TLS

Proceedings of the 15th Texas Linguistic Society

The 15th Texas Linguistic Society was held on October 24–26, 2014, at the University of Texas at Austin. Presentations came from all areas of linguistics, but this year's conference placed a special focus on what we called 'Experimental advantages: the importance of experimental evidence in theories of syntax and semantics,' emphasizing research that highlights the unique advantages of the experimental environment, as opposed to other sources of data.

Many thanks to our keynote speakers:

- T. Florian Jaeger (University of Rochester)
- Philippe Schlenker (New York University / Ecole Normale Supérieure, Paris)
- David I. Beaver (University of Texas at Austin)

Many thanks also to our supporters at the University of Texas at Austin:

- Department of Linguistics
- Department of Germanic Studies,
- Department of Middle Eastern Studies
- Department of French and Italian Studies

We had 62 registered participants, as well as many students and faculty from various departments at UT who joined us for much of the conference.

The 27 presenters and three keynotes had the opportunity to submit their presentations in written form to be included in these proceedings, and fourteen chose to do so. Many thanks to our presenters and especially our proceedings-submitters; we hope this publication helps your research find an even wider audience.

More information about the conference, including a listing of all presentations and abstracts, can be found online at `http://tls.ling.utexas.edu/2014tls/`

Signed, the editors:

Christopher Brown, Qianping Gu, Cornelia Loos, Jason Mielens, Grace Neveu

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The Development of Lexicon in Bilingual Children: Evidence from Arabic-English Speaking Children

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Abstract

To what extent does the amount of exposure and language input affect the size of vocabulary acquired by Arabic-English speaking children? Can those bilinguals understand and distinguish between two language systems? This case study of two Arabic-English speaking 2-year-old children is aimed at finding answers to such questions. The results of this study demonstrate that there is a correlation between the amount of exposure and the vocabulary size; the more exposure the child receives, the more lexical items the child acquires and produces. The children were exposed to Arabic more than English and that seems to influence their vocabulary development. As a result, Arabic is the dominant language in exposure and children's production. Despite the fact of the imbalanced exposure, bilinguals showed their ability to understand and differentiate between Arabic and English vocabularies. That is reflected in their possession and development of two separate lexicons. Thus, this study provides contrary evidence for the Unitary Language System Hypothesis and an additional support for the Independent development hypothesis.

1 Introduction

Early contact with more than one language has become a wide-world linguistic phenomenon. As a result of that contact, a child can acquire, understand, and use languages exposed simultaneously. Obviously, many raise bilingual children and that might be immigrants, students pursuing their higher education, or workers in a foreign country. In fact, exposing children early to two diverse phonological environments, two syntactic structures, and two distinct vocabularies results in possessing unique bilingual competence, which has received more attention from researchers in the field of bilingual first language acquisition.

The primary focus of this case study is on the lexical development of the bilingual children and the factors that may influence it. I examine to what extent the amount of exposure and language input affect the size of vocabulary acquired by the two Arabic-English speaking children. Moreover, I investigate whether those bilinguals can understand and distinguish between Arabic and English vocabularies.

2 Literature review

2.1 Theories of Bilingual Language Acquisition

The majority of studies of early language development have emphasized children being raised in bilingual families. The stage in which bilingual children differentiate two languages during the bilingual acquisition process has been a debated topic in the field of bilingual first language acquisition. Some researchers claim that bilingual children do not distinguish between two language systems in the initial stage of acquisition. This notion is termed as the 'Unitary Language System Hypothesis' (ULS) by Genesee (1989). Moreover, language mixing, and lack of translation equivalents have been seen as evidences for the 'Unitary language System Hypothesis'. For instance, Volterra and Taescher (1978) provide a model to account for language mixing. In their model, they distinguish the three stages that the child passes through during the bilingual acquisition process. In the first stage, children have only one lexical system containing words from both languages. In the second stage, children can differentiate two distinct lexicons, but they use one syntactic system. Finally, the third one is that the bilingual children separate two language systems lexically and syntactically. The first two mentioned stages represent the single approach, which is termed by De Houwer (1996) as "single system hypothesis". Vihman (1985) supports this hypothesis by providing a study of the bilingual infant's productions in his first stage.

Nevertheless, it seems that there is a consensus that Volterra and Taescher's three – stage model does not accurately account for the process of bilingual acquisition (De Houwer, 1996). According to Genesee (1989), "in order to uphold the Unitary Language System…there should be no differential distribution of items from the two languages as a function of the predominant language being used in different contexts" (p. 323).

Contrary to ULS, most researchers provided evidence to support the Independent Development Hypothesis, which declares that the bilingual child develops two language systems from the beginning of language exposure (Bergman 1976; Genesee 1989; Baum, 1997). Genesee (1989) argues that bilingual children have the ability to use and develop two differentiated languages "in contextually sensitive ways" (p. 331). In her longitudinal study of 2 bilingual children who were exposed to English and Spanish, Baum (1997) examined whether code switching and lack of translation equivalents are evidence against the idea of lexical separation in bilinguals. She found that children showed their awareness of two separate language systems "by comprehending two languages, naming objects in the appropriate language in which they are addressed and by having at least some translation equivalents" (p. 99). Therefore, She claims that they have two separate lexicons and they develop two separate language systems where they can understand and produce utterances in both languages. She also concludes "evidence of code-switching and lack of translation equivalents is not sufficient to show that a bilingual child is unable to distinguish between his two lexicons" (p. 99).

