) in relative clause processing. A discrepancy between comprehension and production was observed. She then set another elicited production of RCs with 4 different configurations of animacy by children and by adults (Exp III) in order to test the role of animacy. A comprehension test of ORs with resumptive pronouns (RPs) by children (Exp IV) was also run in order to test the role of RP. We are going to review these experiments in the rest of this subsection.

2.4.1 Experiment I: the role of grammatical relations in the comprehension of Cantonese relative clauses

This experiment was a comprehension and pointing task. 45 monolingual children (mean age: 5;06.03) participated in the experiment. 4 types of RCs were set as items based on the noun phrase accessibility hierarchy (NPAH: Keenan & Comrie 1977): subject, DO, IO and Oblique RCs. 4

pairwise comparisons between RCs of different types formed 4 different conditions: 1) Subject vs. Direct Object; 2) Subject vs. Indirect Object; 3) Direct Object vs. Indirect Object; 4) Direct Object vs. Oblique.

subject vs. direct object (DO):

(51) a. subject:

[RC ___ 追 女仔] 嗰個男仔
 zeoi1 neoi5zai2 go2 go3 naam4zai2
 chase girl that CL boy
 ‘the boy that chases the girl.’

b. direct object:

[RC 男仔 追 ___] 嗰個女仔
 naam4zai2 zeoi1 go2 go3 neoi5zai2
 boy chase that CL girl
 ‘the girl that the boy chases’

subject vs. indirect object (IO) (with *give* verb):

(52) a. subject:

[RC ___ 俾 車車 媽媽] 嗰個仔仔
 bei2 ce1ce1 maa4maa1 go2 go3 zai4zai2
 give car mother that CL son
 ‘the son that gives the mother the car’

b. indirect object:

[RC 仔仔 俾 車車 佢] 嗰個媽媽
 zai4zai2 bei2 ce1ce1 keoi5 go2 go3 maa4maa1
 son give car 3SG that CL mother
 ‘the mother that the son gives (her) the car’

(with dative)

(53) a. subject:

[RC ___ 派 波波 俾 哥哥] 嗰個姐姐
 paai3 bobo1 bei2 go4go1 go2 go3 ze4ze1
 give.out ballon DAT brother that CL sister
 ‘the woman that gives out a balloon to the man’

b. indirect object:

[RC 姐姐 派 波波 俾 佢] 嗰個哥哥
 ze4ze1 paai3 bobo1 bei2 keoi5 go2 go3 go4go1
 sister give.out ballon DAT 3SG that CL brother
 ‘the man that the woman gives out a ballon to (him)’

direct object (DO) vs. indirect object (IO):

(54) a. direct object:

[RC 爸爸 推 ___ 俾 弟弟] 嗰個 妹妹
 baa4baa1 teoi1 bei2 dai4dai2 go2 go3 mui4mui2
 father push DAT little.brother that CL little.sister
 ‘the little sister that the father pushes to the little brother’

b. indirect object:

[RC 爸爸 推 妹妹 俾 佢] 嗰個 弟弟
 baa4baa1 teoi1 mui4mui2 bei2 keoi5 go2 go3 dai4dai2
 father push little.sister DAT 3SG that CL little.brother
 ‘the little brother that the father pushes the little sister to (him)’

direct object (DO) vs. oblique (OBL):

(55) a. direct object:

[RC 男仔 擺 ___ 響 恐龍 後面] 嗰架 車車
 naam4zai2 baai2 hoeng2 hung2lung4 hau6min6 go2 gaa3 ce1ce1
 boy place at dinosaur back that CL car
 ‘the car that the boy placed behind the dinosaur’

b. oblique:

[RC 男仔 擺 車車 響 佢 後面] 嗰隻 恐龍
 naam4zai2 baai2 ce1ce1 hoeng2 keoi5 hau6min6 go2 zek3 hung2lung4
 boy place car at 3SG back that CL dinosaur
 ‘the dinosaur that the boy places the car behind (it)’

Results:

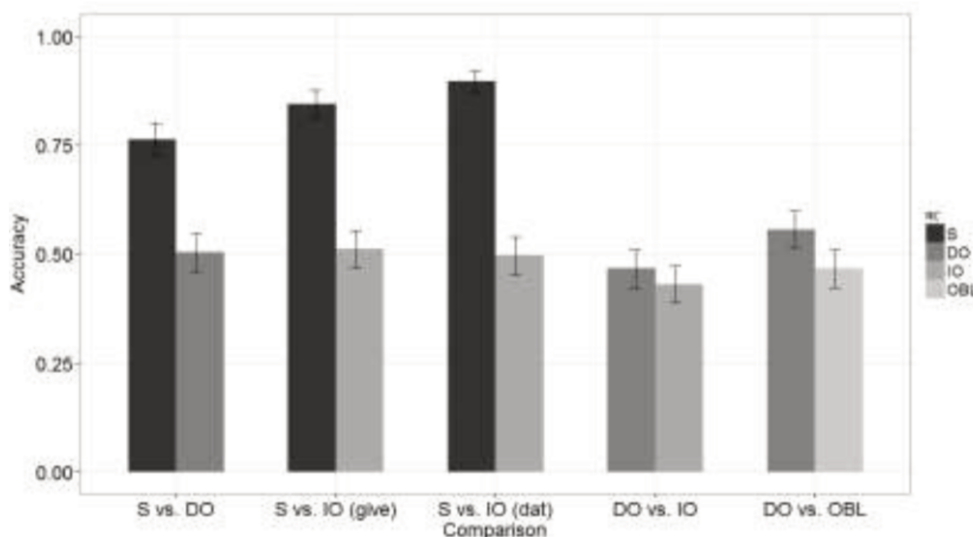


Figure 15. Proportion of the correct responses of different NPs type for each comparisons

Concerning accuracy, the correct responses in subject RCs were significantly more than those in direct object RCs in the S - DO pair. The correct responses in subject RCs were also significantly

more than those in the two types of indirect object RCs with *give* verb and *dative* verb respectively²⁰ in the S - IO (give) and the S - IO (dative) pairs. While the difference between IO (give) and IO (dative) was not significant ($p = .38$). Moreover, there was no interaction between the verb types and the relative types ($p = .21$). As for the comparison between DO and IO, the difference was not significant ($p = .61$). Neither was the difference between DO and OBL.

Here, three types of errors were distinguished: a) head error, in which children correctly assigned the grammatical role but chose a wrong head noun; b) reversal error, in which children incorrectly assigned the grammatical role; c) other error, in which another irrelevant character was chosen.

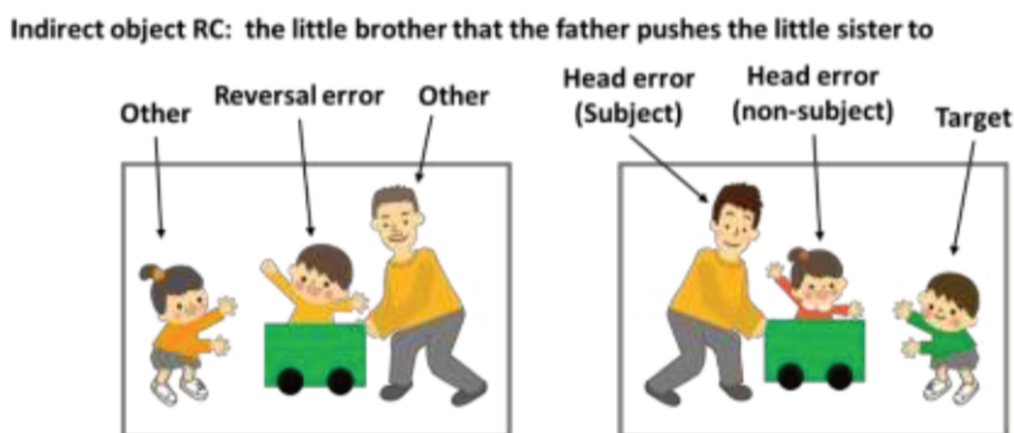


Figure 16 Coding of the errors responses

In the S-DO pair, head errors were found significantly more in the direct object RCs; reversal errors were significantly more in the direct object RCs than in subject RCs; other errors were only found in subject RCs. Concerning head errors, head errors found in DO RCs were all subject errors. A similar result was found in the S-IO pair. As for the DO-IO pair, there were significantly more head errors produced in the IO RCs than in the DO RCs. Whereas, there were significantly more reversal errors in the DO RCs than in the IO RCs. Head errors were significantly more than reversal errors in the IO RCs, while in DO RCs, this proportion was marginal. For the DO-OBL pair, there were slightly more head errors and reversal errors in the OBL RCs than in the DO RCs, but the differences were not significant in both cases (head errors: $p = .36$, reversal errors: $p = .98$). In DO RCs condition, reversal head errors were found more than head errors ($p = .04$), however, in OBL condition, head errors and reversal errors were equally prevalent ($p = .18$).

²⁰ The verb *bei2* - *give* and the dative marker *bei2* - *to* who introduces the indirect object in ditransitive construction are isomorphic in Cantonese.

To sum up, the results of the experiments showed the following asymmetries in the 4 pairwise comparisons about 4 types of RCs in comprehension by children:

(56) Contrasts in relative clause comprehension for Cantonese children:

- a. S > DO b. S > IO c. DO = IO d. DO = OBL

(= example (42) in Lau (2016))

As for the error types observed in the experiment, head errors were predominant types of errors except in the DO-OBL pair. Up to 80% of head errors involved a subject error, in which children misinterpreted the subject of RCs as the head noun. Head errors were more prevalent in low positions (DO, IO)²¹ in NPAH; whereas, reversal errors, in contrast, were found more prevalent in a high position (oblique case). This dichotomy was consistent with the constituent (word) order of the RCs: head errors were found more prevalent in the RCs in a low position, which had a *surface resemblance* with main clauses; reversal head were more prevalent in a high position, whose *surface* order did not resemble main clauses. This is compatible with the hypothesis that children use a canonical word order resemblance strategy.

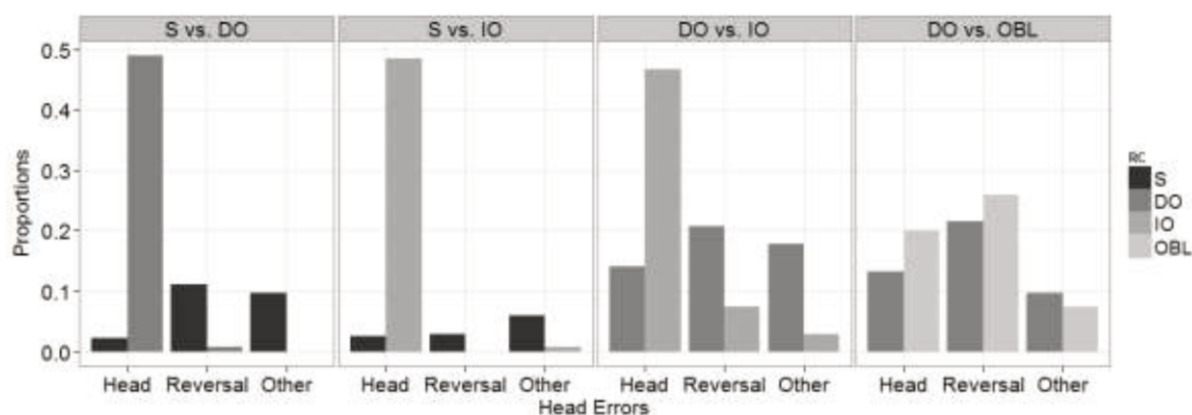


Figure 17 Proportions of different types of errors in children's comprehension

2.4.2 Experiment II: the role of grammatical relations in the production of Cantonese relative clauses

After testing the comprehension of RCs in Cantonese by children, the author extended the test to production. 56 children (including the previous 48 participants in the Exp I) (mean age: 5;07.20) and 48 undergraduate students (adult control) participated in the experiments. The experiment was using picture sets to elicit the production of RCs. Hamburger and Crain (1982)'s set-up was adapted

²¹ The genitive case in NPAH was neither tested nor discussed in the study of Lau (2016).



a. First screen:

Background Description.

There are two boys. One boy is chasing a girl and a girl is chasing the other boy.

b. Second screen: Target.

Oh! Little Fairy is pointing at the boy. Which boy is Little Fairy pointing at?

c. Third screen: Prompt.

Can you tell Bunny which boy is it?
Target: 'the boy that chases the girl'

Figure 18 Sample test trial for production

to the experiment: each set contained two pictures, the same event was displayed in both pictures, but the agent and the patient were reversed. A question was asked in order to trigger the production of the RCs.

Start it from adults, Figure 19 represents the proportion of target productions across comparisons of relative clauses.

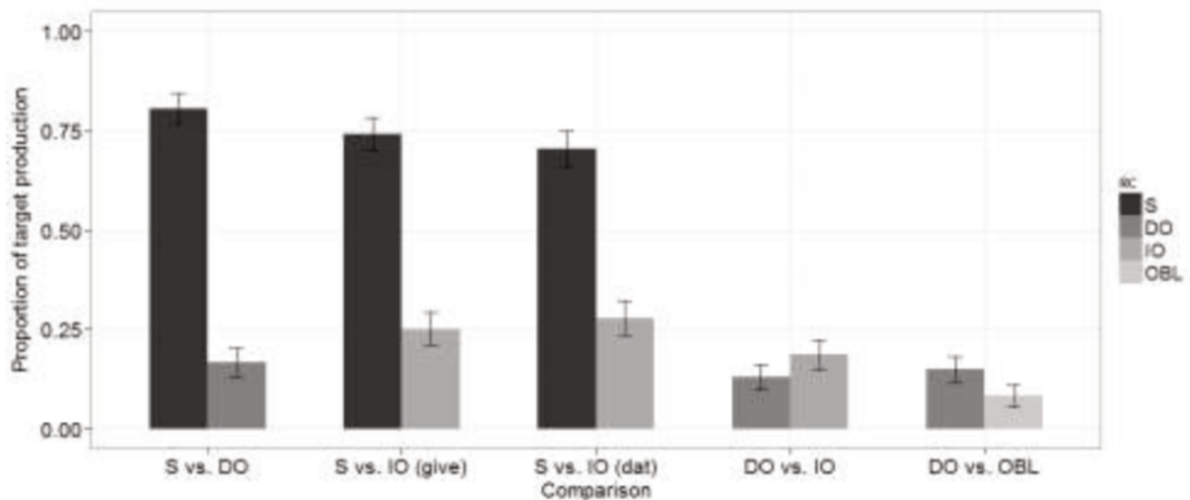


Figure 19 Proportions of adults' target production across comparisons

Concerning the accuracy of target production in each pairwise comparisons, a significant subject preference was observed in pairs containing subject RCs ($p < .001$). Concerning the difference between the two types of verbs in IO, no significant effect was observed ($p = .87$), neither was the interaction between the verb types and the RC type ($p = .28$). As for the comparison of the DO-IO pair, both RC types yielded a low rate of accuracy, and the difference of the accuracy in these two types of RC was not significant ($p = .29$). A similar result was found in the DO-OBL pair: low rate

of accuracy in both types of RC, the difference of accuracy between DO and OBL was not significant.

Concerning the non-target production: in the S-DO pair, subject RC condition yielded a very high accuracy, the non-target production in this condition involved the descriptive subject RC in which the targeted transitive verb was replaced by other verbs to describe the characteristics of the head noun.

As for DO condition, passivized subject RCs were predominant in the non-target production (97.4%). In the S-IO pair, the descriptive subject RCs were observed as non-target production in the subject as in the S-DO pair; another type of non-target production in subject condition involved the omission of the indirect object in the RCs.

In IO condition, the non-RCs production generally involved subject strategies by substituting a transitive or intransitive word to make the direct object to be subject in the structure. Although the subject strategy was the main strategy to avoid the production IO RCs, the production of passivized SRs was low owing to the marginal acceptability of upgrading an IO to S in Cantonese. Another type of non-target production involved IO RCs with a gap which was supposed to be ungrammatical in Cantonese. However, 9.5 % of the production in the IO (give) condition and 14% in the IO (dative) condition were gap-type IO RCs. In the DO-IO pair, passivization was the main strategy in the DO condition. 62% of passivized subject RCs production involves the omission of the direct object.

The other non-target productions included predicate-negating strategy (e.g. *the boy that is not supported by father*), gap-type IO strategy, subject strategy by changing the verbs (as in the other pairs) and genitive RCs by describing the characteristics of the head noun. In the DO-OBL pair, the subject strategy by changing the verb was the main strategy in both conditions (52.6% in the DO condition; 37.1% in the OBL condition). Besides, the subject strategy with passivisation occupied a considerable proportion in the non-target production (19.6% in the DO condition; 10.1% in the OBL condition). In the oblique condition, substituting a locative intransitive verb for the target verb was a common strategy (72.7% in the OBL condition).

In the production experiment, the author was also interested in the distribution of the different syntactic structures of RCs in Cantonese. A table summarizing the result is given below :

Relative Marker	Proportions
㗎 <i>go2</i> + CL	48.6% (395/813)
嘅 <i>ge3</i>	38.4% (312/813)
CL	2.7% (22/813)
²² <i>ge3</i> + <i>go2</i> + CL	9.5% (77/813)
<i>ge3</i> + CL	0.12% (1/813)
<i>go2</i> + CL + <i>ge3</i>	0.73% (6/813)

Table 5 Proportions of various forms of relative markers in adults' relative clauses

The construction with demonstrative *go2* and classifier (CL) was the most produced form, followed by the construction with the relativizer *ge3*. These two constructions were predominant across all conditions.

To sum up, the production of RCs in Cantonese by adults yielded a strong subject preference: not only because subject RCs had a high accuracy, but also because subject strategies were the main strategy over all conditions.

Turning now to children, consider figure 20.

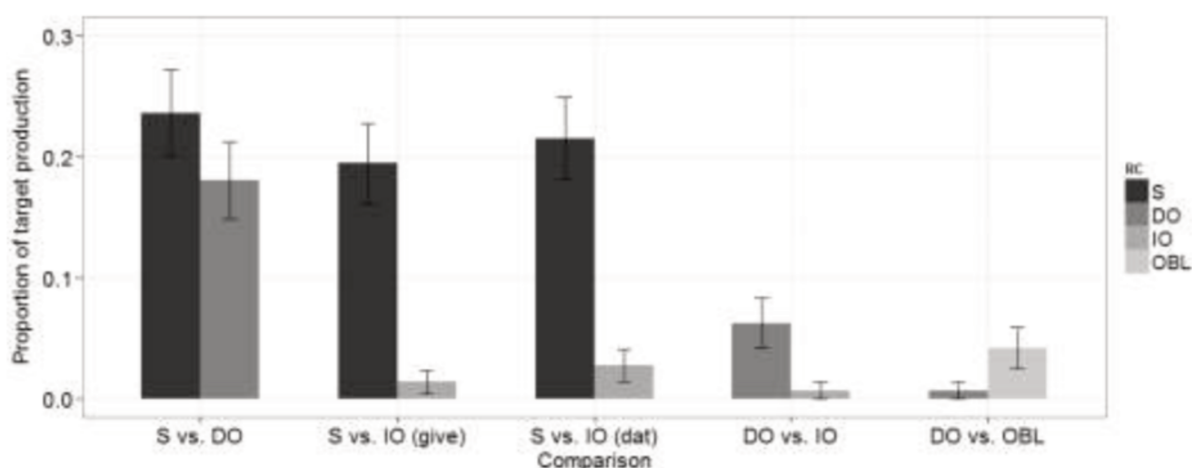


Figure 20 Proportions of children's target production across comparisons

²² The form *ge3* + CL is considered as ungrammatical in Cantonese. (Matthews and Yip 2001)

Compared to adults, children had a lower accuracy. In general, a subject preference was observed: the subject conditions among the pairwise comparisons elicited more target productions than the other conditions. In the S-DO pair, however, the preference of subject with respect to the object was not significant ($p = .36$). In the S-IO pairs, the subject preferences were significant in both IO constructions (give and dative); whereas the effect of the verb (construction) type ($p = .67$) and its interaction between the verb type and the RC type ($p = .87$) were not significant, which is similar to the result in the production by adults. In the DO-IO pair, the DO condition had a significantly higher ($p = .03$) accuracy than the IO condition. As in the DO-OBL pair, the OBL condition yielded a higher accuracy which was almost significant ($p = .06$).

Concerning the non-target production, in the S-DO pair, the main strategy was the subject strategy by substituting the verb for the transitive and reversal target verb in both the subject and the DO condition. In comparing to the production by adults in the DO condition, passivized subject relatives were much less common in the production by children (7.1% vs. 76.8%); and the accuracy in the DO condition was much closer to that in the subject condition (unlike in the production by adults), which means that the DO RCs were not more difficult than the subject RCs for children. In the S-IO pair, the subject strategy by using describing verbs was still the common strategy in this pair. Another common strategy was reducing the ditransitive to a transitive verb. Besides, gap-type strategy (RP avoidance) was also observed in the IO condition as in the production by adults. In the DO-IO pair, a similar result was observed as in the previous pairs: the subject strategy by using describing verbs was the most common strategy, reducing ditransitive verb to transitive verb by the omission of IO was another common strategy. Another strategy observed in this pair included the middle voice strategy in which neither the subject position nor the object position was filled, and the grammatical function of the head noun was rather ambiguous, the gap-type IO strategy was observed in the IO condition as well. In the DO-OBL pair, subject strategies, no surprise, were the main strategy: in this pair of comparison which involved locative construction, intransitive verbs of location or middle voice constructions with location were found the most common. Describing verb strategy was observed not only in the subject RCs but also in the object RCs. Gap-type RCs were observed in the OBL condition.

Concerning the distribution of the different types of RCs, the pattern of children production was different from the one of adult production. A recapitulative table of the result is given as follows: in children's production, the most frequent construction was the construction with a demonstrative and

Relative Marker	Proportions	Relative Marker	Proportions
嗰個 <i>go2</i> + CL	78.2% (498/637)	嗰個 <i>go2</i> + CL	48.6% (395/813)
嘅 <i>ge3</i>	16% (102/637)	嘅 <i>ge3</i>	38.4% (312/813)
CL	4.1% (26/637)	CL	2.7% (22/813)
<i>ge3</i> + <i>go2</i> + CL	0.47% (3/637)	<i>ge3</i> + <i>go2</i> + CL	9.5% (77/813)
<i>ge3</i> + CL	0.16% (1/637)	<i>ge3</i> + CL	0.12% (1/813)
<i>go2</i> + CL + <i>ge3</i>	0.78% (5/637)	<i>go2</i> + CL + <i>ge3</i>	0.73% (6/813)
zero	0.31% (2/637)		

Table 6 Proportions of various forms of relative markers in children's relative clauses

Table 7 Proportions of various forms of relative markers in adults' relative clauses

a classifier; however, unlike adults, this construction was predominant in children's production (78.2% in children vs. 48.6% in adults). The construction with *ge3* was less frequent; moreover the mix constructions were barely found in children's production.

Concerning the target production, the productions of children and adults also showed different tendencies:

(57) Contrasts in relative clause for children and adults:

<u>PRODUCTION by children</u>	<u>PRODUCTION by adults</u>	<u>COMPREHENSION by children</u>
S = DO	S > DO	S > DO
S > IO	S > IO	S > IO
DO > IO	DO = IO	DO = IO
DO = OBL	DO = OBL	DO = OBL

The production of both subject relatives and direct object relatives were difficult for children (both yielded a low accuracy). The subject preference in children's production was not as significant as in adults' production or in children's comprehension. The DO-IO pair in children's production also showed a different tendency: the avoidance of complex structure like IO RCs was significant in children's production; in children's comprehension, on the other hand, the IO RCs were not more difficult than the DO RCs, which was similar to the result of adults' production. The asymmetries displayed above seem to indicate that during the acquisition of relative clauses, comprehension precedes production.

General discussion

Taking the results of the three experiments (including accuracy and error types) into account, *both adults and children showed a strong tendency to prefer subject relative clauses*. In the comprehension experiment, this tendency manifested as a significantly higher accuracy in the subject RCs condition; in the production experiment, it manifested as the frequent production of subject RCs in the object or the oblique conditions. The main strategy for adults was passivization and the main strategy for children was verb changing.

As for the other asymmetries observed between comprehension and production, the author explains it by assuming that the resemblance with the canonical word order plays a stronger role in the production. *Resemblance with main clauses helps children compose relative clauses based on their acquired knowledge of the language's canonical word order. They can follow the basic word order in main clauses to piece the constituents together to form the relative clauses. Therefore, relative clauses which have a constituent order similar to main clauses seem to be easier to produce for children, as suggested in Chan et al. (2011:206) (Lau 2016:98)*. However, the facilitation effect only applied to production; in the comprehension, the isomorphism between the matrix clause and the object relative raise the difficulty to identify the head noun.

2.4.3 Experiment III: the role of animacy in the production of Cantonese relative clauses

Animacy is a factor that is well-known to influence the processing of post-nominal RCs: an animate head noun is more frequently followed by a subject relative; whereas, an inanimate head noun, by an object relative. It is interesting to see if this the effect is also observed in pre-nominal RCs, where the head noun linearly comes after the RCs. In order to test this, the author ran another production experiment. 4 animacy configurations were included in the new experiment: animate subject-animate object (AA), animate subject-inanimate object (AI), inanimate subject-inanimate object (II), inanimate subject-animate object (IA). 22 children (mean age: 5;00.18) and 20 undergraduate students participated in the experiment. The design of the experiment was similar to that in the previous production experiment. The production of RCs was elicited by pictures and questions. Each configuration had 6 sets of materials; there were 24 sets in total; each set can elicit a subject RC and an object RC.

Let us starts with adults. A significant subject preference was observed across all four animacy configurations. This means that the object preference with the AI configuration observed in the

post-nominal RCs did not appear in Cantonese. However, the AI configuration did modulate the object avoidance: the production in the object condition in this configuration yielded the highest accuracy (over 70% were DO). In the other configurations, the alternative strategy was mainly subject strategies (by reversing the patient as the subject head noun of the RC), particularly the passivization strategy.

Moreover, it seemed that only the mismatch of (in)animacy between arguments affected the production of relative clauses. For the two remaining configurations, in which animacy of the subject and the object were the same, their distributions of the production were similar. In combining the results in all four configurations, the author suggested that (only) the mismatch of (in)animacy between the arguments of RCs was crucial for the processing.

Let us turn now to children. As in the previous children production experiment, no significant preference (for subject or subject) was observed in all four animacy configurations. Concerning the non-target RC production, passivized subject RCs were rarely observed in the children production; instead, the common strategies were internally head relative clauses (IHRCs) and descriptive subject RCs.

The effect of animacy in children's production was similar to that in adults' production: the AI configuration seemed to be the most effective in modulating the difficulty of both subject and DO RCs; on the contrary, the IA configuration increased the difficulty of the processing of RCs. Besides, as in adults' production, it seemed that only the mismatch of animacy between the arguments of RCs was crucial for the processing in the children's production: the AA configuration and the II configuration yielded a similar proportion of the target production.

2.4.4 Experiment IV: the role of resumptive pronouns (RPs) in the acquisition of Cantonese relative clauses

In the literature about language acquisition, the studies about whether the resumptive pronouns (RPs) facilitate the processing of RCs yielded contradictory results (Friedmann et al. 2009). In order to test the role of RPs in Cantonese relative clauses, the author ran a new comprehension experiment in which ORs with gap and with RP were compared.

This experiment was a comprehension and picture-pointing task. Three conditions were set: subject relative clauses, direct object relatives with a gap (DO (gap)), direct object relatives with a resumptive pronoun (DO (RP)).

The result of this experiment shows that the use of RP although is grammatical, is not a common strategy in the processing of relative clauses by children. In the comprehension, no facilitative effect was observed in the ORs with RPs, which aligns with the previous observation in other languages (Friedmann et al. 2009). In the production, resumptive NPs as an alternative strategy was much more common than the RPs in the production of RCs.

2.4.5 Conclusion

In Lau's thesis (2016) about the acquisition of relative clauses in Cantonese, a universal subject preference was observed in 4 different experiments involving the comprehension and the production of relative clauses with animate full-NPs arguments, with 4 configurations of animacy and with a resumptive pronoun. Such a preference in these experiments was manifested not only as a higher accuracy in subject relatives but also as the main alternative strategy for children to avoid the complex or difficult relative clauses of a lower position such as indirect object relatives, oblique relatives.

Some asymmetries between the comprehension and the production were also observed, mainly due to the different impact of word order resemblance in comprehension and production: in production, object relatives are easier to produce since the word order of the object relative is similar to a matrix clause; whereas in comprehension, the resemblance of word order led children to misinterpret an object relative as a matrix clause and to wrongly assign the head of the relative, therefore the difficulty to comprehend an object relative increased. Word order resemblance, the very same factor, drove the asymmetries between comprehension and production.

Although the study of Lau was about the acquisition, adults were also tested as a control. In the two production tests, asymmetries between the production by adults and the production by children were observed. Lau speculates that the strategies applied in production by children and by adults were different: word order resemblance was the main strategy for children; whereas, subject strategies (particularly passivization) was the main strategy for adults. Despite the asymmetries in the production, the tendency of children's comprehension was quite similar to the tendency of adults'

production, which suggested that children's comprehension level was more advanced than their production level.

2.5 Pozniak, Huang and Hemforth (2016, 2017): the comprehension of relative clauses with visual word experiment

Pozniak et al. (2016, 2017) investigate the factors influencing the comprehension of relative clauses by adults in SVO languages with post-nominal relative clauses like English, and with pre-nominal relative clauses like Mandarin and Cantonese with a visual world paradigm eye-tracking experiment.

The experiment was a comprehension and eye-fixation task. Participants were first asked to look at a set of pictures (cf. Figure 21), in which two pictures with three identical characters were shown side by side in the screen. The event displayed in these two pictures were also identical, except that the agent and the patient in the pictures were inverted. Then the participants would hear a sentence pronounced (cf. Table 8) and be asked to gaze at the character corresponding to the description of the sentence announced. Their eye movements were simultaneously recorded during the experiment.

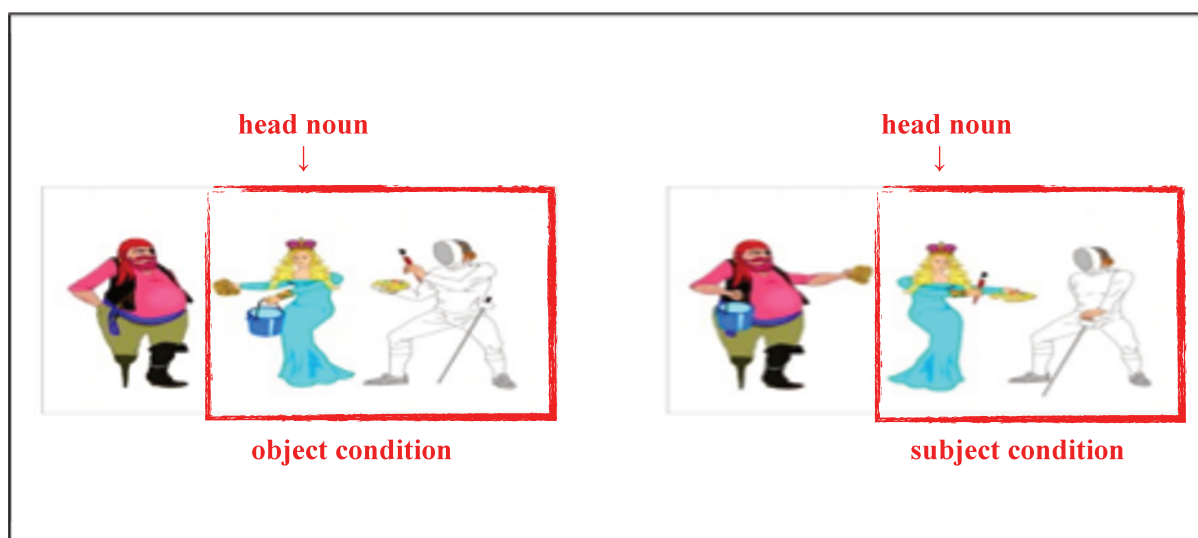


Figure 21 Example of items used in the experiment
(extracted from Pozniak et al. (2017))

Languages	Subject relative	Object relative
Mandarin	请找出相对应的公主，也就是[画击剑者的]漂亮公主。 Please find correct princess, that is to say [say draws fencer_{obj} de] beautiful princess	请找出相对应的公主，也就是[击剑者画的]漂亮公主。 Please find correct princess, that is to say [fencer_{subj} draws de] beautiful princess
Cantonese (relativizer)	請搵出相對應嘅公主，亦即係[畫擊劍者嘅]靚公主。 Please find correct princess, that is to say [draws fencer_{obj} ge3] beautiful princess	請搵出相對應嘅公主，亦即係[擊劍者畫嘅]靚公主。 Please find correct princess, that is to say [fencer_{subj} draws ge3] beautiful princess
Cantonese (dem+cl)	請搵出相對應嘅公主，亦即係[畫擊劍者]嗰個靚公主。 Please find correct princess, that is to say [draws fencer_{obj}] dem Cl beautiful princess	請搵出相對應嘅公主，亦即係[擊劍者畫]嗰個靚公主。 Please find correct princess, that is to say [fencer_{subj} draws] dem Cl beautiful princess
English	Please find the right princess, that is to say the beautiful princess [that is drawing the fencer] on the picture.	Please find the right princess, that is to say the beautiful princess [that the fencer is drawing] on the picture.

Table 8 Example of sentences used for the eye-tracking experiment in each languages tested

All the events in the experiment were reversible. The context was given before each item; therefore, only restrictive interpretation was appropriate for the items. Two conditions were set in English and in Mandarin corresponding to subject (relative) condition and object (relative) condition. Four conditions were set in Cantonese since two types of relative structures were tested in this language, corresponding to subject relatives with relativizer, object relatives with relativizer; subject relatives with demonstrative and classifier; object relatives with demonstrative and classifier.

Three experiments were run in Mandarin (the first two in Paris, France; the last one in Nanjing, China). The results were different in these experiments: in the first experiment with 41 native Mandarin speakers living in Paris, France, no significant difference between subject relatives and object relatives was observed; neither was the interaction between the level of French, as the second language, and the age of acquisition. In the second experiment with 23 native speakers also living in Paris, where the presentation of the sentence was accelerated in order to increase the processing load, a significant subject advantage was observed ($p < .01$). In the third experiment with 35 native speakers living in Nanjing, China, however, with the same speed of the presentation, no significant difference was observed in the experiment. The authors concluded that *faster*

presentation does not seem to be enough to induce processing difficulty for ORs in a monolingual environment.

The result of the experiment in English was straightforward: with 24 native English speakers living in Glasgow, Scotland, a significant subject advantage ($p < .01$) was observed.

As for the result of the experiment in Cantonese, a marginal subject advantage ($p < .05$) was observed in the relative clauses with relativizer *ge3*. A stronger advantage for the subject ($p < .01$) was observed in the relative clauses with demonstrative and classifier. In comparing these two constructions, relative clauses with demonstrative and classifier were processed significantly faster than those with relativizer ($p < .05$).

To conclude, in SVO languages with post-nominal relative clauses, like English, in which linear distance and structural distance predict the same pattern for processing, a clear and robust subject advantage was shown. In SVO languages with pre-nominal relative clauses, like Mandarin and Cantonese, relative clauses processing might involve a competition between linear distance-based and structural distance-based factors, processing advantage might be not significant, or there might be no processing difference between subject and object relatives.

In the case of Cantonese, the processing of the construction with relativizer shared a similar pattern to the processing of relative clause in Mandarin whose relative construction is also with a nominal relativizer *de*: the advantage for the subject with respect to the object is not significant. This aligns with the hypothesis of competition between linear distance-based and structural distance-based factors. The processing of the construction demonstrative and classifier, on the other hand, yielded a more robust subject advantage. The explanation of Pozniak et al. is that the relative constructions with *ge3* and those with demonstrative and classifier might not be generated in the same way in following Yu (2006)'s proposal, therefore yielded the different processing patterns. Constructions with *ge3*, like its counterpart in Mandarin, might be generated by head movement; whereas constructions with demonstrative and classifier might be generated by adjunction due to the absence of overt linker *which is usually obligatory in noun phrases* (Yu 2006:16). In RCs derived by adjunction (dem-cl-RCs), there is no structural dependency between the head and the gap, impact of structural distance-based factor might be weaker in this types of RCs than in the RCs where the head and the gap have a dependency relation (*ge3*-RCs). This might explain why RCs with

demonstrative and classifier are processed faster than RCs with *ge3* in Cantonese. As for the reason why dem-cl-RCs yield a larger processing difference between subject relatives and object relatives, it might be due to an isomorphism between the ORs with demonstrative and classifier and the main clause: ambiguity between isomorphic constructions increases the processing load and slow down the comprehension (Lau 2016).

2.6 Summary

In this chapter, five studies about the processing of relative clauses in Cantonese have been reviewed. Concerning the subject-object asymmetry, the results of the studies about acquisition showed contradictory results: for monolingual children, Lau (2006, 2016) reported a subject advantage for the comprehension and the production of relative clauses; whereas Kidd et al. (2014) reported a slight object advantage. Kidd et al.'s conclusion was based on the accuracy of children's performance in the experiment; Lau's conclusion, on the other hand, was based on both the accuracy and the error types. Besides, the monolingual children in these two experiments were not of the same age group (Kidd et al. (2014): 5;02 to 9;02; Lau (2016): 4;05.28 to 6;07.24). Curiously, the older monolingual children in Kidd et al.'s study did not show any significant difference between subject relatives and object relatives; whereas, the younger children in Lau's study did show a significant subject advantage on the accuracy. The same for adults' production. For bilingual children, Cantonese dominant children showed an object advantage (Yip and Matthews 2007), English dominant children showed a subject advantage (Kidd et al. 2014).

As for the processing by adults, a subject advantage was observed in the experiments reviewed in this chapter (Lau 2016, Pozniak et al. 2016, 2017): Lau reported a significant subject preference in two production experiments with and without animacy variation; Pozniak et al. (2016, 2017) reported an advantage for subject relatives in a visual world paradigm comprehension experiment. The results of their experiment show that the advantage is less significant in the structures with the relativizer *ge3* ($p < .05$) and much stronger in the ones with demonstrative and classifier ($p < .01$).

Concerning the structures of relative clauses, the one with the demonstrative and the classifier are easier to comprehend (Pozniak et al. 2016, 2017) and to produce (Lau 2016) by adults. For the acquisition, this structure is also more frequent in production than the structure with the relativizer *ge3*; however, for the comprehension, in the study of Kidd et al., the structure did not seem to be a significant factor in the comprehension of relative clauses by monolingual children.

The results above show a universal subject advantage/preference in the acquisition by monolingual children (Lau 2006, 2016), in comprehension (Pozniak et al. 2017) and production (Lau 2016) by adults. However, the subject advantage/preference not only results from a shorter structural distance between the gap and the head, but also from an interaction between multiple factors.

In the acquisition of monolingual children, the isomorphism between object relatives and main clauses seems to be a crucial factor driving an asymmetry between comprehension and production: word order resemblance facilitates the production of object relative, however, causes ambiguity and increases processing difficulty in comprehension (Lau 2016). In the acquisition of bilingual children, cross-linguistic influence is observed (Yip and Matthews 2017, Kidd et al. 2014): children adopt the processing pattern of RCs in dominant language to process RCs in non-dominant language.

In adult's comprehension (Pozniak et al. 2017), linear order seems to play a role as well: although a subject advantage is observed in the comprehension experiment, it is not as robust as in the parallel experiment in English. As the prediction presented in section 1.5, the less significant processing difference probably results from a mismatch between linear and structural distances between the head and the gap: the subject gap is structural closer but linearly further from the head noun in Cantonese due to the superficially pre-nominal relative construction. The linear factor seems to weaken the subject advantage in comprehension. Isomorphism also seems to get involved in the comprehension by adults: a larger subject advantage is observed in relative clauses with demonstrative and classifier in comparison to relative clauses with *ge3*. Following Lau (2016), we assumed that word order resemblance increases processing difficulty of object relatives with demonstrative and classifier, causes a larger processing difference between subject and object RCs.

Features of arguments (such as animacy, pronominal status, number, etc.) have been reported to be a universal factor having an impact in acquisition, comprehension and production by adults in other languages (see chapter I). In the previous studies on Cantonese relative clause, only the impact of animacy has been discussed in Lau (2016). Other featural impacts remain to be discussed.

In association with the predictions for Cantonese relative clauses in section 1.5, results of previous experimental studies generally showed a structural-based tendency since subject advantages were observed in monolingual acquisition and comprehension of adults and only structural based factors predict a subject advantage. Meanwhile, the fact that subject advantage is less robust in Cantonese make us consider the impact of linear factors in the processing of RCs. A hypothesis of conflict between structural and linear factors arises. Processing difficulty of object RCs with demonstrative and classifier predicted by the DLT (Gibson 2000) due to a superficial isomorphism between them and the main clause is indeed observed in comprehension by children (Lau 2016) and by adults (Pozniak et al. 2017). As for the processing discrepancies of object relative predicted by featural relativized minimality, although relevant features²³ have not been tested in the previous experimental studies, their results interestingly seem consistent (at least partially) with it.

In the spirit of featural relativized minimality (fRM) (Friedmann et al. 2009, Villata et al. 2016, Rizzi 2018), object relatives are predicted to be fully acceptable for adults and but problematic for children. The robust subject advantage in acquisition (Lau 2016) and the less robust subject advantage in the comprehension experiment with adults (Pozniak et al. 2017) support the prediction²⁴. Featural relativized minimality should predict a processing difference between object relatives with *ge3* and those with demonstrative and classifier in considering the semantic feature ('(in)definiteness') of the arguments²⁵: in object relatives whose subject is a definite NP, if the head noun is indefinite and modified by *ge3* (62b), the object relatives should be as easy as subject relative for both adults and children; if the head noun is definite and contains demonstrative and classifier (63a), the object relatives should be fully acceptable for adults but not for children. In such case, object relatives with *ge3* are supposed to be easier than those with demonstrative and classifier, since RCs with disjunction configuration should be easier than those with non-criterial inclusion configuration.

(58) object relatives with relativizer *ge3*:

	head noun	subject	gap	
a. with a definite subject:	+R	+def	+R	disjunction
b. with an indefinite subject:	+R		+R	disjunction

²³ Remember that animacy is considered as a independent source of difficulty in A'-dependencies (Villata et al. 2016), therefore is not taken account into the featural intervention hypothesis. (see footnote 16 in page 25)

²⁴ Although production in the adult control group in Lau (2016) showed a significant subject preference. Further discussion about subject-object asymmetry in production will be given in the next chapter.

²⁵ Lexical restriction [+NP] is not taken into account here for the reason of complexity of nominal phrases in Chinese.

(59) object relatives with demonstrative and classifier:

	head noun	subject	gap	
a. with a definite subject:	+R, +def	+def	+R,+def	non-criterial inclusion
b. with an indefinite subject:	+R, +def		+R,+def	disjunction

The less robust subject advantage observed in comprehension by adults (Pozniak et al. *ibid.*) seems partially in line with the prediction that object relatives with *ge3* should be as easy as subject relatives with *ge3*, but against the prediction for an advantage to the object relatives with *ge3* with respect to those with demonstrative and classifier, since the object relatives with demonstrative and classifier were observed to process faster than those with *ge3*²⁶. Such results might be due to semantic difference between head nouns: head noun of object relatives with *ge3* is assumed to be indefinite, however head noun in the comprehension experiment is set to be definite in a restrictive context. In this case, object RCs with *ge3* in the experiment also yields a non-criterial inclusion configuration as the object relatives with demonstrative and classifier.

(60) featural configuration in object relatives in the eye-tracking experiment:

	head noun	subject	gap	
a. with <i>ge3</i> :	+R,+def	+def	+R,+def	non-criterial inclusion
b. with dem-cl	+R,+def	+def	+R,+def	non-criterial inclusion

Results in acquisition also seem against the prediction by featural relativized minimality: construction with demonstrative and classifier is predominant in children's production (Lau 2016). It might be due to the reliance of word order resemblance of object RCs with demonstrative and classifier. It is difficult though to judge whether the predictions of fRM fails since isomorphism is a factor independent of featural relativized minimality.

Insofar, results above denote that comprehension of RCs in Cantonese by adults shows bias on structural-based factors, other factors such as linear distance based factor, semantic and context are also involved; as for acquisition, since the construction of language processing system is still ongoing, more factors and strategies are taken into account (e.g. *word order resemblance*, *topicality* proposed by Lau, *internally headed relative clauses* and *gapless attributive clauses* by Yip and

²⁶ More detailed results of the experiment in Pozniak (2017) shows an advantage for object relatives with demonstrative and classifier with respect to those with *ge3* and also a significant advantage for subject relatives with respect to object relatives regardless the constructions.

Matthews) and a more complex result arises in consequence. Considering the complexity of acquisition and the blank of adult's production in psycholinguistic studies about RCs in Cantonese, we decide to run a series of study on production: we are going to test the asymmetries (between subject and object relatives, between with RCs-*ge3* and RCs-*dem-cl*) observed in comprehension and acquisition in production. We are also going to address the featural impacts as well as the intervention hypothesis (featural relativized minimality), which have not been tested in the previous studies, in two production experiments and two corpus studies.

Chapter 3 Experiment I: elicited production with animate full-NPs arguments

As showed in the previous chapter, previous studies about Cantonese relative clauses focused on language acquisition, while processing by adults remained mainly unexplored. Pozniak et al. (2017) reported an advantage for subject relatives in comprehension. What about production? Is there also a subject-object asymmetry in production? If there is, will it be coherent with the observation in comprehension (Pozniak et al. 2017)? Or will there be a discrepancy between comprehension and production as has been observed in acquisition (Lau 2016)? What kind of factors influence the production of RCs, and how do they influence production? Are they involved in the featural intervention? If they are, are their impacts linear-based or structural-based? These are the key questions we try to answer in the following chapters. In order to address these questions, two experiments and two corpus studies have been performed²⁷.

In this chapter, we present the first elicited production experiment addressed to observe subject-object asymmetries under an experimental environment where the context is restrictive and all items include animate arguments. We then turn to two corpus studies based on a TV series and the Hong Kong Cantonese Corpus (Luke and Wong 2015) in chapter 4 in order to compare the experimental findings and the spontaneous data. In chapter 5, we present a second elicited production experiment, where the features of their arguments are varied in four types. Some conclusions and a general discussion are given at the end of chapter 5.

3.1 Methods

The first experiment is an elicited production task with pictures. Two factors were mainly taken into account: the grammatical function and the number endowment (singular/plural) of the arguments. In order to prevent the influence of other factors such as (in)animacy of arguments, all the potential arguments of the targeted RCs were set to be animate full-NPs. Besides, all the verbs provided were set to be semantically reversible.

²⁷ This study has been presented respectively in the 30th, 31th Annual Conference on Human Sentence Processing, in the 23rd Conference of Architectures & Mechanisms for Language Processing. The contents of Chapter 3, 4 and 5 will appear in an article which is submitted to *Studies in Chinese Linguistics*.

3.1.1 Participants

20 native speakers from Hong Kong or Macau aged from 20 to 48 (mean age 28) participated in the experiment, which was run in Paris Diderot University. All the participants were compensated for their participation.

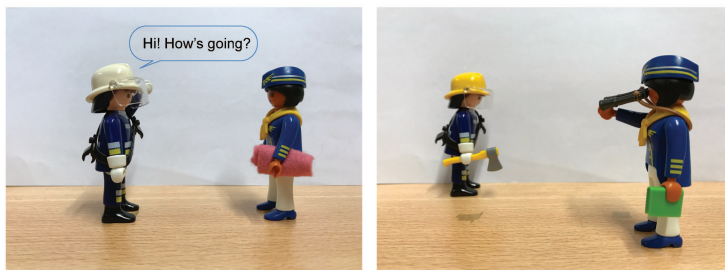
3.1.2 Materials

The task used Playmobil characters with various accessories to trigger the production of relative clauses. Eight cards were set up for the experiment. Each card contains four pictures and each picture contains two interacting characters with some accessories. The characters are identical in all four pictures except for the accessories. In each picture, a different scenario is performed by the characters. For each card, a list of action and of relevant accessories is provided. It was prohibited mentioning the objects in the list of accessories in the answer; whereas the verb in the list of actions were required in the answer.



- ✗ **list of accessories:**
rope, hand bag, oxygen tank, suitcase, white helmet, blanket, axe, book.
- ✓ **list of actions:**
light, follow, greet, peek.

Figure 22 Card for singular condition



- ✗ **list of accessories:**
buckets, sandals, juices, cups, ropes, blankets, fishes, caps.
- ✓ **list of actions:**
light, greet, peek, follow.

Figure 23 Card for plural condition



3.1.3 Procedure

Participants were tested individually. They received the 8 cards (as in Figure 22 and 23) at the beginning of the experiment session and were told that the researcher had another set of cards in which the accessories indicated in the list were absent and the order of the pictures could be different. The first task for them was to find all the accessories of the list in the cards and to describe what happens in each picture with the verbs provided (in the list of actions). Their second task was to help the researcher identify which character has which accessory by answering questions like *Which firefighter is wearing the white helmet?* or *Which sailor is taking the blanket?*. These questions are meant to trigger the production of relative clauses. In the first case, the expected answer will contain a subject RC, something like *the firefighter who is greeting the sailor*, since *the firefighter* is the agent of the verb *greet* in Figure 22. This kind of question determines what we will call the subject condition. In the second case, since *the sailor* is the patient of the verb *greet* in Figure 22, and we expect an object relative like *the sailor that the firefighter is greeting*. We shall call this the object condition. Fillers were also introduced, in the form of questions like *What colour is the blanket (that the sailor is holding)?* or *Which position is the firefighter situated in this picture?*, etc. The ratio of items to fillers was 1 to 2.

In addition to the position of the gap, we were also interested on whether the number of the head had an influence. This is why we also set up plural condition cards, in which both the agent and the patient were plural (two characters with the same gender): cf. Figure 23. It was a 2*2 mixed design, with 4 conditions: singular subject condition, singular object condition; plural subject condition, plural object condition. There were 16 items for each conditions, 64 in total. The order of the items during the experiment was pseudo-randomised.

3.2 Results

1226 RCs productions were collected in this experiment. Among them, 1185 were subject relatives, including 567 passivized subject relatives (cf. 61); 41 were object relatives. 97% of the clauses produced in the subject condition were subject relative clauses (Table 9), but only 7 % in object condition corresponded to object relatives (Table 10). Passivisation (89%) was rather the dominant strategy in object condition (Table 10). All in all, subject preference was overwhelming in this task.

passivized subject relative in Cantonese:

- (61) [RC Ø_i 俾 消防員 照-住 嘅] 水手_i
 bei2 siu1 fong4jyun4 ziu3-zyu6 ge3 seoi2sau2
 PASS firefighter light-ASP REL sailor
 ‘the sailor who is being lightened by the firefighter’

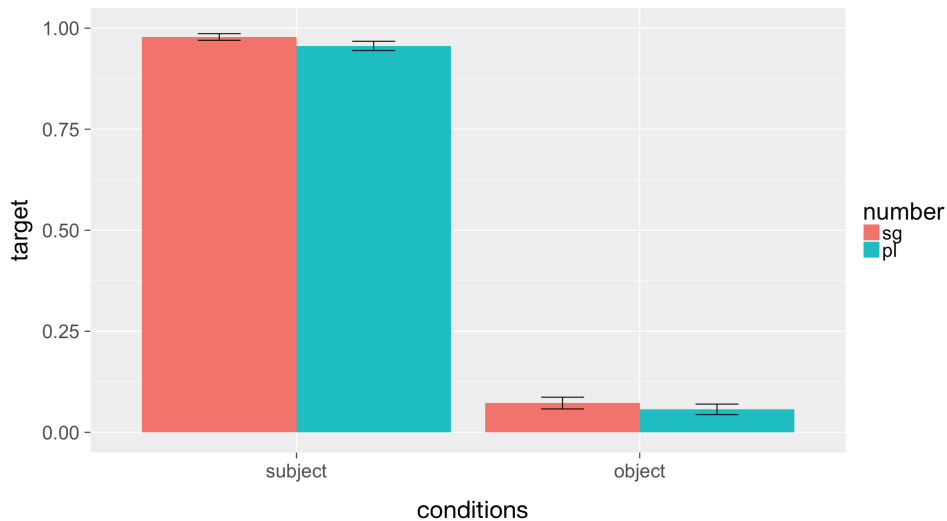
type of answers	occurrences	%
subject relatives	618	97
others	21	3

type of answers	occurrences	%
object relatives	41	7
passivized SRs	567	89
others	27	4

Table 9. productions in subject condition

Table 10. productions in object condition

The grammatical function of the head in the RC had a significant effect in this experiment (subject condition vs. object condition: z-value: -14.486, |Pr| < 2e-16 ***²⁸) (Graphic 1). In contrast, the number of the head was not a main factor in this experiment (singular vs. plural: z-value: -0.360, |Pr| < 0.719) (Graphic 1). There was no interaction between grammatical function (conditions) and number of the head (z-value: 0.510, |Pr| < 0.610).



Graphic 1. target production in different conditions

²⁸ Generalized linear mixed model fixed by maximum likelihood (GLMER), family: binominal (logit) is applied in the statistic analysis. Coding of result for the statistics calculation is marked by 1 and 0: 1 for the target production, which means a subject relative in subject conditions and an object relative in object conditions; 0 for the non-target production, including descriptive sentence, complement clauses in both conditions and passivized subject relative in object conditions.

3.3 Interim discussion

Comparing our results with those of the eye-tracking experiment (Pozniak et al. 2017) presented earlier in section 2.5, an overwhelming preference for subject relative is observed in production. This result shows a difference between language comprehension and language production, which is observed in many psycholinguistic studies on language acquisition (Benedict 1979; Smolensky 1996, Lau 2016 in Cantonese). The reason why comprehension and production yield different results in acquisition could be either that comprehension and production involve different cognitive mechanisms or that they involve the same mechanism, but acquisition is not simultaneous, one might precede the other. While what drives the difference in adults' processing is so far unknown.

Moreover, external factors (other than the design of the experiment) might also influence the result of the experiments. Sample size of research is known to be one of these factors. In our experiment, although sample size is small (20 participants), standard deviation (SD) of target production among the participants is also small ($SD = 1.1268$)²⁹. This means that individual differences of target production among the participants was small. In other words, the results of this experiment, while based on a small sample, appear to be reliable.

Another external factor which might affect production is priming effect. Priming is a psychological term denoting *a nonconscious form of human memory, which is concerned with perceptual identification of words and objects and which has only recently been recognized as separate from other forms of memory or memory systems* (Tulving & Schacter 1990, abstract). In a linguistic perspective, *syntactic priming in language production is the increased likelihood of using a recently encountered syntactic structure* (Jacob, Cho et Watson 2019, abstract). In our elicited production experiment, it is possible that some processes of priming have been at place. Only two factors (grammatical function of head noun and their numbers) were tested, and the features of arguments and the nature of verb were all similar in all items (animate arguments, reversible verb). Although fillers (ratio of 2:1) were set, a rather monotone pattern of questions might cause a priming effect: participants might use the same pattern to answer questions: once they get used to produce subject relatives (in subject and object condition), they stay on this very same type of relative. This might also contribute to the predominant strategy of passivisation in object condition observed in the

²⁹ The extremes of the target production for each participant are [0, 64].

experiment. A similar phenomenon might arise and cause a higher frequency of the relative constructions with demonstrative and classifier.

Despite the different degrees of ‘robustness’, the comprehension experiment and the production one converge in showing that subject relatives are indeed easier than object relatives in Cantonese both in comprehension and in production. In the eye-tracking experiment, the subject advantage is manifested as a shorter time needed to identify the correct image; in the elicited production experiment, subject preference is manifested by more target productions in subject condition and an overwhelming proportion of passivization in object conditions.

In both experiments, the context was such that it forced a restrictive use of the RC, and an interpretation of the head as a definite expression. In both cases, however, the context was very artificial. Will the same asymmetry show up in a spontaneous context? In the next chapter, we are going to discuss spontaneous data from two corpus studies.

Chapter 4 Corpus Studies

Two corpus studies will be presented in this chapter. The first is based on manual recording data from a TV series. The second is based on the Hong Kong Cantonese Corpus (Luke & Wong 2015), which contains natural spontaneous conversations and several broadcast chat shows. In this study, we were interested not only in subject/object asymmetry but also in the variation of the features of the arguments in RC and their impact on RC processing.

4.1 Corpus study 1: TV data

4.1.1 Source

TV series *House of spirits* - 一屋老友記 produced by Hong Kong Television Broadcasts Limited. There are 31 episodes. Each episode lasts 45 minutes.

4.1.2 Results

251 RCs were collected: 92 were subject relatives (1 with passive), 159 were object relatives. Object relatives occurred significantly more than subject relatives ($p\text{-value} = 3.216e-05^{***30}$). Unlike in the elicited production experiment, where the arguments of RCs were all animate full-NPs, the features of the arguments in the RCs collected in TV series were more variable:

animacy of head	SRs	ORs
animate	60 (65%)	30 (19%)
inanimate	32 (35%)	129 (81%)

Table 11. distribution of (in)animacy of heads

animacy between arguments	SRs	ORs
mismatch	17 (18%)	127 (80%)
no mismatch	75 (82%)	32 (20%)

Table 12. distribution of (in)animacy mismatch

As far as animacy is concerned, 65% of subject relatives have an animate head (cf. 62, 63), 81% of object relatives have an inanimate head (cf. 67, 68) (Table 11). Up to 80% of object relatives

³⁰ Chi square test is applied to test whether the difference between the proportions of subject relatives and object relatives is significant.

displayed animacy mismatch (cf. 67, 69), while only 17% of subject relatives did³¹ (cf. 63, 65) (Table 12). The following examples correspond to the various combinations of animacy in the RCs observed in the TV series.

subject relatives:

with animate subject and animate object:

- (62) 呢 個 [RC Ø_i 虐殺 小動物 嘅] 人渣_i
 ne11 go3 joek6saat3 siu2dung6maat6 ge3 jan4zaa1
 Dem Cl.sg sadistically kill small animal REL scum
 ‘this scum who sadistically kills small creatures’

with animate subject and inanimate object:

- (63) [RC Ø_i 識得 維修 呢 啲 舊樓 嘅] 師傅_i
 sik1dak1 wai4sau1 ne11 di1 gau6lau4 ge3 si1 fu2
 know repair Dem Cl.pl old building REL master
 ‘masters who knows (how to) repair these types of old building’

with inanimate subject and inanimate object:

- (64) 呢 個 [RC Ø_i 刻-咗 寶字 嘅] 頸圈_i³²
 ne11 go3 hak1-zo2 bou2zi6 ge3 geng2hyun1
 Dem Cl.sg engrave-ASP BOU character REL collars
 ‘the collars who has been engraved a character *BOU*’

with inanimate subject and animate object:

- (65) [RC Ø_i 鼓勵 我 嘅] 說話_i
 gwu2lai6 ngo5 ge3 syut3waa6
 encourage pron.1sg REL words
 ‘words which encourage me’

object relatives:

with animate subject and animate object:

- (66) [RC 阿爸 最 錫 Ø_i] 嗰 個 (人)_i
 aa3baa4 zeoi3 sek3 go2 go3 jan4
 Dad superlative spoil Dem Cl.sg people
 ‘the one Dad loved the most’

with animate subject and inanimate object:

- (67) [RC 媽媽 送 Ø_i 嘅] 禮物_i
 maa4maa1 sung3 ge3 lai5mat6
 mother give REL present
 ‘a present that (your) mother gives (to you)’

³¹ In our data, all the object relatives have at least 2 arguments, but majority of subject relatives (63%) have only one argument (subject).

³² The subject ‘collars’ is ergative.

with inanimate subject and inanimate object:

- (68) [RC 遺產承辦處 寄 - \emptyset_i - 嚟] 嗰 封 信_i
 wai4caan2sing4baan6cyu5 gei3-lei4 go2 fung1 seon3
 Probate Registry send-RES.come Dem Cl letter
 ‘the letter Probate Registry sent (to us)’

with inanimate subject and animate object:

- (69) [RC 我哋-公司 新 請 - \emptyset_i - 翻嚟 嘅] contractor_i
 ngo5dei2-gung1si1 san1 ceng2-faan1lei4 ge3 contractor
 pron.1pl-company newly hire-RES.return REL contractor
 ‘the contractor that our company recently hired’

Besides, the type of subject included in object relatives is also variable: 75% of ORs have a pronominal subject (either *pro* or pronoun); 21% of ORs have a proper name or a referential noun like ‘Daddy’ or ‘Big brother’ as subject; only 6 % of ORs have generic or indefinite nouns as subject (Table 13). Some examples are given below.

types of subject	occurrences	total
<i>pro</i>	27	120 (75%)
pronoun	93	
proper name	11	33 (21%)
referential	22	
generic	4	6 (4%)
indefinite	2	

Table 13. distribution of subject types in ORs

object relatives:

with null subject:

- (70) [RC *pro* 唔 應該 講 \emptyset_i] 嗰 句 說話_i
 m4 jing1goi1 gong2 go2 geoi3 syut3waa6
 Neg should say Dem Cl words
 ‘the words (you) shouldn’t say’

with pronominal subject:

- (71) [RC 我 最 深愛 \emptyset_i 嘅] 女人_i
 ngo5 zeoi3 sam1ngoi3 ge3 neoi5jan2
 pron.1sg superlative adore REL woman
 ‘the woman that I love the most’

with proper name subject:

(72) [RC 三寶 送 \emptyset_i 畀 你] 個 手袋_i
saam1bou2 sung3 bei2 lei5 go3 sau2doi2
SaamBou give prep.to pron.2sg Cl.sg handbag
'the handbag SaamBou gave to you'

with referential subject:

(73) [RC 阿爸 最 錫 \emptyset_i] 嗰 個 (人)_i
= (51) aa3baa4 zeoi3 sek3 go2 go3 jan4
Dad superlative spoil Dem Cl.sg person
'the one Dad loved the most'

with generic subject:

(74) [RC 女人 應 有 \emptyset_i 嘅] 硬件_i
neoi5jan2 jing1 jau5 ge3 ngaang6gin2
woman should have REL hardware
'hardwares that women should have' (it means: symbols of womanhood)

with indefinite subject:

(75) [RC 其他人 講 \emptyset_i] 嗰 啲 嘢_i
kei4taa1jan4 gong2 go2 di1 je5
other people say Dem Cl.pl thing
'those things other people said'

4.2 Corpus study 2: the Hong Kong Cantonese Corpus

4.2.1 Source

The second corpus study is based on the Hong Kong Cantonese Corpus produced by Luke and Wong (2015). This corpus contains 30 hours of recordings, up to 180000 words, extracted from 52 spontaneous conversations and 42 radio programmes.

4.2.2 Results

283 RCs were collected in this corpus: 153 were subject relatives, 130 were object relatives. Although subject relatives occur more than object relatives, the difference between their occurrences is not significant (p-value = 0.1716³³). As in the TV data, the features of the arguments in the RCs collected in this corpus were also variable:

³³ chi square test is applied to test whether the difference between the proportions of SRs and ORs is significant.

animacy of head	SRs	ORs
animate	96 (63%)	12 (9%)
inanimate	57 (37%)	118 (91%)

Table 14. Distribution of (in)animacy of heads in HKCanCorp

Comparing to the observations in the TV data, similar patterns of the distribution of animacy were observed: 63% of subject relatives have an animate head, 91% of object relatives have an inanimate head (Table 14). 74% of object relatives displayed animacy mismatch, only 22% of subject relatives did (Table 15). Among the remaining 120 subject relatives which did not display animacy mismatch, 29 (24%) have two arguments and share the same animacy; 91 (76%) have only one argument.

animacy between arguments	SRs	ORs
mismatch	33 (22%)	96 (74%)
no mismatch	120 (78%)	34 (26%)

Table 15. Distribution of (in)animacy mismatch in HKCanCorp

As for the distribution of subject types in object relatives, we adopted a similar classification as in the TV data and observed that: 82% of ORs have a pronominal subject (either *pro* or pronoun); 12% of ORs have either a proper name or a referential noun as subject; 4% of ORs have a demonstrative-classifier-noun sequence as subject; 2% of ORs have a generic bare noun as subject. These figures are summarized in Table 16.

type of subject in ORs	occurrence	total
pronoun	70	107 (82%)
<i>pro</i>	37	
proper name	12	15 (12%)
referential noun	3	
definite (dem-cl-N)	5	5 (4%)
generic	3	3 (2%)

Table 16. distribution of subject types in ORs in HKCanCorp

4.3 Interim discussion 2

In general, similar results about the distributions of animacy of head, of animacy mismatches and distribution of subject types object relatives were observed in the two corpus studies, although they seem to display different subject-object asymmetries: in TV data, a significant object preference was observed, whereas in Hong Kong Cantonese Corpus data, subject relatives were observed slightly (but not significantly) more than object relatives. This difference may be explained by the observation that there are more subject relatives with 1 argument, which is assumed to be easier to process (Diessel & Tomasello 2000), in the Hong Kong Cantonese Corpus data than in the TV data (60% vs. 44%).

Moreover, it should also be considered that subject relatives are more difficult to identify in Cantonese than object relatives. This is because in Cantonese, adjective and noun *per se* can be predicate without the presence of copula (*hai6*). An example is given in (76).

- (76) 啲 腸粉 好 好味。
di1 coeng4 fan2 hou2 hou2mei6.
Cl.pl rice noodle roll very delicious
'Rice noodle rolls are very delicious.'

As a result, a structure like (77), including an adjectival phrase preceding a nominal phrase, can be either interpreted as a simple NP modified by an adjective, or as a relative clause construction including a null copula (see Simpson 2001).

- (77) [RC \emptyset_i 好 好味] 嘅 腸粉_i
hou2 hou2mei6 ge3 coeng4 fan2
very delicious GE3 rice noodle roll
'delicious rice noodle roll' (example extracted from the TV series)

For sake of simplicity, these ambiguous structures were not counted in our analysis. This might have led to underestimate the frequency of subject relatives in the corpora.

Another factor that makes subject relatives difficult to identify in Cantonese is *pro*-drop. This entails that a string like (78), can be analysed as either a subject or an object relative. For this kind of ambiguous structures, their classification depends on whether the agent of the event is explicit in

the context. If the agent is explicit, we counted them as an object relative, otherwise a subject relative.

(78)	嗰	啲	[RC	貼	喺度	嘅]	嘢
a. subject relative:	嗰	啲	[RC \emptyset_i	貼	喺度	嘅]	嘢 _i
b. object relative:	嗰	啲	[RC pro	貼 \emptyset_i	喺度	嘅]	嘢 _i
	go2	di1		tip3	hai2dou2	ge3]	je5
	Dem	Cl.pl		paste	here	GE3	stuff
	‘those stuffs that are pasted here’						
	‘those stuffs that someone pastes here’						

(example extracted from Hong Kong Cantonese Corpus)

All in all, the results of the corpus studies appear to be in striking contrast with respect to the results of the elicited production: while an overwhelming subject preference was observed in the experiment, the predominance of subject relatives disappears in the spontaneous environment. However, if we compare the elicited production experiment and the corpus data in more detail, other differences emerge. First of all, the context in elicited production systematically favoured a definite interpretation of the head, while the context in the corpora data could vary a lot. Second, all the arguments in the elicited experiment were animate, while the features of arguments in spontaneous data were more diverse. Third, all the arguments were full-NPs in the experiment, while there were mostly null or pronominal subjects in the two corpora.

With this in mind, we can reconcile the results of the two datasets in the following way: subject relatives are easier to produce in a definite context with animate arguments, while object relatives are easier when the arguments display a featural mismatch: either in (in) animacy (e.g., animate subject vs. inanimate object) or at the lexical level (e.g., pronominal subject vs. full NP object - *She* vs. *president*³⁴). This observation seems compatible with the intervention hypothesis (Friedmann, Belletti et Rizzi 2009, Villata, Rizzi et Franck 2016, Rizzi 2018).

³⁴The effect that pronominal subject facilitate the production of object relative is also observed in other languages, such as English (Fox and Thompson 1990, Reali and Christiansen 2007), Hebrew (Arnon 2010), German (Brandt et al. 2009).

The intervention hypothesis is based on *featural Relativized Minimality* (fRM).

(79) = (27) *Featural Relativized Minimality*:

In ... X ... Z ... Y ... a local relation between X and Y is disrupted when

1. *Z c-commands Y and Z does not c-command X (intervention configuration).*
2. *Z matches X in terms of Relevant Syntactic Features (RSF).*
3. *The degree of disruption is a function of the featural distinctness of X with respect to Z, in accordance with the distinctness hierarchy.*

Subject extraction is easier because a local relation maintains between the head and the subject gap since there is no element c-commanded by the head noun, meanwhile c-commanding the gap. Object extraction is more difficult due to the intervention of the subject between the head and the object gap. Crucially, however, object difficulty is not absolute but gradational according to the degree of featural similarity between the head noun (object) and the intervener (subject). As discussed in the section 1.3.3 (page 27), in case of object relatives, only non-criterial inclusion and disjunction configuration in the distinctness hierarchy are involved since the subject intervener can not contain the criterial feature [+R].

(80) = (32) configuration of features in object relatives:

	head noun	subject	object gap
a. *identity	+R,+NP	*+R,+NP	+R,+NP
b. *criterial inclusion	+R,+NP	*+R	+R,+NP
c. non-criterial inclusion	+R,+NP	+NP	+R,+NP
d. disjunction	+R,+NP		+R,+NP

What we observed in the elicited production and the corpus studies might be explained along these lines. Remember that most object relatives found in the spontaneous data displayed a featural mismatch between arguments (pronominal status, animacy) while all the arguments in the elicited production experiment shared the same features (definiteness, number, animacy, etc.). In the current framework of the fRM, only lexical restriction [+NP] is taken into account in the calculation of intervention.

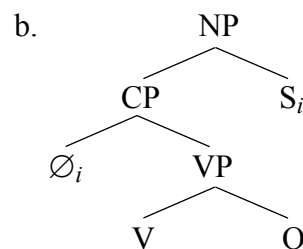
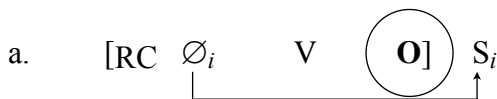
Although such feature is so far not identified in Cantonese, identity of nominal form (e.g. full-NP bare noun with respect to pronoun/pro) of the arguments seems trigger the intervention effect: most object relatives in corpora involve a disjunction configuration between the head noun and the

subject in nominal form (pronominal subject and full-NP object), consequently, as easy as subject relatives. Object relatives in elicited production experiment, on the other hand, involve a non-criterial inclusion configuration (both subject and object head are full-NPs), which are assumed more difficult than object relatives with disjunction configuration of features.

Moreover, the results also showed the nature of featural intervention effect. Remember that relative clauses in Cantonese yield a mismatch between linear and structural order: object linearly intervenes between head and gap in subject relative (81a); subject structurally intervene the head and the gap in object relative (82b). If the intervention effect is linear bias, subject relatives should be difficult in elicited production experiment due to a high degree of featural similarity; however, an overwhelming subject preference is shown. Intervention effect observed in object relatives thus shed light on the structural bias.

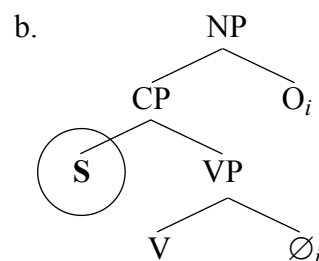
Subject relative:

- (81) [RC \emptyset_i 照-住 水手 嘅] 消防員_i
 ziu3-zyu6 sei2sau2 ge3 siu1fong4jyun4
 light-ASP sailor REL firefighter
 ‘(the) firefighter who is lighting the sailor’



Object relative:

- (82) [RC 消防員 照-住 \emptyset_i 嘅] 水手_i
 siu1fong4jyun4 ziu3-zyu6 ge3 sei2sau2
 fire-fighter light-ASP REL sailor
 ‘(the) sailor that the firefighter is lighting’



linear distance

structural distance

What remains to discuss now is the impact of animacy. In the framework of fRM, animacy is considered as an *independent source of difficulty* and does not participate in the calculation of intervention (Villata et al. 2016). How does animacy affect the production of relative clauses? Does the impact results from the animacy of the head or from the mismatch of animacy between arguments? Although data of corpus studies show a bias towards animacy of head: most subject relatives have an animate head, most object relatives have an inanimate head; such bias actually overlaps with a mismatch of animacy: most object relatives display animacy mismatch; whereas most subject relatives do not. Combining these two observations, we assume that the impact of animacy relates not only to the animacy of the head but also to the animacy configuration (identical vs. mismatch) between arguments. And this is in line with the observation in the previous studies (Brandt, Kidd, Lieven and Tomasello 2009, Kidd, Brandt, Lieven and Tomasello 2007, Lau 2016). The following pattern illustrates the impact of animacy in the elicited experiment and corpus studies:

		subject	object		type of RC
(83)	a. identity	animate	animate	→	subject relative
	b. disjunction	animate	inanimate	→	object relative

Identity of animacy between subject and object favours the production of subject relative, mismatch of animacy between them favours the production of object relative. Regarding the overwhelming proportion of passivized subject relatives in the object conditions in the elicited production experiment, can we consider this overwhelming subject preference as an object avoidance in another perspective? If so, (83a) can be considered as an intervention configuration of animacy: assuming that animacy impact has a similar calculation system to fRM, which is based on the degree of animacy similarity between subject and object. In object relatives, where subject structurally intervenes between head and object gap, when subject and object share the same animacy, a featural intervention effect arises, object relatives are difficult; when subject and object display a mismatch of animacy, featural endowment arises, object relatives are easy. This seems compatible with our data too. Moreover, if featural intervention does apply to animacy, it should also be structurally based for the similar reasons we explained previously. In this case, how does the animacy endowment interact with other features involved in fRM?

Remember that object relatives involve only disjunction and non-criterial inclusion configuration in the spirit of fRM. In the elicited experiment, both arguments are full-NPs and share same animacy and number, object relatives should display a configuration of maximal non-criterial inclusion³⁵.

(84) featural configuration of object relative in the elicited production experiment:

	head noun	subject	object gap
max. inclusion:	+R, +fN ³⁶ , +animate,+sg	+fN, +animate,+sg	+R, +fN, +animate,+sg

In corpus study, contexts vary a lot, so does the features of arguments: most object relatives display animacy mismatch between arguments; subjects in most of the object relatives are in different nominal form (including pronoun/*pro*, proper name, full-NP), object relatives involve either a non-criterial inclusion or a disjunction configuration. Theoretically, processing difficulty increases with the increase of the degree of featural similarity between arguments, therefore:

(85) identity > criterial inclusion > maximal non-criterial inclusion > minimal non-criterial inclusion > disjunction

For impacts of other types of features involving the nominal form of subject (pronoun/*pro*, proper name), which are observed to facilitate the production of object relatives in corpus studies but simply classified as non-lexically-restricted in fRM, we shall test them individually in a controlled context in order to form minimal pairs and reduce the influences of multi-factors.

In addition, we should not ignore the fact that differences between the experimental environment and the spontaneous environment might also influence the production in a general way. Contradiction demonstrated by passivized subject relatives, which are rare in corpus studies and predominant in object condition in elicited experiment supports this point.

³⁵ We call it ‘maximal’ non-criterial inclusion because, the features in common between the head noun and the intervening subject yield the maximum similarity of non-criterial features, in other words, they are identical. The only featural difference between the head noun and the subject is the criterial feature [+Rel]. Otherwise, if the features of arguments yield only one non-criterial feature in common, we call it ‘minimal’ non-criterial inclusion.

	head noun	subject	object gap
maximal non-criterial inclusion:	+R, +A, +B, +C	+A, +B,+C	+R, +A, +B, +C
minimal non-criterial inclusion:	+R, +A	+A	+R, +A

³⁶ fN is the abbreviation of the feature of nominal form: full-NP.

In order to address the new questions concerning the intervention hypothesis arising in the first experiment and the corpus studies, we decided to run a new elicited experiment based on the previous observations.

Chapter 5 Experiment II: elicited production with 4 types of arguments

In the new experiment, the design remained similar to the first experiment. The only difference was that 4 conditions were set in accordance with the previous observations: animate full-NPs condition (as in the experiment I), inanimate-object condition, pronoun-subject condition and proper-noun-subject condition. All condition were object conditions, i.e. conditions where an OR was expected. What was varied was some features of one of the arguments. An example for each condition is given below.

object relative with animate full-NPs in Cantonese:

- (86) [RC 消防員 照-住 \emptyset_i 嘅] 水手_i
 = (82) siu1fong4jyun4 ziu3-zyu6 ge3 seoi2sau2
 fire-fighter light-ASP REL sailor
 ‘(the) sailor that the firefighter is lighting’

object relative with inanimate object in Cantonese:

- (87) [RC 個 女士 秤-緊 \emptyset_i] 嗰 啲 菜_i
 go3 nei5si6 cing3-gan2 go2 di1 coi3
 Cl.sg lady weigh-ASP Dem Cl.pl cabbage
 ‘the cabbages the lady is weighing’

object relative with pronominal subject in Cantonese:

- (88) [RC 佢 跟-住 \emptyset_i] 嗰 個 消防員_i
 keoi5 gan1-zyu6 go2 go3 siu1fong4jyun4
 pron.3sg follow-ASP Dem Cl.sg firefighter
 ‘the firefighter she is following’

object relative with proper name subject in Cantonese:

- (89) [RC Lea 跟-住 \emptyset_i] 嗰 個 消防員_i
 Lea gan1-zyu6 go2 go3 siu1fong4jyun4
 Lea follow-ASP Dem Cl.sg firefighter
 ‘the firefighter Lea is following’

A similar test was run in French as well since featural mismatch has been reported to modulate object dispreference in French (Durrelman 2017). We were also interested in directly comparing the results between an SVO language with pre-nominal RC (Cantonese) and an SVO language with post-nominal RC (French) in order to verify the structural bias of featural intervention effect. An example for each condition in French is given below.

object relative with animate full-NPs in French:

- (90) l'hôtesse de l'air_i [RC que le pompier éclaire \emptyset_i]
the sailor that the firefighter light
'the sailor that the firefighter lights'

object relative with inanimate object in French:

- (91) les choux_i [RC que la dame pèse \emptyset_i]
the cabbages that the lady weigh
'the cabbages that the lady weigh'

object relative with pronominal subject in French:

- (92) le pompier_i [RC qu' elle suit \emptyset_i]
the firefighter that pron.fem.3sg follow
'the firefighter that she follows'

object relative with proper name subject in French:

- (93) le pompier_i [RC que Léa suit \emptyset_i]
the firefighter that Léa follow
'the firefighter that Lea follows'

5.1 Methods

5.1.1 Participants

17 native speakers of Cantonese from Hong Kong or Macau aged from 20 to 58 (mean age 30), 5 of them also participate in the previous elicited production experiment (Exp 1). 17 native speakers of French aged from 19 to 41 (mean age 25) participated in the experiment. Result of 1 participant is excluded in the analysis of French test. Both tasks were run at Paris Diderot University. All the participants were compensated for their participation.

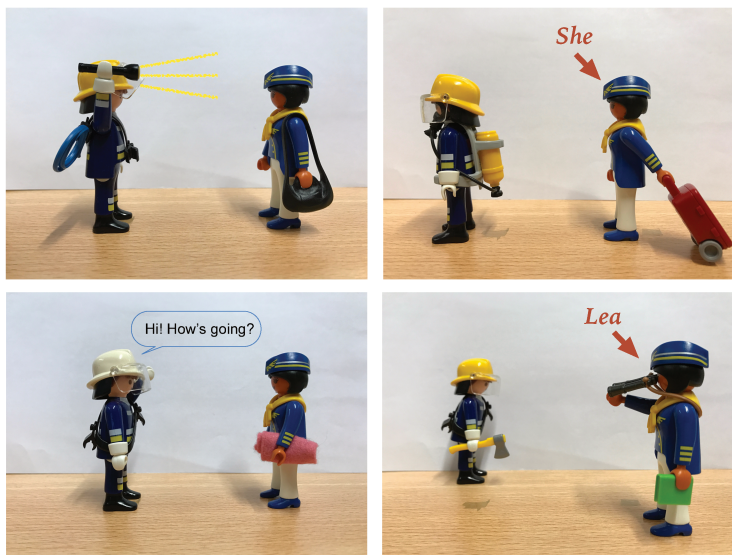
5.1.2 Materials

The materials were similar to the ones in experiment I. Eight cards were set up: each card contained four pictures, and each picture contained either two interacting characters as in the experiment I, or one character and a particular object in the inanimate object condition. The characters were identical in all four pictures except for the accessories. In each picture, a different scenario was displayed. In the cards where the patients of the event were inanimate, the objects were the same in all four pictures except for the colours or the patterns. There was a list of actions and a list of accessories for each card. For the cards for the inanimate object condition, there was also a list of objects. It is prohibited mentioning the objects in the list of accessories in the answer; whereas the verb in the list of actions were required in the answer.



- ✗ **list of accessories:**
elastic, red sleeves, red cap, toque.
- ✗ **list of objects (cabbage):**
yellow, white, green, red
- ✓ **list of actions:**
weigh, buy, carry, cook.

Figure 24 Card for inanimate object condition



- ✗ **list of accessories:**
rope, hand bag, oxygen tank, suitcase, white helmet, blanket, axe, book.
- ✓ **list of actions:**
light, follow, greet, peek.

Figure 25 Card for the other conditions

5.1.3 Procedure

As in the previous experiment, participants were first asked to identify the accessories (and the objects) from the list in the cards and describe the events in each picture with the verbs provided. They were then asked to help the researcher to identify the accessories or the objects by answering questions like ‘*which woman is buying the cabbage?*’ or ‘*which cabbages are yellow?*’, which aimed at triggering the production of relative clauses. In the inanimate object condition, a question like “*Which cabbages are green?*” was meant to elicit an answer like “*the cabbages that the woman is carrying*”. In the pronominal-subject condition, participants were asked to use a pronoun to refer to a specific character (agent of the event) and answer a question like “*Which firefighter is carrying an oxygen tank?*”, the expected answer being “*the firefighter that she is following*”. In the proper name subject condition, participants were also asked to use a proper name to refer to a

specific character (agent of the event) like ‘Lea’ in our example (cf. Figure 25) and use this name to answer a question like “*Which firefighter is carrying an axe?*”, the expected answer being “*the firefighter that Lea is peeking*”. Fillers in this experiment also contained irrelevant questions about the colour of the accessories or the position of the characters in the pictures. The context of the experiment was controlled and only favoured definite interpretation.

Since in the previous experiment number was not a main factor and that number and grammatical function did not display any interaction, plural conditions were not set up in this experiment. Besides, since in the previous experiment subject condition displayed a high accuracy and that ORs were crucial for testing the structural intervention hypothesis, this time we only considered the production in object conditions, the production in the subject conditions as a control. Therefore, there were 32 items and 64 fillers in total, with each condition 8 items. The order of the items during the experiment was pseudo-randomized. The materials used in Cantonese test and in French test were identical.

5.2 Results

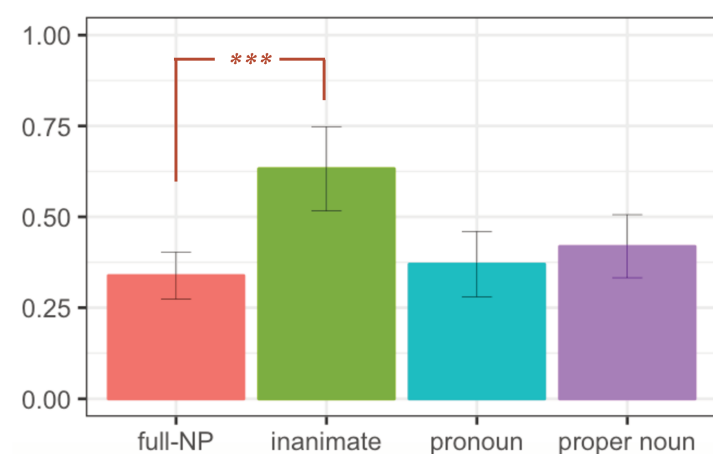
5.2.1 Results of Cantonese test

With 17 native speakers of Cantonese, 537 relative clauses were collected under object conditions. Among them, 236 were object relatives, 301 were passivized subject relatives. Passivized relatives were still produced more than object relatives (55.3% vs. 43.4%). Object relatives were produced most in the inanimate object condition, least in the animate full-NPs arguments condition; the production of passivized relatives displayed an opposite pattern: they were found most in the animate full-NPs arguments condition and least in the inanimate object condition. In comparing the proportion of ORs in the 4 conditions, only the difference between animate full-NPs arguments condition and inanimate object condition is significant (z-value: 5.170, $|\text{Pr}| < 2.35\text{e-}7^{***}$). Individual difference of target production among the participants is rather large in this test: the random effect variance of the participant is 8.168, the standard deviation is 2.858³⁷.

³⁷ The extremes of target production for each participant are [0, 32] in Cantonese and French test.

conditions	ORs	Passivized SRs	others
animate full-NPs	46 (33.8%)	90 (66.2%)	
inanimate object	84 (61.8%)	47 (34.6%)	5 (3.6%)
pronominal subject	49 (36%)	85 (62.5%)	2 (1.5%)
proper name subj.	57 (42%)	79 (58%)	
total	236 (43.4%)	301 (55.3%)	7 (1.3%)

Table 17. Distribution of RCs in 4 conditions in Cantonese



z-value of inanimate condition: 5.170; Pr (>|z|): 2.35e-07***

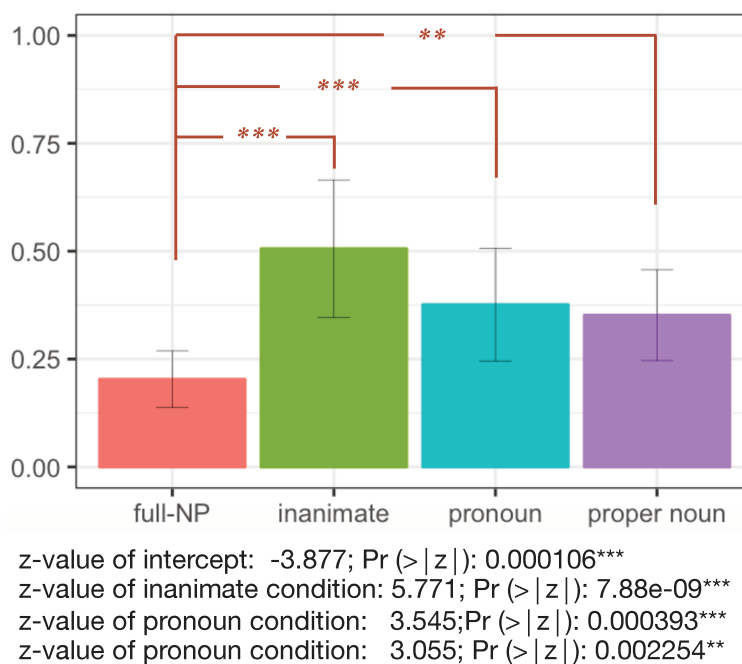
Graphic 2. Proportion of ORs in 4 conditions in Cantonese

5.2.2 Results of French test

With 16 native speakers of French, 506 relative clauses were collected. Among them, 183 were object relatives, 323 were passivized subject relatives. Passivised subject relatives were produced much more than object relatives (55.3% vs. 43.4%). Object relatives were produced most in the inanimate object condition, least in the animate full-NPs arguments conditions; passivized subject relatives were produced most in the animate full-NPs arguments conditions, least in the inanimate object conditions. As for the comparison of the proportions of ORs in the 4 conditions, the difference between the animate full-NPs condition and the three other conditions are all significant, particularly the difference between animate full-NPs condition and inanimate object condition. Individual difference of target production among the participants in this test is also large compared with the previous experiment (Exp 1): the random effect variance of the participant is 3.141e+00 (≈ 8.535), the standard deviation is 1.772345.

conditions	ORs	Passivized SRs	others
animate full-NPs	26 (20.3%)	99 (77.3%)	3 (2.4%)
inanimate object	64 (50%)	62 (48.4%)	2 (1.6%)
pronominal subject	48 (37.5%)	79 (61.7%)	1 (0.8%)
proper name subj.	45 (35.2%)	83 (64.8%)	
total	183 (35.7%)	323 (63.1%)	6 (1.2%)

Table 18. Distribution of RCs in 4 conditions in French



Graphic 3. proportion of ORs in 4 conditions in French

5.3 Interim discussion 3

In comparing the results of the test in Cantonese and the test in French, a similar effect concerning the distribution of relative clauses under the 4 conditions is observed: the production of ORs is largest in the inanimate object condition, least in the animate Full-NPs arguments condition. This effect is stronger in Cantonese. Passivized subject relatives show an opposite pattern: they are most produced in the animate full-NPs arguments condition, least produced in the inanimate object condition. A greater tendency towards passivization is found in French. As for productions of non relative clauses, such as an answer with a completive clause like “(in) the picture that the firefighter lights the sailor” or with descriptive sentences like “There is a firefighter lighting the sailor. And

that sailor is carrying a purse.”³⁸, the distributions were different in the two languages: they were found the most in inanimate object condition in Cantonese test but in animate full-NPs arguments condition in French.

According to our complex version of intervention hypothesis (see section 4.3 interim discussion 2), featural configurations of the four types of arguments tested in this experiment are illustrated as following³⁹:

(94)	head noun	subject intervener	
animate full-NPs arguments	+animate, +fN, +R	+animate, +fN	maximal inclusion
inanimate object	+inanimate, +fN, +R	+animate, +fN	minimal inclusion
pronominal subject	+animate, +fN, +R	+animate	minimal inclusion
proper name subject	+animate, +fN, +R	+animate	minimal inclusion

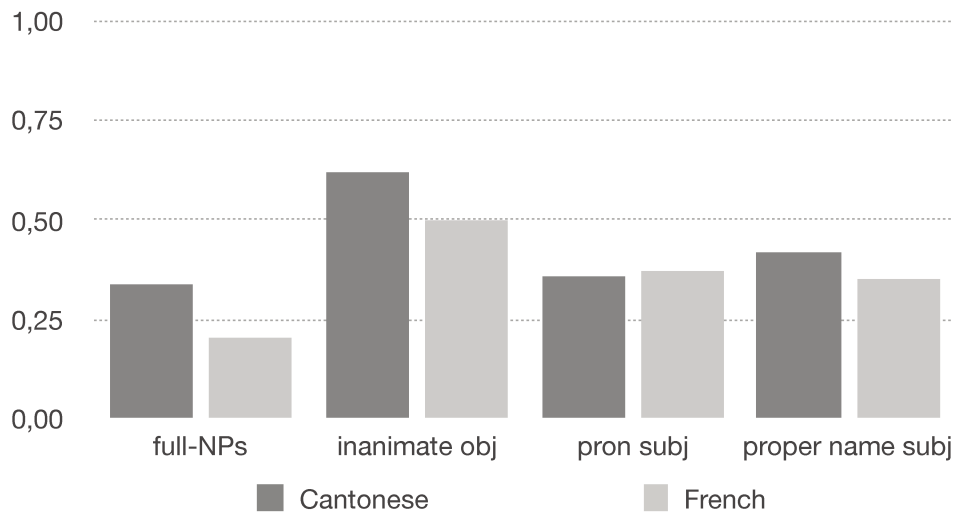
In (94), the similar features between head noun and intervener are marked in bold. Following the distinctness hierarchy of fRM, animate full-NPs arguments condition involves a maximal non-criterial inclusion since the featural distinction between head noun and subject intervener is only the criterial feature +R; inanimate object condition involves a minimal non-criterial inclusion of the morphologic feature of +fN; pronominal subject condition and proper name subject condition involve a minimal inclusion of animacy. Consequently, ORs in condition with animate full-NPs arguments should be the most difficult due to a higher degree of similarity. For the three other conditions, although they all involve minimal inclusions, the features involved were different: inanimate object condition shows the impact of mismatch of animacy; pronominal and proper name subject conditions show the impact of mismatch of nominal form.

The similar distributions of RCs in French and in Cantonese align in general with the complex intervention hypothesis: ORs are indeed produced the least in animate full-NPs arguments condition which involves maximal inclusion. For the other three conditions involving minimal inclusion, result of the experiment shows that animacy has a stronger impact than the nominal form in production of object relatives: on one hand, fewer ORs are produced in pronominal subject condition and proper name subject which involve an intervention of animacy, this indicates that

³⁸ In French test, we also observed other type of production of non relative clause, like temporal adverbial clause *lorsque* - while.

³⁹ Remember that fN is the abbreviation of the feature of nominal form: full-NP. In French test, [+fN] feature is replaced by NP restriction (D + NP) [+NP].

intervention of animacy may be stronger than the intervention of nominal form; on the other hand, mismatch of animacy seems more effective to facilitate production of object relatives in inanimate object condition than mismatch of nominal form in the two other conditions.



Graphic 4. Distribution of ORs in Cantonese and in French

Moreover, the similar distributions of relative clauses in French and in Cantonese confirm again the structural bias of the featural intervention effects: although RCs in Cantonese and in French yield different superficial word orders, similar distributions are observed in the two languages. This means that RCs in these two languages probably have similar underlying structures. Since intervention effects are widely observed in ORs, they should be structural-based instead of linear-based as we argued in section 4.2.

As for different tendencies of productions in Cantonese and in French, it could be explained by three reasons. First might be the influence of linear order: in French, since the subject is closer to the head both for linear distance and structural distance, subject extraction is probably easier in this language, a stronger object avoidance arises. In Cantonese, the mismatch between linear and structural distance make subject extraction less easy resulting in a weaker object avoidance in Cantonese.

The second reason might be that there is a stronger impact on the intervention of NP restriction in French. Conditions that display a larger difference between Cantonese and French are animate full-NPs argument condition and inanimate object condition (cf. Graphic 4). Both of them involve an

intervention of nominal form (cf. 94). The similarity of nominal form was morphologically marked by NP restriction (of a definite article) in French but not in Cantonese. Assuming that the overt marking of NP restriction results in a stronger intervention effect in object relatives in French, a stronger object avoidance arises in French, the difference between Cantonese and French widens.

The third reason for the different tendencies of production in Cantonese and in French might be due to the fact that French allows for more syntactic options for passive: there are three ways to form a passive in French: copular followed by past participle, pseudo-causative form “*se fait*”, and reduced relative. There is only one way in Cantonese, with “*bei*”.

Passivized subject relative with copular and past participle in French:

- (95) le pompier_i [RC qui_i est suivi par l’hôtesse de l’air]
 the firefighter who is followed by the sailor
 ‘the firefighter who is followed the sailor’

Passivized subject relative with pseudo-causative *se fait* in French:

- (96) le pompier_i [RC qui_i se fait suivre (par l’hôtesse de l’air)]
 the firefighter who causative follow (by the sailor)
 ‘the firefighter who is followed the sailor’

Reduced relative with past participle in French:

- (97) le pompier [RRC suivi par l’hôtesse de l’air]
 the firefighter followed by the sailor
 ‘the firefighter followed by the sailor’

Passivized subject relative with *bei* in Cantonese:

- (98) [RC Ø_i 俾 水手 跟-住 嘅] 消防員_i
 bei2 seoi2sau2 gan1-zyu6 ge3 siu1fong4jyun4
 PASS sailor follow-ASP REL firefighter
 ‘the sailor who is followed by the firefighter’

Among the 323 cases of passivized subject relatives in French, 59% (192) are regular passives with copular and past participle, 39% (126) contains a pseudo-causative, and only 2% (5) are reduced relatives. RCs with pseudo-causative occupy a considerable proportion. This might be due to two reasons: first, the agent is not obligatory in relatives with pseudo-causative (and more needed in the two other constructions). This reduces the processing load. Second, RCs with pseudo-causative are easy to produce since its template is simple: the fixed component *se fait* followed by an infinitive form of verb, no extra conjugation is needed. It is easy to trigger a syntactic priming effect. The

performance of one of the participants was excluded in the analysis because the pseudo-causative construction was applied in all his answers in object conditions, even with inanimate head, which is not natural in French⁴⁰. Moreover, relatives with pseudo-causative were mainly produced by 7 participants (including the one performed 100% of pseudo-causative in object conditions): around 93% of RCs with pseudo-causative are produced by them. This supports the hypothesis that pseudo-causative constructions facilitate both self-priming and syntactic priming effect.

Concerning priming effect, we assume that the order of questions (triggering the production of relative clauses) might influence the pattern of responses. We thus added the list of questions (there are 4 lists) as a factor to test whether there was a correlation between production of object relatives and lists of questions⁴¹. However, statistic analysis shows that the hypothetic correlation did not occur in the two tests.

One question remains to be answered: given that a strong facilitation effect of pronominal status has been observed in the corpus studies, why a similar facilitation effect is not observed in the elicited production experiment? Here are two possible explanations: First, in the second experiment, the configurations of features of arguments were fixed, and the pronominal subject condition only corresponded to the configuration of minimal inclusion of animacy; whereas in corpus study, since features of arguments were not fixed, mismatch of nominal form (object relative with pronominal subject) could co-occur with mismatch of animacy and result in a disjunction configuration (cf. 99), which is more accessible than the non-criterial inclusion according to fRM (cf. 85). The results of the corpus studies are consistent with this hypothesis: in the TV corpus, among 121 object relatives with a pronominal subject, 81% (98) display animacy mismatch with an inanimate head noun and an animate subject. In the Hong Kong Cantonese corpus, this proportion went to 83% (89/107).

(99)	head noun		intervener	
double mismatches	+NP, +inanimate, +R		+animate	disjunction
e.g.	the song	that	you	write

Second, mismatch of personal features might also be a factor. Previous psycholinguistic studies on processing of relative clauses reported an impact of personal feature (Gibson 1998, 2000; Gordon et al. 2004; Reali and Christiansen 2007; Adani et al. 2010 among others): mismatch of personal

⁴⁰ e.g. *le bouclier qui se fait essuyer par la dame* - the shield who is wiped by the woman

⁴¹ Linear mixed model fit by REML [`lmerMod`], Formula: target ~ list + (1 | participant) + (1 | items).

features (3rd person head noun vs. 1st or 2nd person subject or object) reduces the difference in processing difficulty between subject and object relatives. The person of arguments was always identical in the elicited production experiments while it varied in the corpus studies. If we consider the person feature as an independent factor⁴² in the featural intervention, the object relatives in the pronominal subject conditions in the second elicited production experiment all display an intervention of person feature between the head noun and the subject intervener; whereas only 10% (26/254) of the object relatives with a pronominal subject in the corpus studies do. These results denote the existence of personal intervention (particularly in the elicited production) and its structural-based nature in Cantonese. In short, features of arguments in the elicited production experiment overall exhibited a higher degree of similarity than those in the corpus studies, and this explains the difference of the production of object relatives in these two data sources.

So far we can not define any hierarchy of impacts between the three features discussed above (animacy, nominal form, person). In order to compare the impact of person with the impact of animacy, minimal pairs (minimal inclusion of person vs. minimal inclusion of animacy vs. minimal inclusion of nominal form (cf. 100 inanimate object)) should be tested in a new experiment.

(100)		head noun		subject
minimal inclusion of person.		3sg , inanimate, +NP,+R		3sg , +animate
	e.g.	the rock	that	he throw
(101)		head noun		subject
minimal inclusion of animacy		3sg, +animate ,+NP,+R		2sg, +animate
	e.g.	the girl	that	you met yesterday

Another issue remaining to discuss is the intervention configurations involving several interveners (such as indirect object relative, object relatives with multi arguments). We expect to complete this discussion in future studies.

(102) indirect object relative:

[RC	你	整	∅ _i	畀	我]	嗰	啲	腸粉 _i
	lei5	zing5	bei5	ngo5	go2	di1		coeng2fan2
	2SG	make	dat.to	1SG	Dem	CL.pl		Rice noodle roll
	‘the rice noodle roll that you made for me’							

⁴² independent to the feature of nominal form (including pronominal status).

(103) object relative with multi arguments:

[RC	你	上次	當-咗	\emptyset_i	係	地布]	嗰條	\emptyset_i
	lei5	soeng6ci3	dong1-zo2		hai6	dei6bou3	go2tiu4	
	2SG	last time	take \emptyset_i as		be	mop	Dem	CL

‘the one that you took as mop last time’

5.4 Conclusion

In our study, two elicited production experiments and two corpus studies have been performed. In the first elicited production experiment, which elicited only animate full-NPs arguments with a definite context, an overwhelming subject preference was observed. In the two corpus studies where contexts were different and the features of arguments were diverse, different results show: an object preference was observed in the TV corpus, but no significant subject/object preference was observed in the Hong Kong Cantonese Corpus. These contradictory results were tentatively interpreted in terms of feature-based intervention (Friedmann, Belletti et Rizzi 2009, Villata et al. 2016, Rizzi 2018): subject extraction is easier due to the local relation holding between the subject head and the gap; object extraction is more difficult but only insofar as the intervening subject shares the same features as the head. If the subject and the object mismatch in features, object extraction is made easier. The strong object relative avoidance observed in the first experiment is due to a strong intervention effect since the subject and the object display a high degree of featural similarity: they are both animate, definite (restrictive) full NPs.

In order to test this hypothesis, a new elicited production experiment was conducted, where the composition of the arguments was varied in four types: a) animate full-NPs arguments as in the first experiment, which is predicted to yield a strong intervention effect; b) inanimate object condition; c) pronoun subject condition and d) proper name subject condition. The last three conditions, where the subject does not match with the object for animacy and nominal form, were expected to display a weaker intervention effect, therefore increase the production of object relatives. On account of the previous observation concerning featural mismatches of RCs in French, a parallel test in French was performed. A subject preference was observed in both languages, but feature mismatches did increase the production of object relatives in comparing to the result of the previous experiment. This result supports the structural intervention hypothesis for the two languages: in both cases, varying the featural composition of the subject with respect to the object increases the production of

ORs. In the two languages, though, features mismatches do not have the same impact. Animacy seems to be the most effective features in influencing object extraction in both languages: on one hand, animacy intervention seems to have a stronger impact (than intervention of nominal form) to increase processing difficulty of object relatives; on the other hand, mismatch in animacy seems to be the most effective in favouring object extraction.

Furthermore, the underlying mechanism of featural intervention seems to be complex: when head and subject contain multiple features, every feature counts. We assume that the more matching features between the head noun and the intervener, the more difficult the construction is. The constructions where the only featural difference between head noun and intervener is the criterial feature ([+R] in the case of relative clauses) are named *maximal (non-criterial) inclusion*. The constructions where the head noun and the intervener have only one feature in common are named *minimal (non-criterial) inclusion*. Based on the distinctness hierarchy of Rizzi (2018, see (31) in p. 25), a complex accessibility hierarchy for the processing of object relatives⁴³ is proposed as follow.

(104) = (85) identity > criterial inclusion > maximal non-criterial inclusion > minimal non-criterial inclusion > disjunction⁴⁴

⁴³ Will it be compatible with other A'-dependency such as wh-question?

⁴⁴ Remember that it is ungrammatical for object relatives to display identity or criterial inclusion configurations.

Chapter 6 Summary of Part I

In the first part of this dissertation, we reviewed three psycholinguistic approaches to the processing of relative clauses. Dependency Locality Theory (Gibson 2000) is linear based. O’Grady (1997)’s proposal about syntactic development and the (featural) intervention approach (Friedmann et al. 2009, Villata et al. 2016, Rizzi 2008) are both structurally based. The difference between them is that O’Grady (1997) focus on the embeddedness of the gap in the syntactic structure, while the intervention hypotheses focuses on whether a local relation can maintain between the head noun and the gap when a similar element structurally intervenes between them and how the feature endowment of the intervening elements define similarity.

Based on the first two hypotheses, we predict that in Cantonese, where RCs are pre-nominal in a VP with VO order, a processing conflict might arise. Linear based approaches predict an object advantage, whereas structural based approaches predict a universal subject advantage. In accordance with the featural intervention hypothesis and the characteristics of NPs/DPs in Cantonese, we assume that the structure of nominal expressions, as well as the constructions of relative clauses (*ge3*-RCs vs. *dem-cl*-RCs) may influence the calculation of the featural intervention effect.

Five psycholinguistic studies about relative clauses in Cantonese are then reviewed. Results show a universal subject advantage/preference that might result from various factors. We believe that structural factors play an important role in processing, but that the impact of linear factors is not negligible either. The superficial similarity between object relatives (particularly those with demonstrative and classifier) and main clauses is observed to have a bidirectional impact: for acquisition, it is one of the main strategies to produce relative clauses, but it leads children to assign a wrong head noun to relatives in comprehension; as for processing by adults, it seems to cause ambiguity and slow down comprehension. Production by adults is ‘unexplored’ in the literature. Moreover, the impact of features of arguments is also unexplored so far. In this reason, we ran two experiments on elicited production of relative clauses and two corpus studies in Cantonese.

The results of our studies are in line with the observation in the previous studies and reveal the existence of structural intervention effects in Cantonese: when the arguments of the RCs share the same features, a structural intervention effect appears, and preference for subject relatives is

overwhelming; when the features of the arguments display some amount of mismatch, proportion of the object relatives increases. This featural endowment effect is also found in a control experiment that we ran in French. In our study, animacy, formal features and person of arguments show their impacts on the production of relative clauses. The impacts of animacy and formal features of arguments both confirm the existence of a purely structural intervention effect in Cantonese, independent from linear intervention. As for the impact of person feature, it remains to be discussed.

The features discussed above are rather semantic and morphologic, whereas syntactic feature (such as NP restriction [+NP]), which is crucial in the featural Relativized Minimality (fRM, cf. (27)), was not taken yet into our account due to the complexity of nominal structures in Cantonese. On one hand, although NP restriction is not overtly marked in Cantonese (unlike in French and English), a structural intervention effect of formal feature (full-NP bare noun) was observed in object relatives in the first elicited production experiment. This indicates that bare noun in Cantonese might also have some syntactic features that can trigger intervention. It is reminiscent of the hypotheses suggesting that bare noun in Chinese can have a complex structure (Cheng & Sybesma 1999, 2009; Tang 2011). What about a pronoun and a proper noun? What are their internal structures? On the other hand, relative markers in Cantonese (*ge3*, classifier, demonstrative and classifier) are all nominally related and contain some nominal features, do these features take part in the featural intervention? If they do, how?

Two pieces of puzzles are thus missing for the account of syntactic feature in the fRM: 1) the structure of the nominal expressions (such as a bare noun, a pronoun, a demonstrative classifier and noun) and 2) the structure of the two main types of relative clauses in Cantonese. We are going to seek these missing pieces at the first chapters of Part II, then continue the discussion about featural intervention in relative clause in Cantonese.

Part II: structure and derivation of relative clauses

Chapter 1 the structures of nominal expression

In this chapter, we are going to look at the first piece of the puzzle: the structure of nominal expression in Chinese, which is a rather complicated case. On one hand, different nominal expressions have different interpretations and distributional restrictions. Furthermore, nominal expressions in Mandarin and those in Cantonese also display some differences. The following table captures the interpretation of three types of nominal expressions in Mandarin and Cantonese.

	<i>Mandarin</i>		<i>Cantonese</i>	
	Indef	Def	Indef	Def
Bare N	+	+	+	–
Cl + N	+	–	+	+
Num + Cl + N	+	–	+	–

Table 1. The interpretation of the difference types of nominal expressions
(= (37) in Cheng & Sybesma 1999: 528)

On the other, the structure of nominal expressions in Chinese yielded a long debate in the literature as mentioned in Part I. Since overt articles are absent in Chinese, whether there is a D and whether nominal expressions are NPs or DPs is still controversial. The following table summarized part of the discussion.

Studies:	Assumptions:
Lin (1997)	definite/indefinite noun phrases → NPs; demonstratives → DPs
Li (1998)	quantified indefinite noun phrases → NPs; definite & non-quantified indefinite noun phrases → DPs (definite bare nouns are base-generated in D°).
Cheng & Sybesma (1999)	definite noun phrases → CIPs (by N-to-Cl movement); indefinite noun phrase → NumPs; no DPs in Chinese.
Kim (2004)	non-specific noun phrases → NPs; specific noun phrases → DPs.

Table 2. Recapitulation of literature about Chinese DPs

As can be seen in Table 2, different proposals follow different criteria: some proposals rely on definiteness, some on quantification, some on specificity. They are all semantic-based.

For the sake of simplification and regularisation, we are going to base the discussion on the morphological form of the nominal expressions in accordance with some previous studies (including Li 1998; Cheng & Sybesma 1998, 1999, 2009, 2012; Simpson 2001, 2002; Tang 2007). In section 1.1, we will focus on bare nouns, addressing their different interpretations and distributional restrictions in Mandarin and in Cantonese, then discuss their structures in different positions in a sentence. In section 1.2, we will focus on [CI+N] phrases. Investigations similar to those for the bare nouns will be performed in this section. In section 1.3, we will address the structure of the [Num-CI-N] sequence and the consequent indefinite interpretation. In section 1.4, we are going to investigate the syntactic position and the generation of demonstratives and the structure of Dem-(Num)-CI-N sequences as well as their variation in different Sinitic languages. A summary will be given in section 1.5.

1.1 Bare nouns

Cheng and Sybesma (1999) show that bare nouns in Chinese can have several interpretations and behave differently in different Sinitic languages: they can be definite, indefinite or generic in Mandarin; however, they can only be indefinite or generic in Cantonese. Moreover, these interpretations go together with some syntactic restrictions. The following examples illustrate these restrictions.

(1) Mandarin:	bare noun [+definite] [+generic]	verb	bare noun [+definite] [+indefinite] [+generic]
(2) Cantonese:	bare noun [+generic]	verb	bare noun [+indefinite] [+generic]

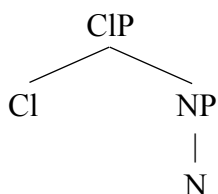
As can be seen, only bare nouns in post-verbal position can have an indefinite interpretation. Similar phenomena are also found in Romance and Germanic languages. Longobardi (1994) argues that the reason why indefinite bare nouns are restricted to object position (which is lexically governed) is that bare nouns are actually DPs with an empty D head, which must be licensed by a

lexical head. As for the other interpretations of bare nouns, such as generic or proper names, Longobardi claims that in those cases, bare nouns undergo N-to-D movement to the D position. Is the empty head assumption compatible with the distribution of the bare nouns in Chinese?

If it is, bare nouns in Chinese should involve a structure beyond NP. Since D is not overtly marked in the language, what is the nature of the empty head triggering this distributional restriction? Cheng and Sybesma (1999) point out that count-classifiers⁴⁵ and D have some common properties: firstly, they share the function of individualization and singularization. Second, they both have the deictic function. Longobardi (1994) indicates that *D has the function of mediating between the description provided by the NP and whatever specific entity in the real world the description is applied to* (Cheng and Sybesma 1999: 513). Authors refer to this function as the deictic function of D. They argue that this function in Chinese is held by Cl.

They claim that bare nouns in Chinese correspond to CIPs with an empty Cl head (see 3). This assumption is consistent with the fact that the indefinite interpretation of bare noun is restricted to a post-verbal position in Chinese.

(3)



(= (16) in Cheng & Sybesma 1999:518)

If this is the case, how are the other interpretations of bare nouns derived? Let us start it from bare nouns in Mandarin. Following Chierchia (1998), Cheng and Sybesma (1999) propose that in Mandarin, the definite interpretation arises with the help of ι operator, a type-shifter that is equivalent to a definite article and is only available to languages with no definite article (Cheng & Sybesma 1999: 522). Since neither Mandarin nor Cantonese has a definite article, the ι operator is therefore legitimate to change the NP (type $\langle e, t \rangle$) to an individual (type $\langle e \rangle$) in both languages. Because NP is now individual, it can not stay in the N level and must undergo movement to Cl. Apart from ordinary bare nouns, Cheng and Sybesma also mention that proper names and pronoun, as initial N type elements, also undergo N-to-Cl movement like definite bare nouns (to receive an

⁴⁵ Cheng and Sybesma (1998) suggest that classifiers in Chinese can be classified into two types: count classifiers and mass classifiers. A more detail analysis will be presented in the subsection 1.2.

individual interpretation). Both pronouns and proper names can be preceded by demonstrative and classifier or numeral and classifier⁴⁶; both of them have a definite interpretation and do not show any distributional restriction.

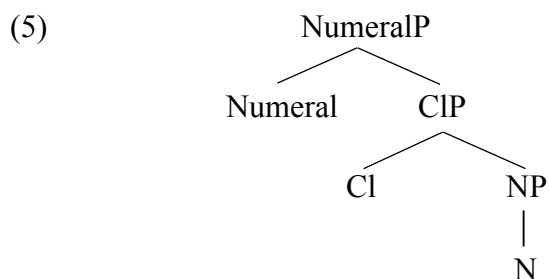
Concerning the generic interpretation, only bare nouns can have it. When they do, they have a distribution similar to that of definite bare nouns, i.e., not restricted to lexically governed positions. Following Longobardi (1994), Cheng and Sybesma (1999) assume that generic bare nouns in Mandarin and Cantonese also undergo N-to-Cl movement (involving another operator).

Going back to the indefinite interpretation, given that Num-Cl-N sequences can only be indefinite whereas [Cl+N] phrases can be either definite or indefinite in Chinese, they argue that Numeral is responsible for the indefinite interpretation.

(4) The indefinite interpretation of nominals in Chinese is linked to the presence of a NumeralP (the head of which may be overt or nonovert).

(= (38) in Cheng & Sybesma 1999: 528)

Consequently, indefinite bare nouns are a NumeralP with an empty Numeral and an empty Cl. (5) illustrates the structure of NumeralPs.



(= (39) in Cheng & Sybesma 1999: 529)

⁴⁶ Here are two examples:

(i) Num-Cl-pronoun
 cong nei-ge jing-zi, wo keyi kandao wu-ge wo.
 from that-CL mirror I can see five-CL I
 'From that mirror, I can see five copies of myself (five I's/me's).'

(= (55) in Cheng & Sybesma 1999: 538)

(ii) Dem-Cl-proper name
 nei-ge Hufei zhen bu xianghua.
 that-CL Hufei truly not decent
 'That Hufei is really unreasonable!'

(= (22b) in Cheng & Sybesma 1999: 523)

Let us turn now to bare nouns in Cantonese. Remember that bare nouns in Cantonese can be either generic or indefinite, but cannot be definite (except for proper nouns and common nouns). When they are generic or indefinite, their structure is similar to that of their counterparts in Mandarin, namely NumeralP for indefinite interpretation and CIP for generic interpretation. As for why bare nouns in Cantonese cannot have a definite interpretation, Cheng and Sybesma (1999) claim that this is because classifiers in Cantonese are capable of expressing definiteness. It is an either-or situation for the expression of definiteness: either a language has a lexical item such as classifier, or it applies the ι operator. In the case of Cantonese, the option of inserting a lexical element is taken, and bare nouns can not express definiteness by the application of ι operator and undergoing N-to-CI movement. They later modify their analysis and conclude that the ι operator is segmentally realized by classifiers in Cantonese (Cheng & Sybesma 2005: 21), but the essence of the argumentation does not change.

A comparison of the interpretations of bare nouns in Mandarin and in Cantonese is repeated below:

bare nouns	definite	generic	indefinite
Mandarin	+	+	+
Cantonese	–	+	+

Table 3. Comparison of interpretation of bare nouns in Mandarin and in Cantonese

The only difference observed above is that the definite interpretation is blocked in bare nouns in Cantonese. This, according to Cheng and Sybesma (1999), is due to the different properties of classifiers in Mandarin and in Cantonese. In the next subsection, we are going to discuss the properties of classifiers as well as the structures and the interpretations of the [CI+N] phrases in Mandarin and in Cantonese.

1.2 Classifier and nouns

In this subsection, we are going to review the proposals of Cheng and Sybesma about the functions of classifiers in Chinese (1998) and the structure of the [CI+N] phrase in Mandarin and Cantonese (1999).

massifier:

- (9) na yi xiao xiang shu insertion of adjective
 that one/whole small CL-box book
 ‘that one small box of books’ (= (5b) in Cheng & Sybesma 1998:3)

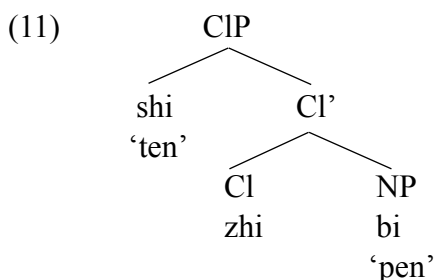
Compatibility with both: however the adjective cannot be accompanied by *de*.

massifier:

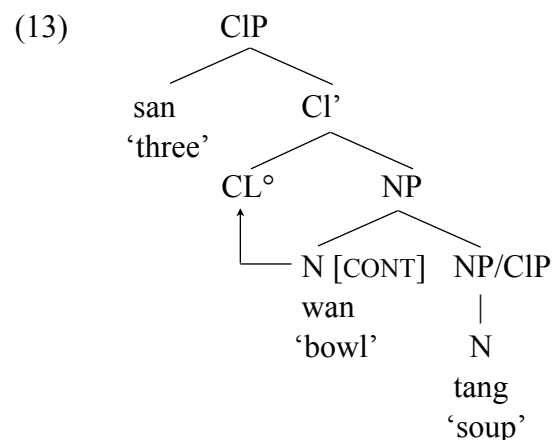
- (10) *na yi xiao-de xiang shu
 that one/whole small-DE CL-box book
 (= (6b) in Cheng & Sybesma 1998:4)

The examples above show that only noun phrases with massifiers allow the occurrence of *de* between the classifier and the noun (observed first by Chao 1986, Paris 1981) and the adjectival modification of classifier. Cheng and Sybesma assume that the different behaviours of these two types of classifier are due to their different natures and different underlying structures: count-classifiers are grammaticalized as classifiers to *name a unit in which the entities denoted by the noun come naturally*; massifiers are full nominal elements (NP) which *create a unit of measure* and contain an unfilled ‘content’ [CONT] feature. As for their structural position, count-classifiers head CIP and select an NP as their complement; massifiers, being nouns, are base-generated in the complement position of the CI, and then undergo N-to-CI movement to fill the empty head of CIP and select a bare noun to satisfy the content feature. The simplified structures of nominal phrases with classifier in Chinese are given below:

count-classifier:



massifier:



(= (36) & (37) in Cheng & Sybesma 1998: 17)

Let us now move to the interpretation and the distributional restriction of the [CI+N] phrases in Mandarin and in Cantonese. Remember that in Cantonese, bare nouns can never be definite. Only [CI+N] phrases carry the definite interpretation. Moreover, definite [CI+N] phrases are not restricted to the object position. In contrast, [CI+N] phrases in Mandarin can never be definite, and it is the bare noun that carries the definite interpretation. Interestingly, [CI+N] can only sit post-verbally. The following examples illustrate the restrictions of the distribution and the interpretations of [CI+N] in Mandarin and Cantonese.

- | | | | |
|-----------------|----------------------|------|---|
| (12) Mandarin: | *CI+N | verb | CI+N
[+indefinite] |
| (13) Cantonese: | CI+N
[+ definite] | verb | CI+N
[+definite]
[+indefinite, –specific] |

A question then arises: why are definite [CI+N] phrases not possible in Mandarin (Cheng & Sybesma 1999: 521)? As discussed in the last subsection, an overt classifier in Mandarin is accompanied by a Numeral, which can be either overt or covert. The presence of the Numeral undoes the definiteness, that is the reason why [CI+N] phrases can never be definite in Mandarin. When the classifier is null, it must be lexically licensed, hence conformed to governed positions.

In Cantonese, on the other hand, the insertion of a classifier is capable of expressing definiteness, and the presence of a classifier is not obligatory to attach to a Numeral. Therefore, [CI+N] phrases in Cantonese can be definite. When they are indefinite, they are NumeralP with an empty Numeral as the [CI+N] phrases in Mandarin. Since there is always an empty Numeral in the indefinite [CI+N] phrases, they are restricted in the object position.

The reason why [CI+N] phrases cannot have a generic interpretation in both Mandarin and Cantonese involves two aspects: in Mandarin, classifiers are always attached to numeral and therefore lack the definite denotation for the kind referring; in Cantonese, although the classifier is capable of denoting definiteness, singular classifiers, which are the majority⁴⁸, block the kind interpretation (which should be plural).

⁴⁸ Cheng and Sybesma (1999) mention that the plural classifier *di*, in certain contexts, can hold a kind interpretation.

If we compare the interpretation and distributional restrictions of bare nouns and [CI+N] phrases in Mandarin and in Cantonese, a mismatch emerges: bare nouns in Mandarin and [CI+N] phrases in Cantonese have some properties in common; so do [CI+N] phrases in Mandarin and bare nouns in Cantonese.

	Mandarin		Cantonese	
	bare noun	CI+N	bare noun	CI+N
definite	+	–	–	+
indefinite	+	+	+	+
generic	+	–	+	–

Table 5. Comparison of interpretation of bare noun and [CI+N] phrases in Mandarin and in Cantonese

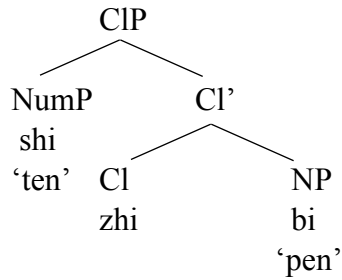
As Table 5 shows, on one hand, both bare nouns in Mandarin and [CI+N] phrases in Cantonese can have definite and indefinite interpretations; on the other hand, both [CI+N] phrases in Mandarin and bare nouns in Cantonese can only be indefinite, which are thus NumeralPs with empty head(s) and therefore undergo distributional restrictions. We assume that this mismatch is due to the different properties of classifiers in Mandarin and in Cantonese: the only interpretational difference between Mandarin and Cantonese is found in the definite interpretation. Remember that Classifiers in Mandarin are not capable of expressing definiteness and must attach to a Numeral, which denotes indefiniteness. Therefore [CI+N] phrases in Mandarin cannot be definite, only bare nouns can be (by N-to-CI movement). On the contrary, definiteness is expressed by classifiers in Cantonese, therefore bare nouns cannot be definite, only [CI+N] phrases can be. We will show that the different properties of classifiers in Mandarin and in Cantonese influences other more complex nominal structures in these two languages.

1.3 Num-CI-N sequences

Cheng and Sybesma (1998) assume that in the underlying structure of the sequence of Numeral-Classifier-Noun in Chinese, CIP can be considered as equivalent to DP since classifier exhibit some characteristics similar to determiner. The underlying representation of the Num-CI-N sequence is illustrated as follow:

Mandarin (Cheng & Sybesma 1998)

(14)

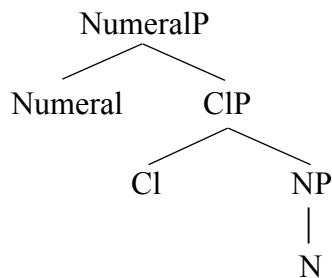


(= (36) in Cheng & Sybesma 1998: 17)

In (14), the agreement between the numeral ‘ten’ and the classifier is checked in a spec-head configuration. As for the semantic agreement between the classifier and the noun, which head respectively CIP and NP, it is established in a head-complement configuration.

As for the position the Numeral, they revise in (1999) their original analysis, and propose that Numeral heads its own projection and selects CIP as its complement, which is similar to the proposal of Tang (1990) and Pan (1990).

(15) = (6)



(= (39) in Cheng & Sybesma 1999: 529)

In Mandarin and in Cantonese, the Num-CI-N sequences are indefinite due to the presence of the Numeral, which is claimed to undo the definiteness.

A question then arises: is there is a distributional restriction for Num-CI-N sequences? If there is, it means that the Num-CI-N sequences, which is assumed to be indefinite, may involve a more complex structure with an empty head. If there is not, NumeralP may be the maximal projection of the Num-CI-N sequences.

Cheng and Sybesma (1999) mention that *all indefinite noun phrases in Mandarin and Cantonese are barred from preverbal position. In other words, indefinite noun phrases with overt numerals are predicted to have the same distribution as bare nouns and [Cl+N] phrases* (Cheng & Sybesma

1999: 531). This lead to the empty head hypothesis for Num-CI-N sequence. However, they also find a counter example, in which an indefinite noun phrase with an overt numeral can appear preverbally (see 16b).

- (16) a. *lian yi-ge xuesheng dou mei lai.*
 Even one-CL student all not-have come
 ‘Not even one student showed up.’
- b. *yi-ge xuesheng dou mei lai.*
 one-CL student all not-have come
 ‘Not even one student showed up.’

(16b) is derived from (16a) by omission of *lian*, an optional element of ‘*lian...dou*’ construction that have a focus interpretation ‘Even’ (Cheng and Sybesma 1999: 531).

Li (1998) also observes a distributional restriction of Num-CI-N sequences in Mandarin and some counterexamples. She suggests that there are actually two types of indefinite Num-CI-N sequences in Chinese: one has a non-quantity indefinite *individual*-denoting interpretation (cf. 17), and the other has a *quantity*-denoting interpretation (cf. 18). Only the former is barred from appearing in preverbal position.

(17) individual-denoting number expression

- a. **san-ge xuesheng zai xuexiao shoushang le.*
 three-CL student at school hurt PAR
 ‘Three students were hurt at school.’

- b. *you san-ge xuesheng zai xuexiao shoushang le.*
 have three-CL student at school hurt PAR
 ‘There were three students who were hurt at school.’

(= (1) and (3) in Li 1998: 694)

(18) quantity-denoting number expression

- wu-ge xiaohai chi-bu-wan shi-wan fan.*
 five-CL child eat-not-finish ten-bowl rice
 ‘Five children cannot finish ten bowl rice.’

(= (4) in Li 1998: 695)

As can be seen in (17) and (18), indefinite Num-CI-N sequences with the individual-denoting number interpretation cannot sit in the subject and topic positions, whereas those with the quantity-denoting number interpretation can. The interpretational and distributional differences between

(22) with individual-denoting numeral expression (DP)

you [san-ge ren]_i chi-bu-wan ni gei tamen_i de wu-wan-fan.
have three-CL people eat-not-finish you give them DE five-bowl-rice
'There are three men_i unable to eat five bowls of rice you gave to them_i.'

Individual-denoting interpretation: Each of these three individuals is unable to finish five bowls of rice that you gave to them. There are fifteen bowls of rice in total involved in this assertion. (= (20b) in Li 1998: 699)

Second, the two types of numeral expressions behave differently under other quantificational expressions. Only individual-denoting numeral expressions (DPs) can occur with 'you-have' existential quantifier and 'dou-all' universal quantifier.

(23) you wu-ge xiaohai chi-bu-wan shi-wan fan.
have five-CL child eat-not-finish ten-bowl rice
'There are five children unable to finish ten bowls of rice' (= (23a) in Li 1998: 699)

Individual-denoting interpretation: Each of these five individuals is unable to finish ten bowls of rice that you gave to them. There are fifty bowls of rice in total involved in this assertion.

*Quantity-denoting interpretation: there are five children and they cannot finish ten bowls of rice. There are ten bowls of rice in total in this assertion.

(24) wu-ge xiaohai dou chi-bu-wan shi-wan fan.
five-CL child all eat-not-finish ten-bowl rice
'None of the five children can finish ten bowls of rice.' (= (23n) in Li 1998: 699)

Individual-denoting interpretation: Each of these five individuals is unable to finish ten bowls of rice that you gave to them. There are fifty bowls of rice in total involved in this assertion.

*Quantity-denoting interpretation: there are five children and they cannot finish ten bowls of rice. There are ten bowls of rice in total in this assertion⁴⁹.

Li's explanation for the incompatibility between the quantity-denoting interpretation and other quantificational expressions is that these expressions quantify over individuals (which are denoted by D).

The restrictions above show that Num-CL-N sequences in Chinese behave indeed differently. The quantity-denoting Num-CL-N sequences are headed by a Numeral, whereas the individual-denoting Num-CL-N sequences are headed by a covert D, therefore are lexically restricted. Li's proposal suggests that some indefinite Num-CL-N sequences can have a structure that goes beyond NumeralP. She points out that although the two types of Num-CL-N sequences behave differently, both of them

⁴⁹ In my opinion, (24) can have a quantity denoting interpretation, but in this case, *dou* is rather an adverb and interpreted as 'even'. The quantity-denoting interpretation of (24) is 'Even five peoples cannot finish ten bowls of rice'. Likewise, Cheng and Sybesma (1999)'s counterexample (16b) is of the same type. In these cases, *dou* can be substituted by 'ye'.

(NumP and DP) can occur in argument positions (although DP with an empty D is restricted in the object position) and be assigned a thematic role.

To sum up, in this subsection, we have reviewed two proposals for the structures of Num-CI-N sequences in Chinese. Cheng and Sybesma (1999) propose that Num-CI-N sequences, which are always indefinite due to the presence of Numeral, are NumeralP in which each element in the sequence heads its own projection (following Tang 1990). They can occur in both the preverbal position and the postverbal position. Besides, adding a demonstrative can make a NumeralP definite (Cheng & Sybesma 1999:539).

Li (1998) observes that Num-CI-N phrases do not all behave alike: some show a distributional restriction, while others do not. She suggests that they should have different structures. According to their interpretation, the ones that are distributionally restricted are individual-denoting numeral phrases, thus DPs; those that do not have any distributional restriction are quantity-denoting numeral phrases, hence NumeralPs.

Combining the proposal that individual-denoting Num-CI-N sequences have an empty head (D in Li 1998) with the fact that the demonstrative can make an indefinite NumeralP definite, the next question is: can the demonstrative fill the empty head position? In the next subsection, we are going to discuss the syntactic position of demonstrative and the structure of Dem-Num-CL-N sequences.

1.4 Demonstratives and Dem-(Num)-CI-N sequences

Demonstratives are always found in the initial position of a complex nominal expression⁵⁰ in Chinese, preceding numeral, classifier and noun. There are various proposals in the literature for the position of demonstratives in Chinese. Table 6 summarizes these proposals.

⁵⁰ The complex nominal expressions discussed in this chapter do not include nominal expression with NP modifiers, such as adjectival modifier, possessor, relative clause and complement clause.

Studies:	Assumptions:
Tang (1990)	Demonstratives are instances of D in Chinese.
Li (1999)	Demonstratives carry [+definite] features, and are thus D.
Tang (2007)	Demonstratives in Chinese are licensed by the head of a functional projection FP intervening between DP and NumP.
Sybesma & Sio (2008)	Demonstratives are generated in a specifier position of DetP, which is a D-related projection immediately dominating NP, then move to a specifier position of S(pecificity)P, which is also a D-related projection dominating NumP.
Simpson (2001, 2002)	Demonstratives are generated in a specifier position of a functional projection XP between DP and NP, but are able to move to a specifier position of a projection higher than D (following Szabolcsi 1994).

Table 6. Summary of proposals about demonstrative in Chinese

As can be seen in Table 6, the proposals about demonstratives in Chinese can be divided into two types: a) demonstratives in Chinese are the head of the topmost layer in the nominal expression (D in Tang 1990 and Li 1999; F in Tang 2007⁵¹; b) demonstratives in Chinese are generated in the specifier position of a functional projection situated in a low position between D and NP, then undergo movement to a higher position (higher at least than NumP/QP) (Simpson 2001; Sybesma & Sio 2008). Cheng and Sybesma (2009) propose that demonstratives are hosted in the topmost layer (Specificity Phrase), however whether they head the SP or sit in the [Spec, SP] position is not explicit.

The hypothesis that demonstratives in Chinese head the topmost projection is based on the features they display (e.g. [+definite] in Tang 1990 and Li 1999; [+referential] in Tang 2007; [+specific] in Cheng and Sybesma 2009) and the fact that demonstratives are always in the initial position of the Dem-(Num)-Cl-N sequence in Chinese (see 25).

- (25) zhe san (*zhe) ge (*zhe) xuesheng
this three this Cl this students
‘these three students’

⁵¹ Tang (2007) claims that both D and F exist in the underlying structure of nominals in Chinese. However, [–definite] in D and [+referential] in F may never agree with each other, therefore D and F may not be filled simultaneously. We thus consider FP as a topmost layer.

Li (1999) proposes that demonstratives in Chinese contain a [+definite] feature, *when a nominal expression contains a [+definite] feature (e.g. pronoun, proper name, demonstrative, elements having [+definite] assigned by the context), D is projected* (Li 1999:91). Tang (2007) claim that the demonstrative is licensed by [+referential] in F (Tang 2007:1010).

The lower position hypotheses are rather general proposals for demonstratives in different languages. They are based on cross-linguistic observations: co-occurrence possibilities of a determiner and a demonstrative and their distribution in a nominal expression. The following examples illustrate the co-occurrence of a determiner and a demonstrative in Spanish.

(26) a. este libro
 this book
 ‘this book’

 b. el libro este
 the book this
 ‘this book’

(= (3) in Sybesma & Sio 2008: 455; (11) in Simpson 2001:129)

(27) a. esa reacciona alemana a las criticas
 this reaction German to the criticisms
 ‘this German reaction to the criticisms’

 b. la reacciona (*esa) alemana esa a las criticas
 the reaction this German this to the criticisms
 ‘this German reaction to the criticisms’

(= (39) and (40) in Simpson 2001: 138)

Simpson (2001) points out that demonstratives carry indeed a [+definite] feature and determiners must agree with this feature since only a definite determiner can co-occur with a demonstrative.

(28) *un libro este
 a book this

(= (11a’) in Simpson 2001: 129)

He also claims that *this “agreement” is a result of the co-occurrence of two elements within a single syntactic unit, each essentially encoding the same single specification* (Simpson 2001:139). His

claim is similar to a later argument of Sybesma and Sio (2008) that nominal expressions in Chinese can have two D-related positions⁵².

Their argumentation is based on previous studies about demonstratives (Giusti 1993, Szabolcsi 1994, Campbell 1996, Bernstein 1997, Brugè 2002) in Romance and Germanic languages, all raising similar conclusions: *One of these conclusions is that one D projection is not enough: we need two, one close to N, the other one as the outer-most layer of the phrase as a whole. Another conclusion is that the demonstrative is an XP which is generated in the spec of an FP which is close to the lexical core. Furthermore, there is an interplay between the lower and higher D projections which determines the referential properties of the phrase as a whole* (Sybesma & Sio 2008: 458 to 459). They observe that demonstratives are in different positions in Zhuang⁵³ and in Chinese: it is in an initial position in Chinese but in a final position in Zhuang. The word orders of the nominal expressions in Chinese and in Zhuang are illustrated as follows:

(29) word order in Chinese: Dem-Num-Cl-N

(30) word order in Zhuang: Num-Cl-N-Dem

In considering the grammatical similarities between Zhuang and Chinese as well as other cross-linguistic phenomena, they propose a general underlying structure for nominal expressions (see 31).

(31) [SP [NumeP [CIP [DetP [NP]]]]]

They suggest that demonstratives in Chinese are generated in the [Spec, DetP], then raise to the [Spec, SP] position. In Zhuang, demonstratives head the DetP, it is the NP that raises to the [Spec, DetP] position.

Derivation of the Dem-Num-Cl-N sequence in Chinese:

(32) [SP Dem_i [S' [NumP Num [CIP Cl [DetP t_i [Det' [NP N]]]]]]]

⁵² In any case, whatever the label, both DetP and SP are “D-type” projections in the sense that they are related to the referential properties of the noun phrase. (Sybesma & Sio 2008:459)

⁵³ Zhuang is a Kar-Tai language spoken by Zhuang people in southern China in the province of Guangxi and in adjacent parts of Yunnan and Guangdong. Although it is not a Sinitic language, its grammar is similar to that of Sinitic languages.

Derivation of the Num-Cl-N-Dem sequence in Zhuang:

(33) [SP [NumP Num [CIP Cl [DetP N_i [Det' Dem [NP t_i]]]]]]

The proposals above assume that demonstratives are generated in a low position and undergo an internal movement to a high position. Cross-linguistic empirical facts seem to support the low position hypothesis. But what is the motivation for the internal movement?

Simpson (2002) proposes that the definiteness of DP is formally established by the movement to D°. When the D° position is not filled (in his case *de* is D°), demonstratives, which have a [+definite] feature, have to raise to the D° to license the definiteness. Sybesma and Sio (2008) suggest that the internal movement is motivated by the interplay between the lower (DetP) and higher D-projection (SpecificityP). They explain that in the general underlying structure *the lower D-projection have certain deictic properties as it is involved in establishing a relation with the outside world*⁵⁴ and the specifier of the higher D-projection contains an operator, *which enables the noun phrase to act as an argument*. In Chinese, the higher D-projection is also responsible for the expression of specificity. Therefore, the motivation of the movement is to *connect the NP as a whole (an argument) to the referent in the context* (Sybesma & Sio 2008: 470).

Another empirical question about the movement is that although Simpson (2002) and Sybesma and Sio (2008) speculate on why demonstrative needs to undergo an internal movement, they do not explain why demonstrative cannot be ‘reconstructed’ in its ‘origin’ position, unlike its counterpart in Romance languages (cf. 26b, 27b)? Notice that neither of the following sequences is legitimate in Chinese.

- (34) a. *Num-**Dem**-Cl-N
 b. *Num-Cl-**Dem**-N
 c. *Num-Cl-N-**Dem**

Another issue concerning demonstratives in Chinese is their different behaviours in different Sinitic languages. Tang (2007) points out that in some Chinese languages (including Mandarin and Hakka), demonstratives can co-occur with a noun without the presence of a numeral and a classifier.

⁵⁴ This is reminiscent of the individual-denoting function of D in Li (1998): D relates a nominal expression to entities in the discourse/world.

However in other languages, such as Southern Min, this type of cooccurrence is not allowed. Cantonese is similar in that to Southern Min.

(35) Mandarin: zhe haizi zenme le?
this kid how LE
'What is wrong with this kid?'
(= (20a) in Tang 2007: 979)

(36) Hakka: ke sengin chin kua.
that kid very good
'That kid is very good'
(= (21a) in Tang 2007: 980)

(37) Southern Min: *chit chu /*hit chu
this book that book
(= (22) in Tang 2007: 980)

(38) Cantonese: *nei1 syu1 /*go2 syu
this book that book

Moreover, demonstratives can function as a pronominal in Mandarin and Hakka, but not in Southern Min and Cantonese.

(39) Mandarin: zhe gei ni.
this give you
'(I) give you this.'
(= (ib) in footnote 11 in Tang 2007:980)

(40) Hakka: ke pun ni.
that give you
'(I) give you that.'
(= (iib) in footnote 11 in Tang 2007:980)

(41) Southern Min: *chit/che ho li.
this/this-CL give you
'(I) give you this.'
(= (iii) in footnote 11 in Tang 2007:980)

(42) Cantonese: *nei1/nei1-go3 bei2 nei5.
this/this-CL give you
'(I) give you this'

The following table summarizes the observations above.

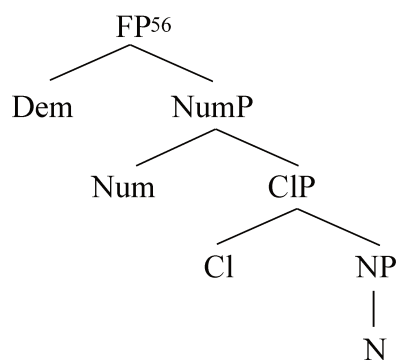
	Dem- \emptyset	Dem-N	Dem-CI-N	Dem-Num-CI-N
Mandarin & Hakka	✓	✓	✓	✓
Cantonese & S. Min	*	*	✓	✓

Table 7. Demonstratives in the nominal expressions in four Sinitic languages

Considering the different behaviour of demonstratives in Mandarin and Hakka on one hand, and in Southern Min and Cantonese on the other, two hypotheses are posited. The first assumes that demonstratives in Mandarin and Hakka and those in Southern Min and Cantonese do not sit in the same syntactic position. Following Tang (2007), the co-occurrence of a demonstrative and a noun in the nominal expression without the presence of numeral and classifier opens the possibility that *the projection of the demonstrative may be independent of that of the numeral and the classifier* (Tang 2007:981). Demonstratives head their own projection and select a NumeralP, CIP or NP as their complement. In the languages where this type of co-occurrence is not legitimate, the demonstrative must attach to a numeral or a classifier. Therefore, demonstratives may be in the [Spec, NumP] of [Spec, CIP] position. Interestingly, this hypothesis is in line with the two proposals for the derivation of demonstrative discussed above⁵⁵. (43) and (44) illustrate the structure of the Dem-Num-CI-N sequences in the two hypotheses.

Hypothesis 1: a. demonstrative in Mandarin and Hakka (adapting Tang 2007)

(43)

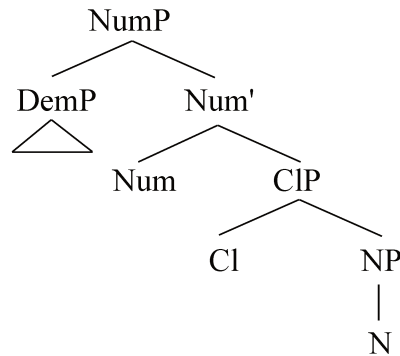


⁵⁵ Considering that demonstratives cannot be reconstructed in their claimed base position, we do not adopt the internal movement analysis, but still assume that demonstrative may sit in the specifier position of the topmost layer.

⁵⁶ The projection is labeled for functional projection (FP) in order to avoid the discussion of the nature of demonstratives and to simplify our discussion. Under different proposals, FP can be DP (Li 1999), SpecificityP (Sio 2006, Cheng & Sybesma 2009) or DetP (Sybesma & Sio 2008).

b. demonstrative in Southern Min and Cantonese (adapting Huang 1982)

(44)



A second possible hypothesis is that demonstratives in these languages are generated in the same syntactic position, and that their different behaviour results from the structural and interpretational differences of the nominal expressions. As shown in the three previous subsections, bare nouns, [Cl-N] phrases with different interpretations may have different structures in different languages (see Cheng & Sybesma 1999): indefinite bare nouns are NumeralP with an empty Num and an empty classifier; definite bare nouns (in Mandarin) are CIP undergoing N-to-Cl movement; definite [Cl-N] (in Cantonese) are CIP; indefinite [Cl-N] are NumeralP with an empty Numeral. In Chinese, a Cl contains a [+definite] feature and a Numeral contains an [-indefinite] feature. Therefore all the Num-Cl-N sequence are indefinite. Table 8 summarizes the interpretations of nominal phrases in Mandarin, Southern Min⁵⁷ and Cantonese.

	bare noun	Cl-N	Num-Cl-N
Mandarin	definite, indefinite	indefinite	indefinite
Southern Min	definite, indefinite	*	indefinite
Cantonese	indefinite	definite, indefinite	indefinite

Table 8. Interpretation of nominal expressions in Mandarin, Southern Min and Cantonese

	Dem-∅	Dem-N	Dem-Cl-N	Dem-Num-Cl-N
Mandarin & Hakka	✓	✓	✓	✓
Cantonese & S. Min	*	*	✓	✓

Table 9. Demonstratives in the nominal expressions in four Sinitic languages

⁵⁷ According to Cheng & Sybesma (2005), Cl-N phrases are not legitimate in Southern Min, since an overt classifier must attach to an overt Numeral in the language.

Combining the behaviour of demonstratives in nominal expressions (repeated in Table 9) with the interpretation of nominal expressions in Mandarin, Southern Min and Cantonese (see Table 8), the interpretations of the nominal expressions do not seem to correlate to whether they can follow a demonstrative.

It is tempting to assume that demonstratives only select a nominal expression containing a classifier. However, Dem-N sequences in Mandarin and Hakka appear to falsify this assumption. Nevertheless, we know that bare nouns in Mandarin can occupy the CI when they are definite, whereas bare nouns in Cantonese can never fill the CI. Therefore the hypothesis above may be revised as follows:

(45) Demonstratives in Chinese can only select a nominal expression with CI overtly filled in the underlying structure.

Under a semantic perspective, once the CI position is filled, the nominal expression is individualized and singularized following Cheng and Sybesma (1999: 520). Remember that classifiers in Chinese are type-shifters, they can change an NP $\langle e, t \rangle$ into an individual $\langle e \rangle$. In Mandarin, the type shifting is realized by the ι operator, NP must then undergo N-to-CI movement once the type is changed; in Cantonese, the ι operator is realized segmentally by an overt classifier. Consequently, bare nouns in Cantonese remain in the NP layer $\langle e, t \rangle$ and cannot shift into an individual $\langle e \rangle$ without the presence of an overt classifier. This explains in another way why demonstratives can select a bare noun in Mandarin but not in Cantonese.

(46) Semantically, demonstratives can only select an individual (type $\langle e \rangle$).

It remains to explain why demonstratives can be pronominal in Mandarin but not in Cantonese. Pronouns in Chinese are definite and referential. In the literature, they are considered occupying either the D position by Li (1999) or the CI position by Cheng and Sybesma (1999). Since pronouns can be followed by a demonstrative, a numeral and a classifier, they are assumed to be base-generated in the N level and undergo movement to the D or CI position. Considering the fact that pronominal demonstratives *zhe* and *na* in Mandarin cannot denote plurality which is assigned by the

Numeral, we thus assume that pronominal demonstratives should be generated in the Cl position which is under the Numeral layer in the structure.

As for the reason why demonstrative cannot be generated in the Cl position in Cantonese, this may be because Cl, as a functional projection, is reserved for classifier, the segmental ι operator in Cantonese. It cannot be occupied by demonstratives even though they have similar features. We leave further discussion about this issue to future studies.

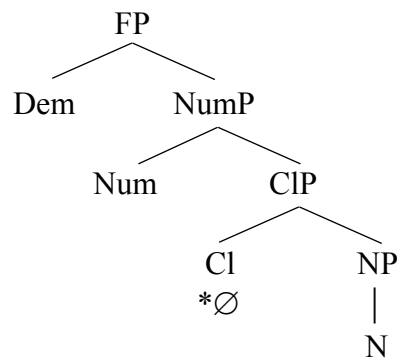
We are now ready to turn back to the two issues concerning the distributional restriction of demonstrative that we mentioned above. For the distributional restriction within the nominal expression, namely why demonstrative must be situated in the initial position, we assume that demonstratives in Chinese have a deictic function or contain features (such as [+specific] in Sybesma & Sio (2008), Cheng & Sybesma (1999, 2009); [+referential] in Tang (2007)) referring to the discourse or the real world, and these features must be checked or matched in the topmost layer of a nominal expression.

As for the different behaviour of demonstratives in a nominal expression (Dem-Num-Cl-N sequences) in different Sinitic languages, they appear to be related to the different properties of classifier/ ι operator.

Let us now go back to our two hypotheses about the derivation of demonstratives. The different behaviour of demonstrative in different languages can be due to either a syntactic difference in the position of demonstratives (hypothesis 1) or independent differences in the nominals following the demonstrative in the Dem-(Num)-(Cl)-N sequences (hypothesis 2). Considering the observations above, the structure and semantic type of the nominal expressions following the demonstrative seem to play a crucial role in limiting the co-occurrence between them. This aligns to our hypothesis 2.

Taking the features (e.g. [+specific], [+referential] and [+definite]) and the function of demonstratives (e.g. deictic function) into account, we argue that demonstratives head their own projection and select either a NumP or a ClP as their complement following Tang (1990, 2007), in which Cl must be filled. This proposal is illustrated in (47).

(47)



1.5 Summary

In this chapter, we have reviewed proposals concerning the structure and interpretation of four types of nominal expressions in Chinese: bare nouns, [CI-N] phrases, Num-CI-N sequences and Dem-Num-CI-N sequences. Following Cheng and Sybesma (1999), nominal expressions in Chinese, according to their interpretations, have different structures: definite nominal expressions are CIPs, indefinite nominal expressions are NumPs.

Definiteness is realized by a ι operator. In Mandarin, the ι operator is covert. It changes an NP (type $\langle e, t \rangle$) into an individual (type $\langle e \rangle$), and the N must undergo an N-to-CI movement to validate the type-shifting operation. Proper names and Common nouns, which are bare nouns but have definite interpretation, also undergo the same process. In Cantonese, the ι operator is overt, and it is segmentally realized by classifiers. Thus, bare nouns in Cantonese cannot receive definite interpretation by N-to-CI movement⁵⁸. Only [CI-N] phrases can be definite in Cantonese. Generic interpretation is realized by the \cap operator in both languages, which also triggers N-to-CI movement as the ι operator does.

Indefiniteness is realized by a covert or overt Numeral in both languages. Consequently, indefinite bare nouns are NumPs with an empty CI and an empty Numeral. Indefinite [CI-N] phrases have an empty Numeral. According to Cheng and Sybesma (1999), overt classifiers in Mandarin must be accompanied by a covert or overt Numeral; thus, [CI-N] can never be definite in Mandarin. As for Cantonese, where it can, this is due to the fact that the classifier itself can express definiteness. Besides, nominal expressions with empty head(s) are restricted to lexically governed positions (Longobardi 1994). The following table recapitulates the interpretations and corresponding structures of nominals in Mandarin and in Cantonese. Structures with empty head(s) are in bold.

⁵⁸ Nevertheless, Cheng and Sybesma (1999) claim that proper names and common nouns can undergo N-to-CI movement to valid the definite interpretation.

	definite	indefinite	generic
Mandarin	bare noun (CIP)	bare noun (NumP)	bare noun (CIP)
		CI-N (NumP)	
		Num-CI-N (NumP)	
Cantonese	CI-N (CIP)	bare noun (NumP)	bare noun (CIP)
		CI-N (NumP)	
		Num-CI-N (NumP)	

Table 10. Interpretations and structures of nominal expressions in Mandarin and Cantonese

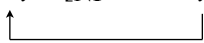
After reviewing the structure and interpretation of the three basic types of nominal expressions, we investigated the position of demonstratives and the structure of the Dem-(Num)-(CI)-N sequences in Chinese. There are generally two types of proposals for the generation of the demonstrative: one is that demonstratives are generated in the head of the topmost layer of the nominal expression; another is that demonstratives are generated in the specifier position of a functional projection which is lower in the nominal, then undergo movement to the specifier position of the topmost layer. This internal movement hypothesis is not confirmed by any evidence in Chinese, since demonstratives cannot be ‘reconstructed’ in any intermediate position in the Num-CI-N sequence.

Besides, demonstratives are observed to behave differently in different Sinitic languages. They can be directly followed by a noun in Mandarin but not in Cantonese. They can function as a pronoun in Mandarin but not in Cantonese. These differences can either be due to a syntactic difference of demonstratives themselves or to a difference in the nominal sequence following them. By comparing the possible co-occurrences of the demonstratives and the nominal sequences in different Sinitic languages as well as their interpretation and structure, we concluded that demonstratives only co-occur with a nominal which is semantically an individual and syntactically a NumP or a CIP with a CI filled. We thus argue that the variation of the Dem-(Num)-(CI)-N sequences in different languages is due to the different structures of the nominals. For the pronominal demonstratives, so far we assume that they are generated in the CI position.

All in all, we argue for a structure of the Dem-(Num)-(CI)-N sequences similar to that proposed by Tang (2007): each element in the sequence heads its own projection. Demonstrative heads the

topmost functional projection FP and selects either a NumP or ClP. In both cases, CI must be filled by either a classifier or a raising N. (48) illustrates the underlying structure of the sequence of Dem-Num-Cl-N.

(48) [FP Dem [NumP Num [ClP Cl/N_i [NP N / t_i]]]]



This structure can be extended to other nominal expressions reaching a unified analysis for the structure of nominals in Chinese. We now have the first piece of the puzzle. In the following chapters, we are going to look at the second, the structure of NP modification and relative clauses.

Chapter 2 Back to data: featural Relativized Minimality in Cantonese

We now have a ‘panorama’ of the structure of nominal expressions in Cantonese. Let us return to the discussion about featural Relativized Minimality in Cantonese. Remember that we observed a strong impact of the features of arguments in the production of relative clauses: *when the arguments of the RCs share the exact same features*⁵⁹, *a structural intervention effect appears, and preference for subject relatives is robust; when the features of the arguments display some amount of mismatch, a feature endowment effect appears, and the proportion of object relatives increases* (see Chapter 6 in Part I). Among the different features possibly involved in featural intervention, a semantic feature (i.e., animacy) appears to trigger intervention effects in Cantonese. What remains to be discussed is the syntactic features of arguments, which are crucial in the featural Relativized Minimality (Villata et al. 2016, Rizzi 2018): the similarity of the relevant syntactic features determine whether a featural intervention occurs.

In previous studies concerning this subject, the lexical restriction [+NP] feature is often taken into account as a non-criterial relevant syntactic feature (RSF) in the calculation of intervention effects. The lexical restriction feature [+NP] refers to the presence of a full lexical noun phrase in a DP (e.g. book in ‘the book’) or a D-linked *wh*-phrase (e.g. book in ‘which book’). A criterial feature is a feature that is able to trigger movement alone. In our case, it is the [+R(relative)] feature. In object relatives, the subject intervener does not contain [+R] feature, hence neither identity nor criterial inclusion of RSF is displayed, only non-criterial inclusion and disjunction configurations can possibly arise. This makes the non-criterial RSF crucial in relative clause processing. The set-theoretic configurations of featural intervention in object relatives are repeated in (49). The distinctness hierarchy for relative clause processing is repeated in Figure 1.

(49) set-theoretic configurations of featural intervention in object relative clauses:

	head noun	subject	object trace
a. identity	+R,+NP	*+R,+NP	+R,+NP
b. criterial inclusion	+R,+NP	*+R	+R,+NP
c. non-criterial inclusion	+R,+NP	+NP	+R,+NP
d. disjunction	+R,+NP		+R,+NP

⁵⁹ Except the [+Relative] feature.

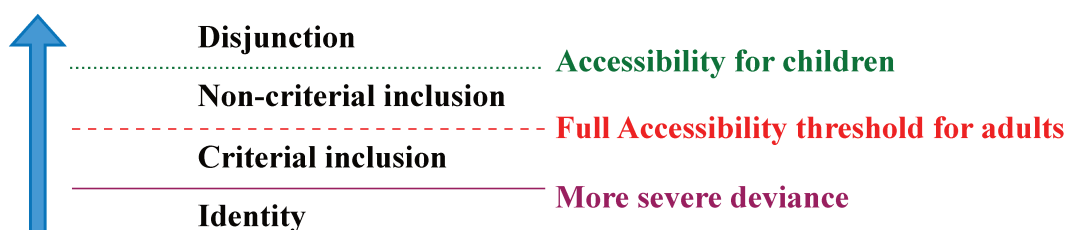


Figure 1. The revised distinctness hierarchy
 (= figure 3 in Rizzi (2018): 360)

As shown in (49), the lexical restriction [\pm NP] plays a role in calculating intervention. Does this RSF apply to Chinese languages, that do not display any (overt) determiner? Can we distinguish a +/- lexically restricted nominal expression in Cantonese? If yes, how is it realized? If not, what are then the relevant syntactic features (apart from [+R]) in Cantonese? We aim to address these questions in this chapter.

In the previous chapter, we have discussed the structure of nominal expressions in Chinese (Mandarin and Cantonese). Table 11 summarizes our conclusions (including their structures and corresponding interpretations) in Cantonese.

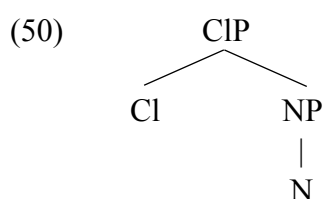
nominal expressions	interpretations	structures
bare noun	generic	[CIP [CI' N _i [NP [N' t _i]]]]
	indefinite	[NumP \emptyset [CIP \emptyset [NP N]]]
	common noun (definite)	[CIP [CI' N _i [NP [N' t _i]]]]
	proper noun (definite)	[CIP [CI' N _i [NP [N' t _i]]]]
pronoun	definite	[CIP [CI' N _i [NP [N' t _i]]]]
CI-N	definite	[CIP CI [NP N]]
	indefinite	[NumP \emptyset [CIP CI [NP N]]]
Num-CI-N	indefinite	[NumP Num [CIP CI [NP N]]]
Dem-(Num)-CI-N	definite	[FP Dem [NumP Num [CIP CI [NP N]]]]

Table 11. Interpretations and structures of nominal expressions in Cantonese

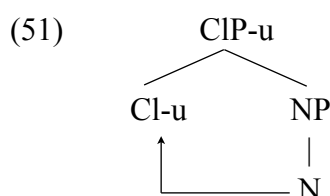
In general, nominal expressions in Cantonese involve three different structures depending on their interpretations. Definite nominals are CIPs, either headed by a classifier or by a noun undergoing N-

to-Cl movement. Indefinite nominals are NumeralPs, and the Numeral can be either overt or covert in the structure. Nominals with demonstratives are FPs headed by a demonstrative which assigns definiteness and specificity to the nominals.

Cheng and Sybesma (1999) argue that the functions of determiner are held by classifiers⁶⁰ in Cantonese. It is tempting to translate the generalizations concerning +/- NP lexical restriction in DP into the domain of Classifier Phrase. If this is true, all the non-indefinite nominal phrases (except for the Dem-(Num)-Cl-N sequences) in Cantonese, which are all CIPs, display a lexical restriction of the classifier in their underlying structure as illustrated in (50).



In the case of proper names, definite and generic bare nouns and pronouns, they are claimed to be base-generated in N and undergo N-to-Cl movement to realize the type-shifting operation in Cl.



In this case, the lexical restriction is cancelled by the N-to-Cl movement. Hence, only definite Cl-N phrases with an overt classifier seem to display the lexical restriction in the superficial structure. How would this configuration accommodate our data?

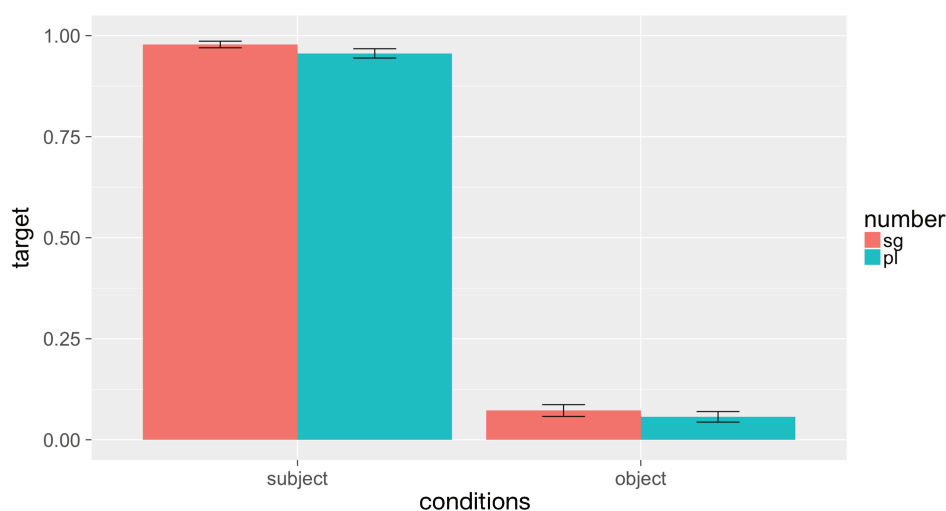
Recall that in the first experiment, both arguments were set to be animate common nouns⁶¹ having a definite referential interpretation. In the second experiment, where we focused on the production of object relatives, arguments were varied into four types: a) animate common nouns arguments, b) animate common noun subject vs. inanimate common noun object, c) pronoun subject vs. animate

⁶⁰ Particularly unit-marking classifiers (Cheng and Sybesma 2009).

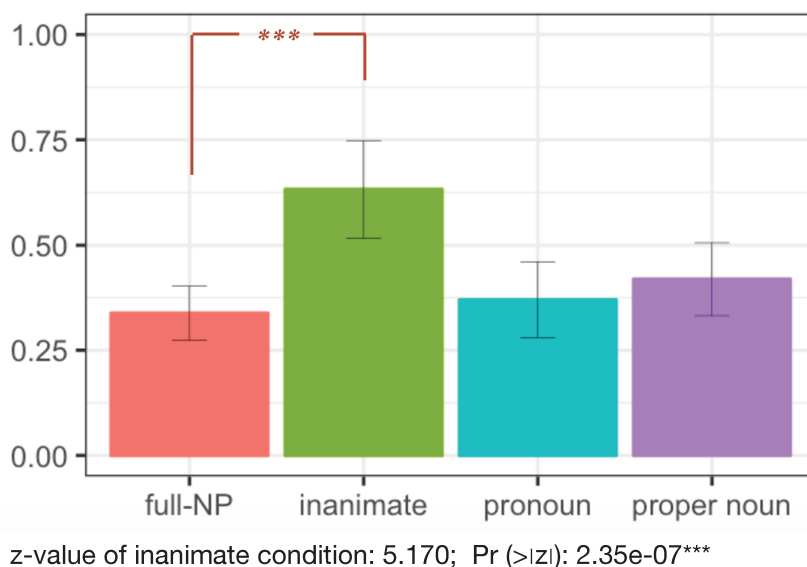
⁶¹ The arguments in the two experiments were morphologically a full NP, and semantically common noun: such as professions (firefighter, sailor, police, sheriff), kinship (such as mother, son) and the others (such as boy, girl).

common noun object and d) proper noun subject vs. animate common noun object. Remember that the context of our experiment forced a definite interpretation for both the head noun and the subject. In the two corpus studies, the context as well as the type of arguments varied a lot: in addition to definite and indefinite bare nouns, proper nouns were also found as head noun of the relative clauses. In object relatives, most of the subject arguments were pronominal (either pronoun or *pro*).

Let us start from the two elicited experiments. The graphics corresponding to the results of the two experiments are repeated here.



Graphic 1. Target production in Experiment I



Graphic 2. Proportion of ORs in Cantonese in experiment II

In consideration of the type of arguments that we set in the two experiments, the configurations between arguments in object relatives can be summarized in the following three cases: 1) both the subject and the relativized object are definite bare nouns; 2) the subject is a proper noun and the

relativized object is a definite bare noun; 3) the subject is a pronoun and the relativized object is a definite bare noun.

Given the structures of the nominal expressions mentioned above, interestingly, all of the arguments involved are CIPs undergoing N-to-Cl movement. Neither display any lexical restriction in their superficial structure. Suppose this means that all of them are [-NP]. If this is the case, the three configurations between subject and relativized object can be reduced to a non-criterial inclusion configuration. (52) illustrates this configuration.

(52)	object	subject	object trace
non-criterial inclusion	+R, -NP	-NP	+R, -NP

The predictions following from this hypothesis seem to be consistent with the result of the second experiment: first, proportions of the object relatives produced in the condition with definite bare nouns as arguments (animate full-NPs condition) and those with a pronoun subject or a proper noun subject are similar⁶². Second, proportions of the object relatives produced in these conditions were significantly lower than those of passivized subject relatives. This object avoidance can be explained along the line of fRM: in the spirit of fRM (Villata et al. 2016, Rizzi 2018), object relatives displaying a non-criterial inclusion configuration are more difficult than subject relatives.

On the other hand, some problems arise. First, it is true that in the second experiment, similar results are observed in the pronoun subject condition and in the animate full-NP arguments condition, but pronominal subject appears to be a factor positively correlating the production of object relatives in the corpus studies: 75% of object relatives in TV corpus and 82% of object relatives in HKCanCorp have a pronominal subject. The distributions of subject types in object relatives in the TV corpus as well as in the HKCanCorp are repeated below.

⁶² Statistic analysis show that there is no difference between the proportion of object relatives in these three conditions.

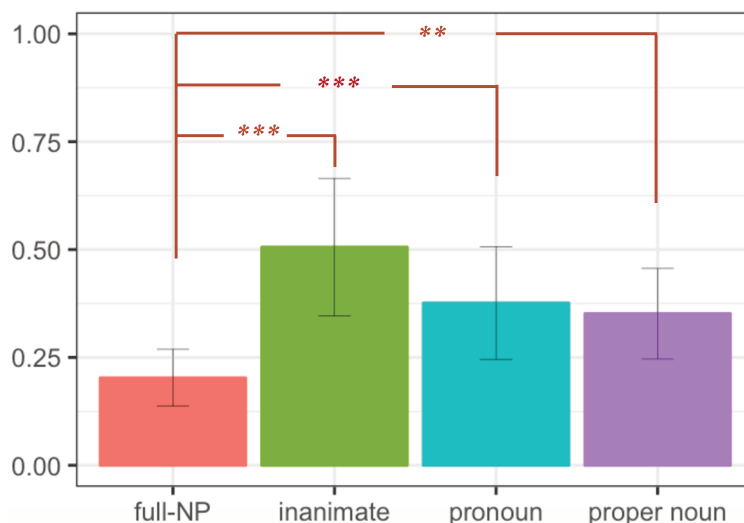
types of subject	occurrences	total
<i>pro</i>	27	120 (75%)
pronoun	93	
proper name	11	33 (21%)
referential	22	
generic	4	6 (4%)
indefinite	2	

Table 12. Distribution of subject types in ORs in TV corpus

type of subject in ORs	occurrence	total
pronoun	70	107 (82%)
<i>pro</i>	37	
proper name	12	15 (12%)
referential noun	3	
definite (dem-cl-N)	5	5 (4%)
generic	3	3 (2%)

Table 13. Distribution of subject types in ORs in HKCanCorp

Notice that the results of the test in French in the second experiment also show a facilitation effect of pronominal subjects: production of object relatives significantly increases in the pronoun subject condition. Where does this contrastive difference arise?



z-value of intercept: -3.877; Pr ($> |z|$): 0.000106***
z-value of inanimate condition: 5.771; Pr ($> |z|$): 7.88e-09***
z-value of pronoun condition: 3.545; Pr ($> |z|$): 0.000393***
z-value of proper noun condition: 3.055; Pr ($> |z|$): 0.002254**

Graphic 3. Proportion of ORs in 4 conditions in French

To the best of my knowledge, the [-NP] feature is usually paired with the [+NP] feature in the same object relative to investigate the impact of the mismatch of the lexical restriction (presence or absence: [\pm NP]) in the arguments (see Bentea, Durrleman and Rizzi 2016). An example is given in (53).

- (53) Montre-moi celle que la fille embrasse.
 show me the one that the girl kiss
 -NP, +R +NP disjunction
 ‘Show me *the one* that the girl is kissing.’
 (= (17) in Bentea et al. 2016: 27)

However, whether the absence of a lexical restriction [-NP] in both the head and the intervening subject (cf. 54) can trigger an intervention effect has not been studied so far. The hypothesis that [-NP] feature can also trigger an intervention effect lacks support by experimental data.

- (54) J’aime ce qu’il aime.
 I like the one that he like
 -NP, +R -NP non-criterial conclusion
 ‘I like *the one* that he likes.’

Another problem concerns the interpretation of [-NP] feature in Cantonese. In the spirit of Bentea et al. (2016), [-NP] refers to a bare element (a determiner or a *wh*-phrase) lacking a lexical restriction. In definite bare nouns, common nouns and proper nouns in Cantonese, where we inferred the [+NP] feature is concealed due to the N-to-CI movement therefore the [-NP] feature arises, the full lexical noun phrase is actually generated. A paradox arises.

Considering the problems observed above, we entertain an alternative hypothesis about our data. If what counts is the structural presence of an NP and not whether it is lexicalized autonomously, the configuration between arguments in object relatives in the two experiments are revised as follows:

- (55) non-criterial inclusion object subject object trace
 +NP, +R +NP +NP, +R

This configuration is consistent with our data in the experiments: in all the cases of N to CI, the nominal expression is [+NP]. What remains to be seen is why pronouns in Cantonese behave differently.

We know that pronouns in French do not involve a lexical restriction, while full DPs do, since pronouns in French are considered to be base-generated in D (Longobardi 1994). (56) illustrates the set-theoretic configuration of an object relative with a pronominal subject in French.

(56)	object +NP, +R le pompier _i 'the firefighter	subject -NP qu'elle that she	suit follows'	object +NP, +R ∅ _i	disjunction
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In Chinese, pronouns are considered to be generated in the N position due to the fact that pronouns can follow a demonstrative and a classifier or a numeral and a classifier as an N does. On the other hand, they are definite and do not show any distributional restriction when they appear alone. They are assumed to undergo movement to the Cl position (Cheng and Sybesma 1999). What is relevant here is whether pronouns display a lexical restriction and can be labelled [+NP]. Given that regular pronouns are by definition not lexical, we instead consider them to have a [-NP] feature following the definition of Bentea et al. (2016). If this is the case, the set-theoretic configuration of an object relative with a pronoun subject in Cantonese would be similar to that in French (cf. 56). A disjunction configuration arises. This might explain the improvement of pronominal subjects in the object relatives in the corpus studies. It leaves however the results in the elicited production experiment unexplained.

Another problem concerning this hypothesis is that the lexical restriction cannot be the whole story, since it does not apply to all nominals in Cantonese. In Romance and Germanic languages, the determiner heads the topmost layer of most nominals and the NP restriction can be present or not. In Cantonese, the classifier heads the first functional projection on the top of the NP, but other functional projections such as Numeral or/and Demonstrative can be projected on the top of the ClP. So when the head of the relative is a Num Cl N or a Dem Cl N sequence, it is not clear whether the presence of an (overt) NP restriction is relevant or not.

To sum up, in this chapter, we tried to combine what we know about the structure of nominal expressions in Cantonese with featural Relativized Minimality in order to explain the intervention effects observed in our data. We have investigated whether the lexical restriction ([+NP]) which is an important factor in Romance and Germanic languages can also explain the data in Cantonese

assuming that a classifier can be lexically restricted by an NP. In the underlying structure of definite bare nouns and proper nouns, the restriction seems to be present, though concealed by N to CI movement. Whether these expressions should be considered as [+NP] due to their “deep structure” or [-NP] according to their “superficial structure” is open to discussion.

In Part I, we proposed a complex accessibility hierarchy for the processing of object relative clauses based on a multi-featural account for the intervention effect.

(57) identity > criterial inclusion > maximal non-criterial inclusion > minimal non-criterial inclusion > disjunction

In order to better understand what goes on with intervention effects and take all the factors involved into account, there is one further dimension of the syntax of relative clauses that need to be considered: the nature of the relative markers. Recall that there are two main relative strategies available in Cantonese: relative clauses with *ge3* (RC-*ge3*) and those with demonstrative and classifier (RC-dem-cl). Both markers are nominally related: *ge3* is considered as a Nominalizer; as for demonstratives and classifiers, as seen in the previous chapter, they are functional projections on the top of the NP. We need to take their syntactic features into account for computing intervention effects in relativization. The following questions need to be addressed: what is the nature of *ge3*? What is the position of the relative markers in a relative clause? Do they participate in the calculation of the intervention effects?

In the next chapter, we are going to discuss the nature of the nominalizer as well as the structure of nominal modification in Chinese. First, we are going to review two proposals for the nature of the nominalizer. Cheng and Sybesma (2009) argue that *de* in Mandarin and *ge3* in Cantonese are unit-marking classifiers heading a CIP-u. Simpson (2001, 2002) argues that *de* is a determiner and that there are two positions for demonstratives in Chinese. Can these assumptions also apply to *ge3* in Cantonese? We will then review their proposals for the derivation of relative clauses with two questions in mind: is the nominalizer *de/ge3* part of the relative clause? Are the demonstrative and classifier part of the head? We will return to the discussion about the featural intervention in Chapter 4, after answering these key questions.

Chapter 3 The nature of nominalizers and the structure of NP modification

In this chapter, we are going to address the nature of nominalizers and the position of the modifier in an NP modification, as well as its internal structures. In an early study about *de* in the Chinese grammar, Zhu (1961) proposes that *de* is an enclitic and that there are three different types of *de* according to the ‘hosts’ they encliticize to: *de1* is enclitic to an adverbial; *de2* to an adjectival⁶³; *de3* to a nominal. Zhu (1980) makes an analogy between *de* in Mandarin and similar element in other Sinitic languages. He points out that the equivalent of *de1*, *de2*, *de3*⁶⁴ in Cantonese are respectively *gaam2* (adverbial), *dei2* (adjectival), *ge3* (nominal).

Half a century after the first explorations about *de* in Modern Mandarin, *de* and its equivalents in other Sinitic languages, particularly the one in the nominal structure (*de3*) is still one of the most discussed issues in Chinese linguistics. Li (2012) summarizes the situation of the discussion in the literature as follows: *among the numerous works inspired by Zhu on de (such as Zhu 1961, 1966, 1983, 1993, among others) and the many formal analyses of de in the Mandarin nominal expression [DP/NP XP de YP], there has been no agreement on the most fundamental issues: what is the grammatical status of de? What is the constituent structure of [DP/NP XP de YP]? Does de form a constituent with XP or YP (Li 2012: 18)?* Li quotes twenty different proposals in the literature for the nature or the functions of *de*. A table recapitulating these proposals is given below.

⁶³ What Zhu (1961) calls adjectival is actually reduplication of either an adjective (Ra) or an adverbial (Rb). The characteristics of this type of reduplication are: a) it cannot be subject, object nor predicate; b) it cannot modify a nominal. The difference between Ra and Rb is that Rb can modify a Num-Cl-N, whereas Ra cannot.

(i) with Ra: gao gao de (ii) with Rb: kuai kuai de
 tall tall DE quick quick DE
 ‘tall’ ‘quickly’

⁶⁴ Number in *de1*, *de2* and *de3* correspond to the three different ‘natures’ of *de*, it is different from the number in the romanisation of LSHK in Cantonese, which corresponds to the tone.

Assumptions:	Studies:
Can <i>de</i> head a nominal?	Si 2004, 2006, Xiong 2005, Zhou 2005, 2007, Tang 2006, Lu 2006, Li 2008, Shi 2008
<i>de</i> is a complementizer taking the preceding XP as its complement	Cheng 1986, Paul 2007
<i>de</i> is part of a relative clause, relativizer.	Lu 1982
<i>de</i> is a nominalizer	Paris 1979
<i>de</i> is small <i>n</i>	Zhang 1999
<i>de</i> is a determiner (D)	Simpson 2001, Simpson and Wu 2002
<i>de</i> assigns Case to the preceding XP	Li 1985, 1990, Larson 2009
<i>de</i> is a conjunction word, it has no contribution to category features	Li 2008, Zhang 2009, Zhang 1987
<i>de</i> is a modification marker inserted in an appropriate structure	Huang 1982
<i>de</i> heads a ModP	Rubin 2003, Sio 2006
in <i>shi...de</i> focus cleft: <i>de</i> is the head of Aspect Phrase in the propositional assertion pattern: <i>de</i> in the head of DetP	Paul 2015
<i>de</i> is a type-shifter (lowerer)	Huang 2006
<i>de</i> is a marker of predicate inversion	den Dikken and Singhapreecha 2004, den Dikken 2006
<i>de</i> is a type of classifier	Arsenijevic and Sio 2007, Cheng and Sybesma 2009
<i>de</i> is a preposition	Li 1992, Wang 1984

Table 14 Recapitulation of discussion of *de* in Chinese

Ge3 in Cantonese is generally considered to be a counterpart to *de* in Mandarin (Zhu 1980, Tang 2011, Cheng & Sybesma 2009, 2014, a.m.). For its nature, Arsenijevic and Sio (2007), Cheng and Sybesma (2009) argue that *ge3* in Cantonese should be analysed as a classifier. Tang (2011) argues that *ge3* in Cantonese cannot be a determiner (contra Simpson 2001, 2002 for *de* in Mandarin) because *ge3* can never be referential. Matthews and Yip (2013) call it a *linking particle* connecting the modifying expression and the noun it modifies.

In this chapter, we mainly focus on the nature and the function of *de* in Mandarin and *ge3* in Cantonese in a nominal modification structure. We are going to review two proposals concerning this issue: in section 3.2, we are going to review the proposal of Simpson (2001, 2002) that *de* is a determiner. In section 3.3, we are going to review the proposal of Cheng and Sybesma (2009) that *de* in Mandarin and *ge3* in Cantonese are both unit-marking classifiers. In 3.4, we are going to give a summary and a comparison between these two proposals.

3.2 Simpson (2001): *de* as determiner in Chinese DP

Based on a typological analogy (comparing Chinese with Hebrew, Buginese and other languages), Simpson (2001) argues that the element *de* found in relative clauses, possessives and nominalizations in Mandarin is an enclitic determiner in D° position, which attracts an element leftwards to its specifier for phonological support. *De*, as a determiner, probably originates from a demonstrative having lost its definiteness specification over time and become a neutral general determiner fully underspecified for the parameter of definiteness, thus, compatible with either definite or indefinite quantifiers.

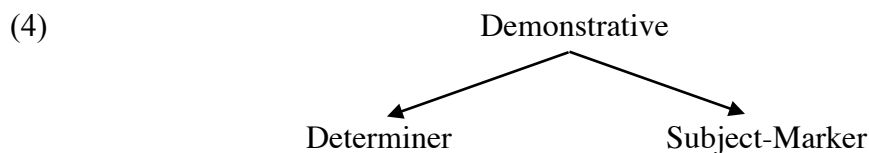
A close equivalent of *de* can be observed in many other languages of Eastern Asia, where it shares similar functions and distribution (e.g. Japanese *no*, Burmese *thii*). These elements have been frequently referred to as “*nominalizers*” (Matisoff 1972, Paris 1979, Kitagawa and Ross 1982, Herring 1991). But their nature is still not clear: do they *apply in the lexicon to some syntactic category converting it to the category N* or are they an independent lexical element of some particular type applying within the syntactic component? (Simpson 2001: 133). Simpson argues that these elements cannot be analysed as a derivational affix converting the syntactic category of an X° element to N° for several reasons: first, these “*nominalizers*” attach to *phrasal* rather than word-level categories (e.g. relative clauses); second, these “*nominalizers*” combine with elements that are nominal already (e.g. the possessive); third, an Adj-*de* sequence cannot be freely inserted between a bare adjective and a bare noun (cf. 2). If Adj-*de* were an N°, another bare adjective Adj° should be able to adjoin to it. The ungrammaticality of (2) shows that Adj-*de* is not an N°, what *de* attaches to in the Adj-*de* sequence cannot be a bare adjective (i.e., a word-level category), but a phrasal-level projection which is able to block the adjunction of a bare adjective (word-level) to a bare noun (word-level).

- (1) hei-de xiao shu
 black-DE small book
- (2) *xiao hei-de shu
 small black-DE book
- (3) xiao hei shu⁶⁵
 small black book

(from Simpson (2001: 134), footnote 5)

⁶⁵ Order of the adjective is restraint in Mandarin, *hei-xiao-shu* (black small book) is much less acceptable than (7).

Given the facts just discussed, Simpson makes the hypothesis that the “*nominalizers*” are indeed determiners of category D° , combining with and selecting a clausal category (CP) in the syntax to produce a DP which may then be case-marked and functions as a DP argument (Simpson 2001:134). With this in mind, more cross-linguistic evidence supporting the determiner hypothesis can be gathered: a number of common patterns of grammaticalization in various languages show that a determiner can develop from a demonstrative (e.g. *the* is related to *this/that*, *le/la* in French derived from the Latin demonstrative *il-le/il-la*); and that a demonstrative may develop into a subject-marker and a nominative-case marker. The relevant developmental connection between a subject marker and a demonstrative, according to Simpson, comes from the fact that they both encode a definite specification. The derivational relation is illustrated as follows:



Going back to the “*nominalizers*” elements in Eastern Asia languages, *no* in Japanese and *thii* in Burmese can function as a subject marker (in literary Burmese, in classical Japanese and in some Japanese dialects). Combining this observation and the hypothesis that they are determiners, the *demonstrative-origin* hypothesis ends up very plausible. All the relevant facts are observed in these languages: there is a demonstrative in Burmese which is homophonic to the “*nominalizers*” and the subject-marker *thii*. In Classical Chinese, *zhi*, the equivalent of *de*, can also function as a demonstrative. All together, these facts support the hypothesis that the “*nominalizers*” in the Eastern Asia languages are elements of type D° derived from an early demonstrative source.

But how did this derivation happen? How come they lost their definite specification? Greenberg (1978) suggests that the grammaticalization of determiners from demonstratives shares some common stages cross-linguistically: one is that the deictic force of original demonstratives begins to weaken so that a new set of demonstratives is developed in order to compensate the loss of deictic function. Simpson claims that this is also the case of *de* in Mandarin and *no* in Japanese. He assumes that given that *de* is indeed a determiner in D° , new demonstratives must be generated in other positions in the DP. Demonstratives in Spanish show a similar effect.

- (5) **la** reacción alemana **esa** a las críticas
 the reaction German this to the criticisms
 ‘this German reaction to the criticisms’
- (6) **esa** reacción alemana a las críticas
 this reaction German to the criticisms
 ‘this German reaction to the the criticisms’

When a determiner and a demonstrative cooccur, the demonstrative is found in a low adjective-like position; when the determiner is absent, the demonstrative is attracted to the initial D° position. Typologically, this is called “layering”.

With the development of determiners, their original definiteness value disappears or persists in some other basic function (Greenberg 1978) (e.g. ‘that’ in English: definiteness disappears in the complementizer function, but is maintained in the demonstrative function). For *de* in Mandarin, Simpson suggests that as a determiner, it *has undergone near full bleaching of its definiteness specification [...] the continued strong presence of ‘de’ in the language must be justified by functional purpose. The function which might seem to be constant and always associated with ‘de’ is to introduce some kind of predication on a nominal* (Simpson 2001:139-140). Since the definiteness specification of *de* has nearly disappeared, it can only occur to introduce a modification of the head noun. The definiteness is encoded in a lower position where demonstratives and quantifiers base-generate. Unlike in other Romance or Germanic languages, where the determiner morphologically agrees with the definiteness of the lower demonstrative in gender and in number (see also section 1.4 about the demonstrative), this agreement is covert in Chinese.

After arguing that *de* is a determiner of category D°, Simpson focuses on the DP-internal structure: in adopting an Antisymmetry analysis for relative clauses and possession structure (Kayne 1994), Simpson suggests that *de* is syntactically *an enclitic determiner which attracts an element leftwards to its Specifier for phonological support* (Simpson 2001: 143).

He further argues that *de* is an enclitic determiner allows a unified analysis of NP-modifiers in Mandarin (and probably other Sinitic languages) such as relative clause, adjectival modifier and possessive. All contain a predication relation between the modifier and the modifiee. It also allows us to reduce a regular D°-head-initial analysis to the head-final configuration of Chinese DPs, which is typologically rare. Under Simpson’s assumption, although the underlying structure of

Chinese DPs is head-initial, its derivation is different from those in other SVO languages with head-initial DPs: taking the derivation of relative clause as an example, in the spirit of Antisymmetry, relative clauses in a ‘regular’ SVO language like English derive from an extraction of the head noun within IP to the position of [Spec, CP], which is the complement of the determiner.

(7) [DP [D the [two [CP book_i [IP I bought t_i yesterday]]]]]

The derivation of relative clauses in Chinese, on the other hand, requires one more step. After the raising of the head noun from its initial position within the IP to the position of [Spec, CP] (cf. 8a), the residual IP moves to the position of [Spec, DP] to fulfil the phonetical enclitic need of *de* (cf. 8b). For the demonstrative and classifier string preceding the head noun in the superficial structure, Simpson (2001) considers it to be an XP that generates between the D and the CP. The following examples illustrate the derivation of an object relative in Chinese.

(8) a. [DP [D de [XP (nei-)liang-ben [CP shu_i [C' [IP wo zuotian mai t_i]]]]] ≈ (7)

DE that two-Cl book I yesterday bought

b. [DP [IP wo zuotian mai t_i]_m [D de [(nei-) liang-ben [CP shu_i t_m]]]

I yesterday bought DE that two-Cl book
‘the two books that I bought yesterday’


Let us now discuss the problems with this determiner analysis. Sio (2006) points out four potential problems in Simpson’s proposal. First, a *de* structure can be preceded by a demonstrative and a classifier, showing that definiteness is not encoded in a low position.

(9) nà běn [Zhāngsān de shū]
that Cl Zhangsan DE book
‘that book of Zhangsan’s’

Even assuming that [Dem-Cl] is capable of moving to the initial position of the DP as proposed by many (Giusti 1993, Szabolcsi 1994, Sybesma & Sio 2008, see also section 1.4), the [Spec, DP] position is already taken by the possessor *Zhangsan*: where is its landing site? If it lands in a head position, what kind of projection can sit higher than a D in a DP? Moreover, Sio (2006) indicates

that this movement violates Relativized Minimality (Rizzi 1990, see also Section 1.3 in Part I), since the demonstrative must move across the determiner *de* and these two elements encode the same definiteness specification according to Simpson. One may assume that (9) may derive as follows: a classifier selects the DP ‘*book of Zhangsan’s*’ as its complement to form a CIP, then a demonstrative select CIP as its complement. In this case, the definiteness is initially encoded in the higher demonstrative. Simpson (2001)’s assumption that the definiteness of DP may be encoded by a lower demonstrative cannot hold.

The second problem pointed by Sio (2006) is that if *de* is an *enclitic determiner which attracts an element leftwards to its Specifier for phonological support* (Simpson 2001: 143), *any element that has a phonological matrix should be able to provide the support* (Sio 2006: 135). However, the following example, given in Simpson (2002), is clearly impossible.

(10) * $r\acute{e}n_i$ *de* t_i

 ↑
 person DE

Simpson (2002) explains that (10) is ungrammatical because *de* requires the presence of a modifying element (modifier). In (10), only the modifiee *rén* ‘person’ is present, and the modification relation cannot be established. He claims that the primary function of the determiner is *to enable a modification relation to be effected* (Simpson 2002:90). He takes Hungarian and English as an example to support his claim.

Hungarian

(11) az *(en) minden allitas-om
 the I every book
 ‘my every book’

English

(12) the Rome *(that I love)

Tang (2007) argues against the determiner analysis for *de* in Mandarin for several reasons. The first concerns the alleged diachronic origin of *de*, *zhi*, as a demonstrative in classical Chinese. Tang contests that *zhi* originates a demonstrative in Classical Chinese. She argues that it can already

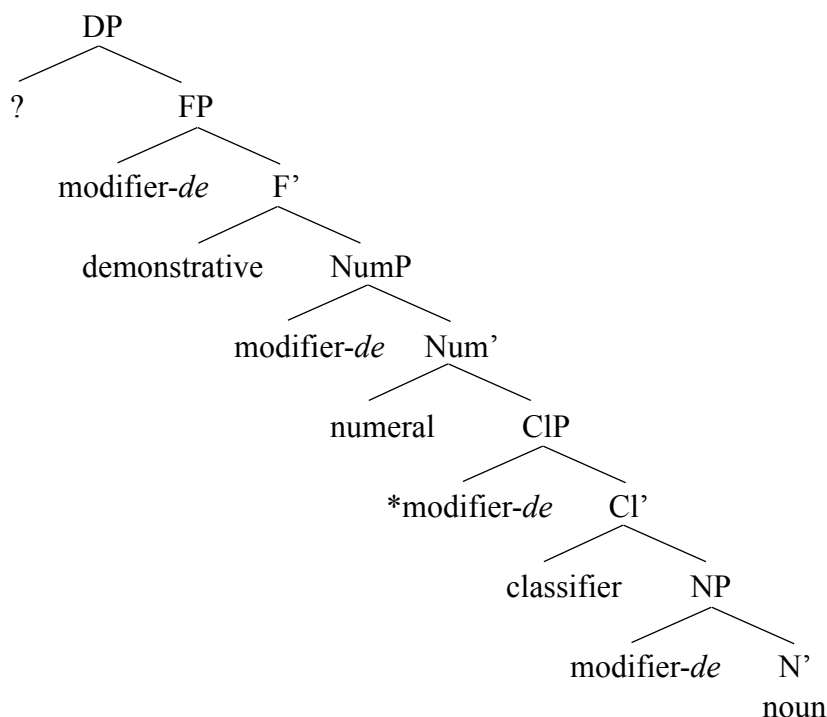
function as a modification marker in Classical Chinese. If this is the case, it is unclear why *de* must originate from the demonstrative *zhi* rather than the modification marker *zhi*.

Second, Simpson's proposal seems unable to capture the distribution of modifier in Mandarin. Modifiers can precede or follow the Dem-Num-Cl sequence, or can even sit between the demonstrative and the numeral. (13) illustrate the possible positions of modifiers in Mandarin.

(13)(Modifier-*de*) - (Demonstrative) - (Modifier-*de*) - (Numeral) - (classifier) - (Modifier-*de*) -Noun

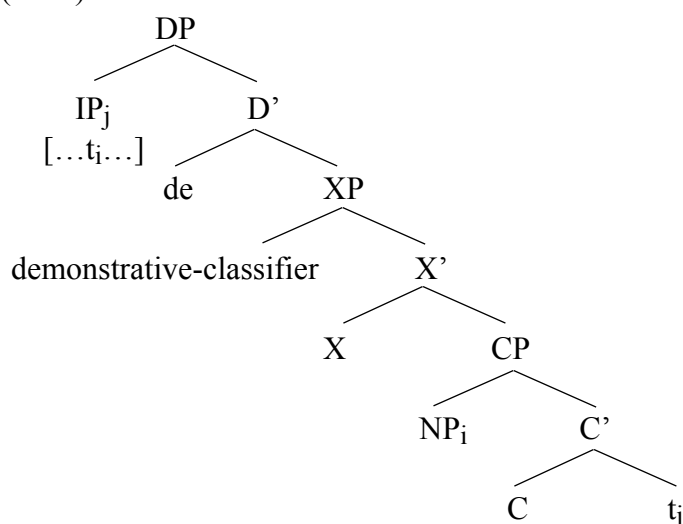
Tang (2007) argues that this distributional freedom of modifiers can be captured if the demonstrative, the numeral and the classifier are generated as distinct heads as in (14). However, under Simpson's approach, *the sequence of demonstrative-numeral-classifier are all generated under one maximal projection XP* (Tang 2007: 999), and there is no position for the extra modifier in the same maximal projection (cf. 15).

(14) Tang (2007)⁶⁶



⁶⁶ Tang does not specify the elements occupying the D position, nor the position of *de*. We assume *de* is part of the modifier. Besides, modifier is not legitimate to occur in the position of [Spec, CIP].

(15) Simpson (2001)⁶⁷



Tang claims that in order to be consistent with the distributional freedom of modifiers in Chinese (cf. 13 above), Simpson proposes a movement of the demonstrative-(numeral)-classifier string to the specifier position of a head higher than DP. The issues of the internal movement of demonstrative and classifier have been discussed in subsection 1.4 and Sio's arguments against Simpson.

Simpson (2002) revises his original analysis and proposes two positions for demonstrative-classifier strings: they can be base-generated either in an initial position or in a lower position in the nominal expression, no movement is involved. The DP structure proposed by Simpson (2002) is as follows (The possible initial positions of demonstrative and classifier are marked in bold):

(16) **DeicticP** **QP** DP_(de) Poss **Dem** **Num** N

The new proposal prevents the violation of Relativized Minimality (see argument of Sio 2006) and conforms partially to the distributional freedom (except for the insertion of modifier between demonstrative and classifier). In this proposal, how are DeicticP and QP generated is not explicit: do they adjoin to DP or do they project a phrase higher than DP? If they are merged by adjunction, how can QP(which contain numeral and classifier) agree with the DP? If they are merged by projection, DP is no more the maximal projection in the nominal expression. Why *de* must be analysed as a determiner instead of a functional projection heading an FP⁶⁸?

⁶⁷ The identity of the X head is not defined in Simpson (2001), what kind of element occupies the C position is also inexplicit.

⁶⁸ "D" is simply a mnemonic expression for the referential head (see Tang 2011: 111, footnote 6).

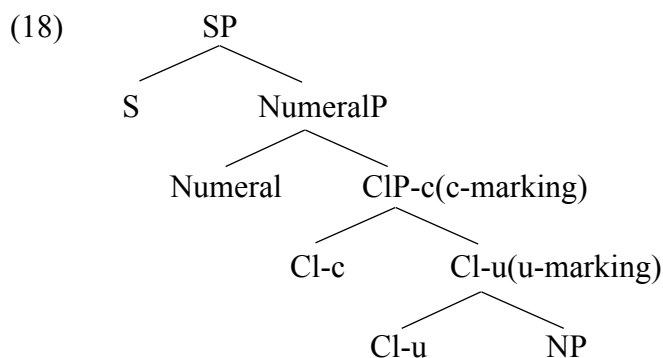
3.3 Cheng & Sybesma (2009): *De* and *ge3* as an underspecified classifier

Based on the empirical observation that both classifiers and *de* is capable of licensing NP ellipsis (NPE) in Mandarin⁶⁹, and a cross-linguistic proposal by Alexiadou and Gengel (2008) that *all NP ellipses are licensed by a CIP*, Cheng and Sybesma (2009) propose that *de* in Mandarin (and *ge3* in Cantonese) is a classifier.

Before developing their proposal, they first justify the term ‘classifier’ applied to *de/ge3*. Sybesma (2007, 2008) divides the functions of classifiers into two types according to their distributional patterns in Mandarin and Cantonese: 1) U(nit)-marking function. *U-marking is a morpho-syntactic process, not of adding meaning, but of bringing out overtly an aspect of meaning that is already present in the semantic denotation of the noun (or which is given contextually). [...] In Cantonese the classifier often performs this function* (Cheng & Sybesma 2009:7). 2) C(ounting)-marking function, which facilitates counting *by acting as the go-between between numeral and noun* (Cheng & Sybesma 2009: 7). Following these criteria, Cheng and Sybesma (2009) assume that modification markers *de* in Mandarin and *ge3* in Cantonese are classifiers, performing a unit-marking function. Hence, they are not specified for number, a c-marker (count classifier) is still needed for counting.

- (17) a. liǎng bēn hěn hǎo-kàn de shū Mandarin
 two CL-c very readable CL-u book
- b. loeng5 bun2 hou2 hou2-tai2 ge3 syu1 Cantonese
 two CL-c very readable CL-u book
 ‘two very good books’ (= (20) in Cheng & Sybesma 2009: 10)

As for the full structure of Chinese nominal expressions, they claim that demonstrative heads a Specificity Phrase (SP) (in following Sio 2006, Cheng & Sybesma 1999, Sybesma & Sio 2008).



⁶⁹ A similar phenomenon was observed by Arsenijevic and Sio (2007, 2008): NP ellipsis can be licensed by classifier and *ge3*. They also argue that *ge3* (at least in NP ellipsis) is a type of classifier.

The first argument for the hypothesis that *de* and *ge3* are also classifiers is based on the empirical observation that both classifier and *de/ge3* can license NP ellipsis (Arsenijevic and Sio 2008 for Cantonese).

- (19) tā bù xǐhuān nèi-běn shū, tā xǐhuān zhèi-běn Ø.
 3SG NEG like that-CL book 3SG like this-CL
 ‘he does not like that book, he likes this one’
 (= (8) in Cheng & Sybesma 2009: 5)

- (20) tā zuótiān mǎi-le yī-jiàn xīn de máoyī, wǒ mǎi-le yī-jiàn jiù **de** Ø.
 3SG yesterday buy-PERF One-CL new DE sweater 1SG buy-PERF one-CL old **DE**
 ‘he bought a new sweater yesterday, I bought an old one’
 (= (9) in Cheng & Sybesma 2009: 5)

Researches in other languages also support this hypothesis: previous studies in Romance and Germanic languages suggested that NP ellipsis is licensed by a ClassifierPhrase (CIP) (Alexiadou and Gengel 2008; Borer 2005; Picallo 2006). An example from Italian is given in (21), in which *-o* is considered being a reflex of the CIP.

- (21) un-**o**/*un grande è sulla tavola
 a big is on.the table
 ‘a big one is on the table’
 (= (10) in Cheng & Sybesma 2009: 6)

They then proceed to explore the distribution of *de* and *ge3*. Table 15 illustrates their observations on Mandarin. Table 16 is a summary.

type of structures	modifier	(<i>de</i>) bare noun	(<i>de</i>) Dem-CI-N
simple adjective	dà big	(<i>de</i>) yú DE fish ‘big fish’	*(<i>de</i>) nèi-tiáo yú DE Dem-CI fish ‘that <i>big</i> fish’
complex adjective	fēicháng dà very big	*(<i>de</i>) yú DE fish ‘very big fish’	??(<i>de</i>) nèi-tiáo yú DE Dem-CI fish ‘that very <i>big</i> fish’
possessor	Zhāng Sān	*(<i>de</i>) yīfú DE clothes ‘Zhangsan’s clothes’	(<i>de</i>) nèi-jiàn yīfú DE Dem-CI clothes ‘that clothe of Zhangsan’

RC	méi mǎi guò shū Neg buy-EXP book	*(de) rén DE person ‘people who have never bought a book’	(de) nèi-gè rén DE Dem-Cl person ‘that person who have never bought a book’
gapless RC	tā chàng gē 3s sing song	*(de) shēngyīn DE voice ‘the voice with which he sings’	(de) nèi-gè shēngyīn DE Dem-Cl voice ‘that voice with which he sings’
PP	duì érzi regarding son	*(de) tàidù DE attitude ‘the attitude towards his son’	??(de) nèi-zhǒng tàidù DE that-Cl attitude ‘that kind of attitude towards one’s son’
non-predicative modifier	yǐqián former	*(de) zǒngtǒng DE president ‘the former president’	(de) nèi-gè zǒngtǒng DE Dem-Cl president ‘that former president’

Table 15 Optionality of *de* in different modification structures in Mandarin

type of structures	(<i>de</i>) bare noun	(<i>de</i>) Dem-Cl-N
simple adjective	✓	✗
complex adjective	✗	??
possessor	✗	✓
RC	✗	✓
gapless RC	✗	✓
PP	✗	??
non-predicative modifier	✗	✓

Table 16 Optionality of *de* in different modification structures in Mandarin

Previous studies about the distribution of *de* in modification structures in Mandarin suggested that the optionality of *de* depends on whether the modifiers are simple or complex (Zhu 1956, 1961; Paul 2005; Huang 2006). Based on empirical data, Cheng and Sybesma (2009) observe that the optionality of *de* is not only related to the complexity of structures, but also to the referentiality of the modifiee. As can be seen in Table 14, the distribution of *de* with a bare noun modifiee seems consistent with the suggestion of the previous studies: *de* is obligatory in complex modification structures. However, this does not hold when the modifiee is a more complex nominal phrase such as Dem-Cl-N. In these cases, *de* can be optional in complex modification. It is tempting to deduce

that the optionality of *de* is related to the (mis-)match of the complexity between the modifier and the modifiee. In other words, if the modifier and the modifiee have the same type of structure (simplex or complex), *de* can be omitted; if the modifier and the modifiee have different types of structure (e.g. the first is complex and the second is simplex and vice versa), *de* can not be omitted.

Nevertheless, this hypothesis does not resist at the light of another empirical fact: *de* is obligatory in complex modification when the modifiee is a sequence of Num-CI-N, which has a complex structure and an indefinite interpretation. Hence, there seems to be an interaction between complexity and referentiality in influence the optionality of *de*.

In order to better understand the conditions governing the presence and absence of *de*, the modification structure with CI-N phrases in Cantonese is also taken into account. Remember that CI-N phrases in Cantonese are different (see Cheng & Sybesma 1998, 1999, see also their proposals for nominal expression in chapter I): CI-N phrases in Cantonese correspond to bare nouns in Mandarin, in being both definite and indefinite; when they are indefinite, they can only appear in object position. On the other hand, CI-N phrases in Mandarin can only be indefinite. Moreover, CI-N phrases in Cantonese can also be found in a modification structure. Therefore, they are attested with the same types of modification structures in Mandarin. Table 17 illustrates the test in Cantonese. Table 18 is a summary.

type of structures	modifier	(ge3) CI-N
simple adjective	*daai6 big intended: 'the big fish'	(ge3) tiu4 jyu2 GE CI fish
complex adjective	*hou2 daai6 very big intended: 'very big fish'	(ge3) tiu4 jyu2 GE CI fish
possessor	zoeng1 saam1 Zoeng Saam 'Zoeng Saam's piece of clothes'	(*ge3) gin6 saam1 DE CI clothes
RC	mou5 maai5-gwo3 syu1 Neg buy-EXP book 'the person who never bought a book'	(*ge3) go3 jan4 DE CI person

gapless RC	keoi5 coeng3 go2 3s sing song 'the voice with which he sings'	(*ge3) baa2 seng1 GE CL voice
PP	deoi3 zai2 regarding son 'the attitude towards his son'	(*ge3) taai3dou6 GE attitude
non-predicative modifier	ji5-cin4 former 'the former president'	(*ge3) zung2tung2 GE president

Table 17 Optionality of *ge3* in different modification structures in Cantonese

type of structures	CI-N	<i>ge3</i> CI-N
simple adjective	✗	✗
complex adjective	✗	✗
possessor	✗	✓
RC	✗	✓
gapless RC	✗	✓
PP	✗	✓
non-predicative modifier	✗	✓

Table 18 Optionality of *ge3* in different modification structures in Cantonese

Two restrictions are observed in the modification structures with CI-N phrase in Cantonese (Sio 2006): first, modifications with *ge3* cannot directly precede a CI-N phrase; second, not all types of modifications tested here are compatible with CI-N phrases (adjectival modifications seems incompatible with CI-N). The first restriction indicates the possibility that *ge3* and classifier might be in the same position in Cantonese. As for the second, although the reason for the incompatibility remains unexplained, it demonstrates that the complexity is not the only factor that influences the optionality of *ge3*: in the two adjectival modification structures (see line 1 and 2 in Table 18), no matter the modifiers are complex or simplex, they are not compatible with the complex modifiee CI-N phrase; moreover the presence of *ge3* is impossible in both cases.

Based on the empirical observations, Cheng and Sybesma (2009) propose a generalization about the modification with *de/ge3*, which is given in (22).

- (22) Phrases with *de/ge3* cannot modify definite nouns. They only modify indefinites.
 (= (27) in Cheng & Sybesma 2009:14)

However, they also point out that there are expectations for this generalization. First, modifiers with *de* can modify a Dem-CI-N phrase that is definite⁷⁰. Second, although modifier with *ge3* in Cantonese can only modify indefinites, it cannot modify all types of indefinite nominals: they can modify indefinite bare nouns and Num-CI-N phrases, but not indefinite CI-N phrases. In summarizing the observations in the modification structures in Mandarin and in Cantonese, the following configurations are put forward, in which “X” represents a bare modifier, “X *de/ge3*” represents a modifier with marker. (23a, b, c) are the configurations that can be found in both Mandarin and Cantonese, (23d, e, f) are the configurations that can only be found in Cantonese.

Mandarin and Cantonese

- (23) a. (Dem) Numeral CI {X *de/ge3*}/ {X_{Simple Adjective}} N
 b. {X *de/ge3*} Numeral CI N
 c. {X (*de/ge3*)} Dem (Numeral) CI N
 [{X} (without *de/ge3*) preferred, strongly so in Cantonese]

Cantonese

- d. CI {X}/*{X *ge3*} N
 e. {X}/*{X *ge3*} CI N [+ def]
 f. *{X}/*{X *ge3*} CI N [- def]

(= (28) in Cheng & Sybesma 2009:15)

Several questions remain to be addressed for investigating *de/ge3* in the modification structures: 1) what are the structural positions of modifiers in the modification structures with and those without *de/ge3*? 2) what is the internal structure of modifiers with and without *de/ge3*? 3) what is the nature of *de/ge3*?

They first analyse the configurations existing both in Mandarin and in Cantonese. Simplex adjectival modification ($\{X_{SA}\}N$) (cf. 23a) with a simple adjective modifier is combined to a bare noun modifiee in the lexical level and remains an N: in other words, Adj-N is a compound. Modification of a bare noun with *de/ge3* ($\{X \text{ de/ge3}\}N$) is a CIP-u following the assumption that

⁷⁰ *Ge3* in Cantonese can also modify a Dem-CI-N phrase. Relative clauses with *ge3*-Dem-CI-N are observed in our elicited production experiments (the discussion about the distribution of relative structures will be given in the next chapter). Authors though consider this generalization (see 22) is correct for Cantonese.

de/ge3 are Cl-u and head their own projection. They suggest that modifiers in {X *de/ge3*} N configuration are located in the [Spec, CIP] position.

The difference between modifications with and without *de/ge3* is that those with *de/ge3* modify an individual (type ⟨e⟩), and those without modify an N *before the individual has been singled out* (type ⟨e, t⟩)(Cheng & Sybesma 2009:15).

A question then arises. Classifiers in Mandarin overtly fill the c-marking position (Cl-c) since u-marking can be encoded in the lexicon level and does not need to be marked by a classifier. If this is the case, why *de* is needed as a u-marker in Mandarin? Their explanation is that *modification of individuals requires that the individual is syntactically active, requiring syntactic u-marking in such cases. In Mandarin, de is the overt realization of the Cl-u* (Cheng & Sybesma 2009:16)⁷¹.

As for the question of why *de/ge3* is dispreferred in the modification of the sequence of Dem-Cl-N, Arsenijevic and Sio (2007, 2008) assume that this is due to a conflict between the deictic function of Cl-u (*ge3*) and that of demonstrative in the Dem-Cl-N sequence. This assumption seems too assertive according to Cheng and Sybesma (2009), since the sequences of modifier-*de/ge3*-Dem-Numeral-Cl-N are not ungrammatical in the two languages.

As for the optionality of *de/ge3*, authors assume that the modification structures having a complex modifiee (such as Dem-(Num)-Cl-N and Num-Cl-N) with and without *de/ge3* (cf. 23b, 23c) involve actually two different structures.

For the modification structures with *de/ge3*, which do not involve contrastive focus reading, their derivation is as follows:

(24) [DP₁ X *de/ge3* ∅][DP₂ Dem (Numeral) Cl NP]⁷²

(adapting (29) in Cheng and Sybesma 2009:16)

⁷¹ This may explain why relative clauses (a subcategory of complex modification) without relativizer *de* are not legitimate in Mandarin, but legitimate in Cantonese with the presence of classifier. Since classifier in Cantonese is a syntactic u-marker.

⁷² The first DP has an empty NP. The same structure also holds in the {X *de/ge3*} Numeral Cl N sequence (cf. 23b).

They claim that this type of modification structures is a sort of an appositive structure: a modification structure (DP1) with an empty N just as in NP ellipsis merge with a complex nominal expression such as a Dem-(Num)-Cl-N phrase (DP2) or a Num-Cl-N phrase (see 23b).

For the modification structures with *de/ge3*, they argue that when [modifier + *de/ge3*] preceding a numeral or a demonstrative, it has a constructive focus reading. Two pairs of examples are given in (25) and (26).

(25) a. Modifier-de-Num-Cl-N:

Zhāng Sān de yī-jiàn yīfu
 Zhang San DE one-CL clothes
 ‘one piece of clothing of Zhang San’s, not Lisi’s’

b. Num-Cl-modifier-de-N:

yī-jiàn Zhāng Sān de yīfu
 one-CL Zhang San DE clothes
 ‘one piece of clothing of Zhang San’s, #not Lisi’s’

(= (2) in Cheng and Sybesma 2009:2)

(26) a. Modifier-de-Dem-Cl-N:

Zhāng Sān de nèi-jiàn yīfu
 Zhang San DE Dem-CL clothes
 ‘that piece of clothing of Zhang San’s, not Lisi’s’

b. Dem-Cl-modifier-de-N:

nèi-jiàn Zhāng Sān de yīfu
 Dem-CL Zhang San DE clothes
 ‘that piece of clothing of Zhang San’s, #not Lisi’s’

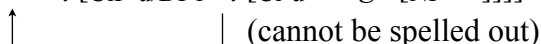
(= (3) in Cheng and Sybesma 2009:2)

In consideration of the contrastive focus reading of these types of structures, they claim that the modifier moves to the left-periphery of the DP/SP (see 27) to mark the focus reading, which means the [Spec, CIP-u] position is then empty. They also claim that Cl-u *need not (or cannot) be overtly spelled out when no XP is in its Spec* (Cheng & Sybesma 2009:16). This explains why *de/ge3* can be ‘omitted’ in this case. The following examples illustrate the derivation of this configuration.

(27) a. [_{FocP} modifier_i [_{CIP-u/DP1} t_i [_{Cl-u} *de/ge* [_{NP} ∅]]]] [_{SP/DP2} Dem [_{CIP-c} Cl [_{NP} N]]]



b. [_{FocP} modifier_i [_{CIP-u/DP1} t_i [_{Cl-u} *de/ge* [_{NP} ∅]]]] [_{SP/DP2} Dem [_{CIP-c} Cl [_{NP} N]]]



classifier in Cantonese, which is also a syntactic u-marker. In consequence, classifier and *ge3* cannot co-occur in the same phrase and this explains some structural restrictions in Cantonese. Classifiers in Mandarin are rather count-marking classifiers, they are attached to a Numeral or a demonstrative in most cases. *De*, unlike *ge3* in Cantonese, can head CIP-u without competing with another u-marking classifier. *De*, as the unique unit-marking classifier, is more indispensable in Mandarin.

Concerning the derivation of modification structures, Cheng and Sybesma (2009) suggest that when *de/ge3* is present in the modification structure, the modifier externally merges with the CIP-u, which is headed by *de/ge3*. The structures where the modifiee has a complex structure (Dem-Cl-N or Numeral-Cl-N) involve an appositive structure: a modification structure with an empty N ([Mod *de/ge3* \emptyset] due to NP ellipsis) adjoins to a complex nominal expression Dem-Cl-N or Num-Cl-N. If these structures have a contrastive focus reading, the modifier moves to the periphery of the DP⁷³ (more precisely [Spec, FocP]) and *de/ge3* can no more be spelled out since the [Spec, CIP-u] position is not filled. This explains the ‘optionality’ of *de/ge3* in certain contexts.

Apart from the modification structure, u-markers (*de/ge3* and classifier in Cantonese) in Chinese also license Noun Phrase Ellipsis (NPE see another proposal by S.W. Tang (2011)⁷⁴). More importantly, in both cases (modification and NPE), modifiers are found in the Spec position of a functional projection of NP.

Cheng and Sybesma (2009) provide a new perspective to analyse the nature and status of *de/ge3* as well as their most important distributional properties in nominal phrases in Mandarin and in Cantonese. However, there are still some questions remaining to answer.

First, remember that Cheng and Sybesma (1999, 2005) propose that ι operator is segmentally realized by the classifier in Cantonese. Can *ge3*, as a u-marking classifier, functions as a ι operator in Cantonese? What about *de*?

⁷³ Authors consider the Dem-Cl-N sequence as a DP in their work (2009). What is the difference between a S(pecificity)P and a DP headed by demonstrative? (comparing (29) and (22) in Cheng & Sybesma 2009)

⁷⁴ Tang (2011:111): *the empty nominal head in Cantonese NP ellipsis has a bare structure, i.e., a bare NP (cf. i), whereas the empty nominal head in Mandarin NP ellipsis may have a complex structure (cf. ii), containing a null NP plus a null referential head that determines the referential properties.*

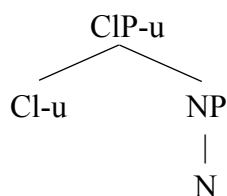
(i) [DP Modifier [DP \emptyset [NP \emptyset]]]
(ii) [NP Modifier [NP \emptyset]]

That *de* functions as a ι operator is consistent with the proposal of Huang (2006) that *de* is a type-lowerer. In both cases, *de* changes a noun from type $\langle e, t \rangle$ to type $\langle e \rangle$. However, only in Cantonese, the ι operator is segmentally realized by the classifier (see also Cheng and Sybesma 2005a). Does this property of classifier/ ι operator affect the function of *de* and *ge3* as well as the interpretation of modifiers with *de* in Mandarin and those with *ge3* in Cantonese?

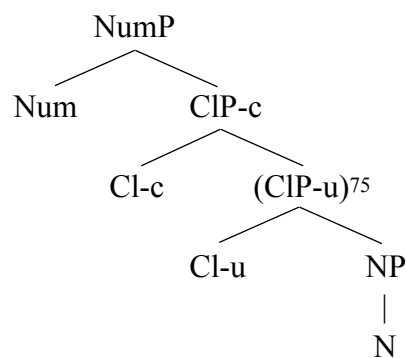
Second, in accordance with the different functions of classifiers applied in Cheng and Sybesma (1999, 2009), does the classifiers in definite CI-N (CIP) phrases and those in indefinite CI-N (NumP) phrases carry different function, consequently a different structure?

In the spirit of Cheng and Sybesma (1999), only in Cantonese, CI-N phrases can be definite. According to the definition of unit-marking function and count-marking function of classifiers (Cheng & Sybesma 2009), we assume that the classifier in definite CI-N phrases is a u-marking classifier (CI-u), while classifier in indefinite CI-N phrases it is a count-marking classifier (CI-c) due to the presence of an covert Numeral. Hence, the structure of definite CI-N phrases and that of indefinite CI-N phrases should be as follows:

(30) a. structure of definite CI-N:



b. structure of indefinite CI-N:



With this in mind, we can now answer the first question. Notice that in Mandarin and Southern Min, where the ι operator cannot be segmentally realized (by classifier), classifiers must attach to a numeral (Cheng and Sybesma 2005a), therefore they should be CI-c in these languages. On the other hand, classifiers in Cantonese, which can function as a segmental ι operator, are typically CI-u. We thus infer that the ι operation is validated in the CI-u position in Chinese: when it is overtly

⁷⁵ CIP-u layer is optional in Mandarin NumeralP (Cheng and Sybesma 2009:8).

filled by either a classifier or *de/ge3*, the N they select can be individualized. In other words, *de/ge3* can also be the segmental ι operator.

Focus now on the definite CI-N structure (30a) in Cantonese. If *ge3* is a unit-marking classifier (CI-u), why CI-N phrases but not *ge3*-N phrases are legitimate in Cantonese?

- (31) [bun2 syu1] /*[ge3 syu1] (nei5) waan4-zo3 mei6?
 CI book GE3 book 2SG return-Perf Neg
 ‘Have you returned the book yet?’

Cheng and Sybesma (2009) explain that *CI-u can only be realised as de/ge3 if the [Spec, CI-u] is filled by a modifier* (footnote 13, p. 17), which is reminiscent of Simpson’s proposal that *de* is enclitic to the element in its specifier for phonological support. Thus, although classifier and *de/ge3* are assumed to sit in the same position, they have different properties.

Third, what are the structure of the nominals with demonstrative and classifier preceding the modifier? Can they also be analysed as an appositive structure as (32b) with an ellipse of NP in the Dem-(Num)-CI-NP phrase, since both classifier and *de/ge3* can license NP ellipsis? This hypothesis is reminiscent of the proposals of Chao (1968) and Hashimoto (1971): relative clauses following a demonstrative are ‘descriptive’; those preceding a demonstrative are restrictive. ‘Descriptive’ in their proposals means appositive (Del Gobbo 2005). However, the configuration of (32b) is analysed as a typical case of restrictive relatives in Cheng and Sybesma (2009:17). Thus, the analyses of Chao (1968) and Hashimoto (1971) and that of Cheng and Sybesma (2009) are not compatible.

- (32) a. [DP X *de/ge3* NP][DP Dem (Numeral) CI NP]
 b. [DP Dem (Numeral) CI NP] [DP X *de/ge3* NP]

Last but not least, Cheng and Sybesma (2009) claim that *phrases with de/ge3 cannot modify definite nouns and this is correct for Cantonese but weakly correct for Mandarin* (Cheng & Sybesma 2009: 14). On one hand, as mentioned above, results of our experiment in Cantonese seem to be against this claim. On the other hand, if our hypothesis that *de/ge3* can function as ι operator is true, *de/ge3* is able to change an NP (type $\langle e, t \rangle$) to an individual (type $\langle e \rangle$) (function of ι operator) and assign

definiteness to a nominal (function of classifier: see Cheng & Sybesma 1999). Hence the NP modified by *de/ge3* may be indefinite, while the whole nominal expression could be interpreted as definite. However, the definiteness of the whole nominal expressions including the modifiers has not been discussed so far. We shall assess this possibility by looking back at our data in the next chapter.

3.4 Summary

In this chapter, we have reviewed two proposals about the nature of *de/(ge3)* in Chinese. Simpson (2001, 2002) proposes that *de* is an enclitic determiner in Chinese. Cheng and Sybesma (2009) propose that *de* in Mandarin and *ge3* in Cantonese are unit-marking classifiers. Although these two proposals seem uncorrelated, they have similar points: in both cases, *de* is a head and requires its specifier position to be filled (although for different reasons: phonological need in Simpson 2001, probably ‘EPP’ in Cheng and Sybesma 2009). Moreover, according to Cheng and Sybesma (1999), the classifier in Chinese holds the functions of a determiner.

The main difference between these two proposals concerns the derivation of the structure. Simpson (2001) proposes a unifying structure for possessive, adjectival modification and relative clauses by assuming that there is a predication relation established between the modifier and the modifiee. Thus, nominals with a modifier are analysed as a D-CP configuration as in the classical antisymmetry analysis for relative clauses repeated here.

(33) a. [DP [D' *de* [CP modifiee_i [C' [IP *t_i* modifier]_j]]]]

b. [DP [IP *t_i* modifier]_j [D' *de* [CP modifiee_i [C' *t_j*]]]]

According to Simpson (2001), the demonstrative-classifier sequence is situated in a functional projection XP projected between DP and CP. The modifier-*de*-Dem-Cl-N configuration derives as follows:

(34) a. [DP [D' *de* [XP Dem-Cl [CP modifiee_i [C' [IP *t_i* modifier]_j]]]]]]

b. [DP [IP *t_i* modifier]_j [D' *de* [XP Dem-Cl [CP modifiee_i [C' *t_j*]]]]]]

Cheng and Sybesma (2009) suggest that the derivation of nominals with modifiers varies according to the structure of the modifiee. When the modifiee is a bare noun, the modifier is merged into the specifier position of *de/ge3* (35a). When it has a more complex structure such as Num-Cl-N or Dem-Cl-N, the nominals involve an appositive structure (35b). If it has a contrastive focus reading, the modifier moves from [Spec, CIP] to [Spec, FocP] and this triggers the ‘optionality’ of *de/ge3* (35c).

(35) a. modifier with bare noun:

[CIP-u modifier [Cl-u' *de/ge3* [NP modifiee]]]

b. modifier with a complex noun with *de/ge3*:

[CIP-u modifier [Cl-u' *de/ge3* [NP \emptyset]]] [SP Dem [NumP Num [CIP-c Cl [NP N]]]]

c. modifier with a complex noun without *de/ge3* (having a constructive focus reading):

[FocP modifier_i [CIP-u t_i [Cl-u' ~~*de/ge3*~~ [NP \emptyset]]] [SP Dem [NumP Num [CIP-c Cl [NP N]]]]



The diagram shows a horizontal line with an upward-pointing arrow from the center of the line to the word 'modifier' in the FocP phrase above it. The line starts under the 'modifier' in the FocP phrase and ends under the 'modifier' in the CIP phrase below it.

The following table summarizes the proposals of Simpson (2001, 2002) and Cheng and Sybesma (2009) concerning the nominal modification structure in Chinese.

	Simpson (2001, 2002)	Cheng and Sybesma (2009)
nature of <i>de</i>	determiner	unit-marking classifier
position of modifier	Spec, DP	Spec, CIP
how does <i>de</i> merges with NP	NP raising to the specifier position of the CP selected by <i>de</i>	<i>de</i> selects NP
how does modifier merges with <i>de</i>	Internal merge: remnant movement to [Spec, DP]	External merge: directly merged in [Spec, CIP]
how does modifier- <i>de</i> -Dem-Cl-N derive	dem-cl phrase projected between DP and CP	modifier- <i>de</i> phrase ajoins to a Dem-Cl-N phrase

Table 19 Comparison of the two proposals about modification structures in Chinese

The main issue in the proposal of Simpson (2001) is that the antisymmetry analysis (D-CP configuration) cannot correctly capture the distributional freedom of modifiers according to Tang (2006). Simpson (2002) proposes an extended structure for nominal modification in Chinese, in which two functional projections, deicticP and QP, respectively hosting demonstrative and classifier, are on the top of the DP. The new structure is compatible with the modifiers preceding or following the demonstrative and classifier. However, under Simpson's antisymmetric analysis, the optimality of *de* (as well as *ge3*, if we adapt his analysis in Cantonese) in the modifier-(*de*)-Dem-Cl-N configuration, which is a possibility in Mandarin (and even more frequent in Cantonese), cannot be explained.

The main issue of the proposal of Cheng and Sybesma (2009) concerns the interpretation of the nominals. Under their proposal, the modification structure varies according to the structure of the modifiee: if the modifiee is a bare noun, the modifier is in a specifier-head-complement configuration; if the modifiee is a complex NP, the modifier (with an empty N) is in apposition to the complex NP. If we extend their proposal to relative clauses in Cantonese, the relative clauses with *ge3* having a bare noun head should be restrictive and the relative clauses with demonstrative and classifier should be appositive (see 12 & 14 in Cheng and Sybesma). If this were the case, we would expect that in our experiments of elicited production, where the context forces a restrictive interpretation, only relatives with *ge3* should be produced. But this is not the case.

Besides, Cheng and Sybesma (2009), following Sio (2006), claim that phrases with *de/ge3* can only modify indefinite nouns. In their work (1999), indefinite nouns have a NumP structure. In other words, phrases with *de/ge3* can only modify a NumP. Is this the case? When the head noun is a bare noun, can Cl-u (*de/ge3*) select a NumP⁷⁶? When the head noun is a complex NumP (Num-Cl-N), as mentioned, a contrastive focus reading may arise. In this case, the modifier should leave the [Spec, CIP] to the [Spec, FocP], hence the Cl-u cannot be spelled out. However, the configuration of RC-Num-Cl-N is not legitimated, neither in Mandarin nor in Cantonese. What forces the presence of *de/ge3* in this case? Moreover, how to explain the existence of the structure RC-*de/ge3*-Dem-Cl-N in which the head noun is definite? Another issue arising in Cheng and Sybesma (2009) concerns the appositive/descriptive and restrictive readings of relative clauses. According to them, relative

⁷⁶ If Cl-u can select a NumP which contains also a Cl-u layer, it means that the DP can derive cyclically.

clauses preceding a complex head noun are appositive, and relative clauses following demonstrative and classifier are restrictive⁷⁷. However, all these forms were observed in our experiments.

RC structure	readings
RC- <i>de/ge3</i> -N	restrictive
RC-(<i>de/ge3</i>)-Dem-CI-N	appositive
RC- <i>de/ge3</i> -Num-CI-N	appositive
Dem-CI-RC- <i>de/ge3</i> -N	restrictive

Table 20 Readings of relative structures in Cantonese in Cheng and Sybesma (2009)

In order to address the questions raised by the two proposals, we are going to have a closer look at the distributions of relative structures in Cantonese in the two experiments of elicited production in the next chapter.

⁷⁷ Recent studies (Lin 2003; Del Gobbo 2001, 2003, 2004, 2005, 2010; Zhang 2001; Shi 2010; Lin and Tsai 2015) argue that the relative clauses in Mandarin are mainly restrictive and the restrictive or appositive reading does not rely on whether the relative clauses precede or follow the demonstrative and classifier.

Chapter 4 Back to data 2: the distribution of relative constructions in Cantonese

In this chapter, we go back to the data of the two experiments of elicited production in order to investigate the distribution of relative constructions, the (in)definiteness status of the head nouns involved and the one of the whole nominal expressions containing the relative clause; and also to address the questions raised in Chapter 3. The data of the two corpus studies will not be considered in the discussion because the contexts were too varied and not controlled. Remember, on the other hand, that the context in the experiments forced a restrictive reading of the relative clauses and a referential interpretation of their arguments.

Let us briefly review the procedure that was employed in the two experiments. Participants received eight cards (see Figure 2). Each card contained four pictures and each picture contained two interacting characters with some accessories. The characters were identical in all four pictures except for the accessories. Since there were four identical characters in the set of each card, the characters, meant to be the arguments in the relative clauses, were referential but not definite as a singular in the context. The production of relative clauses was elicited by a question like ‘*Which sailor is wearing a handbag?*’. In this set of cards, there is only one sailor wearing a handbag. Hence the answer to this question, which is supposed to be a nominal with a relative clause like ‘*the sailor that the firefighter is lighting*’, can only have a restrictive definite reading.

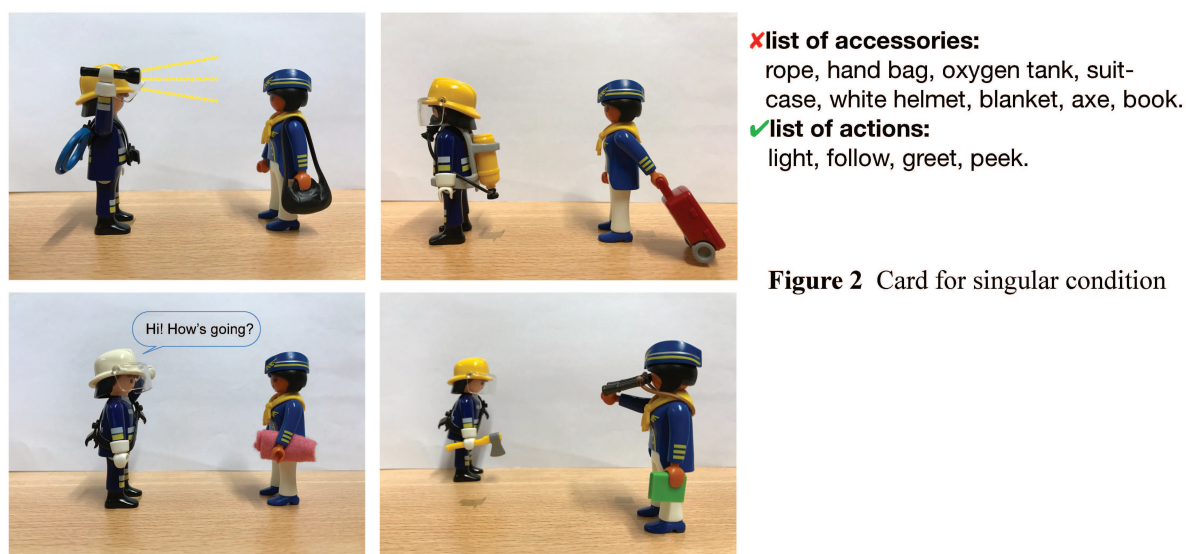


Figure 2 Card for singular condition

Turning now to the relative constructions that this setting elicited, six grammatical constructions were produced. The following examples illustrate these constructions with an object relative.

(1) RC-ge3-N:

消防員	照-住	∅ _i	嘅	水手 _i
siu1 fong4 jyun4	ziu3-zyu6		ge3	seoi2sau2
firefighter	light-ASP		GE3	sailor

‘the sailor that the firefighter is lighting’

(2) RC-CI-N:

消防員	照-住	∅ _i	個	水手 _i
siu1 fong4 jyun4	ziu3-zyu6		go3	seoi2sau
firefighter	light-ASP		Cl	sailor

‘the sailor that the firefighter is lighting’

(3) RC-Dem-CI-N:

消防員	照-住	∅ _i	嗰	個	水手 _i
siu1 fong4 jyun4	ziu3-zyu6		go2	go3	seoi2sau2
firefighter	light-ASP		Dem	CL	sailor

‘the sailor that the firefighter is lighting’

(4) RC-ge3-Dem-CI-N:

消防員	照-住	∅ _i	嘅	嗰	個	水手 _i
siu1 fong4 jyun4	ziu3-zyu6		ge3	go2	go3	seoi2sau2
firefighter	light-ASP		GE3	Dem	CL	sailor

‘the sailor that the firefighter is lighting’

(5) RC-Dem-CI-ge3-N:

消防員	照-住	∅ _i	嗰	個	嘅	水手 _i
siu1 fong4 jyun4	ziu3-zyu6		go2	go3	ge3	seoi2sau2
firefighter	light-ASP		Dem	Cl	GE3	sailor

‘the sailor that the firefighter is lighting’

(6) Dem-(Num)-CI-RC-ge3-N:

嗰	(一)	個	消防員	照-住	∅ _i	嘅	水手 _i
go2	jat6	go3	siu1 fong4 jyun4	ziu3-zyu6		ge3	seoi2sau2
Dem	one	Cl	firefighter	light-ASP		GE3	sailor

‘the sailor that the firefighter is lighting’

4.1 The Distribution of relative constructions in the Experiment 1

Let us begin with the distribution in the first experiment. Notice that in the first experiment, both arguments are set to be animate full-NPs (semantically common nouns) and an overwhelming subject preference was observed, with a high target production in the subject condition and a high proportion of passivized subject relatives in the object condition. Table 21 summarizes the general distribution of the relative constructions.

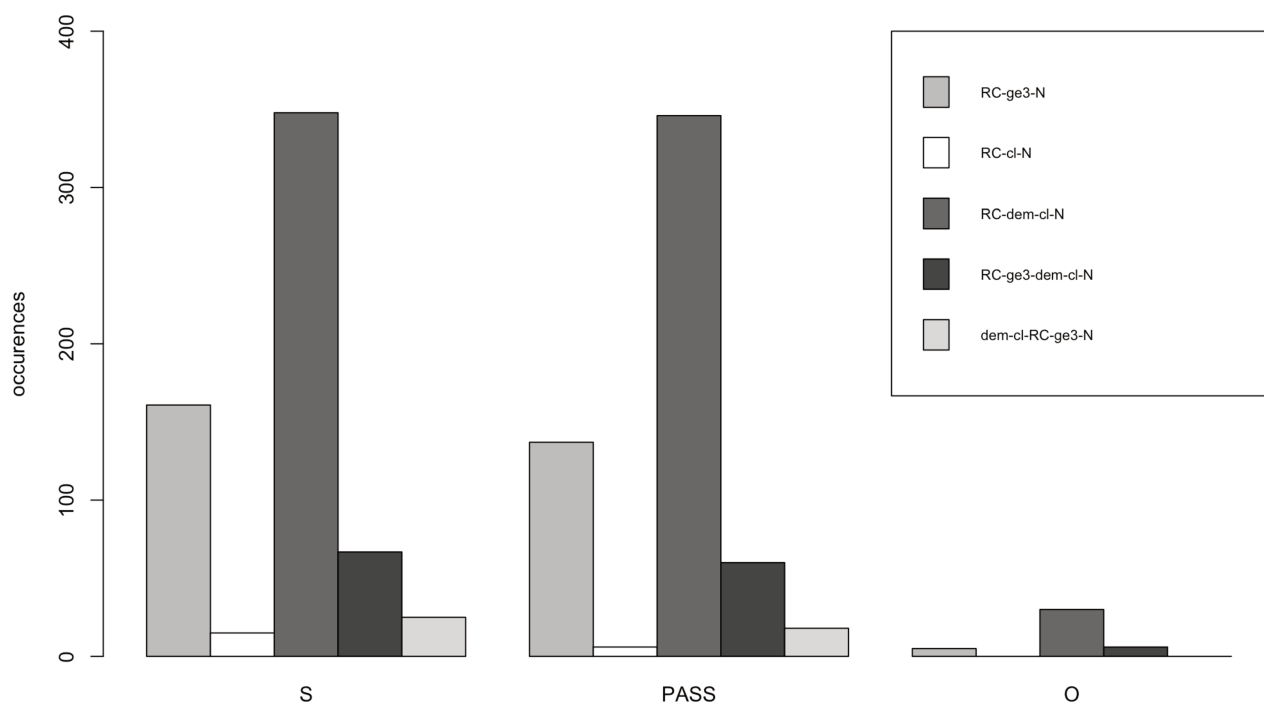
type of construction	occurrence	%
RC-ge3-N	303	25
RC-cl-N	21	2
RC-dem-cl-N	724	59
RC-ge3-dem-cl-N	133	11
dem-cl-RC-ge3-N	43	3
RC-N (no-linker)	2	
TOTAL	1226	

Table 21 General distribution of relative constructions in Exp 1

1226 RCs were collected in this experiment. Among them, 724 (59%) were relative clauses with demonstrative and classifier (cf. 3); 303 (25%) were relative clauses with relativizer *ge3* (cf. 1); 133 (11%) were relative clauses in a mixed form with both relativizer and demonstrative and classifier preceding the head noun (cf. 4). 43 (3%) were relative clauses with *ge3* following demonstrative and classifier (cf. 6). Only 21 (2%) were relative clauses with a classifier preceding the head noun (cf. 2). 2 (0.2%) productions that did not contain any relative linker, which is considered to be ungrammatical, were also observed in this experiment⁷⁸. The construction with demonstrative and classifier (i.e., RC-dem-cl-N), which is considered to be *extremely common and preferred in colloquial Cantonese* by Matthews and Yip (2013), is indeed predominant in this experiment.

Let us turn now to the distribution in the three different types of relative clauses collected in this experiment, namely regular subject relatives (S), passivized subject relatives (PASS) and object relatives (O).

⁷⁸ Interestingly, this ‘ungrammatical’ construction is also observed in the second experiment and the TV data, but its occurrence is very rare. Besides, all the relatives observed with this construction are subject relatives.



Graphic 4 Distribution of relative constructions in different types of RCs in experiment 1

In Graphic 4, the x-axis corresponds to the three types of relative clause (i.e., S, PASS and O), the y-axis corresponds to the occurrences of the relative constructions. The five bars in different colours correspond to the five relative constructions produced in this experiment (cf. 1 to 6, except 5).

As Graphic 4 shows, the distribution of the relative constructions in regular subject relatives and that in passivized subject relatives is very similar. The distributional hierarchy of the relative constructions in these two contexts can be summarized as follows:

(7) RC-dem-cl-N > RC-ge3-N > RC-ge3-dem-cl-N > dem-cl-RC-ge3-N > RC-cl-N

This hierarchy seems consistent with the distribution in object relatives in Graphic 4. Due to the rather low occurrence of object relatives in this experiment, we will take the proportion into account for the comparison of the distribution of relative constructions in the three types of relative clauses. Tables 22, 23 and 24 respectively summarize the detailed distributions of relative constructions in regular subject relatives (S), passivized subject relatives (PASS) and object relatives (O). Graphic 5 illustrates the proportions of each relative construction in the three types of relative clauses.

type of construction	occurrence	%
RC-ge3-N	161	26
RC-cl-N	15	2
RC-dem-cl-N	348	56
RC-ge3-dem-cl-N	67	11
dem-cl-RC-ge3-N	25	4
RC-N (no-linker)	2	1
TOTAL	618	

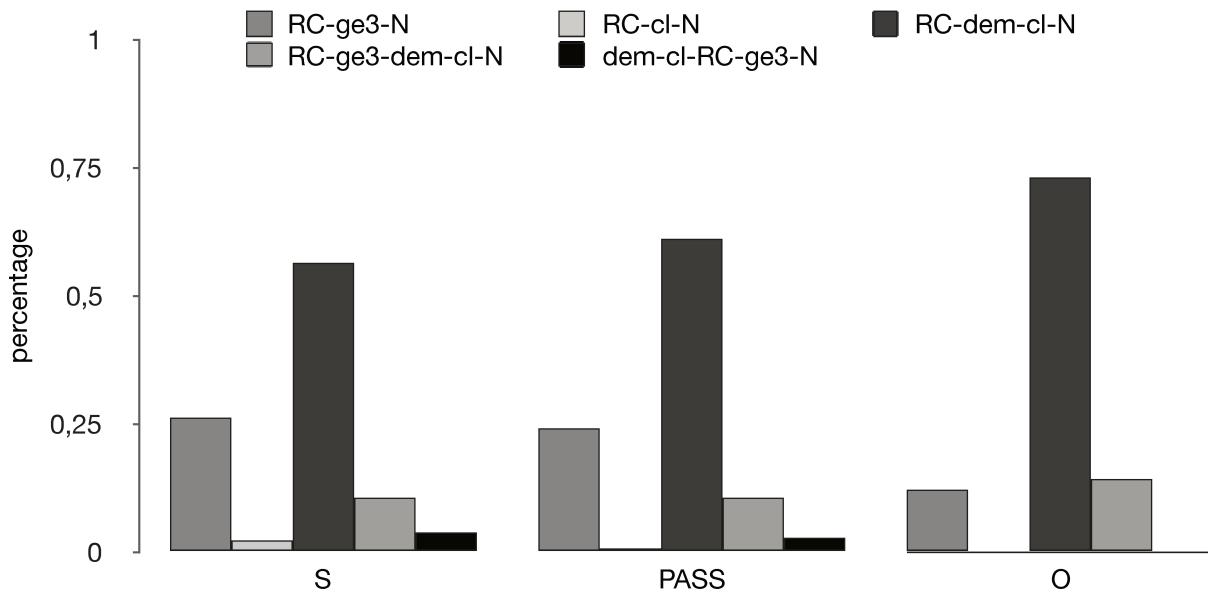
Table 22 Distribution of relative constructions in regular subject relatives

type of construction	occurrence	%
RC-ge3-N	137	24
RC-cl-N	6	1
RC-dem-cl-N	346	61
RC-ge3-dem-cl-N	60	11
dem-cl-RC-ge3-N	18	3
TOTAL	567	

Table 23 Distribution of relative constructions in passivized subject relatives

type of construction	occurrence	%
RC-ge3-N	5	12
RC-dem-cl-N	30	73
RC-ge3-dem-cl-N	6	15
TOTAL	41	

Table 24 Distribution of relative constructions in object relatives



Graphic 5 Proportions of each relative construction in the experiment 1

In Graphic 5, the x-axis corresponds to the three types of relative clauses, the y-axis corresponds to the proportion (percentage) of each relative construction in each type of relative clauses. As can be seen in Graphic 5, concerning the distribution in object relatives, the construction with demonstrative and classifier is also dominant among the five relativization strategies. In comparing the proportion of relatives with demonstrative and classifier (i.e., RC-dem-cl-N) in object relatives with those in regular subject relatives and passivized subject relatives, we observe that this dominance is even stronger in object relatives. In addition, the proportion of relatives with relativizer (i.e., RC-ge3-N) is lower in object relatives. The distributional hierarchy of relative constructions in object relatives in this experiment is as follows:

$$(8) \text{ RC-dem-cl-N} > \text{RC-ge3-dem-cl-N} \geq \text{RC-ge3-N}$$

4.2 Interim discussion 1

The distribution of relative strategies in the first experiment shows that the construction with demonstrative and classifier (i.e., RC-dem-cl-N) is the predominant strategy of relativisation in Cantonese. Moreover, this strategy is found even more in object relatives, which as we know involve a non-criterial inclusion configuration in this experiment (see Chapter 2 of Part II) hence are more difficult to process than subject relatives. This suggests that the use of the construction with demonstrative and classifier (i.e., RC-dem-cl-N) may also be a strategy to avoid or loosen the

intervention effect triggered by the subject. Notice that not only the proportion of relative constructions with demonstrative and classifier but also that of relative constructions with a mixed form (i.e., RC-*ge3*-dem-cl-N) increase in object relatives. In both cases, the demonstrative and classifier string preceding the head noun in object relatives makes the featural make-up of the relativized object (FP) more complex than the featural make-up of the intervening subject (CIP)⁷⁹. The set-theoretic configuration in these relative constructions is as follows:

(9) relatives with demonstrative and classifier

	head noun	subject	object trace
minimal non criterial inclusion	+FP ⁸⁰ , +NP, +Rel	+NP	+FP, +NP, +Rel

If demonstrative and classifier have an impact on the calculation of the intervention effect, they should be part of the head noun and be involved in the A'-dependency between the object gap and the head noun. Is this the case? Recall that in Simpson (2001)'s analysis for nominal modification in Chinese, a demonstrative and a classifier form an XP that is generated between DP and CP, they do not participate in the head raising (see section 3.2 in Part II). We shall address this important question in the next chapter when discussing the derivation of relative clauses in Cantonese.

Turning back to the questions that we raised concerning the structure of nominal modification, we observe that the restrictive reading of relative clauses does not seem to correlate with the choice of relative strategies directly: all the relative clauses in this experiment have a restrictive interpretation. On the other hand, they all display a contrastive focus interpretation due to the design of the experiment. Recall that for every question eliciting the production of relative clauses (e.g. *Which sailor is wearing a handbag?*), there is only one character corresponding to this question (e.g., *It is the sailor that the firefighter is lighting*. Meaning that *it is not the one that the firefighter is greeting*). According to Cheng and Sybesma (2009), the contrastive focus reading may trigger a movement of the modifier (in our case, the relative clause) from the specifier position of DP to the left periphery and result in the 'omission' of *ge3*. They also claim that the constructions associated with contrastive reading (in their case, modifier-*ge3*-Dem-Cl-N or modifier-*ge3*-Num-Cl-N) involve an appositive construction (see Cheng and Sybesma 2009: 16).

⁷⁹ The underlying structure of the intervening subject (a definite bare noun) is: [CIP [C' N_i [NP [N' t_i]]]]; the structure of the head noun with demonstrative and classifier is [FP Dem [CIP Cl [NP N]]]].

⁸⁰ We use [+FP] features to refer the nominals with the presence of a functional element such as classifier or a demonstrative in the superficial structural.

Another observation in this experiment is that nominals in the RC-*ge3*-N configuration can have a restrictive and definite interpretation, but the nominal they modify, in our context, is referential non-definite. This result is partially consistent with the claim of Cheng and Sybesma (2009) that phrases with *de/ge3* can only modify indefinite nouns. On one hand, the nominals in the context are indeed indefinite (but referential); on the other hand, they become definite after being relativized and modified by the clauses with *ge3*. This transformation of (in)definiteness supports our hypothesis that *ge3* is also a ι operator in Cantonese and hence can assign definiteness to the nominals that it selects.

4.2 The distribution of relative constructions in the Experiment 2

Let us turn now to the distribution of the different strategies in experiment 2. Recall that in this experiment, all conditions were meant to elicit object relatives and that four conditions were set: 1) animate full-NPs condition (as in experiment 1), 2) inanimate object condition, 3) pronoun subject condition and 4) proper noun subject condition. Although we only targeted the production of object relatives in this experiment, a subject condition was also set as a control. Table 25 summarises the general distribution of the relative constructions (including the production in the subject condition).

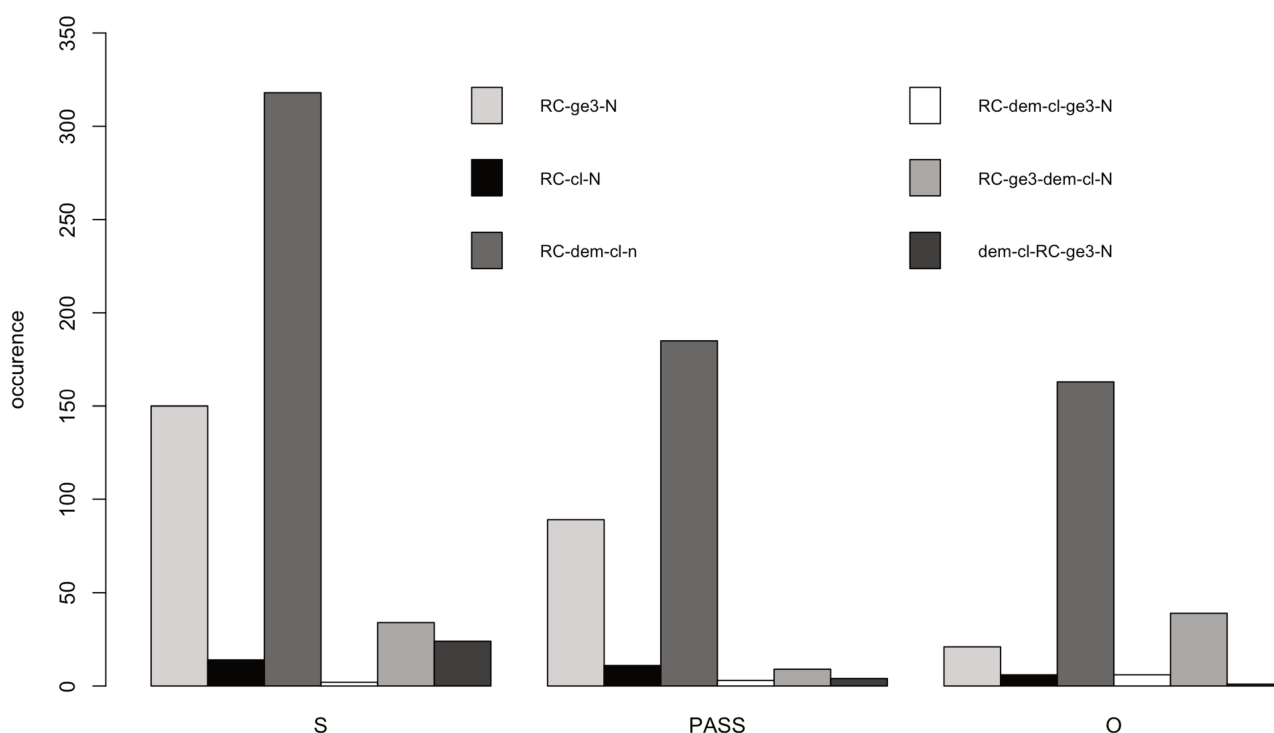
type of construction	occurrence	%
RC- <i>ge3</i> -N	260	24
RC-cl-N	31	3
RC-dem-cl-N	666	62
RC-dem-cl- <i>ge3</i> -N	11	1
RC- <i>ge3</i> -dem-cl-N	82	7
dem-cl-RC- <i>ge3</i> -N	29	3
no-linker	1	
TOTAL	1080	

Table 25 General distribution of relative constructions in Exp 2

1080 RCs were collected in this experiment. The construction with demonstrative and classifier was still predominant: 666 (62%) were relative clauses with demonstrative and classifier (cf. 3). 260 (24%) were relative clauses with relativizer *ge3* (cf. 1); 82 (7 %) were relative clauses in a mixed form with both relativizer and demonstrative and classifier preceding the head noun (cf. 4); 29 (3%)

were relative clauses with *ge3* following demonstrative and classifier (cf. 6); 31 (3%) were relative clauses with a classifier preceding the head noun (cf. 2). One production without any relative linker was also observed in this experiment, as mentioned previously. A new construction (only produced by one participant) was observed in this experiment, in which *ge3* was found ‘inserted’ in the post-relative demonstrative-classifier-N phrase, between the classifier and the noun (cf. 5). This construction is presented in Matthews and Yip (2001) as a typical relative construction in Cantonese. In this experiment, its occurrence was rather low (1%).

Let us focus first on the distribution of relative constructions in the three types of relative clauses: subject, (i.e., the control), object (i.e., the target) and passive. Graphic 6 illustrates the distribution of the relative constructions for each type of relative clauses. The x-axis corresponds to the three types of relative clause (i.e., S, PASS and O), the y-axis corresponds to the frequency of each construction. Six bars in different colours correspond to the six relative constructions produced in this experiment (cf. 1 to 6).



Graphic 6 Distribution of relative constructions in different types of RCs in Exp 2

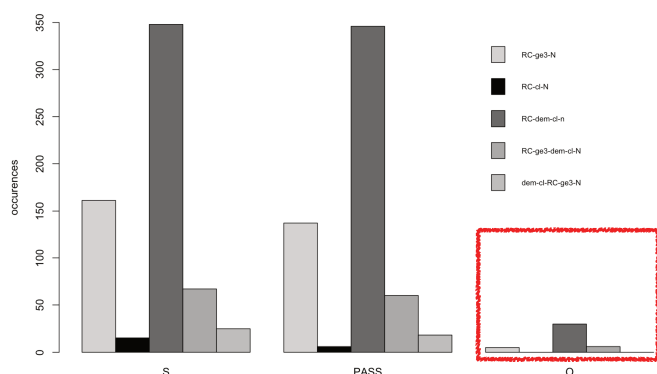
As in the previous experiment, the distribution of the relative constructions in regular subject relatives and that in the passivized subject relatives are very similar. The distributional hierarchy of the relative constructions in these two types of relative clauses is also highly similar to that in experiment 1. Their distribution is summarized as follows:

(10) RC-dem-cl-N > RC-ge3-N > RC-ge3-dem-cl-N > dem-cl-RC-ge3-N > RC-cl-N > RC-dem-cl-ge3-N

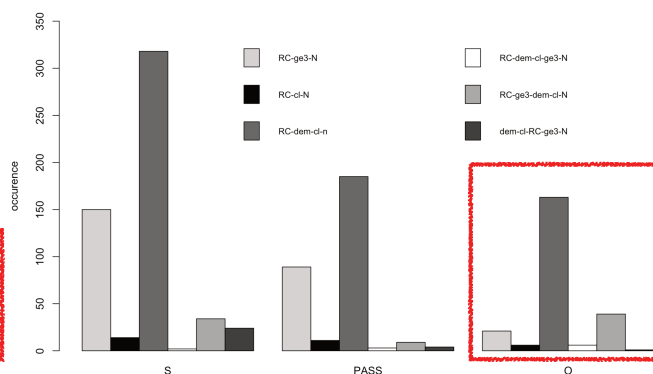
The distributional hierarchy of relative constructions in object relatives is also similar to that in experiment 1, as given in (11):

(11) RC-dem-cl-N > RC-ge3-dem-cl-N > RC-ge3-N > RC-cl-N = RC-dem-cl-ge3-N

Recall that the production of object relatives largely increases in experiment 2 with respect to that in experiment 1 (see chapter 5 in part I). This change is also reflected in the comparison between Graphic 4 and Graphic 6. Moreover, the proportion of relative constructions with a demonstrative and classifier preceding the NP (i.e., RC-dem-cl-N and RC-ge3-dem-cl-N) increase the most in the second experiment.



Graphic 4 Distribution in experiment 1



Graphic 6 Distribution in experiment 2

As for the distribution of relative constructions in the three types of relative clauses, Table 26, 27 and 28 respectively summarise the detailed distribution of each construction in regular subject relatives (S), passivized subject relatives (PASS) and object relatives (O). Graphic 7 illustrates the proportion of each relative construction in each type of relative clause in experiment 2.

type of construction	occurrence	%
RC-ge3-N	150	28
RC-cl-N	14	3
RC-dem-cl-N	318	59
RC-dem-cl-ge3-N	2	
RC-ge3-dem-cl-N	34	6
dem-cl-RC-ge3-N	24	4
RC-N (no-linker)	1	
TOTAL	543	

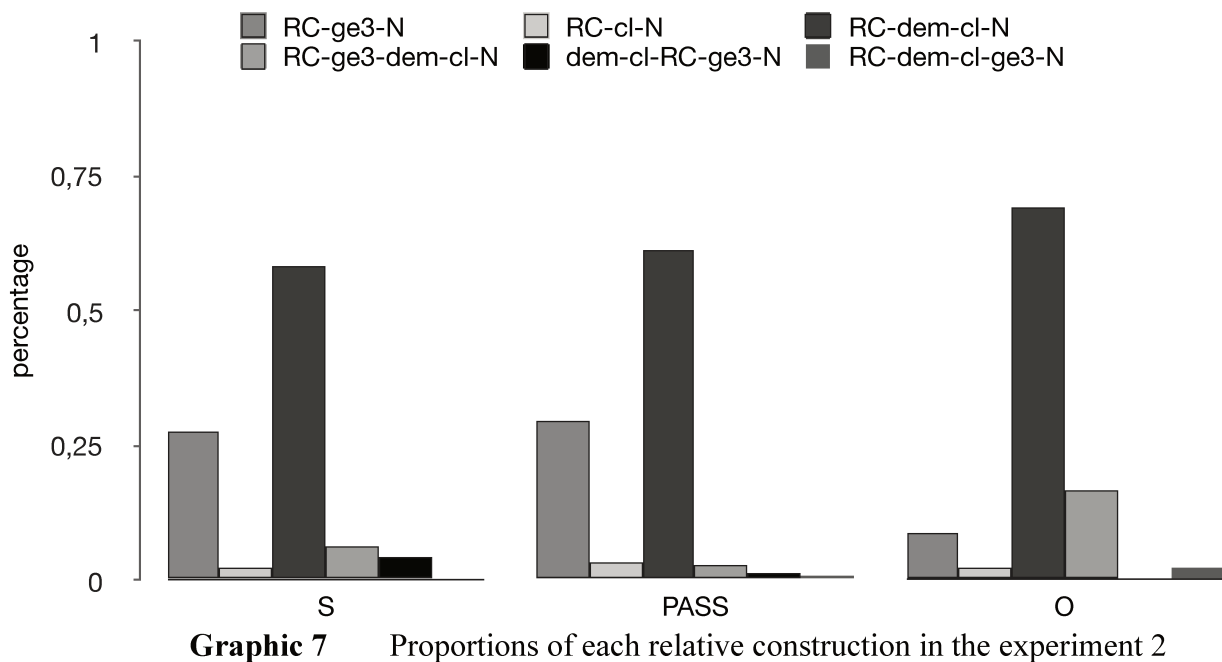
Table 26 Distribution of relative constructions in regular subject relatives

type of construction	occurrence	%
RC-ge3-N	89	30
RC-cl-N	11	4
RC-dem-cl-N	185	61
RC-dem-cl-ge3-N	3	1
RC-ge3-dem-cl-N	9	3
dem-cl-RC-ge3-N	4	1
TOTAL	301	

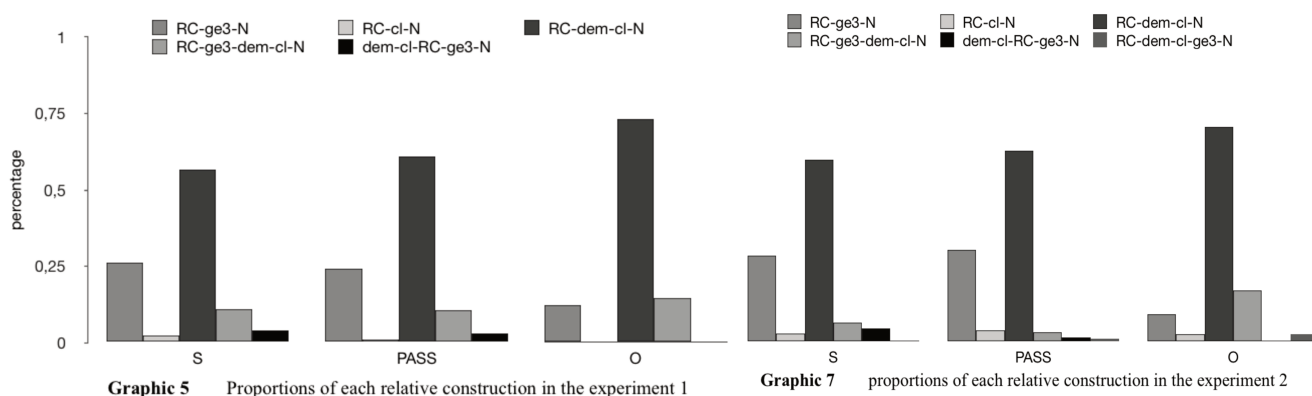
Table 27 Distribution of relative constructions in passivized subject relatives

type of construction	occurrence	%
RC-ge3-N	21	9
RC-cl-N	6	2.5
RC-dem-cl-N	163	69
RC-dem-cl-ge3-N	6	2.5
RC-ge3-dem-cl-N	39	17
dem-cl-RC-ge3-N	1	
TOTAL	236	

Table 28 Distribution of relative constructions in object relatives



In general, the proportion of the various relative constructions in each type of relative clause in this experiment is also similar to what we observed in experiment 1.



Graphic 8 Comparison of the proportion of the relative clauses in the two experiments

4.3 Interm discussion 2

So far, the distribution of relative constructions observed in these two elicited experiments is coherent: the strategy involving demonstrative and classifier (i.e., RC-dem-cl-N) is predominant among all relativization strategies in Cantonese, and this dominance is even stronger in object relatives. The strategy with both *ge3* and the dem-cl string preceding the NP also increases in object relatives. This observation supports our hypothesis previously proposed for experiment 1: opting for a relative with a demonstrative and a classifier immediately preceding the NP is a strategy to avoid or loosen the intervention effect triggered by the subject, which can be a bare noun or a pronoun in our experiments, both corresponding to a CIP (see discussion in Chapter 2). This holds only if the

demonstrative and the classifier are part of the relativized head. We shall discuss this important point in the next chapter.

Talking about the intervention effect, experiment 2 was meant to test whether a feature-based relativized Minimality approach could explain the production of (object) relative clauses in Cantonese. The difference between the results of the first experiment and the results in the two corpus studies pointed to the possibility of a feature intervention effect due to the featural similarity of the arguments (concerning in particular animacy and the nominally restricted status). The second experiment confirms the existence of a featural intervention effect in relative clauses in Cantonese. In particular, animacy intervention appears to have a stronger impact than intervention of [+NP] feature (see section 5.3 and 5.4 in Part I). Furthermore, based on the data observed in the two experiments and the two corpus studies, we proposed a multi-featural account for the intervention effect: *when head and subject contain multiple features, every feature counts; the more matching features between head noun and intervener, the more difficult the construction is* (see section 5.4 in Part I).

Given the observed distribution of relative strategies in different types of relative clauses (S, PASS, O) in experiment 1, we conclude that adding a demonstrative and a classifier preceding the head NP is a strategy to dissimilate the features of the head noun and those of the intervening subject, in order to weaken or avoid the intervention effect. The impact of the pronominal subject in the test in French may also be explained along these lines: since pronominals in French are bare DPs, they lack a [+NP] feature, hence do not trigger an intervention effect when in subject position.

If our multi-featural intervention hypothesis is on the right track, the structural strategy (by adding a demonstrative and a classifier preceding the NP) should interact with other features such as animacy or person. Is this the case? In order to verify this new hypothesis, we should take a look at the distribution of the various relative constructions in the four conditions that we set in experiment 2 (namely, animate full-NPs condition, inanimate object condition, pronoun subject condition and proper noun subject condition) where other features are involved.

4.4 The distribution of relative constructions in the 4 conditions in the Experiment 2

In this section, we only consider the production of object relatives. Before turning to the distribution of the various relative constructions, let us briefly review the featural configurations of arguments in the four conditions, including animacy, person and [+NP] features. The following examples illustrate the set-theoretic configurations of object relatives in 1) animate full-NPs condition, 2) inanimate object condition, 3) pronoun subject condition and 4) proper noun subject condition. The features shared by the relativized object and the intervening subject are marked in bold.

(12) object relative with animate full-NPs:

head noun		subject	
+animate, +3SG, +NP, +Rel		+animate, +3SG, +NP	maximal inclusion ⁸¹
'the sailor	that	the firefighter	is lighting'

(13) object relative with inanimate object:

head noun		subject	
-animate, +3PL, +NP, +Rel		+animate, +3SG⁸², +NP	non-criterial inclusion
'the cabbages	that	the lady	is weighing'

(14) object relative with pronominal subject:

head noun		subject	
+animate, +3SG, +NP, +Rel		+animate, +3SG	non-criterial inclusion
'the firefighter		she	is following'

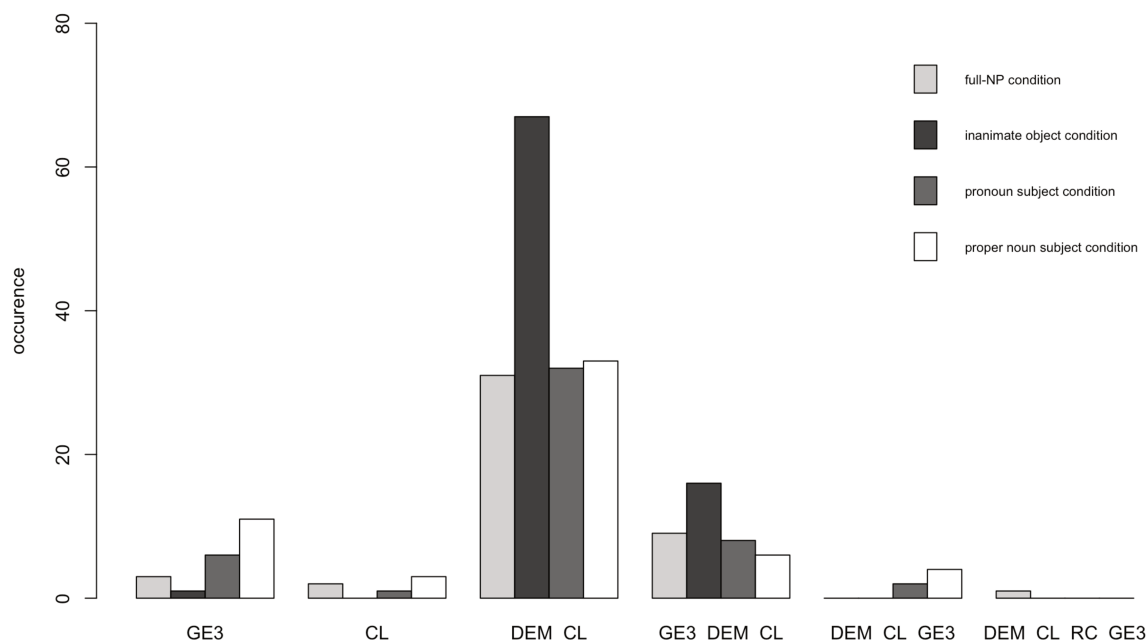
(15) object relative with proper noun subject:

head noun		subject	
+animate, +3SG, +NP, +Rel		+animate, +3SG, +NP	maximal inclusion
'the firefighter		Lea	is following'

Let us look now at the distribution of the various relative constructions, as illustrated in Graphic 9. The x-axis corresponds to the six relative constructions produced in this experiment, the y-axis corresponds to their occurrence, the four bars in each group correspond to the four different conditions set in this experiment.

⁸¹ In the case of relative clauses, maximal inclusion means maximal non-criterial inclusion, since the configuration with criterial inclusion is not legitimated.

⁸² Number feature does not seem to influence the processing of relative clauses in Chinese. Hence only similarity of person counts.



Graphic 9 Distribution of each relative construction in the four different conditions

Recall that the predominant strategy of relativization in the two experiments is the one with a demonstrative and classifier string preceding the head NP (i.e., RC-Dem-Cl-N) and that this strategy is applied even more heavily in object relatives. We consider this to be a strategy to avoid the intervention effect of the subject. According to Graphic 9, however, we observe that object relatives with demonstrative and classifier were found the most in the inanimate object condition; as in the three other conditions, their frequency is more or less constant. The strategy with *ge3* and a demonstrative and classifier string preceding the NP (i.e., RC-*ge3*-Dem-Cl-N) is also considered to be a strategy to avoid or loosen the intervention of the subject. Interestingly, this construction was also found the most in the inanimate object condition. In summary, the choice of the relative strategy seems to cooccur/interact with the (in)animacy endowment of the object in Cantonese. In the strategy with a demonstrative and classifier preceding the head NP, the set-theoretic configuration of featural intervention in the inanimate object condition should be as (16). Notice that [+FP] refers to the presence of one or more functional elements in a nominal, in our case, the demonstrative and the classifier.

(16) object relative with inanimate object in form of RC-dem-cl-N:

head noun		subject	
-animate, +3PL, +NP, +FP +Rel		+animate, +3SG, +NP	non-criterial inclusion
‘the cabbages	that	the lady	is weighing’

(17) = (13) object relative with inanimate object:

head noun		subject	
-animate, +3PL, +NP, +Rel		+animate, +3SG, +NP	non-criterial inclusion
‘the cabbages	that	the lady	is weighing’

If we compare the configuration in (16) with the one corresponding to the configuration set up in the inanimate object condition (repeated in 17), we find that ‘adding’ a demonstrative and a classifier preceding the head NP ([+FP]) increases the featural diversity of the head noun and reduces the similarity of the intervening subject.

In the configuration (17), four features are taken into account in the calculation of intervention (i.e., \pm animate, +3SG, +NP, +Rel). There are two features shared by the relativized object and the intervening subject: the person feature and the [+NP] feature. In the configuration of (16), on the other hand, where a demonstrative and a classifier immediately precede the head noun, although the features shared by the head noun and the subject remain the same, five features are taken into account (i.e., \pm animate, +3SG, +NP, +FP, +Rel). The degree of featural similarity in (17) is higher than the one in (16) (2 out of 4 vs. 2 out of 5). This is consistent with our multi-featural account for the calculation of intervention effect.

4.5 Conclusion

In this chapter, we investigated the distribution of the various relative constructions in the two experiments of elicited production. Six constructions were used in these experiments. In general, the construction with demonstrative and classifier (i.e., RC-Dem-Cl-N) is predominant among the six relative strategies. Besides, similar distributional patterns were observed in both experiments. The two distributional hierarchies respectively corresponding to subject relatives (including regular subject relatives and passivized subject relatives) and object relatives are repeated below:

(18) distributional hierarchy in the subject relatives:

RC-dem-cl-N > RC-ge3-N > RC-ge3-dem-cl-N > dem-cl-RC-ge3-N > RC-cl-N (> RC-dem-cl-ge3-N)

(19) distributional hierarchy in the object relatives:

RC-dem-cl-N > RC-ge3-dem-cl-N > RC-ge3-N > RC-cl-N (= RC-dem-cl-ge3-N)

In comparing the distributional hierarchies in these two types of relative clauses, we assume that the relative constructions with demonstrative and classifier immediately preceding the head NP (i.e., RC-dem-cl-N and RC-ge3-dem-cl-N) are also strategies to avoid or loosen the intervention of the subject. Demonstrative and classifier, which are functional elements having a [+FP] feature,

increase the featural complexity of the head noun and thus reduce the featural similarity between the head noun and the intervening subject. This hypothesis is directly relevant for the question that we raised at the end of the previous chapter: if the [+FP] feature assigned by the relative construction can be a relevant syntactic feature, does it interact with the other features?

In order to address this question, we also investigated the distribution of the relative constructions in the object relatives in experiment 2, where the arguments were varied in four types. The distributional pattern grouped by the relative constructions shows that the relative strategies involving the [+FP] feature seem to co-occur/interact with the endowment of the (in)animacy [+animate] in object relatives (i.e., inanimate object condition) in Cantonese. This supports our hypothesis for the multi-featural account.

However, there are still two questions that need an answer. First, if adding the [+FP] feature in the head noun is an effective strategy to weaken or avoid the intervention of the subject, why the same strategy does not seem to be as ‘effective’ in other conditions? Considering the features involved in the other three conditions (cf. 20, 22 and 23 repeated below), the ‘low’ efficiency of the [+FP] feature in the animate full-NPs condition and the proper name subject condition might be due to the high degree of the featural similarity between arguments in these two conditions: both conditions involve a maximal non-criterial inclusion configuration (cf. 20 and 24). Adding the [+FP] feature in the head noun may reduce the degree of featural similarity between arguments, but comparing to the one in the inanimate object condition (cf. 21), it is still higher (3 out of 5 in the inanimate object condition vs. 2 out of 5 in the animate full-NPs condition and the proper noun subject condition).

(20) object relative with animate full-NPs:

head noun		subject		
+animate, +3SG, +NP, +Rel, (+FP)		+animate, +3SG, +NP		maximal inclusion
‘the sailor	that	the firefighter	is lighting’	

(21) object relative with inanimate object:

head noun		subject		
-animate, +3PL, +NP, +Rel, (+FP)		+animate, +3SG⁸³, +NP		non-criterial inclusion
‘the cabbages	that	the lady	is weighing’	

⁸³ Number feature does not seem to influence the processing of relative clauses in Chinese. Hence only similarity of person counts.

(22) object relative with pronominal subject:

head noun	subject	
+animate, +3SG, +NP, +Rel, (+FP)	+animate, +3SG	non-criterial inclusion
'the firefighter	she	is following'

(23) object relative with proper noun subject:

head noun	subject	
+animate, +3SG, +NP, +Rel, (+FP)	+animate, +3SG, +NP	maximal inclusion
'the firefighter	Lea	is following'

What remains a mystery is that in principle object relatives in the pronoun subject condition (cf. 22) also involve a low degree of feature similarity (2 out of 4) as in the inanimate object condition (cf. 21), the strategy of adding the [+FP] feature in the head noun should be as effective as in the inanimate object condition. However, this is not the case. Moreover, as we mentioned before, pronominal subject does have a positive impact on the production of relative clauses in the French test (see section 5.2 in Part I for the result in the French test). So far, we speculate that this difference might be due to a stronger impact of animacy in Cantonese or due to the interaction between the person feature and the pronominal status of subject. We leave the question open for future discussion.

The second question concerns the relativizer *ge3*. We propose a [+FP] feature to refer to the presence of one or more functional element(s) in a nominal. *Ge3*, being a unit-marking classifier in Cantonese (as Cheng and Sybesma (2009) propose), should also have a [+FP] feature. Does the [+FP] feature of *ge3* participate in the calculation of the intervention effect?

Empirically, if it did, the relative strategy with *ge3* (i.e., RC-*ge3*-N) should provoke some facilitation effect in the production of object relatives, just as the one we observed with demonstrative and classifier does. However, this facilitation effect was not observed in our data. On the other hand, the construction is found more in the two types of subject relatives (S and Pass) with respect to the object relatives (O) (see Graphic 5 and 7).

Theoretically, if *ge3* participated in the calculation of the featural relativized minimality, it should be either 1) part of the head noun; or 2) (part of) the intervener. It is not likely to be part of the head noun, since unlike demonstrative and classifier, which can select an NP to form a complex nominal

(i.e., Dem-Cl-N⁸⁴), *ge3* is not able to form a nominal with an NP without the presence of a filled specifier⁸⁵ (i.e., **ge3*-N). It is not likely to be part of the subject intervener either, and for the same reason. We thus conclude that *ge3* does not participate in the calculation of the intervention effect.

In general, in order to be able to establish which features count for intervention and how featural Relativized Minimality is computed in Cantonese, it is indispensable to understand how relative clauses derive in Cantonese. We are going to address this question in the next chapter reviewing on the basis of Cantonese data the three main approaches to relativization that have been proposed in the literature: the matching analysis, the head raising analysis and the double-headed analysis proposed by Cinque (2003, 2006, 2008, 2015, a.o.).

⁸⁴ Discussion of the construction of Dem-Cl-N phrase is in section 1.4 in Part II.

⁸⁵ See section 3.2 and 3.3 in Part II.

Chapter 5 The derivation of relative clauses in Cantonese

In this chapter, we are going to discuss the derivation of relative clauses in Cantonese. The initial questions are 1) where the head originates; and 2) how the relative clause merges with the head NP. There are mainly two analyses in the framework of generative grammar: the Matching derivation (Partee 1975; Carlson 1977; Chomsky 1977; Jackendoff 1972; Borsley 1997; Safir 1999; Sauerland 1998, 2002 among others) and the Raising derivation (Vergnaud 1976, Kayne 1994, Bianchi 2000, Bhatt 2002, Cecchetto and Donati 2015, Sportiche 2017 among others).

The matching derivation argues that *the head NP is merged external to the relative clause CP. Since the head NP is never inside the relative clause CP, it cannot be reconstructed into a relative clause internal position* (Bhatt 2002: 44), the head NP is thus only indirectly connected to the gap internal to the relative clause, through the mediation of a matching (null or deleted) operator. The raising derivation argues that *the head NP originates inside the relative clause CP, it is possible to reconstruct it inside the relative clause and interpret it in a relative clause internal position* (Bhatt 2002: 45). Whether the head NP can be reconstructed within the relative clause seems to an important criterion to decide whether the relative clause derives by head raising or by matching.

Among various proposals, some argue that the derivation of relative clauses is one and unique: there is only one way to derive a relative clause, either by head raising or by matching (Carlson 1977; Grosu and Landman 1998; Sportiche 2017; a.o.); others argue that the derivation depends, and that different types of relative constructions derive in different ways according to their ‘behaviour’ across languages or even within the same language (Afarli 1994; Del Gobbo 2003; Aoun & Li 2003; Cinque 2003, 2006, 2008; a.o.). In the latter proposals, nevertheless, the head reconstruction effect is still a crucial criterion to determine the derivation strategy of relative clauses.

Cinque (2003, 2006, 2008, 2015) proposes a double-headed analysis of relative clauses, which involve both a raising and a matching strategy and is claimed to apply to all types of relative clauses (prenominal, postnominal and correlative; externally headed, internally headed and headless). Under Cinque’s proposal, all relative clauses have the same underlying structure in which the relative clause is merged in a prenominal position and the different superficial configurations result from different derivational histories.

What about the derivation of relative clauses in Cantonese? As presented in the previous chapter, relative clauses in Cantonese can exhibit up to six different constructions. Moreover, these constructions seem to have different characteristics: in the constructions where a demonstrative and a classifier immediately precede the head NP (i.e., RC-dem-cl-N, RC-*ge3*-dem-cl-N), the demonstrative and the classifier appear to be part of the head noun phrase, hence might participate in the head raising or matching. On the other hand, in the constructions where only a relativizer *ge3* is present (i.e., RC-*ge3*-N), *ge3* does not seem to be part of the head noun phrase. Furthermore, in previous studies about the semantic status of relative clauses in Chinese (Chao 1968; Hashimoto 1971; Huang 1982; Lin 2003; Del Gobbo 2003, 2004, 2005; Lin & Tsai 2015), the different constructions were claimed to have a different semantic status: Chao (1968) and Hashimoto (1971) claim that relative clauses following a demonstrative and classifier (i.e., dem-cl-RC-*de*-N) are descriptive (non restrictive), while those preceding the demonstrative and classifier (i.e., RC-*de*-dem-cl-N) are restrictive. Lin (2003) argues that relative clauses with a demonstrative⁸⁶ (no matter whether preceding or following) are restrictive. Cheng and Sybesma (2009) argue that relative clauses preceding a Dem-Cl-N phrase or a Num-Cl-N phrase involve an appositive structure and may also have an appositive reading. In our experiments, where the context only allows a restrictive reading, six relative constructions were observed. This means that they can all have a restrictive interpretation. Considering the complexity of the discussion about the appositive relative clauses in Chinese and also because of the lack of sufficient empirical data in our studies⁸⁷, we decide to concentrate on relative clauses with a restrictive reading. Do the six constructions observed in Cantonese derive similarly or differently? Do they derive by raising or by matching?

We are going to address these questions in this chapter. This chapter is organized as follows: in section 5.1, we briefly review the three approaches about the derivation of relative clauses: the raising derivation, the matching derivation and the double-headed derivation. In section 5.2, we review three adaptations of these approaches in Chinese: the raising derivation in Simpson (2001, 2002); the matching derivation in Aoun and Li (2003); the double-headed derivation in Del Gobbo (2010). We draw an analogy with relative clause in Cantonese after presenting each proposal in Mandarin. In section 5.3, we present an acceptability judgment test in order to investigate whether

⁸⁶ The term that Lin (2003) employs is ‘pre-determiner relative clauses’ and ‘post-determiner relative clauses’

⁸⁷ According to Lin (2003: abstract), *when the antecedent of a relative clause is a proper name, the non-restrictive interpretation is allowed if the relative clause describes a more or less permanent or stable property*. In our corpus studies, relative clauses with a proper noun head were indeed observed, however their occurrence is rare (4/252 in TV data; 5/284 in HKCanCorp).

there is a head reconstruction effect in relative clauses in Cantonese. A conclusion is given in section 5.4.

5.1 The main analyses

5.1.1 The Matching derivation

The main idea of the matching analysis is that the head noun is generated outside the relative clause (external head) and an element generated within the relative clause (internal head), which may or may not contain an NP identical to the head noun, moves to the edge of the relative clause ([Spec, CP]) and matches with the external head noun in meaning or in form. Under the matching approach, the relative clause is adjoined to the head NP.

As Pankau (2018) remarks, the term Matching is quite ambiguous in the literature: it either refers to a strong matching relation by which the head noun and the relativized element contain an identical NP (Schachter 1973: 31; Salzmann 2006, 2017; Bhatt 2015; Cecchetto and Donati 2015: 55) (which results in the deletion of the internal head in the PF), or to another weaker relationship by which the head noun and the relativized element are coreferential but do not necessarily contain an identical NP (Sauerland 1998, 2003; Bianchi 1999: 34; Aoun and Li 2003: 99; Cinque 2015). The Head External Analysis (Chomsky 1977, 1982; Jackendoff 1977; Boef 2013; Webelhuth et al. 2018) is an analysis of the second kind (see Pankau 2018:191). The following examples illustrate the two mechanisms that have been proposed under the label of Matching Analysis in the literature.

(1) the book that Modiano writes

a. Strong Matching Analysis:

[DP the [NP [NP book]_i [CP book_i [C' that [TP Modiano writes t_i]]]]]

b. Weak Matching Analysis (Head External Analysis):

[DP the [NP [NP book]_i [CP Op_i [C' that [TP Modiano writes t_i]]]]]

(1') the book which Modiano writes

a. Strong Matching Analysis:

[DP the [NP [NP book]_i [CP [DP which book_i]_j [C' [TP Modiano writes t_j]]]]]

b. Weak Matching Analysis (Head External Analysis):

[DP the [NP [NP book]_i [CP which_i [C' [TP Modiano [VP writes t_i]]]]]]]

In the strong Matching analysis (cf. 1a, 1'a), there are two identical NPs 'book', one external and one internal to the clause. Sportiche (2017) calls this type of Matching "strong matching". In the Weak Matching analysis 2 (cf. 1b, 1'b), the internal relativized element is either a null operator in (1b) or the relative pronoun 'which' in (1'b). In Sportiche (2017), it is called "weak matching".

Sportiche provides a more general definition of the matching analysis unifying the weak matching and the strong matching: *In the matching derivation for relatives, relativization brings a phrasal XP to the periphery of the relative clause, call this the internal head, where it matches an independently merged external head* (Sportiche 2017:6).

5.1.2 The Raising/Promotion derivation

The main idea of the raising or promotion analysis is that the head noun of the relative clause is generated inside the relative clause within a DP headed either by a *wh*-word (relative pronoun) or by an empty determiner. This relativized DP raises to [Spec, CP] leaving a trace. In many languages (such as Romance and Germanic languages), the head NP further moves outside the DP to a higher position. The following examples illustrate the raising/promotion derivation. The arrow in full line corresponds to the raising of the relativized DP, and the arrow in dotted line corresponds to the projection of the head NP.

(2) the book that Modiano writes

raising analysis: [DP the [XP [NP book]_j] [CP [DP Op t_j]_i] [C' that [TP Modiano writes t_i]]

(2') the book which Modiano writes

raising analysis: [DP the [XP [NP book]_j] [CP [DP which t_j]_i] [C' C° [TP Modiano writes t_i]]

Two questions arise under the raising/promotion derivation. The first concerns the motivation of the movement of the NP after the entire DP has moved to [Spec, CP]. What is the motivation of this further step? The second question concerns the position of the moved NP: does the NP head a new projection and label it as an NP (as in Schachter 1973; Vergnaud 1974, 1985; Bhatt 2002; Henderson 2007; Heycock 2014)? Or does it move to another left peripheral position within the

relative clause, which keeps the CP label (as in Kayne 1994; Bianchi 1999, 2000; de Vries 2002)? This layer is tagged as XP in (2) and (2') for the sake of being neutral to this issue.

Donati and Cecchetto (2011) and Cecchetto and Donati (2015) provide a principled and unified answer for these two questions: for the motivation problem, they define the movement of the NP as a *selection-driven* movement (Cecchetto and Donati 2015: 59). Its motivation is to satisfy the sectional requirement of the external determiner ('*the*' in the cases of 2 and 2'). For the landing site problem, they argue that the movement of the head noun itself relabels the CP into an NP.

5.1.3 Raising vs. Matching

In the last two subsections, we have reviewed different proposals concerning the matching and the raising derivation. In this subsection, we are going to review the debate between the raising derivation and the matching derivation: what are the motivations for these two analyses? And what are their advantages and disadvantages?

The main evidence in favour of a raising analysis concerns the reconstruction of the external head. This reconstruction can be made visible with respect to several phenomena: idiomatic interpretation, binding phenomena and scope interpretation.

Idiom chunks are phrases that can only be interpreted together as a whole, as a lexical entry (Bhatt 2002, Donati and Cecchetto 2015). They are typically syntactically not separable. This is shown in (3) with the English idiom *to make headway*.

- (3) a. We make headway.
b. # (The) headway was satisfactory.
c. the headway that we made \approx the progress that we made

(3a) contains an idiom *to make headway* which means 'to make progress'. The object of the idiom, *headway*, is not capable of expressing the meaning of progress when it stands in isolation from the rest of the idiom. This is why (3b) cannot be interpreted idiomatically. However, the idiomatic interpretation of 'make headway' is maintained in an object relative clause with the object 'headway' being relativized (3c). This shows that the external head must be interpreted in the position of the gap within the relative clause where the other idiom chunk is found.

Reconstruction is also observed in object relatives involving binding configurations (Chomsky 1986). Principle A of the binding theory (Chomsky 1986) prescribes that an anaphor must be bound by its antecedent in a local domain (in the same clause), as (4) shows.

- (4) a. Picasso_i takes a picture of himself_i.
b. *Picasso_i said that Miro had taken a picture of himself_i.

In (4a), the anaphor *himself* is c-commanded by its antecedent *Picasso* in a matrix clause, namely locally bound, and the sentence is grammatical. In (4b), *himself* is not locally bound by its antecedent *Picasso*, since *himself* and *Picasso* are not in the same clause, *Picasso* is in the matrix clause, *himself* is in the complement clause, therefore the sentence is ungrammatical. The grammaticality of (5) shows that the origin of *himself* is within the relative clause and that the head noun *picture of himself* is interpreted in the gap position. Otherwise, the expression should be ungrammatical due to the violation of Principle A as in (4b).

- (5) the [picture of himself]_i that Picasso_i takes _____j

The same kind of effect can be observed with configurations relevant for Principle B.

- (6) a. *Picasso_i takes a picture of him_i.
b. *the [picture of him]_i that Picasso_i takes _____j

(6a) illustrates Principle B of the binding theory: a pronoun (*him*) cannot have a local antecedent (*Picasso*). In (6b), if the head noun *picture of him* were base-generated in the external position, there should be no Principle B violation, since the pronoun *him* is not locally bound by its antecedent *Picasso*. The ungrammaticality of (6b) shows again the reconstruction of the head noun in the gap position: only if the head noun reconstructs, *him* is locally bound by *Picasso*, a violation of Principle B arises.

Unlike reconstruction effects concerning Principle A and Principle B configurations, which are very clearly observable in relative clauses, the situation with Principle C is more controversial.

Let us review first the definition of Principle C in the binding theory (Chomsky 1986). A referential expression cannot have an antecedent that c-commands it, as illustrated in (7).

(7) *He_i likes a picture of John_i.

In (7), *John* and *he* are coreferent. However *he*, being the subject of the clause, c-commands *John*. This makes the sentence ungrammatical. In the relative clause in (8), the R-expression *John* is located higher than *he*. If this sentence is grammatical, it means that *John* is indeed located in a position higher than *he* in the underlying structure, which means that the head containing it (*the picture of John*) originates **outside** the relative clause. If (8) is ungrammatical, it means that *he* c-commands *John* at a certain point of the derivation, hence that the head NP *picture of John* originates **inside** the relative clause, where it reconstructs causing a Principle C violation.

(8) (?) the [picture of John_i]_j that he_i takes _____j

In the literature, an asymmetry between questions and relative clauses concerning Principle C effects was observed by Vergnaud (1974), Munn (1994) and discussed later by Safir (1999), Bianchi (1999), Sauerland (2003), Cecchetto (2006) and Cecchetto and Donati (2015) among others: relative clauses such as (8) appear to be only slightly degraded, while a question involving the same configuration (see 9) is fully ungrammatical.

(9) *Which [picture of John_i]_j does he_i take _____j ?

The contrast between (8) and (9) is a challenge for the raising analysis: if the head NP originates in the gap position within the relative clause, a violation of Principle C should arise in (8) as it arises in (9). The acceptability of (8) is taken as evidence supporting a matching derivation (see Sauerland 1998, 2003, Hulsey and Sauerland 2006).

Cecchetto and Donati (2015) argue that the grammaticality of (8) can be explained by the late merger of the modifier *of John* after N-raising: since the modifier is never present in the gap

position within the relative clause⁸⁸, *John* in the modifier is never bound by *he*. Therefore, no Principle C violation is involved. Under the analysis of Cecchetto and Donati (2015), (8) should be revised as (10).

(10) the picture_j of John_i that he_i takes _____j

As for the reason why the modifier *of John* does not late Merge in (9), their explanation is that in relative clause, it is the raising N (*picture*) that labels the structure (in order to satisfy the selectional requirement of the external determiner, as mentioned above), and *this forces the late Merge of any modifier of the noun* (Cecchetto and Donati 2015:70). In interrogatives like (9), the *wh*-phrase does not label the structure, and late Merge of the modifier is not obligatory. As a consequence, a total reconstruction of *picture of John* may occur, triggering a violation of Principle C.

Another evidence supporting the reconstruction effect of the head noun in relative clauses is the scope interpretation.

(11) the two articles_i that every linguist reads _____i ($2 > \forall$; $\forall > 2$)

An interpretation of (11) is that there are two articles and every linguist reads these two articles. But the inverse scope reading, by which every linguist reads some two articles is also available. This means that the numeral quantifier *two* in the head NP is under the scope of the universal quantifier *every* that is within the relative clause, namely *two* is c-commanded by *every* in the relative clause. Given that the relative clause is an island and blocks quantifier raising, the only explanation for this scope interpretation is that the head NP containing the numeral quantifier *two* reconstructs in the gap position within the relative clauses.

Let us turn now to the matching analysis. The main evidence supporting the existence of matching derivation is extraposition (Hulsey and Sauerland 2006), illustrated in (12).

(12) I read the book yesterday that Patrick gave me.

⁸⁸ This suggestion is reminiscent of Bhatt (2002)'s, who suggests that only the NP can reconstruct within the relative CP since only the NP raises.

In (12), the continuity between the external head noun *book* and the relative clause is interrupted by *yesterday*. The existence of extraposition challenges the raising derivation, particularly the versions of Kayne (1994) and Bianchi (1999) where the external head is part of the relative CP. Hulseley and Sauerland (2006), following Fox and Nissenbaum (2000), suggest that extraposed relative clauses should be late-merged to the head NP. In the spirit of Fox and Nissenbaum (2000), only an adjunct can be late-merged. However, later merger of CP cannot be compatible with a raising derivation, since the head NP itself originates from that CP.

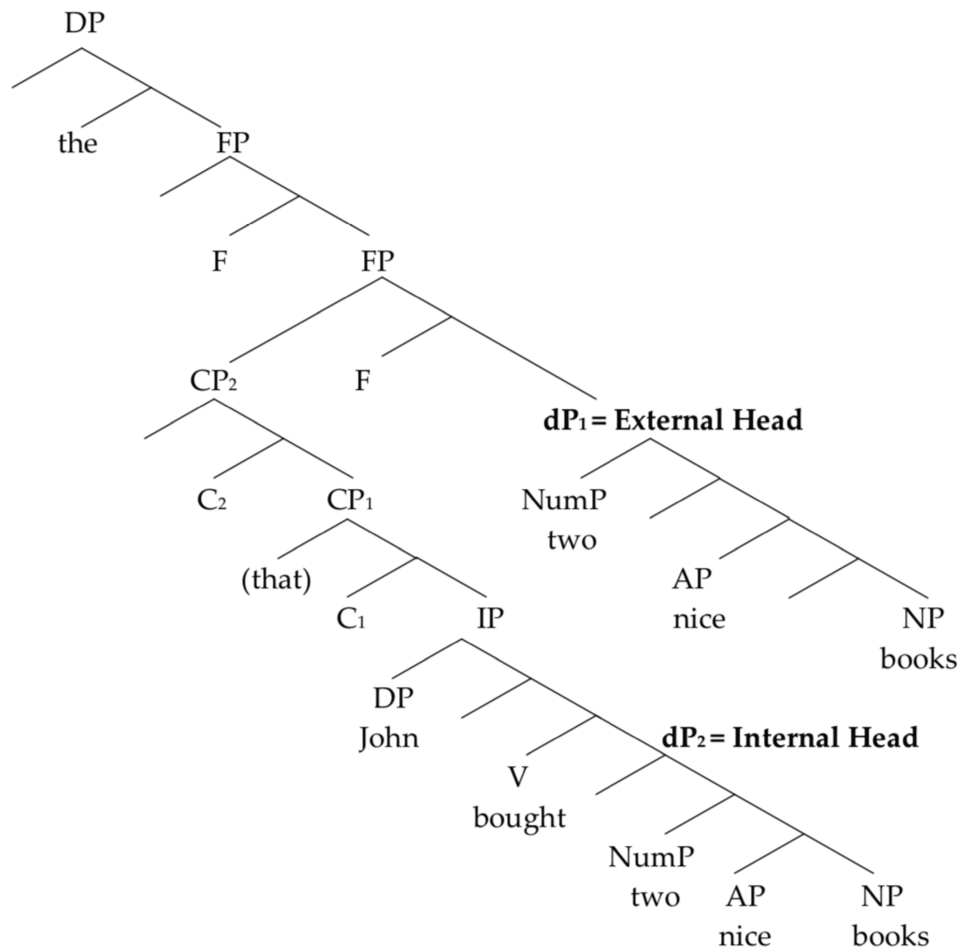
5.1.4 Raising and Matching

As shown above, both the raising and the matching derivation have some piece of evidence supporting their existence. Some linguistics (Afarli 1994; Del Gobbo 2003; Aoun & Li 2003; Cinque 2003, 2006, 2008; a.o) suggest relative clauses might be derived by head raising or through matching according to their behaviour in the language.

In this subsection, we are going to review only one of these proposals. Cinque (2003, 2006, 2008, 2015, a.o.) proposes a double-headed derivation of relative clauses which is claimed to be able to analyse all types of relative clauses cross-linguistically (prenominal, postnominal and correlative; externally headed, internally headed and headless). Under this proposal, all the nominal structures containing a relative clause have the same underlying template, in which the relative clause is merged into a functional projection domain (FP) in a pre-nominal position. This position is above weak determiners (such as Numeral, indefinite article) and below strong determiners (such as definite article, demonstrative and universal quantifier). The following example illustrates the underlying template of a relative clause with the double-headed analysis.

(13) a. the [two nice books]_{*i*} (that) John bought ____ _{*i*}

b. underlying structure of (13a)



(= (3) in Cinque 2015: 4)

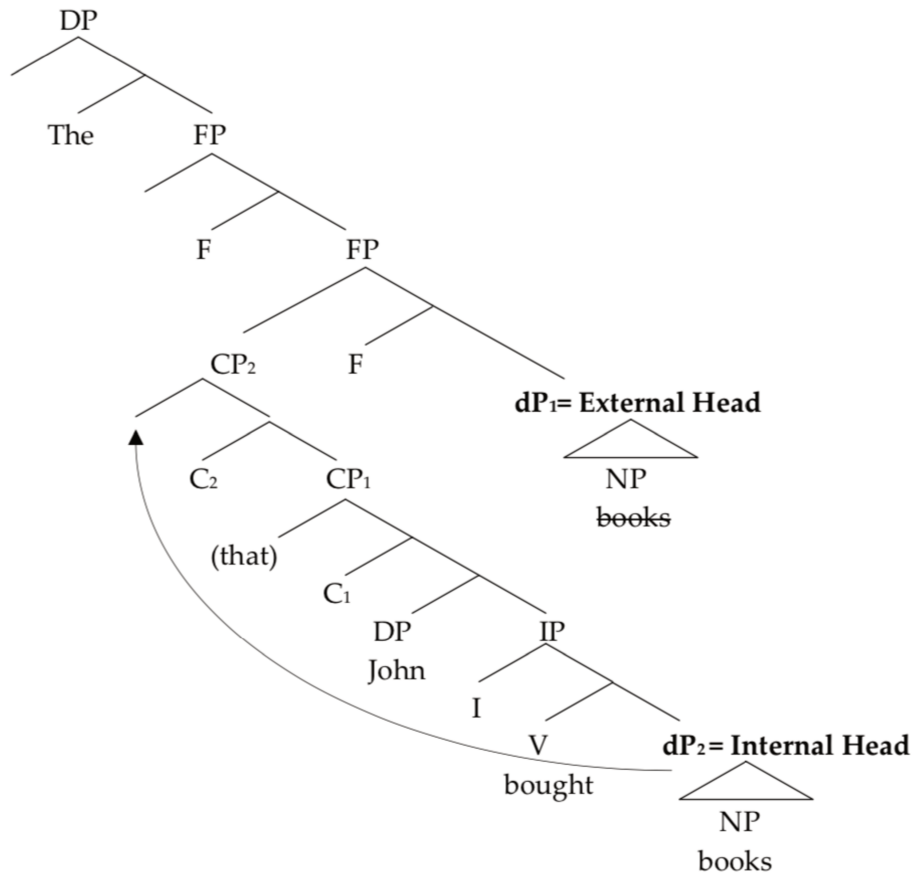
Under the double-headed analysis, there are two heads in the underlying structure of a relative clause: an internal head and an external head. Internal head is a dP^{89} base-generated within the relative IP (dP_1); external head is another dP (dP_1) which is identical to the internal head and base-generated as the complement of the functional projection (FP) in the main clause (Del Gobbo 2010: 389, following Cinque 2003, 2006, 2008). The relative clause (CP_2) containing the internal head (dP_2) is externally merged in the specifier position of the functional projection (FP) above the internal head (dP_1).

In relative clauses involving a head reconstruction effect, the internal head (dP_1) raises to the specifier of the highest CP ([Spec, CP_2]) which c-commands the external head (dP_2), and deletes the external head on the basis of identity. Since the internal head is base-generated within the

⁸⁹ According to Cinque (2003, 2006, 2008), the difference between dP and DP is that dP includes numerals and attributive adjectives (weak determiners), while DP hosts determiners and demonstratives (strong determiners) (Del Gobbo 2015, footnote 2:388).

relative clause, it can reconstruct in its original position. The following example illustrates the ‘raising derivation’ under Cinque’s analysis.

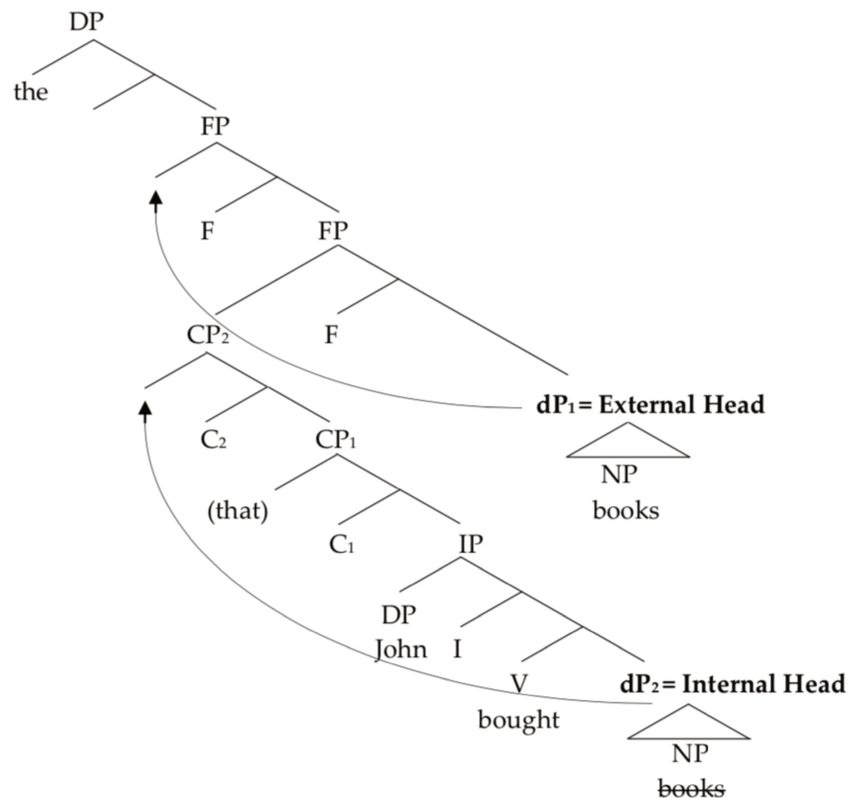
(14) raising derivation



(= (4) in Cinque 2015:5)

As for the relative clauses derived by matching, which do not involve any head reconstruction effect, the derivation requires one more step: after the raising of the internal head (dP2) to the [Spec, CP2] position, the external head (dP1) raises to the specifier position of the functional projection ([Spec, FP]) which c-commands the raising internal head (dP2) and deletes it. Since the remaining external head (dP1) is base-generated outside the relative clause, it cannot reconstruct within the relative clauses. The following example illustrates the ‘matching derivation’.

(15) matching derivation



(= (5) in Cinque 2015: 6)

5.1.5 Summary

In the previous subsections, we have briefly reviewed two main approaches for the derivation of restrictive relative clauses: the raising and the matching analyses. Whether a relative clause involves raising or matching derivation relates to whether the head NP can reconstruct within the relative clause: if it can, it is base-generated in the gap position within the relative clause and undergoes movement(s) to the external position; if it cannot, it is base-generated in the external position. As for the question of how the relative clause is merged with the head NP, it is adjoined to the head NP under the matching derivation; under the raising derivation, the head NP is internally merged (move) in the specifier position of the relative CP, and the relative CP is the complement of the external determiner D.

The main evidence supporting the existence of a raising derivation is the head reconstruction effects. The evidence supporting the existence of a matching derivation is the extraposition of relative clause.

In order to capture both the empirical facts supporting the raising derivation and those supporting the matching derivation, Cinque (2003, 2006, 2008, 2015) proposes a unified underlying structure for relative clauses with the presence of two heads: an internal head and an external head. A ‘raising’ derivation is realized by the raising of the internal head to a position where it can c-command the internal head, followed by a deletion of the external head. A ‘matching’ derivation is realized by the raising of the internal head to the periphery of the relative clause ([Spec, CP]) followed by the raising of the external head to a higher position ([Spec, FP]) where it can c-command the raising internal head and delete it.

A ‘matching’ derivation is realized by the raising of the internal head to the periphery of the relative clause ([Spec, CP]) following by the raising of the external head to a higher position ([Spec, FP]) where it can c-command the raising internal head. The raising external head later deletes the raising internal head by identity. Since the remaining external head noun is generated outside the relative clause, there is no head reconstruction effect under this derivation. Moreover, based on this unified underlying template of relative clauses, all type of relative structures can be derived by different strategies, such as movements of heads, movement of CP/FP and deletion of the lower copy⁹⁰.

So far, the three approaches reviewed in the previous subsections are based on data in English or Romance languages. In the next section, we are going to review the adaptation of these three approaches to Mandarin Chinese: the raising derivation proposed by Simpson (2001, 2002); the matching derivation proposed by Aoun and Li (2003) and the double-headed derivation proposed by Del Gobbo (2010).

⁹⁰ The deletion strategy applied in the double-headed analysis is consistent with the deletion strategy in the early version of matching analysis (Schachter 1973; Lees 1960, 1961; Chomsky 1965; Montague 1974; Partee 1975). More details about derivation of different relative structure, see Cinque (2015).

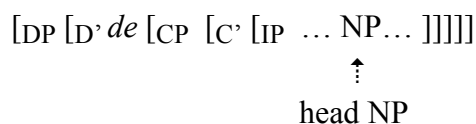
5.2 Review of the literature: the main analyses for Chinese

5.2.1 Simpson (2001, 2002): an antisymmetry analysis

In section 3.2, we have presented Simpson's proposal for the structure of nominal modification in Chinese. Let us briefly review his main proposals and then we are going to draw an analogy of the raising derivation in Cantonese.

Simpson (2001, 2002) argues that *de* is an enclitic determiner D that must attach to a modifying element in its specifier position. He also argues that all NP modification constructions can be analysed in a unitary way in a D-CP configuration as in the classical antisymmetry analysis for relative clauses (Kayne 1994). The underlying structure of a relative clause and its derivational is summarized below:

(16) underlying structure of a relative clause



(17) derivation

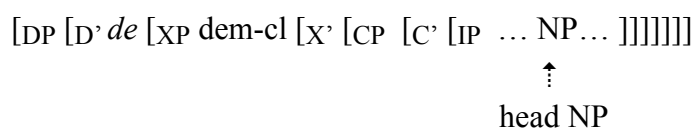
a. the head NP raises to [Spec, CP]: $[\text{DP} [\text{D}' \textit{de} [\text{CP} \text{NP}_i [\text{C}' [\text{IP} \dots t_i \dots]]]]]$

b. the remnant IP raises to [Spec, DP]: $[\text{DP} [\text{IP} \dots t_i \dots]_j [\text{D}' \textit{de} [\text{CP} \text{NP}_i [\text{C}' t_j]]]]$

As shown in (16) and (17), the head NP originates within the relative clause and raises to the [Spec, CP] position. The remnant IP then raises to the [Spec, DP] position due to the enclitic properties of *de*. Under this derivation, the head NP is expected to be able to reconstruct in the gap position within the relative clause.

Simpson (2001, 2002) also discusses the derivation of the relative construction with a demonstrative and a classifier. The starting point is the structure below.

(18) underlying structure of a relative clause with demonstrative and classifier



(22) derivation

- a. DP1 raises to [Spec, CP2]: [DP2 [D2' *de* [CP2 DP1 [C' [IP2 ... *t*_{DP1}...]]]]]
- b. IP2 raises to [Spec, DP2]: [DP2 [IP2 ... *t*_{DP1}...] [D2' *de* [CP2 DP1 [C2' *t*_{IP2}]]]]]
-

Notice that in this derivation, a full DP1 can raise and thus eventually reconstruct within the relative clause. This is a challenge to the claim of Bhatt (2002) that only NPs can raise out of the relative clause, or to the even stricter condition posited by Cecchetto and Donati (2015), by which it is only the head N that raises out in the relativization.

As discussed in details the subsection 3.4, Simpson’s proposal (2001, 2002) unifies the derivation of all nominal modification constructions in Chinese. Let us now try and extend his analysis to the derivation of relatives in Cantonese. Consider first the construction with *ge3* which is taken as the counterpart of *de* in Mandarin. We suggest that the same process schematized as in (17) might derive this construction. Hence, the derivation process can be as follows, illustrated with an object relative:

(23) RC-*ge3*-N

ngo5 zung1ji3 ___ i ge3 zok3 gaa1i
 1SG like GE3 writer
 ‘(the) writer that I like’

(24) derivation of (23)

- a. head NP raises to [Spec, CP]: [DP [D' *ge3* [CP zok3 gaa1i [C' [IP ngo5 zung1ji3 *t*_i]]]]]
- b. IP raises to [Spec, DP]: [DP [IP ngo5 zung1ji3 *t*_i]] [D' *ge3* [CP zok3 gaa1i [C' *t*_j]]]]]
-

As for the constructions with a demonstrative and a classifier preceding or following the relative clause, an extension of Simpson’s analysis would look like the following:

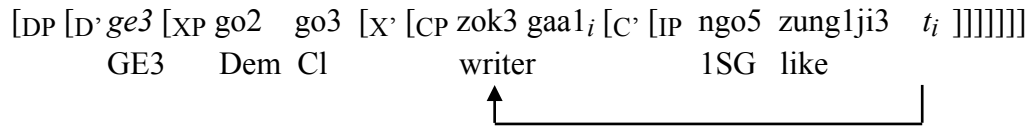
(25) Dem-Cl-RC-*ge3*-N

go2 go3 ngo5 zung1ji3 ___ i ge3 zok3 gaa1i
 Dem Cl 1SG like GE3 writer
 ‘the/that writer that I like’

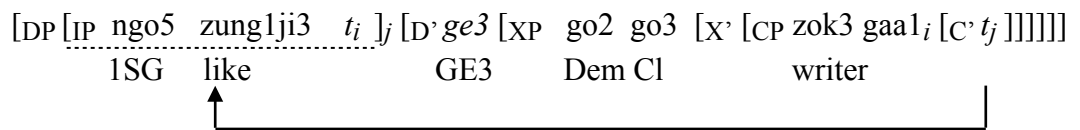
without *ge3* in a raising analysis? A tentative derivation in this spirit is illustrated below on the basis of (28).

(29) possible derivation of RC-Dem-Cl-N

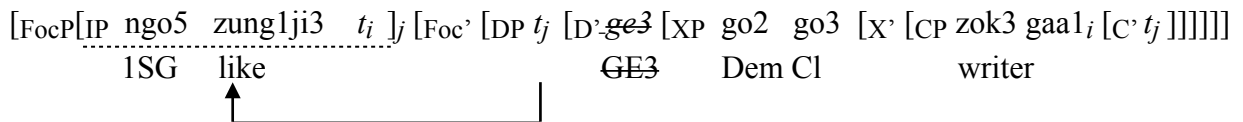
a. NP head raises to [Spec, CP]



b. IP raises to [Spec, DP]



c. IP raises to [Spec, FocP] and *ge3* is deleted at PF



This derivation does not seem to violate any constraint on movement, and the hypothesis that *ge3* is only superficially absent because of a deletion at PF (Cheng and Sybesma 2009) appears to be compatible with a raising derivation.

Summarizing so far, we have shown that the raising analysis can successfully derive the four relative constructions that are most attested in Cantonese, and that we found the most in our two experiments.

An important question in the derivation of relative clauses in Cantonese is the status of the Dem-Cl sequence in relation to the head NP. In Simpson's analysis, the sequence does not form a constituent with the head NP at any step of the derivation. In chapter 4, we observed that relative constructions with demonstrative and classifier immediately preceding the head NP (i.e., RC-dem-cl-N and RC-*ge3*-dem-cl-N) are the main strategies used in our production experiments to form object relatives. We explained this bias towards these types by assuming that demonstrative and classifier, which are both functional elements containing a [+FP] feature, may increase the featural complexity of the head noun, therefore reduce the intervention effect of the subject. If our hypothesis is on the right track, demonstrative and classifier should be part of the head noun.

language displaying head-initial relative constructions, such as English or Lebanese Arabic, relatives involve a complementation structure; in a languages displaying head-final relatives, relative clauses involve adjunction (Aoun and Li 2003: 96).

As mentioned in the previous chapter, whether a relative construction derives by raising or by matching is manifested by whether the head noun can reconstruct. Aoun and Li begin their investigation about the structure and derivation of relative clauses in Chinese by testing the reconstruction effects in relative constructions.

They report that head reconstruction effects may occur in relative clauses in Chinese involving Principle A configurations and idioms. The following examples illustrate these reconstruction effects.

(31) relative clause involving reflexive (principle A configuration)⁹¹

a. Zhangsan_i kai ziji_i de che lai.
 zhangsan drive self DE car come
 ‘Zhangsan drives over his own car’

b. [[Zhangsan_i kai ____j lai de] ziji_i de che]_j
 zhangsan drive come DE self DE car
 ‘his own car that Zhangsan drives over’

(adapted from (1) in Aoun and Li 2003: 132)

(32) relative clauses involving an idiom

[ta chi ____i de] cu
 he eat DE vinegar
 Lit. ‘the vinegar that he eat’ (*chi cu* ‘eat vinegar’ means to be jealous)
 ‘his jealousy’

(adapted from (1) in Aoun and Li 2003: 132)

⁹¹ The original sentence in Aoun and Li (2003) is given as follows:

- (i) a. wo jiao zhangsan quan mei-ge-ren_i kai ziji_i de chezi lai
 I ask Zhangsan persuade every-CL-person drive self DE car come
 ‘I asked Zhangsan to persuade everyone to drive self’s car over.’
 b. [[wo jiao zhangsan quan mei-ge-ren_i kai t lai de] ziji_i de chezi]
 I ask Zhangsan persuade every-CL-person drive come DE self DE car
 ‘self’s car that I asked Zhangsan to persuade everyone to drive over’

Original examples in Aoun and Li (2003) involve embedded clause, antecedent modified by universal quantifier ‘*mei*-every’, complex verbal structure (e.g. *kai lai* - drive come - ‘drive over’) and double embedded relative clause. For the sake of simplicity, the examples in this subsection are simplified.

The examples above show that there might be some constraints for head reconstruction in Chinese. Given the interpretation difference between (33a) and (33b), it is tempting to infer that the unavailability of head reconstruction is due to the presence of a universal quantifier. However, this is not the case: scope inversion is possible in a matrix clause containing *dou*.

- (34) mei-ge-ren (dou) hui kan san-ben shu
 every-CL-person all will read three-CL book
 ‘Everyone will read three books’ ($\forall > 3; 3 > \forall$)

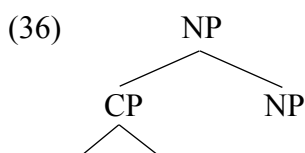
Aoun and Li then propose that the unavailability of the reconstruction effect in (33a) is rather due to the numeral quantifier (in this case a QP). They propose that *QP as a head of a relative clause does not reconstruct to interact with another QP inside the relative clause* (Aoun and Li 2003:137). Given that reconstruction is indeed observed in other cases (with idiom and binding configurations), they suggest that *only when the head itself is a QP, scope reconstruction is not available* (Aoun and Li 2003:137). Their observations concerning reconstruction in Chinese relatives are summarized below.

(35) Availability of reconstruction in Chinese relative constructions:

- a. Reconstruction is possible for binding relations involving anaphora, bound pronouns, and so on, in the Head.
- b. Reconstruction is not possible for structures involving a QP head interacting with another QP inside a relative clause for scope interpretations.
- c. Idiom chunks involving a relativized Head can be related to the other part of the idiom within the relative clause. Therefore, reconstruction is possible when idiom chunks are involved.

(= (2) in Aoun and Li 2003:159)

After investigating reconstruction effects in Chinese, Aoun and Li turn to their structure and derivation. Their main claim is that the relative clause is adjoined to the head NP, as illustrated below:



Their main argumentation against the complementation structure of the classical raising analysis proposed by Kayne (1994) ([_{DP} D CP]), is that Chinese lacks a determiner. According to Bianchi (1999) and Alexiadou et al. (2000), the relative clause (CP) and the determiner (D) exhibit a close dependency relation. Due to the lack of determiner, this dependency relation cannot be established in Chinese.

Their second argumentation against the raising analysis concerns the semantic status of relative clauses. Kayne (1994) claims that the distinction between restrictive and non restrictive relative clauses in English is that in non restrictive relative clauses, a further movement takes place at LF, namely, IP moves to [Spec, DP]. Subsequently, IP is no longer under the scope of the determiner, and a non restrictive interpretation arise. The structural template of a non restrictive relative clause is given below:

(37) [_{DP} IP [_{D'} D° [_{CP} NP [_{C'} C° [_e]_i]]]]

(= (133) in Kayne (1994):112)

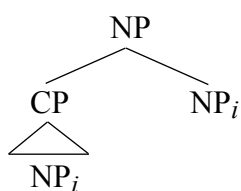
This non restrictive relative clause template proposed by Kayne appears to correspond exactly to the raising analysis for Chinese relatives proposed by Simpson (2001, 2002) (see also Wu 2001) just discussed in the preceding section: the NP raises to [Spec, CP]; and the remnant IP moves to [Spec, DP] in order to derive the head-final word order. In the spirit of Kayne, relative clauses in Chinese should be all non restrictive, since they are never under the scope of the determiner. But this is not the case. Aoun and Li (2003) thus conclude that there is no evidence supporting the raising analysis for the derivation of Chinese relative constructions.

The evidence supporting the adjunction derivation is the distributional freedom of relative clause in Chinese. Aoun and Li (2003) indicate that the distribution of relative clauses is similar to the one of adjectives in Chinese, which are rather free. Recall that modifiers in Chinese including adjectives and relatives clauses can be found in different positions in a nominal phrase: preceding demonstrative or inserted in between the demonstrative-numeral-classifier-noun phrase (see also Tang 2007), etc.

A question arises immediately: if the relative construction is derived by adjunction, how can the head NP reconstruct within the relative clause? There seems to be a sort of derivational paradox.

In order to account for the head reconstruction effects and keep at the same time an adjunction structure, Aoun and Li propose an NP relativization process operating on an adjunction structure. The structure and the derivation are illustrated as follows:

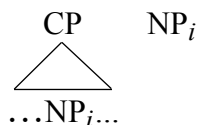
(38) structure of Chinese relative



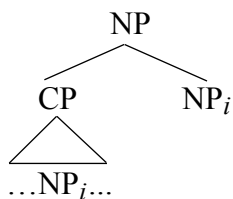
(= (1) in Aoun and Li 2003: 158)

(39) derivation

- a. A CP is generated.
- b. The CP is merged with an NP. The NP can be a copy of an NP inside the CP:



- c. NP projects.



(= (3) in Aoun and Li 2003: 158)

They claim that this derivation can capture all the constraints of reconstruction effect in Chinese relative constructions summarised in (35) and that this derivation is licit since the head NP c-commands its copy within the relative clause in this derivation structure and an NP can be generated in an argument position in Chinese⁹².

Aoun and Li (2003) propose an interesting analysis. However, several problems arise in their argumentations against the raising derivation in complementation structure.

⁹² They argue that the reason why NP raising/copying is not available in English under their analysis is because a bare NP alone cannot be in an argument position in English.

Aoun and Li (2003) argue against adopting a complementation structure in Chinese relative construction due to the lack of determiner and related selectional properties. However, as has been extensively discussed in the previous chapters, there are determiner-like elements in Chinese, such as *de* (Simpsons 2001, 2002; Cheng and Sybesma 1999, 2009) and unit-marking classifiers (Cheng and Sybesma 1999, 2009)⁹³. Although these elements may not be able to select a CP, they are able to select an NP. If the head NP can project beyond CP as proposed by Bhatt (2002) and Cecchetto and Donati (2015), the selectional problem can be solved.

Their second argument against the complementation structure is that Kayne's raising analysis can wrongly predict that relative clauses in Chinese have an appositive interpretation. Remember that the relative IP undergoes remnant movement to the [Spec, DP] position, and is thus outside the scope of D. This according to Kayne (1994) yield a non restrictive interpretation.

However, an important point in Kayne's proposal is missing in Aoun and Li (2003). What Kayne (1994) proposes for non restrictive relative clauses in English is a movement at LF (see Kayne 1994: 112), not affecting the superficial word order. However, the remnant movement of IP/CP that is posited in relative clauses in Chinese does affect the word order. Thus, there is no reason to assume that these movements are the same or that they affect interpretation in the same way⁹⁴. The remnant movement of IP in the derivation of Chinese relative construction is not an LF movement and it is legitimate to assume that it does not affect the semantic status of the relative clause.

Some issues also arise in their proposal for the derivation. Given that the NP outside the relative CP is a copy of an NP inside the CP (cf. 39b), it is very difficult to distinguish the 'so-called' NP raising analysis in Aoun and Li (2003), namely an internal merger, from a strong Matching analysis which involves a copy merger. As we discussed in the previous section, a strong matching analysis, in which the Internal NP is an identical copy of the External NP, is virtually indistinguishable from a raising analysis on empirical grounds. In both cases, there are two copies of the head NP, one external and one internal of the relative clause, and the same reconstruction effects are expected to hold. The only difference between these two analyses is theoretical, and it concerns the origin of the copies: whether they are base-generated independently and just "happen" to be identical, or whether

⁹³ Aoun and Li propose that *de* is an associative marker, indicating that the XP in [XP *de* N] bears some relation to (is associated with) the head N. *de* can form a constituent with the preceding XP, thus may not head a projection (see fn 12 in A&L 2003:250).

⁹⁴ Given the characteristics and the motivation of the remnant movement of IP in the relative constructions Chinese, which affect the word order and whose motivation is to satisfy the enclitic need of *de*, it should be a movement before spell-out.

they are identical because they are generated by internal merge, call it movement. Given that we know that internal merge (movement) does exist in the grammar, an obvious principle of parsimony would favour an analysis using this rather than a more obscure “accidental” copy mechanism.

Having said that, the real problem with relativization, that has led to so much debate and controversy, is the categorical status of the constituent the NP head raises to. Usually, when a movement is involved, it is the target that projects, i.e., CP in (39). In relativization, on the other hand, the landing site has all the semantic and distributional properties of an NP. A projecting conflict seems to arise. Iatridou, Anagnostopoulou and Izvorski (2001), as well as Bhatt (2002), propose that this is exactly what relativization is: the moving category can project in the case of relative clauses for the following reasons: *whether it is the target or the moving phrase that projects may be determined by selectional restriction of the immediately higher node.[...] When there are no such restrictions, the category of the moved element may be able to determine the category of the projected phrase.[...]Relative clauses are arguably such an environment. They are not directly selected for by a higher head* (Bhatt 2002:80). In English, there may be a sectional restriction of the determiner; whereas in Chinese, in the spirit of Aoun and Li (2003), there is no determiner and thus no sectional restriction. As a result, the category of a moved phrase NP can project. The seemingly projecting problem arising in the NP raising derivation proposed by Aoun and Li (2003) can be solved in this way. The projecting movement of the head indeed makes the relative template superficially identical that of an adjunction structure, without an adjunction derivation, which would give rise to a derivational paradox: if the relative CP were adjoined to the head NP, CP would later merge to it. How can the very same NP raise from a position internal to a CP that is not merged yet?

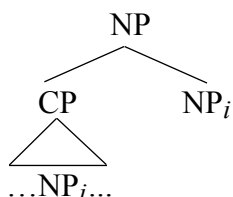
Besides, there are also two points appearing to be missing in their proposal: according to Aoun and Li (2003), a QP (Num-Cl-N) as a head noun cannot reconstruct; however, whether the NP inside the QP can reconstruct is not discussed, neither is the derivation of the relatives with a QP head.

Considering the similarity between a raising analysis and a strong matching analysis that are discussed above as well as the main argument of Aoun and Li (2003) that relative constructions in Chinese involve an adjunction structure, we suggest that their proposal for the derivation (cf. 39) is rather a strong matching analysis, in which the relative CP is indeed adjoined to the head NP and the reconstruction effect may occur. In this case, the NP head does not *raise* from the relative

clause, but rather matches an identical copy within the clause. The reconstruction effects are thus not due to an actual movement but to the presence of a strongly matching copy in the gap position, which gets deleted at a certain point of the derivation.

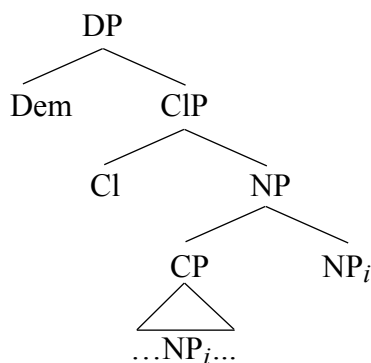
Let us now think over the derivation of Cantonese relative clauses in the spirit of a strong matching analysis. Recall that under the approach of Aoun and Li (2003), Chinese relatives only allow NP reconstruction and prohibit DP reconstruction. Aoun and Li (2003) following Li (1998, 1999) propose that D can be occupied by demonstrative and that the Dem-Num-Cl-N phrase is a DP⁹⁵. Hence the strong matching derivation only applies to the relative with a bare NP (i.e., RC-*ge3*-N) but not those with a demonstrative and a classifier immediately preceding the NP (i.e., RC-*ge3*-Dem-Cl-N and RC-Dem-Cl-N). For the bare NP relative (i.e., RC-*ge3*-N), a tentative derivation in the spirit of strong matching should be identical to (39), repeated below.

(40) = (39) possible derivation of RC-*ge3*-N



In addition, given that after the copying merger, the newly formed object is also an NP, it can thus be selected by a classifier to form a CIP. This CIP can lately be selected by a numeral to form a QP or by a demonstrative to form a DP. Consequently, a relative clause following a demonstrative and a classifier can also derive under the strong matching analysis. A possible derivation is as follows:

(41) possible derivation of Dem-Cl-RC-*ge3*-N

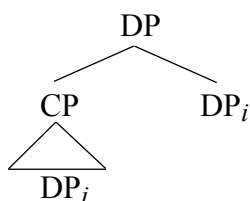


⁹⁵ see also section 1.4 in Part II for the detailed discussion about the structure of the Dem-Num-Cl-N phrase.

For the constructions of RC-*ge3*-Dem-Cl-N and RC-Dem-Cl-N, as mentioned previously, we can only infer that these structures cannot derive by strong matching in the spirit of Aoun and Li (2003). This inference is based on their proposals that relative constructions in Chinese are in an adjunction structure and that DP cannot reconstruct in Chinese. In the constructions of RC-*ge3*-Dem-Cl-N and RC-Dem-Cl-N, what CP is merged with is a DP, which is claimed to be unable to reconstruct. Therefore, these constructions are unlikely to derive by strong matching.

However, their claim about the unavailability of reconstruction of DP in Chinese is based on the observation in relatives clauses with a QP (Num-Cl-N) as head noun, the relative clause with a demonstrative and a classifier immediately preceding the NP (i.e., RC-*de*-Dem-Cl-N) is not discussed in Aoun and Li (2003). Hence, whether the unavailability of reconstruction applies to the relatives with a Dem-Cl-N phrase is not explicitly addressed. In addition, the unavailability of reconstruction of QP correlates to the presence of another QP inside the relative clause: the scope interaction reappears if the quantifier is absent (see section 5.1 in Aoun and Li 2003:134). Therefore we assume that the reconstruction may probably be blocked by the intervention of the QP inside the relative clause. This indicates that the unavailability of reconstruction of QP may be not due to the structure of the head noun, but rather due to the presence of an intervener. If our assumption is on the right track, DP can reconstruct as long as there is no intervener⁹⁶ present within the relative clause. And the possible derivation of RC-*ge3*-Dem-Cl-N and RC-Dem-Cl-N should be as follows:

(42) possible derivation of RC-*ge3*-Dem-Cl-N and RC-Dem-Cl-N



An important question arising here seems to be the same as what we asked with respect to the raising analysis proposed by Simpson (2001): can a Dem-Cl-N phrase head reconstruct within the relative clause?

⁹⁶ Notice that *dou* ‘all’ may be able to intervene the reconstruction of a Dem-Cl-N phrase in the spirit of Cinque (2015), since both demonstrative and universal quantifier are strong determiners. Other possible intervener to the DP reconstruction is a subject Dem-Cl-N phrase in an object relative. Also recall that the structural complexity of the Dem-Cl-N may affect the calculation of intervention effect (see chapter 4).

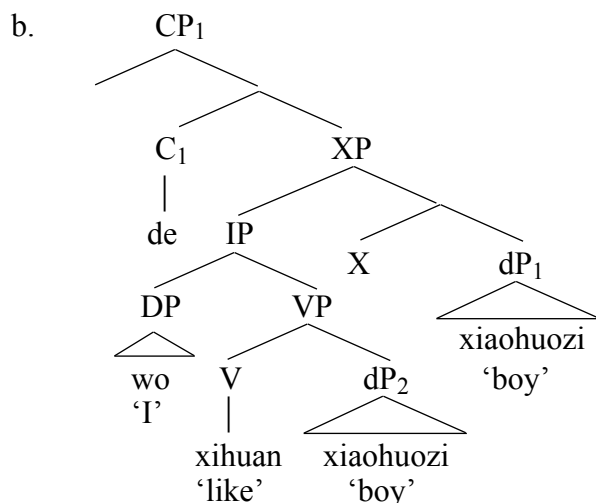
So far, we have investigated the derivation of Chinese relative constructions under two different proposals: a classical raising analysis proposed by Simpson (2001, 2002) suggesting that relative clauses in Chinese derive in a completion structure; a strong matching analysis adapted from Aoun and Li (2003) assuming that relative clauses in Chinese derive in an adjunction structure. In the next subsection, we are going to continue our investigation with a third analysis proposed by Del Gobbo (2010) adopting Cinque (2003, 2006, 2008)'s double-headed derivation, which also assumes that relative constructions involve an adjunction structure and that head raising and head matching can both occur during the derivation.

5.2.3 Del Gobbo (2010): a Double headed derivation in Chinese

As mentioned in the previous subsection, Aoun and Li (2003) observed that head reconstruction effects surface in some relative constructions in Chinese, but not in others. Based on these empirical observations, Del Gobbo (2010) adopts Cinque (2006, 2008)'s proposal for the structure of relative clauses in Chinese. The underlying structure of a restrictive relative clause under Del Gobbo (2010)'s proposal is generally identical to the unified structure in Cinque (2003, 2006, 2008, 2015). IP, which contains the internal head (dP₂), is externally merged in the specifier position of a functional projection (i.e., XP in 32b) dominating the external head (dP₁). Following Cheng (1986, 1997) and Paul (2006), she analyses *de* as a non-root complementizer, which dominates the functional projection XP. The following examples illustrate the underlying structure of a restrictive relative clause in Chinese:

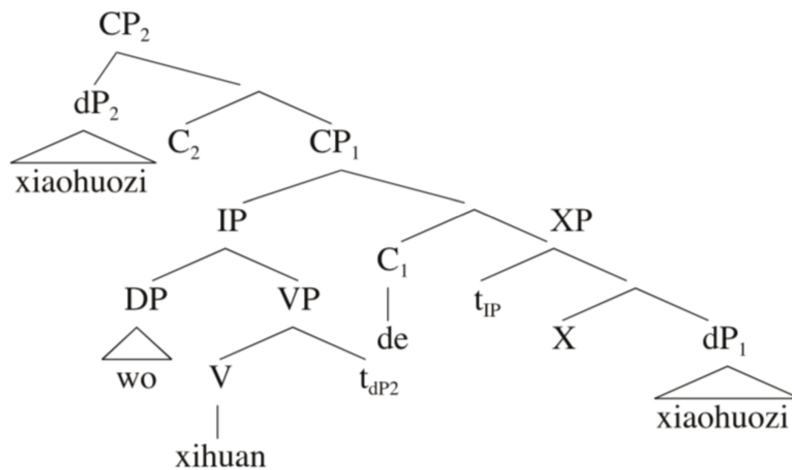
- (43) a. wo xihuan de xiaohuozi
 I like Mod boy
 'the boy I like'

(= (5) in Del Gobbo 2010:390)



The derivation involves the movement of the internal head and the movement of the entire remnant CP1. The process is as follows: 1) IP raises to the [Spec, CP1] position for licensing *de*; 2) the internal head (dP2) raises to the specifier position of another projection in the left periphery ([Spec, CP2]) above CP1⁹⁷. These two steps of derivation are illustrated in the following diagram.

(44)



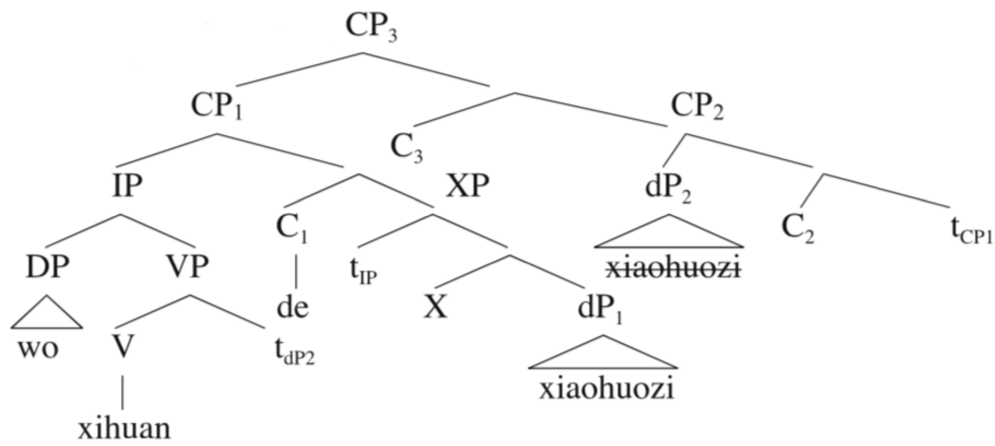
(adapting (7) in Del Gobbo 2010: 391)

After these two steps, Del Gobbo proposes two different derivational options in order to derive the correct word order: one corresponds to a matching derivation for the relative clauses that do not exhibit head reconstruction effect; the other corresponds to a raising derivation for the relative clauses exhibiting head reconstruction effect.

Let us start from the matching derivation. Under the matching derivation, a new complementizer C is projected above CP2. The whole CP1 moves to the specifier of CP3. The raising internal head is deleted since it is cyclic c-commanded by the raising external head (dP1). This derivation is illustrated in the following diagram:

⁹⁷ This movement, according to Del Gobbo (2010), aims at accounting for the existence of island effects in Chinese relatives.

(45)



(= (7) in Del Gobbo 2010:391)

The crucial notion here is that of cyclic c-command: in (45) the dP1 does not c-command the dP2, while the CP1 containing it does. In order to justify this notion and its relevance for Chinese, Del Gobbo (2010) points out that a pronoun cannot c-command its antecedent in Chinese as in English (see 46); however, this principle is not sufficient to explain the ungrammaticality arising in a sentence like (47).

- (46) * Ta_i xihuan Zhangsan $_i$ ⁹⁸.
 he xihuan Zhangsan
 *‘He $_i$ likes Zhangsan $_i$.’

- (47) * $[DP$ Ta_i de mama] xihuan Zhangsan $_i$.
 he Mod mother likes Zhangsan
 ‘His $_i$ mother likes Zhangsan $_i$.’

(= (169a) in Huang 1998: 275; (9) in Del Gobbo 2010: 391)

In (47), the pronoun *ta* in the subject *ta de mama* -‘his mother’ does not c-command the proper name *Zhangsan*. In principle, the sentence should be grammatical. However, it is not the case.

In order to capture this phenomenon, Huang (1982) proposes a notion of ‘cyclic-c-command’ in terms of the notions of cyclic nodes and c-command (Huang 1998⁹⁹: 279).

⁹⁸ (46) corresponds also to a configuration of Principle C, however, Principle C effect is not taken into account in Huang (1982) and Del Gobbo (2010).

⁹⁹ Huang (1998) is a revision of Huang (1982).

- (48) Cyclic c-command
 A cyclic-c-commands B if and only if:
 a. A c-commands B, or
 b. if C is the minimal cyclic node (NP or S') that dominates A but is not immediately dominated by another cyclic node, then C c-commands B.
 (= (181) in Huang 1998: 279; (11) in Del Gobbo 2010: 392)

Huang (1982) explains that in (47), although the pronoun *ta* does not c-command *Zhangsan*, the NP dominating it (i.e., *ta de mama* 'his mother') does. Moreover, there is no other NP immediately dominating this NP, it is thus a cyclic node. Therefore, the pronoun *ta* cyclic-c-commands its antecedent *Zhangsan*.

He concludes that Chinese obeys a stronger hierarchical condition than English on pronominal anaphora, that he proposes to formulate as follows as a language-specific condition on Chinese:

- (49) Condition on Pronominal Anaphora in Chinese
 A pronoun may not cyclic-c-commanded its antecedent.

Del Gobbo (2010) argues that the term of minimal cyclic node should be extended to DP and CP and the notion of cyclic c-command is revised as in (48').

- (48') Cyclic c-command (revised by Del Gobbo 2010)
 A cyclic-c-commands B if and only if:
 a. A c-commands B, or
 b. if C is the minimal cyclic node (DP or CP) that dominates A but is not immediately dominated by another cyclic node not belonging to the same periphery, and C c-commands B.
 (= (14) in Del Gobbo 2010: 392)

Moreover, she suggests taking the notion of cyclic c-command into account for PF deletion in the derivation of relative clauses in Chinese. More precisely, the PF deletion of dP2 (the raising internal head) is licensed by dP1 (the raising external head) cyclic-c-commanding it (dP2): in (45), the minimal cyclic node of dP1 (i.e., CP1) c-commands dP2, therefore dP1 cyclic-c-commands dP2. Notice that since what is deleted is the internal head, the remaining external head noun cannot reconstruct within the relative clause.

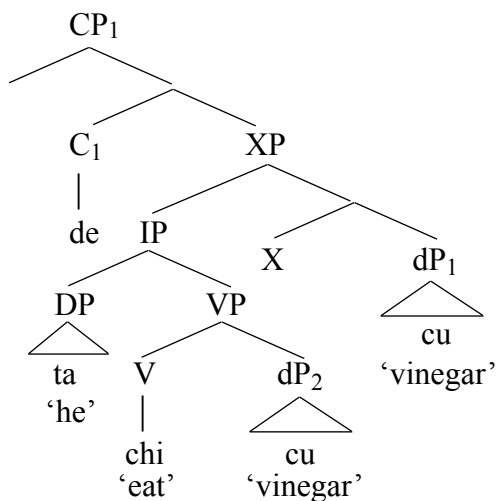
Let us now turn to the raising derivation for the relative clauses exhibiting reconstruction effects. As discussed in the last section, Aoun and Li (2003) show that head reconstruction effects are attested in relative clauses in Chinese in the case of idiomatic interpretation and some binding configurations¹⁰⁰. Following Aoun and Li (2003), Del Gobbo illustrates the raising derivation with the following example involving idiomatic chunks.

- (50) [ta chi ____i] de cu_i
 he eat Mod vinegar
 Lit.: ‘the vinegar he eats’
 ‘His jealousy’

(= (15) in Del Gobbo 2010:393)

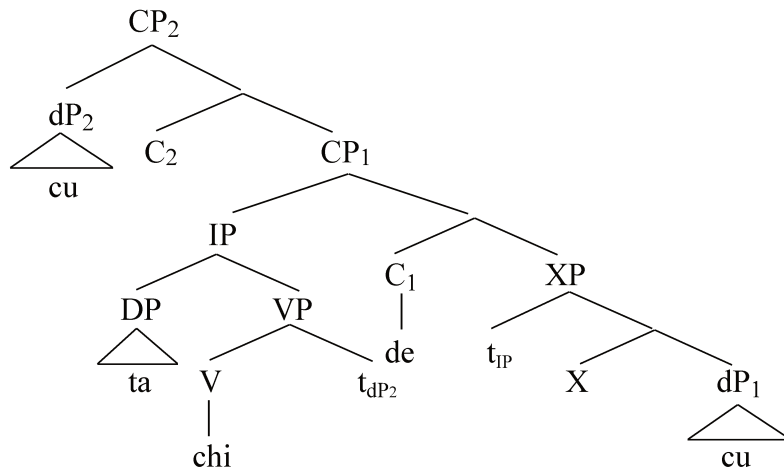
(50) contains an idiom chunk *chi cu* in Chinese. Literally, it means ‘eat vinegar’; idiomatically, it means ‘be jealous’. This idiomatic interpretation is conserved in an object relative with the object ‘*cu* -vinegar’ relativized in (50). The following diagram illustrates the derivation proposed by Del Gobbo (2010).

(51) a. underlying structure

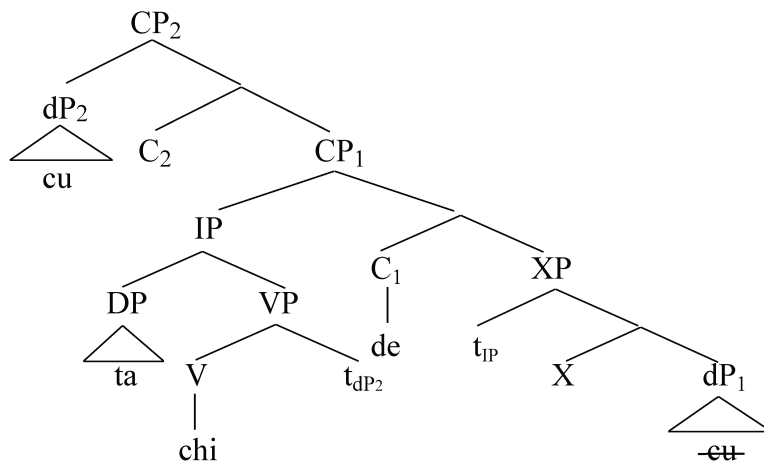


¹⁰⁰ Recall that we previously argued that the unavailability of reconstruction with a QP head might not be due to the structure of QP itself, but rather to an intervention by another quantifier within the relative clause.

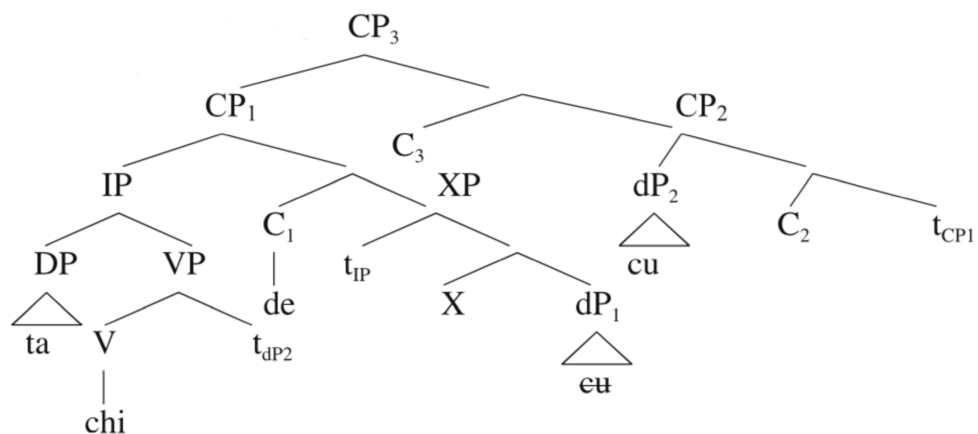
b. derivation step 1 & 2 (identical to those in the matching derivation see 33)



c. derivation step 3: deletion of dP1 at PF



d. derivation step 4: raising of the CP1



(= (16) in Del Gobbo 2010: 394)

For the raising derivation, after the movement of IP to the [Spec, CP1] position and the movement of the internal head (dP2) to the [Spec, CP2] position which occurs also in the matching derivation

(see 51b), the deletion of the external head (dP1) at PF is licensed by the raising dP2 c-commands the external head dP1 (51c). After the deletion of the dP1, the whole CP1 moves to the specifier position of a new complementizer C3 projected above CP2 (51d). Since in this derivation, the remaining head is the internal head (dP2), head reconstruction effects can arise.

Comparing the structures and the derivations of restrictive relative clause in Chinese and those in English, Del Gobbo summarizes that the difference between them are: 1) the internal head (dP2) in Chinese can never be realized as a relative pronoun; and 2) the external head (dP1) never raises in Chinese, while the remnant CP1 does (Del Gobbo 2010: 394).

Del Gobbo (2010)'s adaptation of the double-headed analysis for relative clauses in Chinese greatly captures the spirit of the proposals of Cinque (2003, 2006, 2008): she provides a unified underlying structure for relative clauses in Chinese and two different derivational strategies for the relative clause with the presence of head reconstruction effect (i.e., raising structure) and for those without (i.e., matching structure). There are still three questions lacking a clear answer.

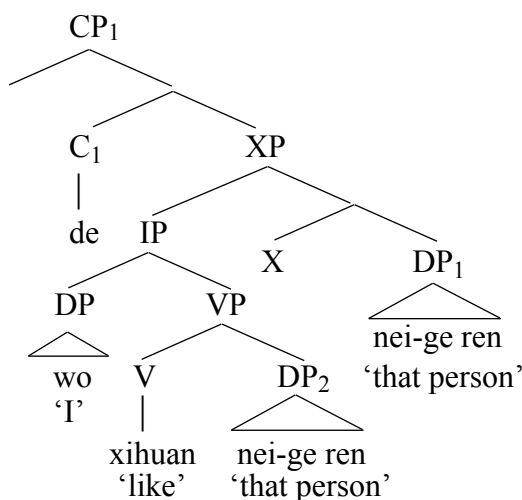
The first question concerns PF deletion. In comparing the two derivations just discussed, their difference seems to be the order of the PF deletion (of either dP1 or dP2) and the raising of CP1. Recall that the first two steps in both derivational processes are identical, and involve the movement of IP to the specifier position of *de* (C1) followed by the movement of the internal head (dP2) to the specifier position of CP2 (see 44, 51b). In the matching derivation, CP1 moves first to the [Spec, CP3] position and then trigger the PF deletion of the internal head (dP2) since dP1 cyclic-c-commands dP2 after the movement of CP1 (see 44). In the raising derivation, on the other hand, the PF deletion of the external head (dP2) occurs first, followed by the movement of CP1 (see 51c, 51d). The problem is that after the first two derivation steps, dP2 c-commands and thus cyclic-c-commands dP1 in both derivations (see 44 for the matching derivation and 51b for the raising derivation): so why the PF deletion of dP1 is triggered in (51b) but in (44)¹⁰¹? PF deletion in the derivations of relative clauses in Chinese seems to be selective, and cyclic-c-command is not the only criterion affecting it. What triggers this choice?

¹⁰¹ This derivational issue does not occur in the original version of double-headed analysis proposed by Cinque (2003, 2006, 2008, 2015) since the PF deletion is licensed by regular c-commanding and the external head can also raise (see examples 14, 15 in section 5.1.4 in this chapter).

The second question concerns the derivation of relative clauses with demonstrative and classifier. As shown in the previous chapters, relative clauses can modify a Dem-Cl-N phrase or a Num-Cl-N phrase in Chinese. For these relative constructions (i.e., RC-*de*-Dem-Cl-N), Del Gobbo (2010) proposes a structure in which demonstrative and classifier are base-generated, which would then be a DP and not a dP (see footnote 6 in Del Gobbo 2010:393)¹⁰². Recall that DP hosts determiners and demonstratives (strong determiners) according to Cinque (2003, 2006, 2008) (Del Gobbo 2010, footnote 2:388). Following her proposal, the underlying structure of a relative clause with demonstrative and classifier preceding the head NP should be as follows:

- (52) a. [wo xihuan ____i] de [nei-ge ren]_i
 I like Mod that-Cl person
 ‘the man that I like’

b. underlying structure:



¹⁰² Del Gobbo’s original proposal is for a relative clause with a resumptive pronoun, as (i) shows.

- (i) wo song le ta yi-ben shu de nei-ge ren
 I send ASP him one-Cl book Mod that-Cl person
 ‘the person to whom I send a book’

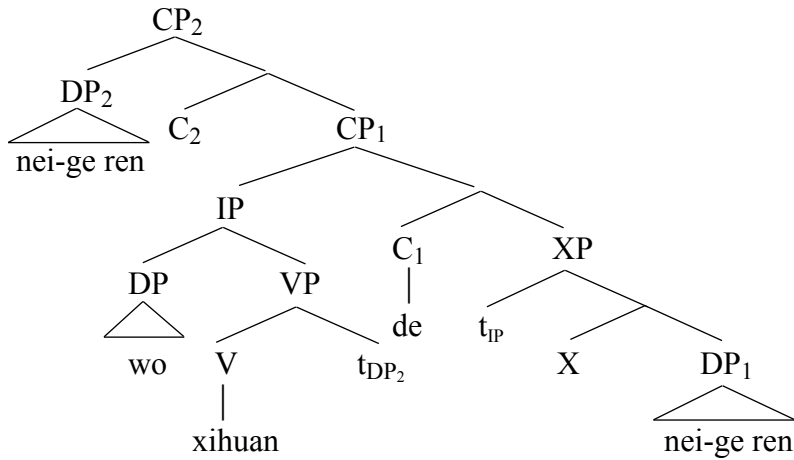
The structure that she proposes is as (ii):

- (ii) [CP₁ [IP wo song-le [DP₂ ta] yi-ben shu] [C' de [XP t_{IP} [X' [DP₁ nei-ge ren]]]]]
 (= (i) and (ii) in footnote 6 in Del Gobbo 2010: 393)

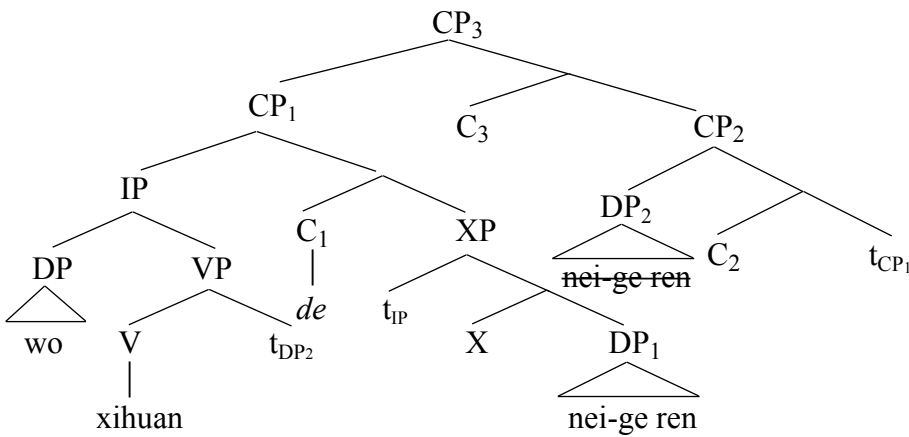
In this structure, DP₁ is base generated as dP₁ in the previous double headed analysis. We adapt this idea to analyse the relative clause modifying a Dem-Cl-N phrase.

The process of derivation should be as follows:

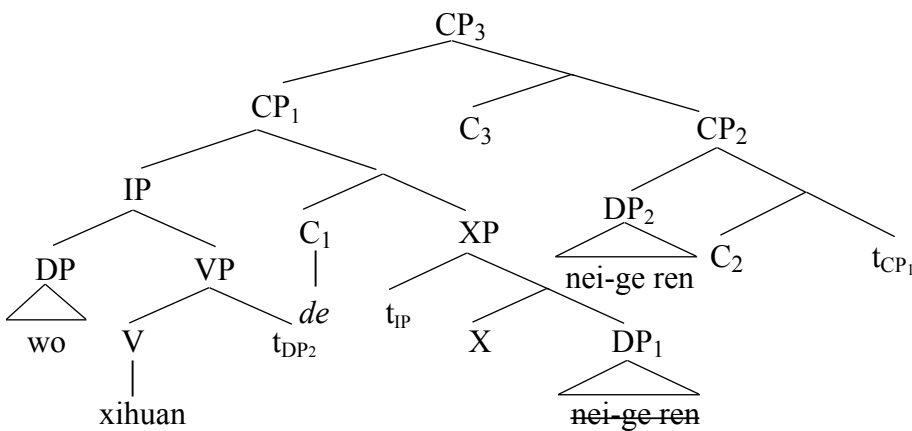
(53) a. step 1 & 2: movement of IP to [Spec, CP1] and movement of DP2 to [Spec, CP2]



Matching derivation: b. step 3 & 4: movement of CP1 to [Spec, CP3] and deletion of DP2 at PF



Raising derivation: b'. step 3 & 4: deletion of DP1 at PF and movement of CP1 to [Spec, CP3]



In general, the derivation of a restrictive relative clause modifying a Dem-CI-N phrase (DP) should be identical to that of a restrictive relative clause with dP (see examples 43 to 45 and 51).

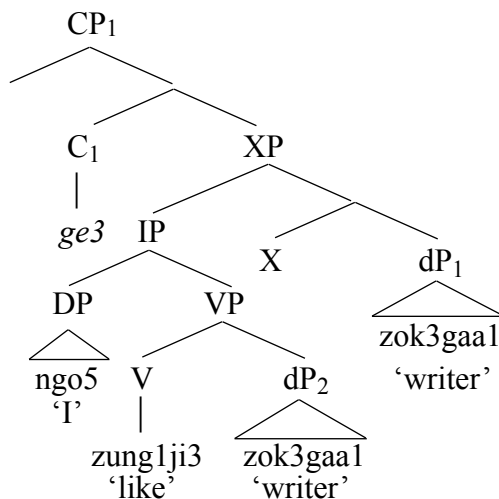
The third question is why the movement of the external head (dP1/DP1) is prohibited in the derivation of relative clauses in Chinese, while the remnant movement of CP1 is licensed? Del Gobbo (2010) considers this phenomenon to be one of the two main differences with respect to English, however, without giving a principled explanation for this.

Try now to apply the double-headed derivation to relative clauses in Cantonese. Let us begin with the derivation of relative clauses with *ge3* (i.e., RC-*ge3*-N), which should be similar to its counterpart in Mandarin, namely RC-*de*-N. The following diagrams illustrate the derivation.

(54) = (23) RC-*ge3*-N

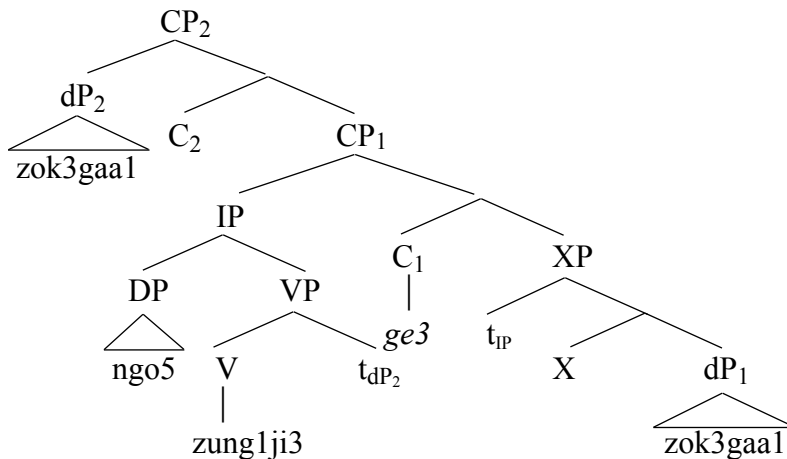
- a. ngo5 zung1ji3 ____i ge3 zok3 gaa1_i
 1SG like GE3 writer
 ‘(the) writer that I like’

b. underlying structure

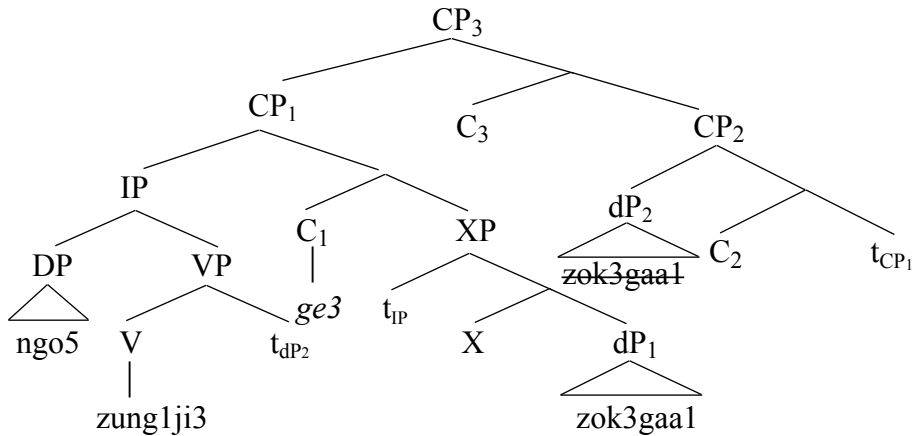


(55) derivation

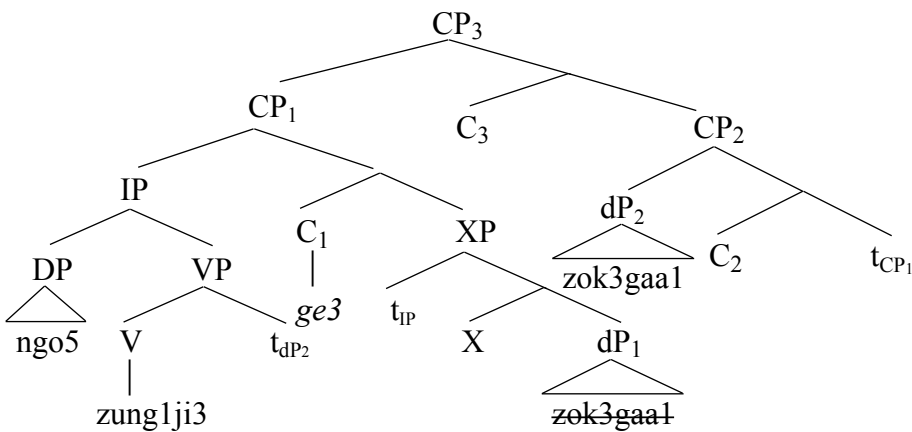
- a. step 1 & 2: movement of IP to [Spec, CP1] and movement of dP2 to [Spec, CP2]



Matching derivation b. step 3 & 4: movement of CP₁ to [Spec, CP₃] and deletion of dP₂ at PF



Raising derivation b'. step 3 & 4: deletion of dP₁ at PF and movement of CP₁ to [Spec, CP₃]

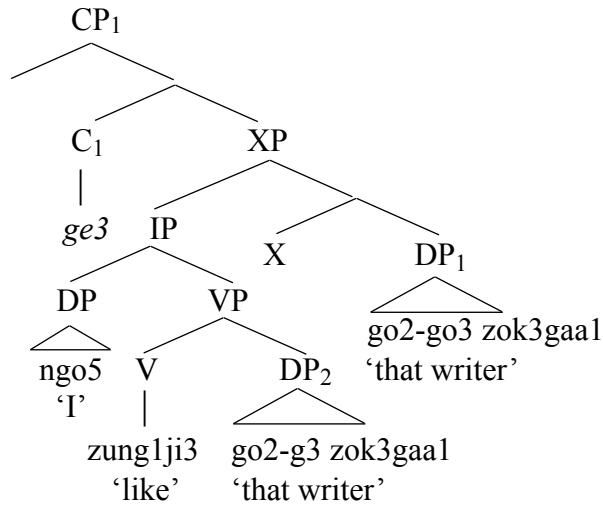


As for the relatives with *ge3* and a demonstrative and a classifier immediately preceding the NP (i.e., RC-*ge3*-Dem-CI-N), the derivation should also be similar to its counterpart in Mandarin (see 52, 53), whose head noun is a Dem-CI-N phrase. Notice that in the subsection, we have discussed the possibility of DP reconstruction in Chinese. We thus provide both matching and raising derivation for RC-*ge3*-Dem-CI-N. The following diagrams illustrate the derivation.

(56) = (27) RC-*ge3*-Dem-CI-N

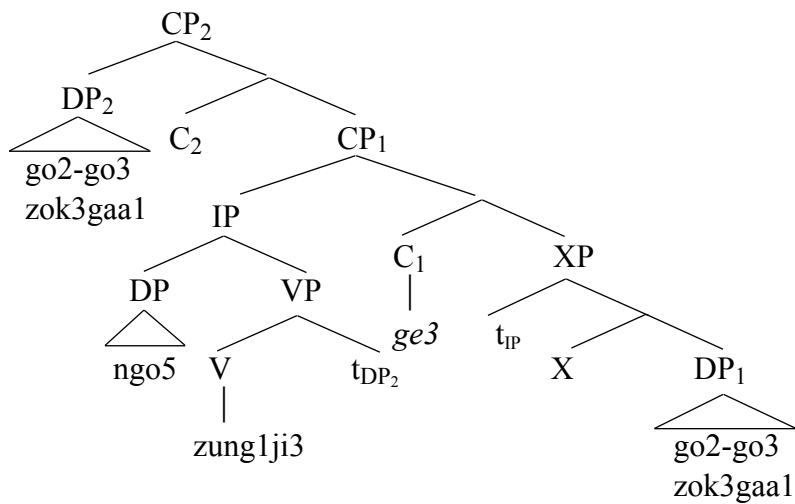
- a. ngo5 zunglji3 ____i ge3 go2 go3 zok3 gaa1_i
 1SG like GE3 Dem CI writer
 ‘the writer that I like’

b. underlying structure

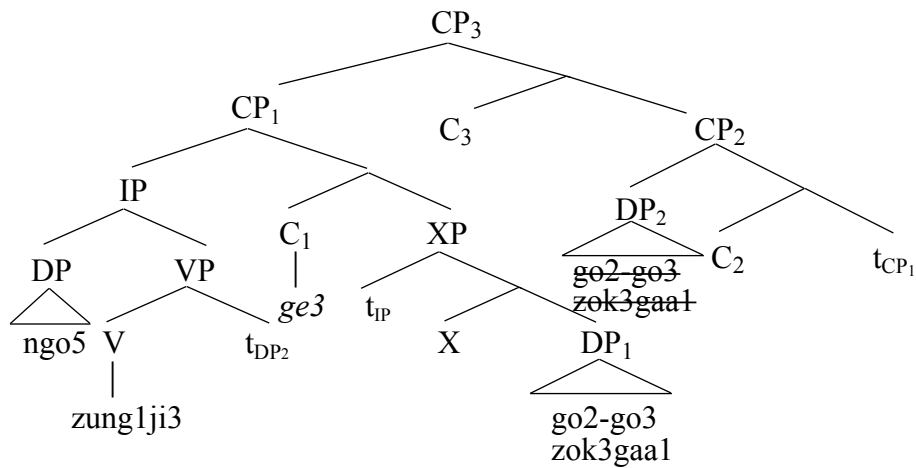


(57) derivation

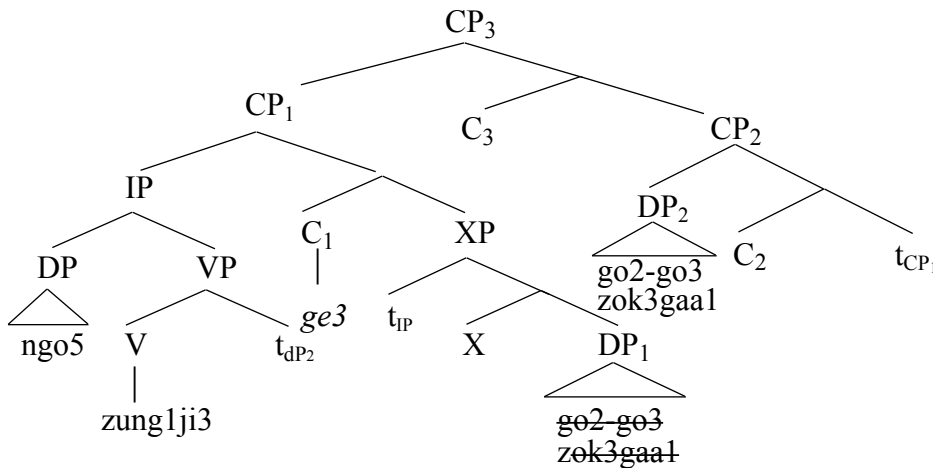
a. step 1 & 2: movement of IP to [Spec, CP1] and movement of DP2 to [Spec, CP2]



b. **Matching derivation** step 3 & 4: movement of CP1 to [Spec, CP3] and deletion of DP2 at PF



b' **Raising derivation** step 3 & 4: deletion of DP1 at PF and movement of CP1 to [Spec, CP3]



In subsection 5.2.1, we have attested that RC-Dem-Cl-N can derive from RC-*ge3*-Dem-Cl-N by the deletion of *ge3* at PF (in the spirit of Cheng and Sybesma 2009) in a raising analysis. Can a similar strategy apply to the double-headed derivation? Recall that the deletion of *ge3* at PF is realized by the relative IP movement from the specifier of a functional projection hosting *ge3* to the left periphery of the DP to mark focus, the deletion is triggered by the absence of the specifier of *ge3*. The following diagram illustrates the derivation of RC-Dem-Cl-N.

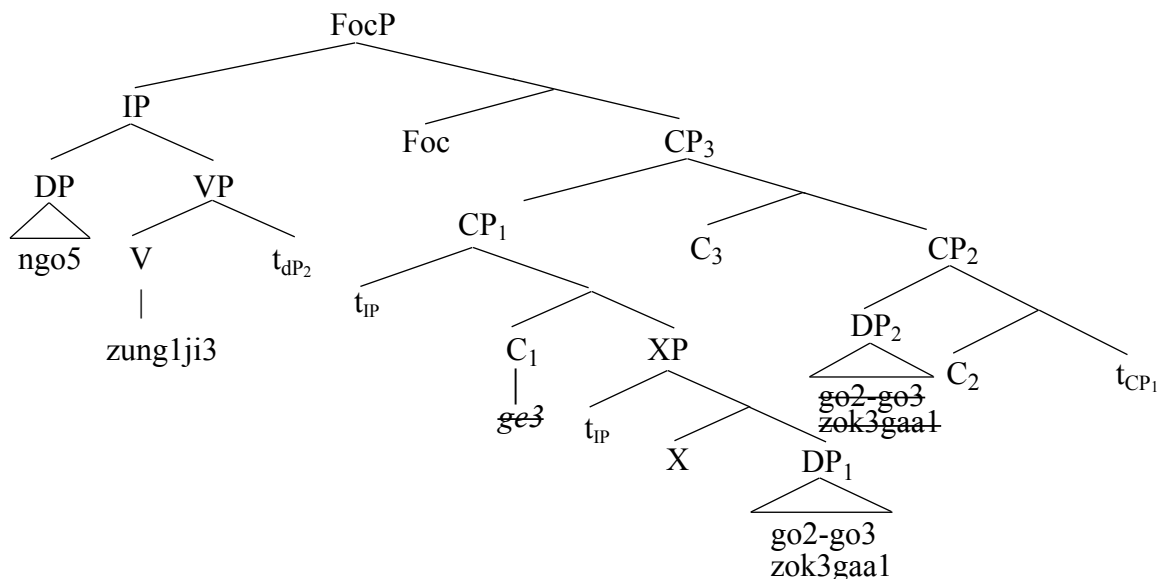
(58) RC-Dem-Cl-N

ngo5	zung1ji3	___	ge3	go2	go3	zok3	gaa1
1SG	like	<i>i</i>	GE3	Dem	Cl	writer	

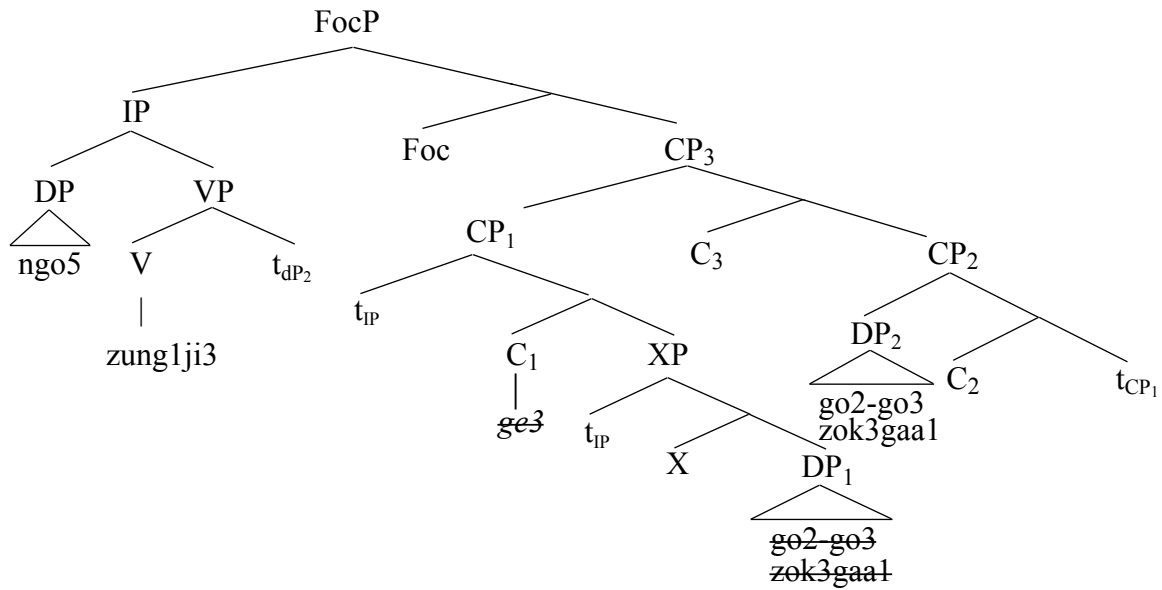
‘the writer that I like’

(59) possible derivation of RC-Dem-Cl-N based on the derivation of RC-*ge3*-Dem-Cl-N

c. **Matching derivation** step 5: movement of IP to [Spec, FocP], deletion of *ge3* at PF.



c'. **Raising derivation** step 5: identical to (60c)



Under this possible derivation, the deletion of *ge3* at LF triggered by the remnant IP movement to the [Spec, FocP] position¹⁰³ occurs at the last step of the derivation in both raising and matching analysis.

For the derivation of the construction with a demonstrative and classifier preceding the relative clause (i.e., Dem-Cl-RC-*ge3*-N), given that restrictive relative clauses (including the relativizer) are merged below the demonstrative (a strong determiner) occupying D position, we propose a possible derivation for relatives with Dem-Cl-RC-*ge3*-N configuration based on the RC-*ge3*-N. The following diagram illustrated the derivation.

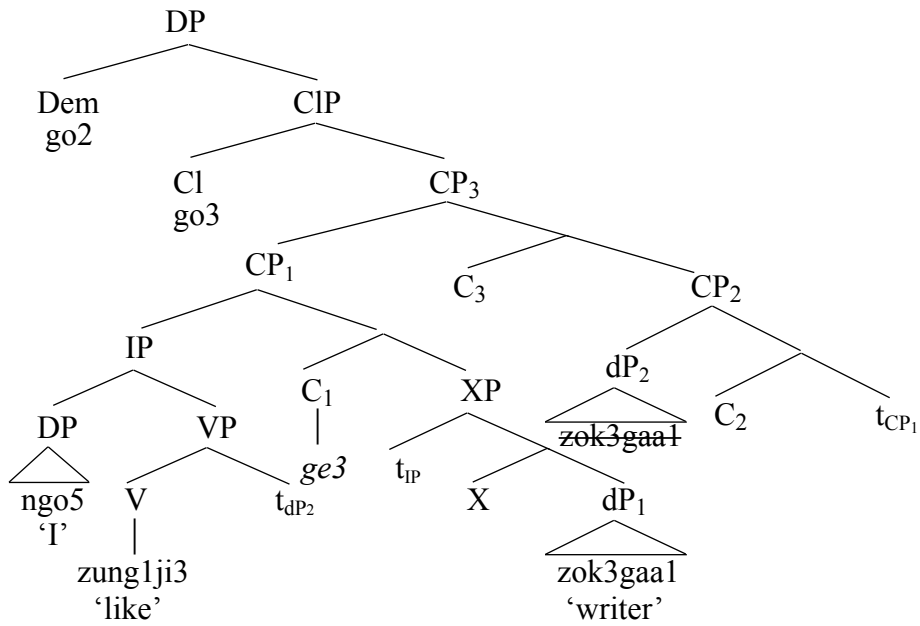
(60) Dem-Cl-RC-*ge3*-N

go2-go3	ngo5	zung1ji3	___ _i	ge3	zok3gaa1
Dem-Cl	1SG	like		GE3	writer
'the writer that I like'					

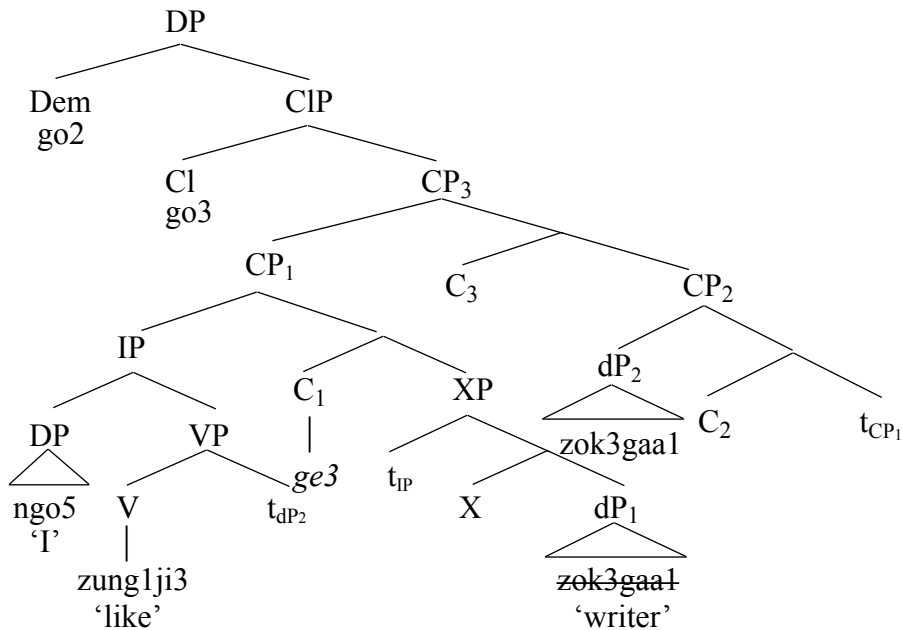
¹⁰³ Notice that in (59), although CP3 seems to be a barrier blocking the IP movement, given that CP1, CP3 and FocP all belong to the periphery domain of the DP1, the blocking effect by CP3 may be avoided.

(61) derivation of Dem-Cl-RC-ge3-N

a. matching derivation:

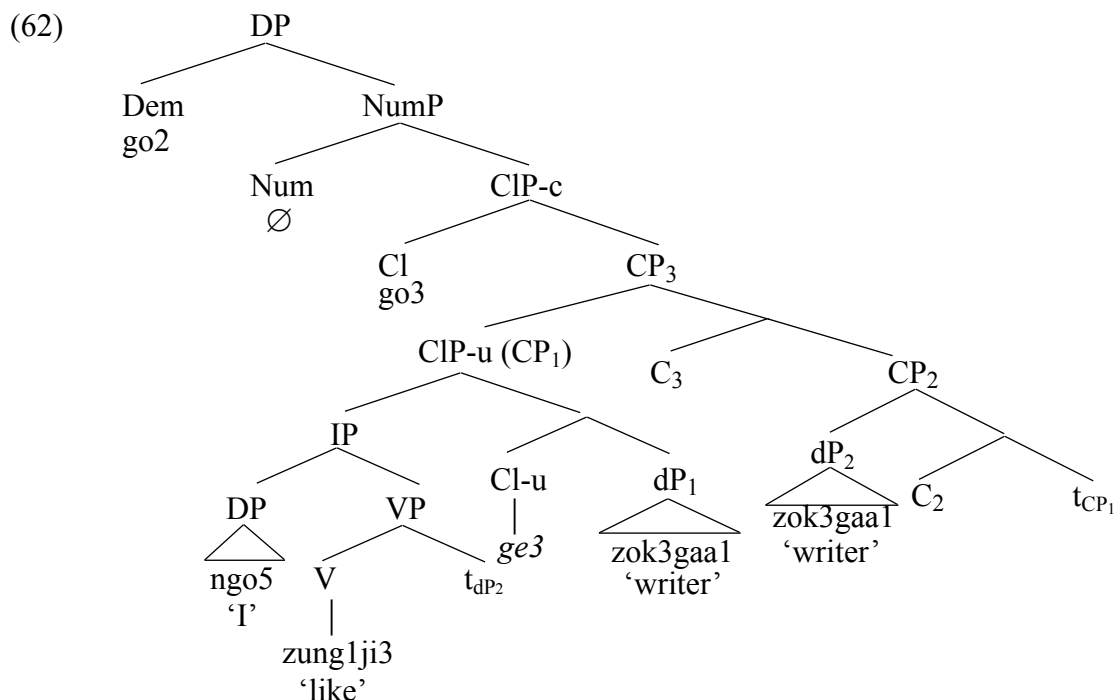


a' raising derivation:



In (61), we suggest that a classifier takes RC-ge3-N as a complement to form a CIP, then a demonstrative takes this CIP as complement and form a DP in both strong matching and raising derivation. However, a problem arises: a classifier generally takes an NP but not a CP as its complement.

Notice that under Del Gobbo (2010)'s analysis, relative construction is a complex CP headed by *ge3*. In the spirit of Cheng and Sybesma (2009), *ge3* is a unit-marking classifier, which is a projection in the functional structure of noun phrase (Cheng and Sybesma 2009:18). In adopting Cheng and Sybesma (2009), we propose to substitute CIP-u for the category of *ge3*. Given that CIP-u is already a functional projection, XP, which is also a functional projection dominating the external head in Del Gobbo (2010), is no more necessary to project. As for the classifier that takes RC-*ge3*-N as a complement, it can be analysed as a count-marking classifier selected by an empty numeral. Hence, the derivation of Dem-Cl-RC-*ge3*-N should be revised as follows¹⁰⁴:



A question arises under this analysis: can CIP-u allow the merger of a new complementizer (C2), which licenses the movement of the internal head (dP2)?

Above all, relatives with *ge3* (i.e., RC-*ge3*-N) and those with a demonstrative and a classifier immediately preceding the NP (i.e., RC-*ge3*-Dem-Cl-N, RC-Dem-Cl-N) seem to be compatible a double-headed derivation (in the spirit of Del Gobbo 2010). However, for the relatives following a demonstrative and a classifier, a double-headed derivation faces some issues. A more general question also arises: if both NPs and DPs (including QP) can reconstruct as we assumed above, can we reduce the two different derivational processes to the raising derivation?

¹⁰⁴ (62) corresponds to both raising and matching derivations.

5.2.4 Summary

In this subsection, we have reviewed three proposals for the derivation of relative constructions in Chinese: Simpson (2001, 2002) proposes a raising derivation in a complementation structure; Aoun and Li (2003) as we understand it propose a strong matching derivation in an adjunction structure; Del Gobbo (2010) suggests a double-headed derivation in an adjunction structure. The following table summarizes the three proposals discussed in this section (section 5.2).

	Simpson (2001, 2002)	Aoun and Li (2003)	Del Gobbo (2010)
derivation	Raising	Strong Matching	Double-headed derivation
relative constructions	complementation	adjunction	adjunction
nature of <i>de</i>	determiner (D)	associative marker (not a functional head)	non-root complementizer (C)
origin of RC head	internal	external	internal and external
reconstruction effect	yes	yes	yes/no
Is Dem-Cl part of the head?	No	yes (in the sense that QP can be the head)	yes

Table 29 Comparison of the three proposals about relative derivation in Chinese

Under Simpson's proposal, relative clauses in Chinese, which are superficially head-final, can derive in a classical antisymmetry approach (Kayne 1994, Bianchi 1999). He argues that *de* in Chinese can be analysed as a determiner and that the derivation of relatives in Chinese is similar to the one in English. The difference is that the derivation in Chinese requires a remnant movement of IP after the raising of the head noun in order to satisfy the enclitic need of *de* (63a). For the relative constructions containing a demonstrative and classifier cluster, Simpson assumes that the Dem-Cl cluster based-generated in the specifier of a functional projection between CP and NP (63b). It can undergo movements to another specifier of a functional projection above DP aiming to achieve the pre-relative word order (63c).

- (63) a. [DP [IP ... t_i ...]_j [D' *de* [CP NP_i [C' t_j]]]] (RC-*de*-N)
- ↑
- b. [DP [IP ... t_i ...]_j [D' *de* [XP dem-cl [X' [CP NP_i [C' t_j]]]]]] (RC-*de*-Dem-Cl-N)
- ↑
- c. [QP/DeiticP [dem-cl]_j [Q'/Deitic' [DP [IP ... t_i ...]_k [D' *de* [XP t_j [X' [CP NP_i [C' t_k]]]]]]]] (Dem-Cl-RC-*ge3*-N)

We adopt his proposal for the derivation of relatives in Cantonese and successfully derive the four most attested constructions in our experimental and corpus data. For the constructions without relativizer *ge3*, we adopt the proposal of Cheng and Sybesma (2009) and propose that this construction derives by an IP movement from the specifier of *ge3* to the left periphery of DP, following by a deletion of *ge3* at PF.

Under Aoun and Li (2003)'s analysis, a relative clause in Chinese is merged with an NP, and this NP can be a copy of an NP within the relative clause. Since the derivation is in an adjunction structure, the whole relative construction remains an NP. Aoun and Li claim that this derivation process involves an NP raising. Nevertheless, given the similarity between the mechanism of raising (internal merger) and that of strong matching (copy merger) and the derivational paradox between the 'NP-raising' derivation and the adjunction structure, we consider the derivation they put forward to be more like a strong matching derivation.

(64) [NP NP_i [CP ... NP_i ...]]

We also adopt a similar derivation for the relatives in Cantonese. With this derivation, we derive the bare NP relatives (RC-*ge3*-N) and the relatives following a demonstrative and a classifier (Dem-CI-RC-*ge3*-N), in which the head noun is an NP. According to Aoun and Li (2003), only NPs but not DPs can reconstruct in Chinese. However, the empirical data supporting this claim is based on the relative clauses with a head QP. Moreover, a QP cannot reconstruct as long as another quantifier scopes over the gap position within the relative clause. We thus infer that the 'unavailability of reconstruction' of QPs (and DPs) may result from intervention by another similar element (QP or DP) c-commanding the gap position. Hence, DP and QP can also reconstruct in Chinese when there is no intervener in the relative clause. With this in mind, we derive the relatives with a Dem-CI-N phrase (DP) as a head noun (RC-(*ge3*)-Dem-CI-N).

Under Del Gobbo (2010)'s analysis, there are two heads in a relative clause, an internal one and an external one. A relative clause containing the internal head is externally merged into the specifier of a functional projection (XP) of the external head. *De* is analysed as a non-root complementizer taking the XP as its complement. The underlying structure of a relative clause under the double-headed derivation is given as follows:

(65) [DP [D' [CP₁ [C₁' *de* [XP [IP(RC) ... **internal head** ...] [X' [dP₁ **external head**]]]]]]]]

The raising derivation and the matching derivation are both based on this underlying configuration. These two derivations also involve similar processes. In both cases, relative IP raises first to the [Spec, CP₁] to fulfil the enclitic need of *de*. The internal head within the relative clause then raises to the specifier of a new complementizer (CP₂) in order to capture the island effect in Chinese (Del Gobbo 2010: 390). The difference between raising and matching is that: in the raising derivation, after the movement of the internal head to [Spec, CP₂], deletion of the external head at PF takes place following by a remnant movement of CP₁ to a [Spec, CP₃] probably to achieve the correct pre-nominal word order of Chinese relatives. In the case of raising, the remaining head noun is the internal one. The reconstruction effect can occur under this derivation. In the matching derivation, CP₁ first undergoes movement to [Spec, CP₃] and then deletion of the internal head takes places. Since the remaining head in the matching derivation is the external head, there is no reconstruction effect. In adopting the double-headed derivation to relative clauses in Cantonese, we observed some issues arising, particularly in the derivation of Dem-CI-RC-*ge3*-N.

We know that NP can reconstruct in Chinese relative clauses thanks to the empirical observation of Aoun and Li (2003). However, whether a DP can reconstruct is controversial. As can be seen above, this issue is crucial to the derivation of relative clauses in Cantonese: whether a demonstrative and a classifier are generated with the NP as a DP head determines the derivation process of the constructions of RC-*ge3*-Dem-CI-N or RC-Dem-CI-N.

In the previous chapter, we observed that in our two experiments, constructions with demonstrative and classifier preceding NP appear to be the main strategy in the production of object relatives. We assumed that this is because the presence of demonstrative and classifier increases the complexity of the head noun and reduce the intervention of the subject in the spirit of featural Relativized Minimality. Under this account, demonstrative and classifier should be part of the head noun and thus involved in the calculation of the featural intervention effect.

In order to test our hypothesis and also to verify the reconstruction effect in Cantonese relative clauses, we have run an acceptability judgement test. We are going to present the design and the result of this test in the next section.

5.3 Reconstruction effects in Cantonese relative clauses: an acceptability judgment test

As presented at the beginning of this chapter (see section 5.1), whether the head of a relative clause can reconstruct is an important criterion to decide its derivation strategy. If the head noun can fully reconstruct in the relative clause, the relative structure is probably derived by head raising; if it cannot, it is more likely derived by matching¹⁰⁵.

Aoun and Li (2003) observe that reconstruction effects can occur in relative clauses in Mandarin Chinese, but only with an NP head. Given that the examples supporting the unavailability of reconstruction of QP in Aoun and Li involve another QP that scopes over the gap within the relative clause, we assume that the reason why a QP head cannot reconstruct is related to the intervention of another internal QP. Moreover, the distribution of relative constructions in our two experiments indicates that demonstrative and classifier may probably be part of the head noun and be taken into account for the calculation of intervention effects in Cantonese. Based on these observations, we argue against the claim and assume that not only an NP but also a DP (Dem-CI-N) can reconstruct in Cantonese relative constructions.

In this subsection, we are going to present a pilot study in order to test the head reconstruction effect in the relative clause in Cantonese, mainly focusing on two types of relative constructions: relatives with *ge3* (RC-*ge3*-N) and those with a demonstrative and a classifier preceding the NP (RC-Dem-CI-N), since these two constructions are related to the other two constructions. As discussed in details in the previous section, the constructions of Dem-CI-RC-*ge3*-N can derive on the basis of RC-*ge3*-N; and the construction of RC-Dem-CI-N derives by the PF deletion of *ge3* (adopting Cheng and Sybesma 2009).

Do these two constructions derive similarly or differently? In the second construction, do the demonstrative and the classifier reconstruct as part of the head noun? By answering these questions, we may also have a clearer idea about how relative constructions derive in Cantonese and whether a DP can reconstruct within relative clauses.

¹⁰⁵ Some word of caution is needed here: under the strong matching analysis (Sauerland 2000, but see also our discussion of Aoun and Li in section 5.2.2 above) what moves to the periphery of the clause from the position of the gap is an NP which is an exact copy of the externally merged head. Under this version, the matching analysis virtually becomes a notational variant of the raising analysis, both postulating two copies and only diverging on the rule generating them (merge vs. move) and deleting the lower one (ellipsis vs copy deletion). In this subsection, the term ‘matching’ corresponds to the weaker version, and we shall focus on this version, which is where different empirical (i.e. testable) predictions arise.

An effective way to detect the head reconstruction effect in the relative clause is to rely on two concrete effects of reconstruction: Principle C violation¹⁰⁶ and idiomatic interpretation. In what follows, we will employ these two effects as diagnostic tests for reconstruction. Recall that in a relative clause involving a Principle C configuration, if the head can fully reconstruct, a violation of Principle C will arise (see 66). In a relative involving idiom chunks, if the head can fully reconstruct within the relative clauses, the idiomatic interpretation can be conserved (see 67).

(66) Principle C violation in a matrix clause and in a relative clause

- a. *He_i likes a picture of John_i.
- b. the [picture_j of John_i]*_j that he_i takes _____j

(67) Idiom in a matrix clause and in a relative clause

- a. we made headway.
- b. the headway that we made

5.3.1 The different hypotheses applied to relative constructions in Cantonese

What about Cantonese? If we couple the reconstruction effects in these two conditions with the questions concerning the derivation of two relative constructions, two hypotheses can be put forward.

Under the first hypothesis, the two types of relative structures are derived in the same way: if they are both derived through (a) **raising**, we expect the head to be able to reconstruct in both cases. This entails that relative clauses involving a Principle C configuration as (66b) should be ungrammatical. On the other hand, relative clauses with an idiom as (67b) should be acceptable with an idiomatic reading. If the two types of relatives are derived through (b) **matching**, the head should never reconstruct within the relative clause: as a result, relatives like (66b) should involve no Principle C violation and should thus be grammatical, and relatives like (67b) should not be interpretable with an idiomatic meaning.

¹⁰⁶ The reason why we do not apply the Principle A violation (as in Aoun and Li 2003) to detect the reconstruction effect is because the reflexive in Chinese (*ziji*) can refer to either the local subject or the matrix subject (Xu, 1993; Pan, 1997, 2001; Huang and Liu, 2001), which may cause an interpretation ambiguity. Besides, He and Kaiser (2016) report that person of arguments is a crucial factor that affects the anaphoric interpretation of the reflexive. In order to avoid these complications, we decided to take only Principle C configuration into account.

Under a second possible hypothesis, the two relative structures might derive through two different mechanisms: the one derived by head raising will show a behavior identical to (a) in Hypothesis 1. The one derived by matching will show a behavior identical to (b) in Hypothesis 1. These two hypotheses are summarized as follows:

(68) **Hypothesis 1:** The two types of relatives structures in Cantonese are derived similarly, by

- | | | | | |
|----|--------------|---------------------------------|-------------------------|-----|
| a. | head raising | ⇒ head can be reconstructed | ⇒ Principle C effect | (X) |
| | | | ⇒ Idioms can hold | (✓) |
| b. | matching | ⇒ head can not be reconstructed | ⇒ No Principle C effect | (✓) |
| | | | ⇒ Idioms can not hold | (X) |

(69) **Hypothesis 2:** The two types of relative structures derive differently,

- | | | | |
|----|---|-------------------------|-----|
| c. | for the structure derived by head raising, see a. | ⇒ Principle C effect | (X) |
| | | ⇒ Idioms can hold | (✓) |
| d. | for the structure derived by matching, see b. | ⇒ No Principle C effect | (✓) |
| | | ⇒ Idioms can not hold | (X) |

5.3.2 Acceptability test with two types of relative clauses

In order to test whether there is a head reconstruction effect and whether it holds across the board for each type of relatives, we ran an exploratory pilot study with an acceptability rating test, with relative clauses involving Principle C configurations and idioms chunks.

5.3.2.1 Design of test

In Principle C condition, there were four items. Each item contains a minimal pair of sentences including a) an object relative with relativizer and b) an object relative with demonstrative and classifier. Among the four items, two were object relatives in the subject position of the main clause; and the two others were object relatives in the object position of the main clause. Two examples of relative clauses in Principle C condition are given in (70) and (71).

Relative with relativizer *ge3*:

- (70) [RC 佢_i 鐘意 ____j 嘅] [畢加索_i 嘅 相]_j
 keoi5 zung1ji3 ge3 bat1 gaa1 sok3 ge3 soeng2
 3SG like GE3 Picasso GE3 picture

It is supposed to mean: ‘picture(s) of Picasso_i that he_i likes’

Relative with demonstrative and classifier:

- (71) [RC 佢_i 鐘意 ____j] [a 嗰 幅 [b 畢加索_i 嘅 相]_j
 keoi5 zung1ji3 go2 fuk1 bat1 gaa1 sok3 ge3 soeng2
 3SG like Dem Cl Picasso GE3 picture

It is supposed to mean: ‘the picture of Picasso_i that he_i likes’

As in (70) and (71), the pronoun and Picasso are coreferent, if the head noun *picture of Picasso* reconstructs within the relative, a Principle C effect will arise, and the sentence will be unacceptable. If it is generated outside the relative, no Principle C violation should arise, and the sentence should be acceptable.

As a control, we also inserted a pair of sentences with grammatical subject relatives and a pair with grammatical object relatives. Two examples for each type are given below.

Grammatical subject relative with relativizer *ge3*:

- (72) [RC ____j 拍 一代宗師 嘅] 導演_j
 paak3 jat1doi6zung1si1 ge3 dou6 jin2
 make the Grand Master GE3 director
 ‘director who makes the Grand Master’

Grammatical subject relative with demonstrative and classifier:

- (73) [RC ____j 拍 一代宗師] 嗰 個 導演_j
 paak3 jat1doi6zung1si1 go2 go3 dou6 jin2
 make the Grand Master Den Cl director
 ‘the director who makes the Grand Master’

Grammatical object relative with relativizer *ge3*:

- (74) [RC 我 尋晚 睇 ____j 嘅] 戲_j
 ngo5 caam4maan5 tei2 ge3 hei3
 1SG last night watch GE3 movie
 ‘movie(s) that I watch last night’

Grammatical object relative with demonstrative and classifier:

- (75) [RC 我 尋晚 睇 ____j] 嗰 套 戲_j
 ngo5 caam4maan5 tei2 go2 tou3 hei3
 1SG last night watch Dem Cl movie
 ‘the/that movie that I watch last night’

In the idioms condition, a similar design was applied. Four minimal pairs of sentences including an object relative with relativizer and another one with demonstrative and classifier, were tested with four different idioms. The idioms that were used are listed in (76).

- (76) 炒魷魚 caau2jau4jau2: to fry squids - to dismiss/resign
 執死雞 zap1sei2gai1: to pick up a dead chicken - to take/get advantage by luck
 扯貓尾 ce2maau1mei5: to pull a tail of cat - to cover up each other's mistake
 跌眼鏡 dit3ngaan5geng2: to drop glasses - to be disappointed

Object relatives in all the items are in the subject position of the main clause. A pair of examples are given in (77) and (78).

Relative with relativizer *ge3*:

- (77) [[RC 老細 炒 ___ *i* 嘅] 魷魚_{*i*}] 咪 係 阿明 囉¹⁰⁷。
 lou5sai3 caau2 ge3 jau4jyu2 mai6 hai6 aa3ming4 lo1
 Boss fry GE3 squid Adv be AaMing SFP

Literally: 'Aming is the squid that the Boss fried.'

It is supposed to mean: 'AaMing is the one that the Boss fired.'

Relative with demonstrative and classifier:

- (78) [[RC 老細 炒 ___ *i*] [a 嗰 條 [b 魷魚]_{*i*}] 咪 係 阿明 囉。
 lou5sai3 caau2 go2 tiu4 jau4jyu2 mai6 hai6 aa3ming4 lo1
 Boss fry Dem Cl squid Adv be AaMing SFP

Literally: 'AaMing is the squid that the Boss fried.'

'AaMing is the one that the Boss fired.'

For each idiom, moreover, three root clauses containing respectively a bare noun, a nominal sequence of a classifier and noun and a sequence of demonstrative-classifier-noun as the object of the idioms were also inserted in the design. This was done in order to verify the compatibility of each idiom with definite and indefinite NPs. Recall that a bare noun is (mainly) indefinite in Cantonese, while the Dem-Cl-N phrase is definite. A Cl-N phrase can be either definite or indefinite depending on its position in the sentence according to Cheng and Sybesma (1999)¹⁰⁸. Three examples are given in (79).

¹⁰⁷ For a discussion about the construction of *mai6...lo1*, see Tang (2008).

¹⁰⁸ In the case of (79b), the Cl-N phrase has an indefinite interpretation, since it is in the object position restricted by the verb.

(79) a. with bare noun:	老細	炒-咗	阿明		魷魚。
	lou5sai3	caau2-zo2	aa3ming4		jau4jyu2
	Boss	fry-ASP	AaMing		squid
b. with CI-N:	老細	炒-咗	阿明	條	魷魚。
	lou5sai3	caau2-zo2	aa3ming4	tiu4	jau4jyu2
	Boss	fry-ASP	AaMing	CI	squid
c. with Dem-CI-N:	老細	炒-咗	阿明	嗰 條	魷魚。
	lou5sai3	caau2-zo2	aa3ming4	go2 tiu4	jau4jyu2
	Boss	fry-ASP	AaMing	Dem CI	squid
					‘Boss has fired AaMing.’

For each item in this test, different constructions (with *ge3* and with demonstrative and classifier in the case of relative clauses; with a bare noun, a CI-N phrase and a Dem-CI-N phrase as object in the case of an idiom in a root clauses) appear successively as a pair or a group. The order of these pairs or groups of items were pseudo-randomized. A sample of the acceptability judgment test is given in Appendix 3¹⁰⁹.

5.3.2.2 Participants

About the participants, 23 native speakers of Cantonese (age: 16 to 42, mean: 28) participated in this pilot on the platform Google Forms. 11 participants live in France, 9 live in Hong Kong, 1 live in Guangzhou, 2 live in other countries. 2 participants have not been taken into account in the results since they gave only a 1-point rate to the grammatical object relative clause. Therefore, there were 21 participants in total.

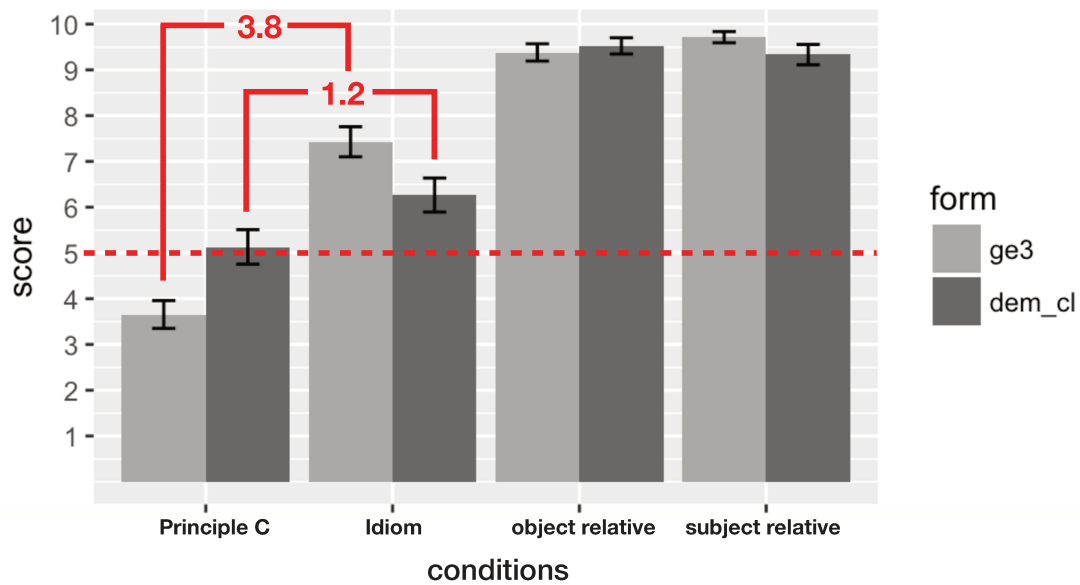
5.3.2.4 Procedures

Participants were first asked to fill a form about their background and were then briefly invited to explain the meaning of the four selected idioms in a sentence. After that, they needed to read each sentence and rate its acceptability on a 1 to 10 point scale. In the sentences where the idioms appear, they were instructed that their interpretation should be consistent with that they had given before the test. In the sentences involving a Principle C configuration, a note indicating the coreferential relation between a pronoun and a proper noun was given immediately after the sentences. During the test, the participants can change their judgement on the previous items.

¹⁰⁹ Two groups of relative clauses with Principle A configuration were also tested. However, as mentioned in footnote 106, Principle A in Chinese is rather complicated: a reflexive pronoun can have either a local or non-local antecedent. The results obtained in the test varied in different items. We decided not to take them into account.

5.3.3 General results

Graphic 10. Distribution of acceptability in different conditions



Graphic 10 shows the overall results in this pilot acceptability test. The x-axis corresponds to the two conditions that we tested (Principle C condition and idiom condition) as well as the two controls: grammatical object relatives and grammatical subject relatives; the y-axis corresponds to the mean score of acceptability, the bar in light grey corresponds to the relative structure with relativizer *ge3*, the bar in dark grey corresponds to the one with demonstrative and classifier. Both relative clauses with *ge3* and those with demonstrative and classifier display a low acceptability (3.6 for *ge3*-RCs and 5 for Dem-Cl-RCs) in the Condition C condition with respect to the acceptability of a grammatical object relative (9.4 for *ge3*-RC and 9.6 for Dem-Cl-RC); and were scored better in the idioms condition (7.4 for *ge3*-RCs and 6.2 for Dem-Cl-RCs). These results are compatible with a head reconstruction, namely our hypothesis 1a, repeated here (see 80).

- (80) head raising \Rightarrow head can be reconstructed \Rightarrow Condition C effect (✗)
 \Rightarrow Idioms can hold (✓)

On the other hand, relative clauses with *ge3* seem to display a stronger tendency towards the reconstruction effect than those with demonstrative and classifier. The difference of the acceptability score between the two conditions for the relatives with *ge3* is 3.8 and that for the relatives with demonstrative and classifier is only 1.2. However, it should be underlined that both conditions involve a different degree of variation between items. For this reason, we can only draw a descriptive statistic analysis based on the numerical data.

5.3.3.1 Results in the Principle C condition

Turning now to the results in each condition, let us start with the Principle C condition. Graphic 11 shows the distribution of acceptability of each item in this condition, corresponding to examples (81) to (83).

item 1: object relative in object position

(81) 牆 上面 掛住 [[RC 佢_i 影 ____j 嘅] [畢加索_i 嘅 相_j].
 coeng4 soeng6min6 gwaa3zyu6 keoi5 jing2 ge3 Picasso ge3 soeng6
 wall on hang-ASP 3SG photograph GE3 Picasso Poss picture
 ‘The wall is hanging a picture(s) of Picasso_i that he_i takes.’

item 2: object relative in subject position

(82) [[佢_i 喺 演唱會 唱 ____j 嘅] [張學友_i 嘅 歌_j] 係 吻別。
 keoi5 hai2 jin2coeng3wui6 coeng3 ge3 zoeng1hok6jau5 ge3 gol hai6 man5bit6
 3SG at concert sing GE3 Jacky Cheung Poss song be goodbye
 ‘The song of Jacky Cheung_i that he_i sings at the concert is goodbye kiss’

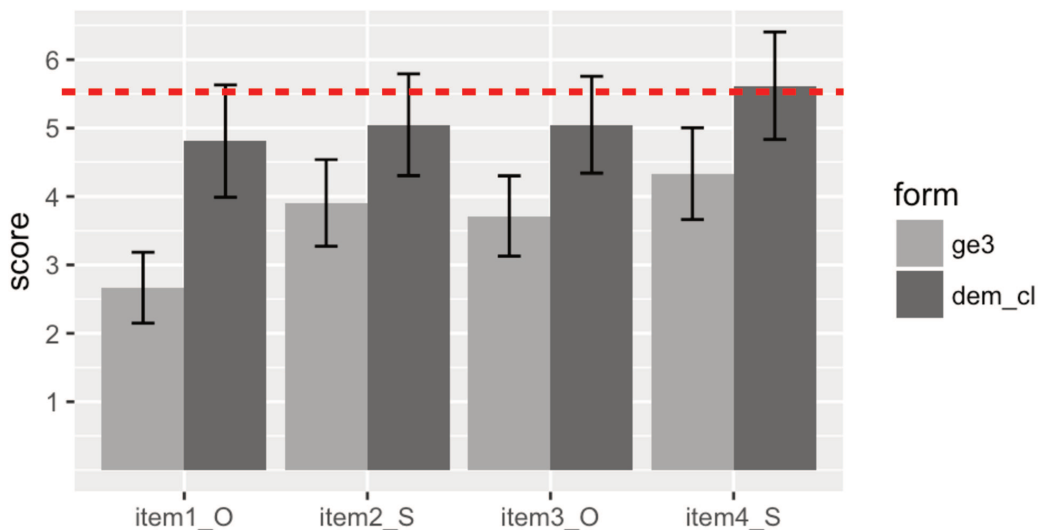
item 3: object relative in object position

(83) May 好 鐘意 [[佢_i 尋日 畫 ____j 嘅] [John_i 嘅 畫像_j].
 hou2 zung1ji3 keoi5 cam4jat6 waak6 GE3 ge3 waa2zoeng6
 very like 3SG yesterday paint ge3 GE3 portrait
 ‘May likes a lot the (auto)portrait of John_i that he_i painted yesterday.’

item 4: object relative in subject position

(84) [[佢_i 最中意 ____j 嘅] [王家衛_i 嘅 戲_j] 係 東邪西毒。
 keoi5 zeoi3zung1ji3 ge3 KWW ge3 hei6 hai6 dung1ce4sai1duk6
 3SG like the most GE3 KWW GE3 film be Ashes of Time
 ‘The movie of Wong Kar-wai_i that he_i likes the most is Ashes of Time.’

Graphic 11. Distribution of acceptability of ORs in Principle C condition



As mentioned before, both types of relatives receive a low acceptability score in this condition, which suggests that a Principle C violation may occur, and that there is a head reconstruction effect in both types of relatives. However, Graphic 11 also shows a difference in acceptability between the two relative constructions: the constructions with demonstrative and classifier were more acceptable than those with *ge3*, which suggests that the types of the relative constructions influences its acceptability in this condition. More precisely, the construction with demonstrative and classifier seem to exhibit a weaker Principle C violation.

Besides, we were also interested in testing whether the position of the relative clauses in the sentence affects the acceptability. Our preliminary results suggest that the position of the relative clauses may be irrelevant to the acceptability of the sentence. However, due to the lack of enough data and the setting of contrastive items, a more detailed experiment will be needed to further explore this point.

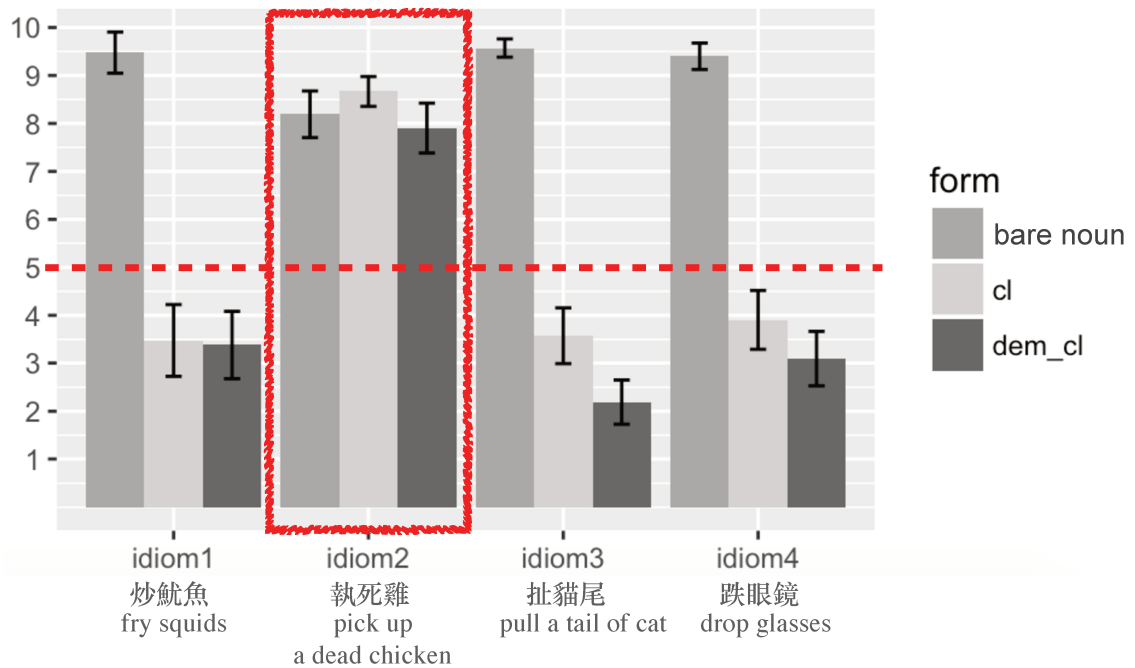
5.3.2.4 Results in the Idiom chunks condition

Let us turn now to the results in the idiom condition. Table 30 shows the acceptability of each idiom, including the items with three types of object in the main clauses (bare nouns, Cl-N phrases and Dem-Cl-N phrases), which can be found at the first three columns on the left, and the items of object relative with two types of structure, which can be found at the two columns on the right.

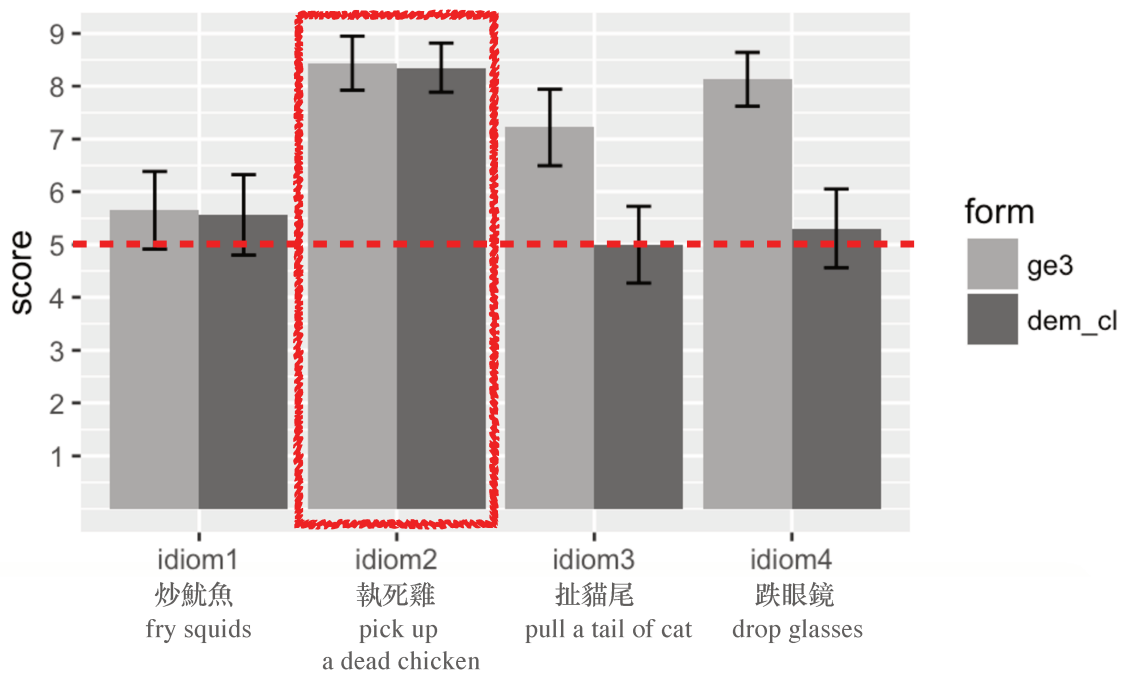
Table 30. Distribution of acceptability in idiom condition

Idiom1: 炒魷魚 to fry squids - to dismiss/resign				
bare N	cl-N	dem-cl-N	OR_ge3	OR_dem_cl
9.48	3.48	3.38	5.48	5.81
Idiom2: 執死雞 to pick up a dead chicken - to take/get advantage by luck				
bare N	cl-N	dem-cl-N	OR_ge3	OR_dem_cl
8.6	8.8	8	8.85	8.55
Idiom3: 扯貓尾 to pull a tail of cat - to cover up the other's mistake by lying				
bare N	cl-N	dem-cl-N	OR_ge3	OR_dem_cl
9.76	3.83	2.83	8.39	5.44
Idiom4: 跌眼鏡 to drop glasses - to be disappointed				
bare N	cl-N	dem-cl-N	OR_ge3	OR_dem_cl
9.6	3.65	2.3	7.3	5.21

Graphic 12. Distribution of acceptability to the selected idiom with different types of object



Graphic 13. Distribution of acceptability of object relative in idiom condition



Graphic 12 and 13 correspond to the bar plots of table 30. From the distribution of acceptability of the selected idioms with different types of object, we can observe that the four idioms that we selected behave differently: “執死雞 to pick up a dead chicken” is compatible with the three types of object. The three other idioms are only compatible with a bare noun object, which is indefinite in most cases in Cantonese.

The distribution of acceptability of object relatives (Graphic 13) correlated in general with the definiteness of the object in the idiom displayed in Graphic 12: while both types of constructions are equally acceptable with the only idiom that is compatible with both a definite and an indefinite object, which is 執死雞 ‘to pick up a dead chicken’, the construction with *ge3* is significantly more acceptable with the idioms that only allow a bare noun object, namely idiom 3 (扯貓尾 ‘to pull a tail of cat’) and 4 (跌眼鏡 ‘to drop glasses’). This result suggests that the demonstrative and the classifier are very plausibly part of the head, which is then definite. There also seem to be a head reconstruction effect in both relative constructions, according to the results in the idiom2.

What remains problematic is why object relatives with the idiom1 炒魷魚 ‘to fry squids’ are rated low with both types of relative structure. Our guess here is that this idiom involves actually a double object construction. Instead of 炒魷魚 ‘to fry squids’, the actual structure of the idiom is ‘to fry someone squids’ as in (85). The omission of the direct object ‘someone’, in our case ‘Aaming’, destroys the idiom and causes lower acceptability as in (86) and (87). If we are on the right track, the low acceptability score of the relative clauses involving “炒魷魚 to fry squids” is not due to the lack of head reconstruction effect, but rather to a defect of the items *per se* (i.e., lack of direct object).

- (85) 老細 炒-咗 阿明 (魷魚)。
 lou5sai3 caau2-zo2 aa3ming4 jau4jyu2
 Boss fry-ASP AaMing squid
 ‘Boss has fired AaMing.’
- (86)???老細 炒-咗 魷魚。
 lou5sai3 caau2-zo jau4jyu2
 Boss fry-ASP squid
 ‘Boss has fried squids’
- (87)???[[RC 老細 炒 ___ *i* 嘅] 魷魚_{*i*}]
 lou5sai3 caau2 ge3 jau4jyu2
 Boss fry GE3 squid
 ‘squids that Boss fried’

Another question that arises is why even if the demonstrative and classifier belong to the head, this type of relative construction (cf. 89) yields better scores than the corresponding non-raised idiom with a definite object (cf. 88): see Table 31. We leave this question to the future study.

(88) main clause (mean score: 2.83):

阿強 同 阿文 喺度 扯-緊 嗰 條 貓尾。
 aa3koeng4 tung4 aa3man4 hai2-dou6 ce2 gan2 go2 tiu4 maau1mei5
 Aakoeng with AaMan here pull-ASP Dem Cl tail of cats
 Literally: AaKoeng and AaMan are pulling the tail of cat.
 It is supposed to mean: ‘AaMan and Aakoeng are lying.’

(89) object relative (mean score: 5):

[RC 你哋 扯-過 ___ *i*] 嗰 啲 貓尾_{*i*}
 nei5 dei6 ce2-gwo3 go2 di1 maau1 mei5
 2PL pull-ASP Dem Cl.pl tail of cat
 Literally: ‘the tails of cat you have pulled’
 It is supposed to mean: ‘the lies that you have told’

	炒魷魚 to fry squids	扯貓尾 to pull a tail of cat	跌眼鏡 to drop glasses
main clause with dem-cl	3.17	2.83	2.04
object relative with dem-cl	5.6	5	4.64

Table 31. Comparison of the acceptability of structures with Dem-Cl-N

5.3.3 Discussion

To sum up, in this exploratory pilot study, we tested the acceptability of relative clauses involving Principle C configurations and idiom chunks. Relative clauses in the Principle C condition were low scored, in comparison with the score of grammatical object relatives, which is compatible with the existence of a Principle C violation. In the idiom condition, we observed that the acceptability of a relative clause containing an idiom chunk seems to be closely related to the type of the object in the idiom: for an idiom with a bare noun object, which is indefinite, a relative clauses with *ge3* was better scored than the one with demonstrative and classifier; for an idiom which is compatible with both bare noun and Dem-Cl-N phrase as its object, which is definite, a relative clause with *ge3* and that with demonstrative and classifier were scored similarly. The patterns of acceptability of relative clauses that we observed in the idiom condition and in the Principle C condition are both

compatible with a head reconstruction effect arising in both types of relative clauses, which makes them both compatible with a raising analysis.

The only difference that we were able to observe, thanks to the idiom condition, seems to be that the raised head differs in its definiteness in the two constructions: it is definite in the relative clauses with Demonstrative and Classifier, while it can be indefinite in the relative clause with *ge3*.

Our (preliminary) finding, suggesting that a sequence as complex as a Dem-Cl-N can reconstruct in Cantonese, may directly challenge the claim in Bhatt (2002), that only a bare NP can raise out of the relative clause, or the even stricter condition posited by Cecchetto and Donati (2015), by which it is only the head Noun that raises out of the clause. It may also challenge the claim of Aoun and Li (2003) that only NPs can reconstruct in Chinese. On the other hand, this finding supports our previous hypothesis that demonstrative and the classifier as part of the head can increase the complexity of the head and reduce or avoid the intervention effect of the subject in an object relative.

This exploratory pilot study indicates not only the possibility of a head reconstruction effect in the two relative constructions in Cantonese, but also a new perspective to investigate reconstruction effects in relative clauses. The characteristics of the idiom seem to affect the acceptability of relative constructions containing the idiom. In order to better understand how head reconstruction effects vary in different types of idiom, more detailed experiments with a more fine-grained classification of idioms are needed.

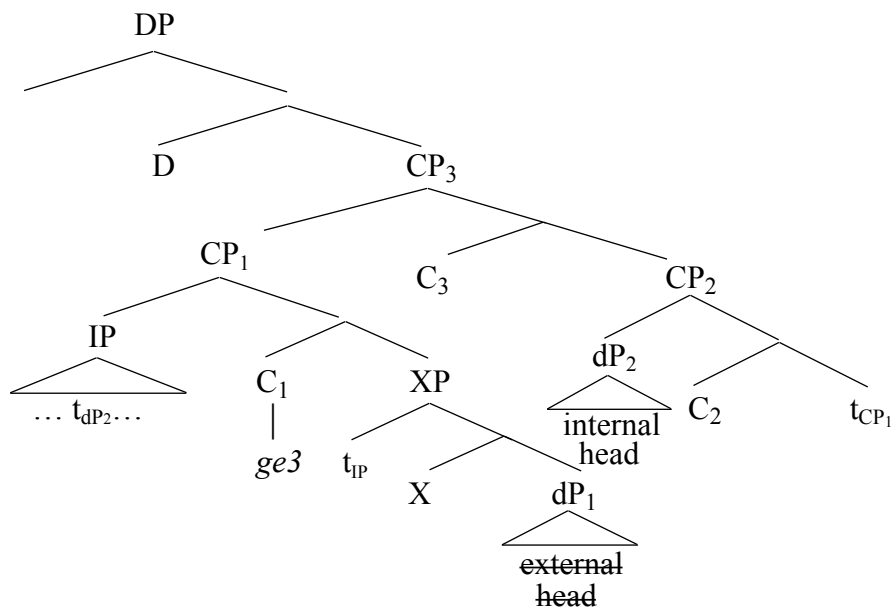
Suppose our preliminary results are confirmed, and we know that both relatives with a bare NP head and those with a DP head may involve a head reconstruction, hence a raising derivation. Let us now return to the different derivational analyses that we discussed for Cantonese relative constructions. The following diagrams illustrate the possible derivations of the relative constructions with *ge3* and those with a Dem-Cl-N phrase under the two raising analyses.

(90) The antisymmetry analysis

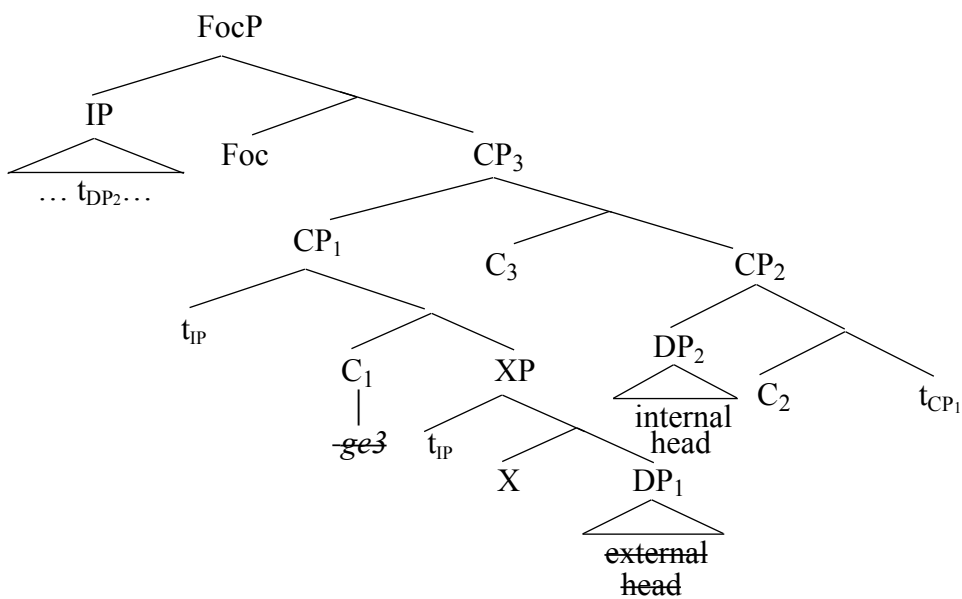
- a. RC-*ge3*-N: [DP [IP ... t_i ...]_j [D' *de* [CP NP_i [C' t_j]]]]]
- b. RC-Dem-Cl-N [_{FocP} [IP ... t_i ...]_j [_{Foc'} [DP t_j [D' *de* [CP [DP Dem-Cl-N]_i [C' t_j]]]]]]]

(91) The double-headed analysis (raising derivation)

a. RC-ge3-N:



b. RC-Dem-Cl-N:

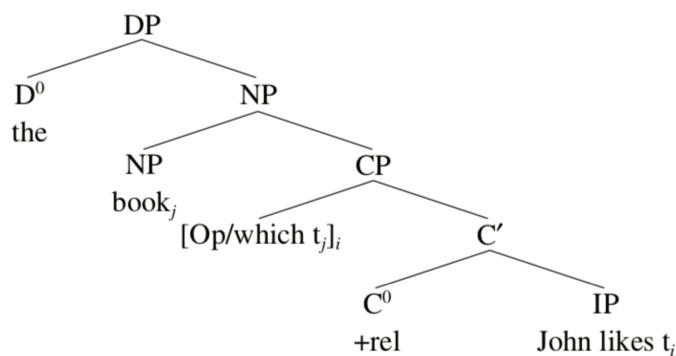


Interestingly, the two raising derivations illustrated above show that the head only moves to [Spec, CP] and never projects further. It is the IP that undergoes remnant movement to a position outside the relative CP: (90 & 91). This contrasts with what happens in English according to standard raising assumptions: (92).

Raising derivation of relative clause in English:

(92) a. the [book]_j [CP [which t_j]_i John likes t_j]

b.



If this is the case and if the constraint proposed by Bhatt (2002) and Cecchetto and Donati (2015) only holds to the projecting/labelling step of the raising, we can understand why it does not hold for relative clauses in Chinese.

Let us review the derivation of the four constructions used the most in Cantonese. Considering the complexity of the double-headed derivation, we are going to apply the antisymmetry template for the raising derivation for the sake of simplification. The following examples respectively illustrate their derivations.

(93) RC-*ge3*-N

[DP [IP ... t_{NP} ...] [D' *ge3* [CP NP [C' t_{IP}]]]]

(94) Dem-Cl-RC-*ge3*-N

[QP/DeiticP [Dem-Cl] [Q'/Deitic' [DP [IP ... t_{NP} ...] [D' *de* [CP NP [C' t_{IP}]]]]]]]]¹¹⁰

(95) RC-(*ge3*)-Dem-Cl-N

[FocP [IP ... t_{NP} ...] [Foc' [DP t_{IP} [D' *ge3* [CP NP [C' t_{IP}]]]]]]

¹¹⁰ Simpson (2002) proposes that the initial demonstrative and classifier can be base-generated in the [Spec, QP/DeiticP].

5.4 Summary

In this chapter, we have reviewed three approaches for the derivation of restrictive relative clauses in the literature: the raising derivation, the matching derivation and the double-headed derivation. These approaches differ from each other in the origin of the head noun and the derivational history. Under the raising derivation, the head noun originates inside the relative clause and undergoes movement (internal merge) to its superficial position. Since the head noun is generated within the relative clause, it can reconstruct and be interpreted in its original position.

Under the matching derivation, the head noun is base-generated outside the relative clause, which is externally merged with it. There is an element originating inside the relative clause which raises to the edge of the relative clause ([Spec, CP]) and matches with the external head. Since the head noun is generated outside the relative, it cannot reconstruct within it.

The double headed-derivation involves both raising and matching. Under this derivation, there are two heads in the underlying structure of relatives: an internal one and an external one. The internal head originates within the relative clause, which is externally merged into the specifier position of a functional projection ([Spec, FP]) above the external head. According to whether the head noun can reconstruct or not, either the internal head raises to a position c-commanding the external head in order to delete it at PF or vice versa. The reconstruction effect holds under the former derivation, since what remains in the superficial structure is the internal head; but cannot hold under the latter, since the remaining head noun is the external one.

As can be seen, the origin of the head noun determines whether it can reconstruct within the relative clause, which is an important criterion to decide the derivation strategies.

After reviewing the three main proposals about the derivation of relative clauses in the framework of generative grammar, we turned to three corresponding approaches in Chinese. Simpson (2001, 2002) adopts an antisymmetry analysis for relatives in Chinese, in which the relative marker *de* is analysed as a determiner and the relative CP is its complement. Under this analysis, relatives in Chinese can derive similarly as relatives in English. However, according to the enclitic nature of *de*, the remnant IP needs to move to its specifier position ([Spec, DP]).

Aoun and Li (2003) argue that relative constructions in Chinese are an adjunction structure. Based on empirical data, they observe reconstruction effects with idioms and with certain binding configurations. However, there seem to be some constraints. Given that a relative with a QP head

(Num-Cl-N) cannot have inverse scope interpretation with another QP within the relative clause, they assume that QP cannot reconstruct and further extend the unavailability of reconstruction to the DP.

In order to reconcile the reconstruction effects with an NP head with the adjunction structure of Chinese relatives, they propose a relativization strategy operating on an adjunction structure: the relative CP is merged with the head NP, and the head NP can be a copy of an NP within the relative CP. In this case, NP projects and the whole relative construction remains an NP. Some problems arise in this derivation: on the one hand, if the head NP can be a copy inside the relative clause, the derivation may involve an internal merge, which is similar to the raising derivation; on the other hand, if the relative CP is adjoined to the head NP, CP is late merged, and it is not possible for the head NP to raise from an internal position of CP, since it is already generated in an external position. Considering this derivational paradox, we proposed to reanalyse the derivation of Aoun and Li (2003) as a version of strong matching.

Del Gobbo (2010), following Cinque (2006, 2008), put forward a double-headed derivation for relative constructions in Chinese in order to capture the observed availability and unavailability of reconstructions according to Aoun and Li (2003). Under her proposal, *de* is analysed as a non-root complementizer. The relative IP is externally merged into the specifier of a functional projection of the external head. The relative IP raises to the specifier position of *de* to satisfy its enclitic need, as in Simpson (2001). Internal head then raises to a higher position in order to license the further derivations. Unlike Cinque's proposal for English relatives, the external head in Chinese relative construction does not raise; instead, it is the remnant CP that raise to derive a head-final order. As for the PF deletion of one of the two heads, it is licensed in terms of cyclic-c-command. According to whether the relative constructions can exhibit the reconstruction effects, different derivation processes arise.

We tried to extend these three analyses to relatives in Cantonese. In the production experiments we described in details in the first Part of this work, six constructions were observed, involving a restrictive reading. Among them, the following four constructions were employed the most: RC-Dem-Cl-N, RC-*ge3*-N, RC-*ge3*-Dem-Cl-N and Dem-Cl-RC-*ge3*-N. Relative clauses with a bare NP head are compatible with all the three derivations. However, the derivation of those followed by a

demonstrative-classifier-noun cluster is unclear. Whether the demonstrative and the classifier form a constituent with the NP results in different derivations.

Besides, in chapter 4, we observed that choosing with a demonstrative and a classifier preceding the NP appears to be a strategy to reduce the intervention effect of the subject in an object relative in the two production experiments. Therefore, we assumed that demonstrative and classifier in these constructions might be taken into account in the featural intervention effect. Hence they should be part of the head. We thus proposed three possible derivations with a DP head.

In order to explore whether there are reconstruction effects in Cantonese relatives and investigate whether a DP can reconstruct in relative clauses in Cantonese, we ran a pilot acceptability judgement test. The preliminary results of this pilot appear to be compatible with head reconstruction in both relatives with a bare NP (RC-*ge3*-N) and those with demonstrative and classifier (RC-Dem-Cl-N), which might in turn indicate bility that these two constructions both involve a raising derivation. More importantly, the results in the idiom condition suggest that the demonstrative and classifier are likely to be generated with the NP, and together form a DP head. These preliminary results align not only with our hypothesis about the DP head but also with the one about the impact of the demonstrative and classifier on the calculation of intervention effect in an object relative.

Chapter 6 General conclusion

In the first part of this thesis, we showed that structural factors play a crucial role in processing and producing relative clauses in Cantonese. The results of our studies based on two elicited production experiments and two corpus studies indicate the existence of featural-based intervention effects (Friedmann, Belletti et Rizzi 2009, Villata et al. 2016, Rizzi 2018) in Cantonese: subject extraction is easier due to the local relation holding between the subject head and the gap; object extraction is more difficult due to an intervention of the subject but only insofar as the intervening subject shares the same features as the head; if the subject and the object mismatch in features, the intervention effects of the subject are reduced or avoided.

However, the production of relative clauses was not yet ‘explored’. Considering this ‘vacancy’ in the research domain, we ran a study based on two elicited production experiments and two corpus study. We showed that structural factors play a crucial role in the production of relative clauses in Cantonese: notwithstanding the superficially head-final order displayed by Cantonese relativization¹¹¹, an overwhelming subject preference emerged in the first elicited production experiment with animate full-NPs argument; even in the second experiment, where the features of arguments varied, a subject preference still emerged.

The results of our studies also indicated the existence of featural-based intervention effects (Friedmann, Belletti et Rizzi 2009, Villata et al. 2016, Rizzi 2018) in Cantonese: subject extraction is easier due to the local relation holding between the subject head and the gap; object extraction is more difficult due to an intervention of the subject but only insofar as the intervening subject shares the same features as the head; if the subject and the object mismatch in features, the intervention effects of the subject are reduced or avoided. In the two corpus studies, where the contexts varied a lot, and the features of arguments were more diverse, the subject preference disappeared; in the second elicited production experiments, where the features of arguments were varied according to four factors, although the result still showed a subject preference, the proportion of the production of object relatives visibly increased with respect to the results in the first experiment.

¹¹¹ Relative clauses in this word order are expected to result in an object preference according to the linear factor based hypothesis: since the linear distance between the filler and the gap is shorter in the object relatives with respect to the subject relatives.

Moreover, we observed that the underlying mechanism of featural intervention seems to be complicated: when head and subject contain multiple features, every feature counts. We assumed that the more matching features between head noun and intervener, the more difficult the construction is. Based on the observation in our experimental and corpus data, we decided to further investigate the impact of animacy, nominal form and person feature of arguments in the featural intervention effect.

In the second part of the thesis, we have explored the two domains that were necessary in order to build a full-fledged account in terms of featural Relativized Minimality for the distribution of Cantonese relatives: the structure of nominal expressions and the structure and derivation of two main relative constructions that are available in the language.

We first investigated the structure and interpretation of four types of nominal expressions in Chinese: bare nouns, [CI-N] phrases, Num-CI-N sequences and Dem-Num-CI-N sequences. We observed that the interpretation of nominal expressions is related to their structure and that each element in a nominal expression has a different function, and heads its own projection. Definiteness in Chinese is realized by a ι operator, which changes type $\langle e, t \rangle$ into an individual (type $\langle e \rangle$). The ι operator is covert in Mandarin but overt in Cantonese, where it is segmentally realized by the classifier. Indefiniteness is realized by a covert or overt Numeral. Demonstrative heads the topmost layer of the function projections of NP, and selects a complement with a filled CI.

We then proceeded to explore the structure of nominal complementation. Two proposals were reviewed: Simpson (2001) analyses *de* as an enclitic determiner and possessive, adjectival modification as a relative construction. Cheng and Sybesma (2009) consider *de* in Mandarin and *ge3*, its equivalent in Cantonese, to be a unit-marking classifier, which can be a ι operator. As for the nominal modifications, they suggest that their structures differ according to the structure of the nominals modified: modification of a bare noun involves a spec-head-comp configuration; modification of a complex nominal, such as a Num-CI-N phrase or a Dem-CI-N phrase is in an appositive structure. In addition, they indicate that the modifications involve a contrastive focus reading. In order to validate this reading, the modifier moves to the left periphery domain and provoke the deletion of *ge3* at PF. Construction without *ge3* derives in this way.

Recall that based on our empirical data (including two production experiments and two corpus studies), we observed that featural intervention in Cantonese relatives involve a complex mechanism: when head and subject contain multiple features, every feature counts. The more matching features between the head noun and the intervening subject, the more difficult the construction is. We proposed two new terms to refer to the relationships between arguments in a relative: the constructions where the only featural difference between head noun and intervener is the criterial feature ([+R] in the case of relative clauses) correspond to a configuration of maximal (non-criterial) inclusion; the constructions where head noun and intervener have only one feature in common correspond to what we have called a minimal (non-criterial) inclusion configuration. Based on the distinctness hierarchy of Rizzi (2018), we put forward a complex accessibility hierarchy for the processing of object relative clauses:

- (1) identity > criterial inclusion > maximal non-criterial inclusion > minimal non-criterial inclusion disjunction¹¹²

Taking the structure of nominal expressions in Cantonese into account, we suggested that the lexical restriction parameter [\pm NP], which is a syntactic feature that have proved to be relevant in many languages in previous studies on the (featural) intervention hypothesis (Friedmann et al. 2016, Villata et al. 2009, Rizzi 2018, a.o.), can also play a role in the calculation of intervention effects in Cantonese. In Romance and Germanic languages, the lexical restriction is overtly visible with a determiner lexically restricted by an NP. In Cantonese, what appears to count is the presence of a lexical restriction in underlying structure with a classifier lexically restricted by an NP. However, for nominal expressions involving bare common nouns and proper nouns, which are assumed to undergo a N-to-Cl movement, the lexical restriction is concealed by this movement.

Another factor that must be taken into account is the relative construction. Relative markers in Cantonese (e.g. *ge3*, classifier, demonstrative) are all nominally related, so verify whether they participate in the featural intervention calculation is of primary importance. In order to answer this question, we investigated the distribution of the relative constructions in our two experiments. The results showed that constructions with a demonstrative and a classifier preceding the NP are the

¹¹² Remember that it is impossible for a (non-stacking) relative clause to have identity and criterial inclusion configurations. This is coherent with the fact that object relatives, although difficult to process, are grammatical.

predominant strategy in object relatives in both experiments. We assume that this is because the demonstrative and the classifier, being both functional projections, have a [+FP] feature, which can increase the featural complexity of the head and consequently the featural difference between the head and the subject intervener¹¹³. If our assumption is correct, demonstrative and classifier are part of the head of the relative clause. As for the relativizer *ge3*, on one hand, it cannot form a complex nominal with the NP without a filled specifier; on the other hand, we did not observe any facilitation effect of relative with *ge3* in object relatives in our data. Based on these empirical observations, we concluded that *ge3*, although endowed with a [+FP] feature, is not taken into account in the calculation of the featural intervention effect.

In order to verify whether the demonstrative and the classifier belong to the head of the relative, we turned to investigate the derivation of relative constructions in Cantonese. We investigated the derivation of relative constructions in Cantonese based on three different approaches: the raising derivation, the matching derivation and the double-headed derivation. The main differences between these approaches are where the head noun is generated and how the relative clause merges with the head noun. Under the raising derivation, the head noun originates inside the relative clause and internally merge with the relative clause. Under the matching derivation, the head noun is base-generated in a position outside the relative clause, which externally merges with it. Double-headed derivation involves both the raising and the matching strategies: the relative clause containing the internal head is directly merged to the specifier of a functional projection taking the external head as complement. According to the behaviour of relatives in the language (e.g., syntactic position, scope interpretation), different processes occur in order to achieve different superficial structures and different scope interpretations.

We also reviewed the adaptations of these three approaches to the derivation of relative clauses in Chinese, with which we successfully derive the four constructions used the most in our data in Cantonese.

We then ran an acceptability judgement test to investigate whether the head noun of relative clauses can reconstruct. Results suggest that both relatives with *ge3* (RC-*ge3*-N) and those with demonstrative and classifier (RC-Dem-Cl-N) exhibit a head reconstruction effect. Moreover,

¹¹³ But only if that subject intervener itself is not a Dem-Cl-N phrase, namely is not endowed with the same [+FP] feature.

demonstrative and classifier are likely to be generated within the relative clause together with the head NP. This supported our hypothesis that demonstrative and classifier are part of the head of the relative clause.

In conclusion, the featural Relativized Minimality in Cantonese has a complex calculation system involving different features: semantic features such as animacy and person; syntactic feature such as [+R(el)], [+NP] and [+FP]. When the arguments of a relative involve multiple features, every feature counts (even the syntactic features of the internal elements of the arguments, such as demonstrative and classifier). The processing load of an object relative is firmly related to the featural similarity between the head and the subject intervener: when they exhibit a maximal degree of similarity (i.e., *maximal inclusion*), the object relative is very difficult; when they involve a disjunction configuration, the object relative is expected to be as easy as a subject relative.

We tried to provide a panorama of featural Relativized Minimality in Cantonese in this work. However, there are still some questions remaining open. Our empirical data indicate a possible asymmetry between the semantic features and the syntactic features: similarity of the semantic features seems to provoke a stronger intervention effect than that of syntactic features in Cantonese. In the two production experiments, object relatives in the pronoun subject condition involve a low degree of feature similarity (but involve matching of animacy and person). However, the expected facilitation effect is not observed. On the other hand, the corpus studies showed an impact of person feature. 90% of the object relatives with pronominal subject display a mismatch in person. This seeming asymmetry between the different features is needed to be further investigated.

Another question that is worth studying concerns the intervention configurations with multiple interveners (such as indirect object relative, object relatives with multi-arguments). This issue is so far not explored yet in the literature. We hope to investigate the featural Relativized Minimality account for this type of configurations with new experiments and hope to find a new perspective to analyse a relative clause with complex structure.

References

- Adams, C. (1990). Syntactic comprehension in children with expressive language impairment. *British Journal of Disorders of Communication*, 25(2), 149–171.
- Adani, F., Van der Lely, H. K., Forgiarini, M., & Guasti, M. T. (2010). Grammatical feature dissimilarities make relative clauses easier: A comprehension study with Italian children. *Lingua*, 120(9), 2148–2166.
- Áfarli, T. A. (1994). A promotion analysis of restrictive relative clauses. *The Linguistic Review*, 11(2), 81–100.
- Alexiadou, A., & Anagnostopoulou, E. (2000). Greek syntax: A principles and parameters perspective. *Journal of Greek Linguistics*, 1, 171–222.
- Alexiadou, A., & Gengel, K. (2012). 8 NP ellipsis without focus movement/projections: the role of Classifiers. *Contrasts and Positions in Information Structure*, 177.
- Aoun, J., & Li, Y. A. (2003). *Essays on the representational and derivational nature of grammar: The diversity of wh-constructions*. MIT Press.
- Arnon, I. (2010). Rethinking child difficulty: The effect of NP type on children's processing of relative clauses in Hebrew. *Journal of Child Language*, 37(1), 27–57.
- Arsenijevic, B., & Sio, J. (2007). Talking about classifiers, the Cantonese ge is a curious one. *WSM, Leiden University*.
- Arsenijevic, B., & Sio, J. U.-S. (2008). The Cantonese ge. *Annual Research Forum (ARF) 2008*.
- Benedict, H. (1979). Early lexical development: Comprehension and production. *Journal of Child Language*, 6(2), 183–200.
- Bentea, A., Durreleman, S., & Rizzi, L. (2016). Refining intervention: The acquisition of featural relations in object A-bar dependencies. *Lingua*, 169, 21–41.
- Berman, R. (1997). Early acquisition of syntax and discourse in Hebrew. *Psycholinguistic Studies in Israel: Language Acquisition, Reading, and Writing*, 57–100.
- Bernstein, J. B. (1997). Demonstratives and reinforcers in Romance and Germanic languages. *Lingua*, 102(2–3), 87–113.
- Bever, T. G. (1970). The cognitive basis for linguistic structures. *Cognition and the Development of Language*, 279(362), 1–61.
- Bhatt, R. (2002). The raising analysis of relative clauses: Evidence from adjectival modification. *Natural Language Semantics*, 10(1), 43–90.
- Bhatt, R. (2015). Relative clauses and correlatives. *Syntax–Eory and Analysis: An International Handbook. de Gruyter: Berlin*.

- Bianchi, V. (2000). The raising analysis of relative clauses: A reply to Borsley. *Linguistic Inquiry*, 31(1), 123–140.
- Bianchi, V. (2011). *Consequences of antisymmetry: Headed relative clauses* (Vol. 46). Walter de Gruyter.
- Boef, E. (2013). *Doubling in relative clauses: Aspects of morphosyntactic microvariation in Dutch*. Netherlands Graduate School of Linguistics.
- Borer, H. (2005). *Structuring sense* (Vol. 1). Oxford University Press Oxford.
- Borsley, R. D. (1997). Relative clauses and the theory of phrase structure. *Linguistic Inquiry*, 629–647.
- Brandt, S., Kidd, E., Lieven, E., & Tomasello, M. (2009). The discourse bases of relativization: An investigation of young German and English-speaking children's comprehension of relative clauses. *Cognitive Linguistics*, 20(3), 539–570.
- Brown, H. D. (1972). Children's comprehension of relativized English sentences. *Child Development*, 42, 1923–1936.
- Brugè, L. (2002). The positions of demonstratives in the extended nominal projection. *Functional Structure in DP and IP: The Cartography of Syntactic Structures*, 1, 15–53.
- Campbell, R. (1996). Specificity operators in SpecDP. *Studia Linguistica*, 50(2), 161–188.
- Carlson, G. N. (1977). Amount relatives. *Language*, 520–542.
- Cecchetto, C. (2006). Reconstruction in relative clauses and the copy theory of traces. In P. Pica and J. Rooryck, eds., *Linguistic variation yearbook 5*, 5–35. Amsterdam: John Benjamins.
- Cecchetto, C., & Donati, C. (2015). *(Re) labeling* (Vol. 70). MIT Press.
- Chan, A., Matthews, S., Yip, V., & Kidd, E. (2011). The acquisition of relative clauses in Cantonese and Mandarin. *The Acquisition of Relative Clauses: Processing, Typology and Function*, 197, 225.
- Chao, Y. (1968). *A grammar of spoken Chinese*. Univ of California Press.
- Cheng, Lisa Lai-Shen. (1986). de in Mandarin. *Canadian Journal of Linguistics/Revue Canadienne de Linguistique*, 31(4), 313–326.
- Cheng, Lisa Lai-Shen, & Sybesma, R. (1998). Yi-wan tang, yi-ge Tang: Classifiers and massifiers. *Tsing-Hua Journal of Chinese Studies New Series*, 28–385.
- Cheng, Lisa Lai-Shen. (1997). Marking modification in Cantonese and Mandarin. *Ms., University of California, Irvine and HIL, Leiden*.
- Cheng, Lisa Lai-Shen, & Sybesma, R. (1999). Bare and Not-So-Bare Nouns and the Structure of NP. *Linguistic Inquiry*, 30(4), 509–542. Retrieved from JSTOR.

- Cheng, Lisa Lai-Shen, & Sybesma, R. (2005a). A Chinese relative. *Organizing Grammar: Studies in Honor of Henk van Riemsdijk*, 69–76.
- Cheng, Lisa Lai-Shen., & Sybesma, R. (2005b). Classifiers in four varieties of Chinese. *Handbook of Comparative Syntax*, 259–292.
- Cheng, Lisa Lai-Shen., & Sybesma, R. (2009). De as an underspecified classifier: first explorations. *Yuyanxue Luncong*, 39, 123–156.
- Cheng, Lisa Lai-Shen, & Sybesma, R. (2012). Classifiers and DP. *Linguistic Inquiry*, 43(4), 634–650.
- Chierchia, G. (1998). Plurality of mass nouns and the notion of “semantic parameter.” In *Events and grammar* (pp. 53–103). Springer.
- Chomsky, N. (1957). *Syntactic structure*. Mouton.
- Chomsky, N. (1965). Aspects of the theory of syntax. *Cambridge, MA: MIT Press*.
- Chomsky, N. (1977). *On wh-movement*. *Formal syntax*, ed. by Peter W. Culicover, Thomas Wasow, and Adrian Akmajian, 71–132. New York: Academic Press.
- Chomsky, N. (1982). *Some concepts and consequences of the theory of government and binding*. MIT press.
- Chomsky, N. (1986). *Barriers* (Vol. 13). MIT press.
- Chomsky, N. (1995). *The Minimalist Program*. MIT Press, Cambridge, MA.
- Chomsky, N. (2000). Minimalist inquiries: the framework. In: Martin, R., Michaels, D., Uriagereka, J. (Eds.), *Step by Step – Essays in Minimalist Syntax in Honor of Howard Lasnik*. MIT Press, Cambridge, MA.
- Chomsky, N. (2001). Derivation by phase. M. Kenstowicz (ed.): *Ken Hale: a life in language*. Cambridge, MA: MIT Press, 1, 52.
- Cinque, G. (2003). The prenominal origin of relative clauses. Paper presented at the *Workshop on Antisymmetry and Remnant Movement*, NYU, New York.
- Cinque, G. (2006). *Restructuring and Functional Heads: The Cartography of Syntactic Structures Volume 4: The Cartography of Syntactic Structures* (Vol. 4). Oxford University Press on Demand.
- Cinque, G. (2008). *Two types of nonrestrictive relatives*.
- Cinque, G. (2015). Three phenomena discriminating between ‘raising’ and ‘matching’ relative clauses. *Semantics-Syntax Interface*, 2(1), 1–27.
- Clancy, P. M., Lee, H., & Zoh, M.-H. (1986). Processing strategies in the acquisition of relative clauses: Universal principles and language-specific realizations. *Cognition*, 24(3), 225–262.

- Cook, V. J. (1975). Strategies in the comprehension of relative clauses. *Language and Speech*, 18(3), 204–212.
- Correa, L. M. (1982). Strategies in the acquisition of relative clauses. *Working Papers of the London Psycholinguistic Research Group*, 4, 37–49.
- Corrêa, L. M. S. (1995). An alternative assessment of children's comprehension of relative clauses. *Journal of Psycholinguistic Research*, 24(3), 183–203.
- Crain, S., Fodor, J.D. (1985). *How can grammars help parsers?* In: Dowty, D., Karttunen, L., Zwicky, A. (Eds.), *Natural Language Parsing: Psychological, Computational, and Theoretical Perspectives*. Cambridge University Press, Cambridge, UK, pp. 94–128.
- De Villiers, J. G., de Villiers, P. A., & Hoban, E. (1994). *The central problem of functional categories in the English syntax of oral deaf children*. U H. Tager-Flusberg (ur.), *Constraints on language acquisition: Studies of atypical children (9–47)*. Hillsdale, NJ: Erlbaum.
- De Villiers, J. G., Flusberg, H. B. T., Hakuta, K., & Cohen, M. (1979). Children's comprehension of relative clauses. *Journal of Psycholinguistic Research*, 8(5), 499–518.
- De Vries, M. (2002). *The syntax of relativization*. Utrecht: LOT Publications.
- Del Gobbo, F. (2001). Appositives schmappositives in Chinese. In UCI Working Papers in Linguistics 7, ed. Maki Irie, and Hajime Ono, 1–25. University of California, Irvine.
- Del Gobbo, F. (2003a). Appositives and quantification. *Proceedings of the 26th Annual Penn Linguistics Colloquium*, 9, 73–88. Citeseer.
- Del Gobbo, F. (2003b). *Appositives at the interface*. University of California, Irvine. Doctoral Dissertation.
- Del Gobbo, F. (2004). On prenominal relative clauses and appositive adjectives. *Proceedings of WCCFL*, 23, 182–194.
- Del Gobbo, F. (2005). Chinese relative clauses: restrictive, descriptive or appositive? In Brugè, Laura et al.(eds.), *Contributions to the thirtieth Incontro di Grammatica Generativa, Venezia: Libreria Editrice Cafoscarina, 2005, pp. 207-305*. Venezia, Libreria Editrice Cafoscarina.
- Den Dikken, M. (2006). *Relators and linkers: The syntax of predication, predicate inversion, and copulas* (Vol. 47). MIT press.
- Del Gobbo, F. (2010). On Chinese appositive relative clauses. *Journal of East Asian Linguistics*, 19(4), 385–417.

- Den Dikken, M., & Singhapreecha, P. (2004). Complex noun phrases and linkers. *Syntax*, 7(1), 1–54.
- Diessel, H., & Tomasello, M. (2000). The development of relative clauses in spontaneous child speech. *Cognitive Linguistics*, 11(1/2), 131–152.
- Diessel, H., & Tomasello, M. (2005). A new look at the acquisition of relative clauses. *Language*, 882–906.
- Donati, C., & Cecchetto, C. (2011). Relabeling heads: A unified account for relativization structures. *Linguistic Inquiry*, 42(4), 519–560.
- Dryer, M. S. (2005). Order of relative clause and noun. *The World Atlas of Language Structures*, 366–369.
- Dryer, M. S. (2013). Order of Relative Clause and Noun. In M. S. Dryer & M. Haspelmath. (Eds.) *The World Atlas of Language Structures Online*. Leipzig, Germany: Max Planck Institute for Evolutionary Anthropology.
- Durreleman, S. (2017). Do Grammatical and Cognitive Phenotypes Illuminate Each Other? Reflections on Un-Cartesian Linguistics and the Language-ToM Interface. *Theoretical Linguistics*, 43(3–4), 249–260.
- Flynn, S., & Lust, B. (1980). Acquisition of relative clauses: Developmental changes in their heads. *Cornell Working Papers in Linguistics*, 1, 33–45.
- Ford, M. (1983). A method for obtaining measures of local parsing complexity throughout sentences. *Journal of Verbal Learning and Verbal Behavior*, 22(2), 203–218.
- Fox, B. A. (1987). The noun phrase accessibility hierarchy reinterpreted: Subject primacy or the absolute hypothesis? *Language*, 856–870.
- Fox, B. A., & Thompson, S. A. (1990). A discourse explanation of the grammar of relative clauses in English conversation. *Language*, 297–316.
- Fox, D., & Nissenbaum, J. (2000). Extraposition and covert movement. *Talk Presented at NYU*.
- Franck, J., Lassi, G., Frauenfelder, U. H., & Rizzi, L. (2006). Agreement and movement: A syntactic analysis of attraction. *Cognition*, 101(1), 173–216.
- Frauenfelder, U., Segui, J., & Mehler, J. (1980). Monitoring around the relative clause. *Journal of Verbal Learning and Verbal Behavior*, 19(3), 328–337.
- Frazier, L., Clifton, C., & Randall, J. (1983). Filling gaps: Decision principles and structure in sentence comprehension. *Cognition*, 13(2), 187–222.
- Frazier, L., & Clifton Jr, C. (1989). Successive cyclicity in the grammar and the parser. *Language and Cognitive Processes*, 4(2), 93–126.

- Frazier, L., & d'Arcais, G. B. F. (1989). Filler driven parsing: A study of gap filling in Dutch. *Journal of Memory and Language*, 28(3), 331–344.
- Friedmann, N., Belletti, A., & Rizzi, L. (2009). Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. *Lingua*, 119(1), 67–88.
- Garrod, S. C., & Sanford, A. J. (1977). Interpreting Anaphoric Relations: The Integration of Semantic. *Journal of Verbal Learning and Verbal Behavior*, 16, 77–90.
- Garrod, S. C., & Sanford, A. J. (1982). The mental representation of discourse in a focussed memory system: Implications for the interpretation of anaphoric noun phrases. *Journal of Semantics*, 1(1), 21–41.
- Gennari, S. P., & MacDonald, M. C. (2008). Semantic indeterminacy in object relative clauses. *Journal of Memory and Language*, 58(2), 161–187.
- Gibson, E., & Ko, K. (1998). An integration-based theory of computational resources in sentence comprehension. *Fourth Architectures and Mechanisms in Language Processing Conference, University of Freiburg, Germany*.
- Gibson, E. (1998). Linguistic complexity: Locality of syntactic dependencies. *Cognition*, 68(1), 1–76.
- Gibson, E. (2000). The dependency locality theory: A distance-based theory of linguistic complexity. *Image, Language, Brain, 2000*, 95–126.
- Giusti, G. (1993). *La sintassi dei determinanti*. Unipress.
- Goodluck, H., & Tavakolian, S. (1982). Competence and processing in children's grammar of relative clauses. *Cognition*, 11(1), 1–27.
- Gordon, P. C., Hendrick, R., & Johnson, M. (2001). Memory interference during language processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 27(6), 1411.
- Gordon, P. C., Hendrick, R., & Johnson, M. (2004). Effects of noun phrase type on sentence complexity. *Journal of Memory and Language*, 51(1), 97–114.
- Greenberg, J. H. (1978). Generalizations about numeral systems. *Universals of Human Language*, 3, 249–295.
- Grosu, A., & Landman, F. (1998). Strange relatives of the third kind. *Natural Language Semantics*, 6(2), 125–170.
- Hakes, D. T., Evans, J. S., & Brannon, L. L. (1976). Understanding sentences with relative clauses. *Memory & Cognition*, 4(3), 283–290.

- Hakuta, K. (1981). Grammatical description versus configurational arrangement in language acquisition: The case of relative clauses in Japanese. *Cognition*, 9(3), 197–236.
- Halliday, M. A. K., & Hasan, R. (1976). *Cohesion in english*. Routledge.
- Hamburger, H. (1980). A deletion ahead of its time. *Cognition*, 8(4), 389–416.
- Hamburger, H., & Crain, S. (1982). Relative acquisition. *Language Development*, 1, 245–274.
- Hashimoto, A. Y. (1971). *Mandarin syntactic structures*. Chinese Linguistics Project and Seminar, Princeton University.
- Haviland, S. E., & Clark, H. H. (1974). What's new? Acquiring new information as a process in comprehension. *Journal of Verbal Learning and Verbal Behavior*, 13(5), 512–521.
- Hawkins, J. A. (1990). A parsing theory of word order universals. *Linguistic Inquiry*, 21(2), 223–261.
- Hawkins, J. A. (1994). *A performance theory of order and constituency* (Vol. 73). Cambridge University Press.
- He, X., & Kaiser, E. (2016). Processing the Chinese Reflexive “ziji”: Effects of Featural Constraints on Anaphor Resolution. *Frontiers in Psychology*, 7, 284.
- Henderson, B. (2007). Matching and raising unified. *Lingua*, 117(1), 202–220.
- Herring, S. C. (1991). Nominalization, relativization, and attribution in Lotha, Angami, and Burmese. *Linguistics of the Tibeto-Burman Area*, 14(1), 55–72.
- Heycock, C. (2014). *Relative reconstructions?*
- Huang, C.-T. J. (1982). *Logical relations in Chinese and the theory of grammar*. PhD diss. MIT.
- Huang, C.-T. J., & Liu, C.-S. L. (2001). Logophoricity, attitudes, and ziji at the interface. *Long-Distance Reflexives*, 33, 141–195.
- Huang, S.-Z. (2006). Property theory, adjectives, and modification in Chinese. *Journal of East Asian Linguistics*, 15(4), 343–369.
- Hulsey, S., & Sauerland, U. (2006). Sorting out relative clauses. *Natural Language Semantics*, 14(2), 111.
- Hupet, M., & Tilmant, B. (1989). How to make young children produce cleft sentences. *Journal of Child Language*, 16(2), 251–261.
- Iatridou, S., Anagnostopoulou, E., & Izvorski, R. (2001). Observations about the form and meaning of the perfect. *Current Studies in Linguistics Series*, 36, 189–238.
- Jackendoff, R. (1972). *Semantic interpretation in generative grammar*.
- Jackendoff, R. (1977). *X syntax: A study of phrase structure*. MIT press.

- Jacobs, C. L., Cho, S.-J., & Watson, D. G. (2019). Self-Priming in Production: Evidence for a Hybrid Model of Syntactic Priming. *Cognitive Science*, 43(7), e12749.
- Joshi, A. K. (1990). Processing crossed and nested dependencies: An automation perspective on the psycholinguistic results. *Language and cognitive processes*, 5(1), 1-27.
- Kac, M. B. (1981). Center-embedding revisited. *Proceedings of the Third Annual Conference of the Cognitive Science Society*, 123–124. Lawrence Erlbaum Hillsdale, NJ.
- Kayne, R. (1994). *The antisymmetry of syntax* (Vol. 25). MIT Press.
- Kayne, R. (2018). The place of linear order in the language faculty. *Ms. New York University*.
- Keenan, E. L., & Comrie, B. (1977). Noun phrase accessibility and universal grammar. *Linguistic Inquiry*, 8(1), 63–99.
- Kidd, E., Chan, A., & Chiu, J. (2014). *Cross-linguistic influence in relative clause comprehension in bilingual Cantonese-English children*.
- Kidd, Evan, Brandt, S., Lieven, E., & Tomasello, M. (2007). Object relatives made easy: A cross-linguistic comparison of the constraints influencing young children’s processing of relative clauses. *Language and Cognitive Processes*, 22(6), 860–897.
- Kim, J.-Y. (2004). Specific nominals in Chinese and Korean. *Language and Linguistics*, 5(1), 243–270.
- Kim, Y.-J. (1987). *The acquisition of relative clauses in English and Korean: Development in spontaneous production*. Hanshin Publishing Company.
- Kitagawa, C., & Ross, C. (1982). Prenominal modification in Chinese and Japanese. *Linguistic Analysis*, 9(1), 19–53.
- Larson, R. K. (2009). Chinese as a reverse Ezafe language. *Yuyanxue Luncong*, 39, 30–85.
- Lau, E. (2006). *The acquisition of relative clauses by Cantonese children: An experimental approach* (Unpublished master’s thesis). University of Hong Kong, Hong Kong.
- Lau, E. (2016). *Acquisition of relative clauses in Cantonese: A multi-factorial analysis* (PhD Thesis). University of Hawai’i at Manoa.
- Lees, R. B. (1960). *The Grammar of English Nominalizations*, Mouton, The Hague.
- Lees, R. B. (1961). The constituent structure of noun phrases. *American Speech*, 36(3), 159–168.
- Lempert, H., & Kinsbourne, M. (1980). Preschool children’s sentence comprehension: Strategies with respect to word order. *Journal of Child Language*, 7(2), 371–379.
- Li, Y. A. (1985). *Abstract Case in Mandarin Chinese*. Doctoral dissertation, University of Southern California.

- Li, Y. A. (1990). *Order and Constituency in Mandarin Chinese*. Dordrecht: Kluwer Academic Publishers.
- Li, Y. A. (1998). Argument determiner phrases and number phrases. *Linguistic Inquiry*, 29(4), 693–702.
- Li, Y. A. (1999). Plurality in a classifier language. *Journal of East Asian Linguistics*, 8(1), 75–99.
- Li, Y. A. (2008). Duanyu jiegou yu yulei biaoji: de shi zhongxinyu?[Phrase structures and categorial labeling: De as a head?]. *Dangdai Yuyanxue [Contemporary Linguistics]*, 2, 97–108.
- Li, Y. A. (2012). De in Mandarin ↔ e in Taiwanese. *Studies in Chinese Linguistics*, 33(1), 17–40.
- Limber, J. (1973). The genesis of complex sentences. In *Cognitive development and acquisition of language* (pp. 169–185). Elsevier.
- Lin, J. (1997a). Noun phrase structure in Mandarin Chinese: DP or NP. *Chinese Language and Linguistics*, 3, 401–434.
- Lin, J. (1997b). Some remarks on the semantics of prenominal relative clauses in Chinese. *Seventh International Conference on Chinese Linguistics, Leiden University, Leiden, The Netherlands*.
- Lin, J. (2003). On restrictive and non-restrictive relative clauses in Mandarin Chinese. *Tsinghua Journal of Chinese Studies*, 33(1), 199–240.
- Lin, J.-W., & Tsai, W.-T. D. (2015). Restricting non-restrictive relatives in Mandarin Chinese. *Chinese Syntax in a Cross-Linguistic Perspective, Oxford University Press, Oxford*, 100–127.
- Longobardi, G. (1994). Reference and proper names: A theory of N-movement in syntax and logical form. *Linguistic Inquiry*, 609–665.
- Lu, B. (2006). Butong xuepai de “hexin” gainian zhi bijiao [The notion of head in different linguistic paradigms]. *Dangdai Yuyanxue*, 289–310.
- Lü, S. (1982). *Zhongguo-wenfa-yaolüe*. 中国文法要略. Shangwu Yinshuguan [商务印书馆].
- Luke, K. K., & Wong, M. L. (2015). The Hong Kong Cantonese corpus: design and uses. *Journal of Chinese Linguistics*, 25(2015), 309–330.
- Mak, W. M., Vonk, W., & Schriefers, H. (2002). The influence of animacy on relative clause processing. *Journal of Memory and Language*, 47(1), 50–68.
- Mak, W. M., Vonk, W., & Schriefers, H. (2006). Animacy in processing relative clauses: The hikers that rocks crush. *Journal of Memory and Language*, 54(4), 466–490.

- Matisoff, J. A. (1972). Lahu nominalization, relativization, and genitivization. *Syntax and Semantics, 1*, 237–257.
- Matthews, S., & Yip, V. (2003). Relative clauses in early bilingual development: Transfer and universals. *Typology and Second Language Acquisition*, 39–81.
- Matthews, S., & Yip, V. (2013). *Cantonese: A comprehensive grammar*. Routledge.
- Matthews, S., & Yip, V. (2017). Noun-modifying clauses in Cantonese. *Noun-Modifying Clause Constructions in Languages of Eurasia*, 105–120.
- McKee, C., McDaniel, D., & Snedeker, J. (1998). Relatives children say. *Journal of Psycholinguistic Research*, 27(5), 573–596.
- Miller, G.A., & Chomsky, N. (1963). Finitary Models of Language Users. In *Handbook of Mathematical Psychology*, vol. 2, ed. R. D. Luce, R.R. Bush, and E. Galanter, 419-491. Newyork: Wiley.
- Miller, G. A., & Isard, S. (1964). Free recall of self-embedded English sentences. *Information and Control*, 7(3), 292–303.
- Montague, R. (1974). *Formal Philosophy: Selected Papers, RH Thomason, Ed.* Yale University Press, New Haven, Conn.
- Munn, A. (1994). A minimalist account of reconstruction asymmetries. *Proceedings of NELS, 24*, 397–410. Citeseer.
- O’grady, W. (2007). *Syntactic development*. University of Chicago Press.
- O’Grady, W. (2011). Relative clauses: Processing and acquisition. *The Acquisition of Relative Clauses: Processing, Typology and Function*, 13–38.
- Pan, H. (1990). Head noun movements in Chinese, the ECP and minimality. *Ms., University of Texas, Austin*.
- Pan, H. (2000). Why the blocking effect. *Long-Distance Reflexives*, 33, 279–316.
- Pan, H. (2013). *Constraints on reflexivization in Mandarin Chinese*. Routledge.
- Pan, H. (2018, November 23). *Are Gapless Relative Clauses (GRC) really complement clauses?* Presented at the The 8th International Conference on Formal Linguistics.
- Pankau, A. (2018). The Matching Analysis of relative clauses: an argument from antipronominal contexts. *The Journal of Comparative Germanic Linguistics*, 21(2), 189–245.
- Paris, M.-C. (1979). Nominalization in mandarin Chinese: the morpheme " de" and the " shi"... " de" constructions. *Université Paris 7 Département de recherches linguistiques*.
- Partee, B. (1965). Subject and object in English. *Ph. D. thesis, MIT*.
- Partee, B. (1975). Montague grammar and transformational grammar. *Linguistic Inquiry*, 203–300.

- Paul, W. (2006). The insubordinate subordinator *de* in Mandarin Chinese. Ms., CRLAO, EHESS, Paris.
- Paul, W. (2015). The insubordinate subordinator *de* in Mandarin Chinese: Second take. *The Attributive Particle in Chinese*.
- Pérez-Leroux, A. T. (1995). Resumptives in the acquisition of relative clauses. *Language Acquisition*, 4(1–2), 105–138.
- Picallo, C. (2006). On Gender and number, ms. *Universitat Autònoma de Barcelona*.
- Pozniak, C. (2018). *Le traitement des relatives dans les langues: une approche comparative et multifactorielle* (PhD Thesis). Sorbonne Paris Cité.
- Pozniak, C., Huang, J., & Hemforth, B. (2016). *Competition of linear and structural distance in relative clause processing-Evidence from Mandarin and Cantonese Visual World experiments*.
- Pozniak, C., Huang, J., & Hemforth, B. (2017). *Relative clause processing, structural and linear distance matter-Evidence from Mandarin, Cantonese and English Visual World experiments*.
- Rambow, O., & Joshi, A. K. (1994). A Processing Model for Free Word-Order Languages. In *Perspectives on Sentence Processing*, ed. C. Clifton Jr., L. Frazier, and K. Rayner, 267-301. Hillsdale, N.J.: Erlbaum.
- Real, F., & Christiansen, M. H. (2007). Word chunk frequencies affect the processing of pronominal object-relative clauses. *Quarterly Journal of Experimental Psychology*, 60(2), 161–170.
- Rizzi, L. (1990). *Relativized minimality*. The MIT Press.
- Rizzi, L. (2004). Locality and left periphery. *Structures and beyond: The Cartography of Syntactic Structures*, 3, 223–251.
- Rizzi, L. (2018). Intervention effects in grammar and language acquisition. *Probus*, 30(2), 339–367.
- Roth, F. P. (1984). Accelerating language learning in young children. *Journal of Child Language*, 11(1), 89–107.
- Rubin, E. J. (2003). Determining pair-merge. *Linguistic Inquiry*, 34(4), 660–668.
- Safir, K. (1999). Vehicle change and reconstruction in \bar{A} -chains. *Linguistic Inquiry*, 30(4), 587–620.
- Salzmann, M. (2006). Resumptive prolepsis. *A Study in Indirect A'-Dependencies*. LOT, Utrecht, The Netherlands.
- Salzmann, M. (2017). *Reconstruction and Resumption in Indirect A'-Dependencies: On the Syntax of Prolepsis and Relativization in (Swiss) German and Beyond* (Vol. 117). Walter de Gruyter GmbH & Co KG.

- Sauerland, U. (1998). *The Meaning of Chains* (Doctoral dissertation). Massachusetts Institute of Technology.
- Sauerland, U. (2000). Two structures for English restrictive relative clauses. *Proceedings of the Nanzan GLOW*, 351–366.
- Sauerland, U. (2003). Unpronounced heads in relative clauses. *The Interfaces: Deriving and Interpreting Omitted Structures*, 61, 205–226.
- Schachter, P. (1973). Focus and relativization. *Language*, 19–46.
- Sheldon, A. (1974). The role of parallel function in the acquisition of relative clauses in English. *Journal of Verbal Learning and Verbal Behavior*, 13(3), 272–281.
- Shi, D. (2008). De he de zi jiegou [De and de construction]. *Dangdai Yuyanxue*, 298–307.
- Shi, D. (2010). Xianzhixing dingyu han miaoxiexing dingyu [restrictive and descriptive modifiers], *Foreign Language Teaching and Research* 42(5): 323-328.
- Si, F. (2004). Head theory and DeP in Chinese [J]. *Contemporary Linguistics*, 1, 26–34.
- Si, F. (2006). Zhongxinyu lilun he Bloomfield nanti [The head theory and the Bloomfield puzzle]. *Dangdai Yuyanxue*, 1, 60–70.
- Simpson, A. (2001). Definiteness agreement and the Chinese DP. *Language and Linguistics*, 2(1), 125–156.
- Simpson, A. (2002). On the status of ‘modifying’DE and the structure of the Chinese DP. *On the Formal Way to Chinese Languages*, 74–101.
- Simpson, A., & Wu, Z. (2002). From D to T–Determiner Incorporation and the Creation of Tense. *Journal of East Asian Linguistics*, 11(2), 169–209.
- Sio, J. (2006). *Modification and reference in the Chinese nominal*. The Leiden University Centre for Linguistics (LUCL), Faculty of Arts.
- Smolensky, P. (1996). On the comprehension/production dilemma in child language. *Linguistic Inquiry*, 27, 720–731.
- Sportiche, D. (2017). *Relative clauses: Promotion only, in steps*. MS, UCLA.
- Stowe, L. A. (1986). Parsing WH-constructions: Evidence for on-line gap location. *Language and Cognitive Processes*, 1(3), 227–245.
- Sybesma, R. (2007). Běifāng fāngyán hé Yuèyǔ zhōng míngcí de kěshùbiāoji [Markers of countability on the noun in Mandarin and Cantonese]. *Yǔyánxué Lùncōng*, 35, 234–245.
- Sybesma, R. (2008). Classifiers, number and countability. Ms. Leiden University.
- Sybesma, R., & Sio, J. (2008). D is for demonstrative—investigating the position of the demonstrative in Chinese and Zhuang. *The Linguistic Review*, 25(3–4), 453–478.

- Szabolcsi, A. (1994). The Noun Phrase. In *The Syntactic Structure of Hungarian: Syntax and Semantics* (pp. 179-275). Academic Press.
- Tang, C.-C. J. (1990). *Chinese phrase structure and the extended X'-theory*, Cornell University (PhD Thesis). Ph. D. dissertation.
- Tang, C.-C. J. (2007). Modifier licensing and Chinese DP: a feature analysis. *Language and Linguistics*, 8(4), 967–1024.
- Tang, S.-W. (2006). Yi de wei zhongxinyu de yixie wenti [On de as a head in Chinese]. *Dangdai Yuyanxue [Contemporary Linguistics]* 3: 205-212.
- Tang, S.-W. (2008). Syntactic Properties of the Discontinuous Construction “mai... lo” in Cantonese. *Bulletin of Chinese Linguistics*, 3(1), 145–160.
- Tang, S.-W. (2011). A parametric approach to NP ellipsis in Mandarin and Cantonese. *Journal of East Asian Linguistics*, 20(2), 107–115.
- Tavakolian, S. (1981). The conjoined-clause analysis of relative clauses. *Language Acquisition and Linguistic Theory*, 167, 187.
- Traxler, M. J., Morris, R. K., & Seely, R. E. (2002). Processing subject and object relative clauses: Evidence from eye movements. *Journal of Memory and Language*, 47(1), 69–90.
- Traxler, M. J., Williams, R. S., Blozis, S. A., & Morris, R. K. (2005). Working memory, animacy, and verb class in the processing of relative clauses. *Journal of Memory and Language*, 53(2), 204–224.
- Tulving, E., & Schacter, D. L. (1990). Priming and human memory systems. *Science*, 247(4940), 301–306.
- Vergnaud, J.-R. (1974). *French relative clauses*. (PhD Thesis). Massachusetts Institute of technology.
- Villata, S., Rizzi, L., & Franck, J. (2016). Intervention effects and Relativized Minimality: New experimental evidence from graded judgments. *Lingua*, 179, 76–96.
- Wang, L. (1984). *Wangli Wenji Diyijuan Zhongguo Yufa Lilun [Collected Works of Wangli, Vol. 1, The Theory of Chinese Grammar]*. Jinan: Shandong Education Press.
- Wanner, E., Maratsos, M., Halle, M., Bresnan, J., & Miller, G. A. (1978). *Linguistic theory and psychological reality*.
- Warren, T., & Gibson, E. (1999). The effects of discourse status on intuitive complexity: Implications for quantifying distance in a locality-based theory of linguistic complexity. *Poster Presented at the Twelfth CUNY Sentence Processing Conference, New York*.

- Webelhuth, G., Bargmann, S., & Götze, C. (2018). Idioms as evidence for the proper analysis of relative clauses. *Reconstruction Effects in Relative Clauses*.
- Xiong, Z. (2005). A DP structure headed by De [J]. *Contemporary Linguistics*, 2, 148–165.
- Xu, L. (1993). The Long-Distance Binding of " ZIJI." *Journal of Chinese Linguistics*, 21(1), 123–42.
- Yip, V., & Matthews, S. (2000). Syntactic transfer in a Cantonese–English bilingual child. *Bilingualism: Language and Cognition*, 3(3), 193–208.
- Yip, V., & Matthews, S. (2002). Relative clauses in early bilingual development: Transfer and universals. In A. Giacalone (Ed.), *Typology and Second Language Acquisition* (pp. 39–81). Berlin, Germany: Mouton de Gruyter.
- Yip, V., & Matthews, S. (2007). Relative clauses in Cantonese-English bilingual children: Typological challenges and processing motivations. *Studies in Second Language Acquisition*, 29(2), 277–300.
- Yngve, V. H. (1960). A model and an hypothesis for language structure. *Proceedings of the American Philosophical Society*, 104(5), 444–466.
- Yu, D. (2006). Relative clauses and nominal modifiers in Cantonese. *UC Berkeley*.
- Zhang, J. (1987). Hanyu Yufa Wenti [Issues in Chinese Grammar]. *Beijing: Social Science*.
- Zhang, N. N (1999). *Chinese de and the de-construction*.
- Zhang, N. N. (2001). On the absence of nonrestrictive relatives in Chinese. Ms., ZAS, Berlin.
- Zhang, N. N. (2008). Gapless relative clauses as clausal licensors of relational nouns. *Language and Linguistics*, 9(4), 1003–1026.
- Zhang, N. N. (2009). *Coordination in syntax* (Vol. 123). Cambridge University Press.
- Zhou, G. (2005). Dui “Zhongxinyu lilun he hanyu de DeP” yi wen de zhiyi. *Dangdai Yuyanxue*.
- Zhou, G. (2006). Revisiting the de-X structure: The bracketing paradox and linguistic intuition. *Contemporary Linguistics*, 1.
- Zhu, D. (1956). Xiàndài Hànyǔ xíngróngcí yánjiū [A study of adjectives in Modern Chinese]. *Zhōngguó Yǔwén*, 5, 447–458.
- Zhu, D. (1961). Shuo de [On de]. *Zhongguo Yuwen*, 12, 1–15.
- Zhu, D. (1966). Guanyu “shuo de” [On “on de”]. *Zhongguo Yuwen [Studies of The Chinese Language]* 1. Reprinted in *Dexi Zhu (1999) Zhu Dexi Wenji* Vol. 2, 131– 151. Beijing: The Commercial Press.
- Zhu, D. (1980). Beijing Hua, Guangzhou Hua, Wenshui Hua he Fuzhou Hua li de ‘DE’Zi [DE in Beijing Mandarin, Cantonese, Wenshui Dialect, and Fuzhou Dialect]. *Fangyan*, 3, 160–165.

- Zhu, D. (1983). Zizhi he zhuanzhi: hanyu mingcihua biaoji de, zhe, suo, zhi de yufa gongneng he yuyi gongneng [Self-designation and transferred-designation: The syntactic and semantic function of Chinese nominalizing markers de, zhe, suo, zhi]. *Fangyan*.
- Zhu, D. (1993). Cong Fangyan he Lishi Kan Zhuangtai Xingrongci de Mingcihua Jian Lun Hanyu Tongweixing Pianzheng Jiegou [A Dialectal and Diachronic Study on Nominalization of Adjectives that Describe Temporary Properties and Some Collaries on Chinese Appositional Modifier-Head Structures]. *Fangyan*.

Appendix 1: Elicitation of relative clauses in experiment I

Materials: Cards in singular condition

附加配件: 繩索, 手袋; 氧氣筒, 行李箱; 白色頭盔, 氈; 斧頭, 書.

動作: 照, 跟, 問候, 偷睇.



附加配件: 馬刺, 藍色棒球帽; 狗, 藍色繩索; 黑色牛仔帽, 雙筒望遠鏡; 橙色繩索, 魚.

動作: 摸, 瞄準, 推, 攻擊.



附加配件: 手套, 髮夾; 手槍, 冰刀; 電筒, 牛仔帽; 騎師帽, 曲棍球棍.
動作: 噴, 逮捕, 錄, 打



附加配件: 對講機, 羽毛手環; 藍色棒球帽, 盾牌; 購物袋, 羽毛頭飾; 雙筒望遠鏡, 斗篷.

動作: 警告, 畫, 祝福, 拍



Cards in plural condition

附加配件: 帽, 斗篷, 果汁, 盾牌, 雙筒望遠鏡, 羽毛手鉞, 袋, 羽毛頭飾.
動作: 畫, 警告, 影, 祝福



附加配件: 頭盔, 水桶, 繩索, 手槍, 電筒, 帽子, 杯, 雙筒望遠鏡.
動作: 噴, 錄, 打, 逮捕.



附加配件: 水桶, 拖鞋; 果汁, 杯; 繩索, 氈; 魚, 帽
動作: 照, 問候, 偷睇, 跟.



附加配件: 帽, 雙筒望遠鏡; 水壺, 電筒; 海狸, 氈; 繩索, 杯.
動作: 摸, 攻擊, 推, 瞄準.



Procedure:

Elicitation of a subject relative:

Probe questions:

1) 請問邊個人拖住個籠? 水手定消防員?

Please answer that who is carrying a luggage? Sailor or firefighter?

2) 咁 (即係) 四個水手入面, 邊一個 (水手) 拖住籠呢?

Then among the four sailors, (it is) which one is carrying a luggage?

Target answer:

(即係) 跟住消防員 嗰個 水手。

It is the sailor who is following the firefighter.

Filler question:

個籠係咩顏色㗎? answer: (係) 紅色嘅。

which colour is the luggage? (It is) red.

Elicitation of an object relative:

Probe questions:

3) 請問邊個人揸住個氧氣筒? 水手定消防員?

Please answer that who is carrying a luggage? Sailor or firefighter?

4) 咁 (即係) 四個消防員入面, 邊一個 (消防員) 揸住個氧氣筒?

Then among the four sailors, (it is) which one is carrying a luggage?

Target answer:

(即係) 水手跟住 嗰個 消防員。

It is the sailor who is following the firefighter.

Filler question:

咁呢個消防員企喺圖嘅咩位置?

Then which position is this firefighter situated in this picture?

answer: (佢企喺) 圖嘅左手邊。

(He is) in the left side.

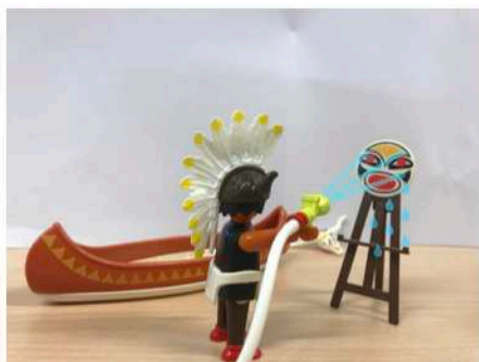
附加配件: 繩索, 手袋; 氧氣筒, 行李箱; 白色頭盔, 氈; 斧頭, 書.

動作: 照, 跟, 問候, 偷睇.



Appendix 2: Elicitation of relative clauses in experiment II

Materials: Cards in inanimate object condition



附加配件: 羽毛頭飾, 斗篷, 羽毛發帶, 羽毛手鉤.

動作: 洗, 抹, 畫, 影.

物件(盾牌): 臉譜, 黑色十字, 白色十字, 黃色圈



附加配件: 橡筋, 紅色袖子, 紅色棒球帽, 白色廚師帽.

動作: 稱, 買, 搬, 炒.

物件(花椰菜): 黃色, 白色, 綠色, 紫色



附加配件: 繩索, 手袋; 氧氣筒, 行李箱; 白色頭盔, 氈; 斧頭, 書.
動作:照, 跟, 問候, 偷睇.



附加配件: 馬刺, 藍色棒球帽; 狗, 藍色繩索; 黑色牛仔帽, 雙筒望遠鏡; 橙色繩索, 魚.
動作:摸, 瞄準, 推, 攻擊.

Cards in other three conditions:



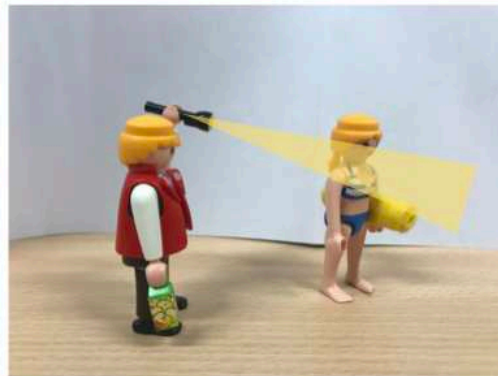
附加配件: 藍色棒球帽, 果汁; 蛋, 胡蘿蔔; 手袋, donut; 橙色水桶, 購物袋.
動作: 瞄準, 推, 摸, 攻擊.



附加配件: 啡色牛仔帽, 行李箱; 繩索, 黑貓; 手槍, 藍色棒球帽; 通緝令, 虎斑貓.
動作: 偷睇, 照, 問候, 跟.



附加配件: 衛兵帽, 相機; 淋花水壺, 牛仔帽; 繩索, 海盜帽; 電筒, 消防頭盔.
動作: 推, 摸, 攻擊, 瞄準.



附加配件: 馬仔, 拖鞋; 袋, 對講機; 白色太陽帽, 綠色圓帽; 果汁, 氈.
動作: 跟, 問候, 偷睇, 照.

Procedure:

Elicitation of a subject relative (control):

See 1) & 2) in Appendix 1

Elicitation of an object relative with animate full-NPs arguments:

See 3) & 4) in Appendix 1

Elicitation of an object relative with inanimate object:



附加配件: 橡筋, 紅色袖子, 紅色棒球帽, 白色廚師帽.
動作: 稱, 買, 搬, 炒.
物件(花椰菜): 黃色, 白色, 綠色, 紫色

Probe question:

請問邊畀菜係綠色嘅?

Please answer: which cabbages are green?

Target answer:

個女仔搬緊嗰畀 (菜)。

The one that the girl is carrying.

Filler questions:

1) 咁啱呢幅圖入面, 你仲見到乜嘢呢?

In this picture, what else do you see?

answer: 蛋, 蘿蔔, 薯仔, 仲有啲蒜頭。

Eggs, turnips, potatoes, and some heads of garlic.

2) 圖中嘅女仔有乜嘢特徵呢?

What is the characteristic of the girl in this picture?

answer: 佢戴住一頂紅色嘅cap帽。

She is wearing a red hat.

Elicitation of an object relative with a pronoun subject:



附加配件: 繩索, 手袋; 氧氣筒, 行李箱; 白色頭盔, 氈; 斧頭, 書.
動作: 照, 跟, 問候, 偷睇.

Probe questions:

- 1) 請問邊個人預住一條藍色繩索? 水手定消防員?
Please answer: who is carrying a blue rope? Sailor or firefighter?
- 2) 請你描述一下呢個消防員嘅特徵?
Please describe characteristics of this sailor.
- 3) 請喺以下嘅問題裡面用‘佢’來代替呢個消防員。
Please use ‘he’ to denote this firefighter in the following question.
- 4) 請問邊一個水手預住一個黑色手袋?
Please answer: which sailor is carrying a black handbag?

Target answer:

佢照住嗰個水手。
The sailor that he is lighting.

Filler questions:

- 1) 請問呢個水手企喺圖嘅咩位置?
Please answer: where is this sailor in this picture?
answer: (佢企喺) 圖嘅右手邊。
(She is) in the right side.
- 2) 佢邊隻手拎住個手袋?
With which hand, she is taking the hand bag?
answer: 右手。
right hand.

Elicitation of an object relative with proper noun subject:



附加配件: 繩索, 手袋; 氧氣筒, 行李箱; 白色頭盔, 氈; 斧頭, 書.
動作: 照, 跟, 問候, 偷睇.

Probe questions:

- 1) 請問邊個人預住一條藍色繩索? 水手定消防員?
Please answer: who is carrying a blue rope? Sailor or firefighter?
- 2) 請你描述一下呢個消防員嘅特徵?
Please describe characteristics of this sailor.
- 3) 可唔可以幫佢改個名啊? (e.g. Patrick)
Could you name him?
- 4) 請喺以下嘅問題裡面用 'Patrick' 來代替呢個消防員。
Please use 'Patrick' to substitute this firefighter in the following question.
- 5) 請問邊一個水手預住一個黑色手袋?
Please answer: which sailor is carrying a black handbag?

Target answer:

Patrick照住嗰個水手。
The sailor that Patrick is lighting.

Filler questions:

- 1) 請問呢個水手嘅頭髮係咩顏色㗎?
Please answer: What colour is the hair of this sailor?
answer: (係) 黑色嘅。
(It is) black.
- 2) 咁佢對鞋呢?
Then what about her shoes?
answer: (係) 藍色嘅。
(They are) blue.

Appendix 3: Acceptability judgment test

粵語句子接受度調查

本調查分為兩部分，第一部分調查受試者對俗語的理解；第二部分調查受試者對有關句子的接受度。感謝參與！

1. 性別

2. 年齡

3. 居住地

4. 請簡單解釋你對俗語‘炒魷魚’嘅理解

5. 請簡單解釋你對俗語‘執死雞’嘅理解

6. 請簡單解釋你對俗語‘扯貓尾’嘅理解

7. 請簡單解釋你對俗語‘跌眼鏡’嘅理解

請讀以下句子，並根據你對句子的接受度評分：10分 完全接受；1分 完全不接受

注意：本部分句子中含有上部分所提及的俗語，句子意思與俗語引伸義相符

8. 老細炒咗阿John魷魚

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

9. 老細炒咗阿John條魷魚

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

10. 老細炒咗John嗰條魷魚

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

11. 牆上面掛住 [佢影嘅畢加索嘅相] (⚠️ 注意: 佢=畢加索)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

12. 牆上面掛住 [佢 影 嗰 幅 畢 加 索 嘅 相] (⚠ 注意: 佢=畢加索)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

13. 牆上面掛住 [佢 影 嘅 嗰 幅 畢 加 索 嘅 相] (⚠ 注意: 佢=畢加索)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

14. [我 尋 晚 睇 嘅 戲] 係 一 代 宗 師

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

15. [我 尋 晚 睇 嗰 套 戲] 係 一 代 宗 師

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

16. [我尋晚睇嘅嗰套戲] 係一代宗師

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

17. [佢係演唱會唱嘅] 張學友嘅歌] 係嘢別 (⚠ 注意: 佢=張學友)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

18. [佢係演唱會唱] 嗰首張學友嘅歌] 係嘢別 (⚠ 注意: 佢=張學友)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

19. [佢係演唱會唱嘅] 嗰首張學友嘅歌] 係嘢別 (⚠ 注意: 佢=張學友)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

20. 佢咪係 [畀老細炒嘅魷魚] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

21. 佢咪係 [畀老細炒] 嗰條魷魚] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

22. 佢咪係 [畀老細炒嘅] 嗰條魷魚] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

23. 蓮姐執咗死雞

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

24. 蓮姐執咗隻死雞

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

25. 蓮姐執咗嗰隻死雞

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

26. 阿May好鐘意 [佢 尋日畫 嘅] John 嘅 畫像] (注意⚠️: 佢=John)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

27. 阿May好鐘意 [佢 尋日畫] 嗰幅 John 嘅 畫像] (注意⚠️: 佢=John)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

28. 阿May好鐘意 [佢 尋日畫 嘅] 嗰幅 John 嘅 畫像] (注意⚠️: 佢=John)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

29. 佢 咪係 [炒咗 阿明 魷魚 嘅] 老細] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

30. 佢 咪係 [炒咗 阿明 魷魚] 嗰個 老細] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

31. 佢 咪係 [炒咗 阿明 魷魚 嘅] 嗰個 老細] 囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

32. [佢最中意嘅王家衛嘅戲] 係東邪西毒 (注意⚠️: 佢=王家衛)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

33. [佢最中意嗰套王家衛嘅戲] 係東邪西毒 (注意⚠️: 佢=王家衛)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

34. [佢最中意嘅嗰套王家衛嘅戲] 係東邪西毒 (注意⚠️: 佢=王家衛)

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

35. [你執嘅死雞] 都好大隻喔!

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

36. **[你執 嗰隻 死雞] 都好大隻喔!**

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

37. **[你執 嘅 嗰隻 死雞] 都好大隻喔!**

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

38. **班家長知道呢件事之後，都跌晒眼鏡**

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

39. **班家長知道呢件事之後，都跌晒啲眼鏡**

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

40. 班家長知道呢件事之後，都跌晒嗰啲眼鏡

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

41. [拍一代宗師 嘅 導演] 係 王家衛

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

42. [拍一代宗師 嗰個 導演] 係 王家衛

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

43. [拍一代宗師 嘅 嗰個 導演] 係 王家衛

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

48. 落花流血 係 [Eason最中意 ___ 嗰首 佢自己嘅歌]

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

49. 落花流血 係 [Eason最中意 ___ 嘅 嗰首 佢自己嘅歌]

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

50. 阿強同阿文嘅度扯緊貓尾

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

51. 阿強同阿文嘅度扯緊條貓尾

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

52. 阿強同阿文喺度扯緊嗰條貓尾

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

53. [老細 炒 嘅] 魷魚] 咪係 阿明囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

54. [老細 炒] 嗰條 魷魚] 咪係 阿明囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

55. [老細 炒 嘅] 嗰條 魷魚] 咪係 阿明囉

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

56. [佢最中意嘅]自己嘅書]係鹿鼎記

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

57. [佢最中意]嗰本自己嘅書]係鹿鼎記

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

58. [佢最中意嘅]嗰本自己嘅書]係鹿鼎記

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

59. [你哋扯過嘅]貓尾]已經夠晒多喇。

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

60. [你哋 扯過] 啲 貓尾] 已經夠晒多喇。

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

61. [你哋 扯過] 啲 貓尾] 已經夠晒多喇。

Une seule réponse possible.

	1	2	3	4	5	6	7	8	9	10	
完全不 接受	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	完全 接受

Fourni par



Appendix 4: Statistic calculations

Experiment 1: Elicitation production

a. target as function of subject/object condition:

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: target ~ conditions + (1 | subject) + (1 | code)
Data: sub_rc
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	logLik	deviance	df.resid
447.9	468.5	-219.9	439.9	1270

Scaled residuals:

Min	1Q	Median	3Q	Max
-19.7795	-0.1569	0.0314	0.1324	10.7174

Random effects:

Groups	Name	Variance	Std.Dev.
code	(Intercept)	0.6468	0.8042
subject	(Intercept)	1.2697	1.1268

Number of obs: 1274, groups: code, 64; subject, 20

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	4.1161	0.4231	9.729	<2e-16 ***
conditionsobject	-7.6015	0.5248	-14.486	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

b. target as function of number of arguments (singular vs. plural):

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: target ~ number + (1 | subject) + (1 | code)
Data: sub_rc
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	logLik	deviance	df.resid
588.5	609.1	-290.3	580.5	1270

Scaled residuals:

Min	1Q	Median	3Q	Max
-10.8599	-0.1794	0.0242	0.1154	6.9203

Random effects:

Groups	Name	Variance	Std.Dev.
code	(Intercept)	28.889	5.375
subject	(Intercept)	1.229	1.109

Number of obs: 1274, groups: code, 64; subject, 20

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.8431	1.0127	0.832	0.405
number2	-0.5002	1.3889	-0.360	0.719

c. interaction between fixed effects (condition*number):

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: target ~ conditions * number + (1 | subject) + (1 | code)
Data: sub_rc
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	logLik	deviance	df.resid
449.9	480.8	-219.0	437.9	1268

Scaled residuals:

Min	1Q	Median	3Q	Max
-18.1633	-0.1672	0.0348	0.1444	11.3205

Random effects:

Groups	Name	Variance	Std.Dev.
code	(Intercept)	0.5635	0.7507
subject	(Intercept)	1.2602	1.1226

Number of obs: 1274, groups: code, 64; subject, 20

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	4.4683	0.5334	8.377	<2e-16 ***
conditionsobject	-7.7745	0.6411	-12.127	<2e-16 ***
number2	-0.6868	0.5589	-1.229	0.219
conditionsobject:number2	0.3675	0.7205	0.510	0.610

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

d. correlation between fixed effects (number + condition):

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: target ~ number + conditions + (1 | subject) + (1 | code)
Data: sub_rc
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	logLik	deviance	df.resid
448.2	473.9	-219.1	438.2	1269

Scaled residuals:

Min	1Q	Median	3Q	Max
-18.7189	-0.1700	0.0349	0.1407	11.6181

Random effects:

Groups	Name	Variance	Std.Dev.
code	(Intercept)	0.582	0.7629
subject	(Intercept)	1.266	1.1253

Number of obs: 1274, groups: code, 64; subject, 20

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	4.3469	0.4678	9.292	<2e-16 ***
number2	-0.4672	0.3531	-1.323	0.186
conditionsobject	-7.5927	0.5188	-14.636	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:

	(Intr)	numbr2
number2		-0.447
condtnsobjct	-0.644	0.104

Experiment 2: Elicitation of production with 4 types of arguments

a. Test in Cantonese: target as function of lexical condition (4 types of arguments)

```
Generalized linear mixed model fit by maximum likelihood
(Laplace Approximation) [glmerMod]
Family: binomial ( logit )
Formula: Obj ~ lexical_cond + (1 | participant) + (1 | items)
Data: sub_can
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	logLik	deviance	df.resid
389.2	413.7	-188.6	377.2	435

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2476	-0.4262	-0.1294	0.3121	3.3375

Random effects:

Groups	Name	Variance	Std.Dev.
items	(Intercept)	0.4552	0.6747
participant	(Intercept)	7.7221	2.7789

Number of obs: 441, groups: items, 32; participant, 14

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.7061	0.8490	-2.010	0.0445 *
lexical_cond2	2.4318	0.5429	4.480	7.48e-06 ***
lexical_cond3	0.6288	0.5280	1.191	0.2336
lexical_cond4	0.7428	0.5261	1.412	0.1580

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

b. Test in French: target as function of lexical condition (4 types of arguments)

```
Generalized linear mixed model fit by maximum likelihood
(Laplace Approximation) [glmerMod]
Family: binomial ( logit )
Formula: Obj ~ lexical_cond + (1 | participant) + (1 | items)
Data: sub_fr2
Control: glmerControl(optimizer = "bobyqa")
```

AIC	BIC	loglik	deviance	df.resid
516.9	542.7	-252.5	504.9	530

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.8008	-0.5275	-0.2185	0.5485	3.1943

Random effects:

Groups	Name	Variance	Std.Dev.
items	(Intercept)	0.001264	0.03555
participant	(Intercept)	3.945076	1.98622

Number of obs: 536, groups: items, 32; participant, 17

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.3025	0.5693	-4.045	5.24e-05 ***
lexical_cond2	2.0699	0.3583	5.777	7.60e-09 ***
lexical_cond3	1.2333	0.3475	3.549	0.000387 ***
lexical_cond4	1.0706	0.3499	3.060	0.002212 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Corpus study 1: TV data

difference between the proportion of SRs and ORs:

Hypothesis 0: SRs and ORs are equally distributed.

Chi-squared test for given probabilities

data: table

X-squared = 17.286, df = 1, p-value = 3.216e-05

Corpus study 2: the Hong Kong Cantonese Corpus

difference between the proportion of SRs and ORs:

Hypothesis 0: SRs and ORs are equally distributed.

Chi-squared test for given probabilities

data: table

X-squared = 1.8693, df = 1, p-value = 0.1716