2.2 Previous studies of bilingual lexical development

A myriad of linguists and psycholinguists have turned their interest to the development of vocabulary in bilingual children. It has been questioned whether there is a relationship between language exposure and vocabulary development in bilingual acquisition. In a study of English-Spanish bilinguals, Pearson et al (1997) demonstrate that there is a strong correlation between the exposure amount and vocabulary size in both languages. Additionally, Pearson (2007) claims in her study titled "*Social factors in childhood bilingualism in the United States"* there are several factors, which have an impact on the development of bilingual language, including the amount of exposure, the age of acquisition, and the status of each language.

Moreover, in a study of nine German-French speaking children growing up in bilingual families since infancy (44 to 71 months), Macleod et al (2012) focus on the role of parental input on the development of receptive vocabulary. Their findings demonstrate that the imbalanced exposure to the two languages affects and leads to an imbalanced growth in the receptive vocabulary. As it has been shown in the study that there is a slow growth in German (the minority language) compared to French (the majority language).

Some researchers, such as Huttenlocher et al (1991) and David & Wei (2008), have concentrated on studying the individual differences in vocabulary development and its relation with the language exposure. For instances, in their study of 22 children 26 months and their mothers, Huttenlocher et al (1991) argue that there is an essential correlation between individual differences in vocabulary development and the varying amount of vocabulary produced by particular mothers. David and Wei (2008) claim in their study of 13 English-French speaking children that "the more balanced the child's language exposure is the more likely the child is to have cross-linguistic synonyms in his/her lexicon". Additionally, they point out that parental input has a pivotal role in bilingual's lexical development where it influences language dominance and vocabulary size.

3 Subjects

As most studies that uphold the Independent Development Hypothesis have been conducted on bilinguals speaking two similar languages, Romaine (1995) points out that there is need for extensive studies that deal with bilingual children speaking two languages that are typologically different. Thus, this present study aims to study bilinguals who speak both languages, Arabic and English, which are from two different families.

Two-year-old twins girls were the subject of this research. They were born in the U.S. in a bilingual family and their parents are Arabic-English speakers. However, they were first exposed to Arabic from birth until the age of 1:8. Afterward, they were exposed to both Arabic and English from the age of 1:9 as they have been attending daycare for 10 hours per day where only English is used. Children were also exposed to the TV in both Arabic and English. In addition, they were being raised in an educated home environment where both parents came to the U.S to pursue their higher education to obtain MA.

The parents practice both languages at home; they use their mother tongue, Arabic and their second language, English to address their children. Nevertheless, Arabic is used more often (85% of the time).

Subject	Lang. used at home	Lang. used at the daycare	Age of attending daycare
Subject 1	Arabic-English	English	1:9
Subject 2	Arabic-English	English	1:9

Table 1: A summary of participants' background.

4 Methodology

The data for this study was collected by using three different methods:[1]

4.1 Observation

(The aim of using this method is to measure the size of vocabulary.)

At first, the words that the parents believed their children knew were written down. Then, videos of two conversations between the mother and each child were taken at different times; one conversation in Arabic and the other in English. In addition, a picture book, some toys and items were used in conversations. The conversations were transcribed and the vocabulary size was measured and compared. Table 2 shows the number of children's Arabic and English vocabulary reported by the parents.

Participants	Arabic Vocabulary	English Vocabulary
Subject 1	98	47
Subject 2	92	50

Table 2: The expected total of vocabulary children acquire in both languages reported by bilingual children's parent.

4.2 Sit-stand game

(The goal is to evaluate their comprehension of words in both languages—The game is played three times)

In this game, the daily directives, such as *sit down* and its equivalent word in Arabic *ejluso*, and *stand up* and its equivalent word in Arabic *wʌgfo* were used in both languages. I asked the twins to stand and to follow the directives. I switched between

[1] All methods used in this study were done in the children's home.

Arabic and English quickly in order to explore whether the children could follow the directions in both Arabic and English words. Concerning calculating the points, the total of the points of the game is calculated based on the number of repetition of directives that are used in each game. The repetition number of the used directives in game 1, 2, and 3 is nine, seven, and four, respectively. Therefore, the total is 20. If the children keep up with the directives, they will keep their points, which are 20. However, if children do one action incorrectly, they will lose one point and so on.

Procedures: I asked them to stand and to follow my directions. I switched between Arabic and English to notice their understanding of the two commands (*wʌgfo=stand up, ejluso=sit down*).

Game 1:

The directives	**Children's performance**
Stand up	they stood up
Sit down	they sat down
Wʌgfo	they stood up
Stand up	they remained standing
Ejluso	they sat down
Sit down	they remained sitting
Stand up	they stood up
Wʌgfo	they remained standing
Stand up	Subject 2 remained standing whereas Subject 1 sat down and she was laughing

Game 1 is over

Game 2:

The directives	**Children's performance**
Ejluso	they sat down
Sit down	they remained sitting
Wʌgfo	they stood up
Sit down	they sat down
Stand up	they stood up
Wʌgfo	they remained standing
Ejluso	they sat down

Game 2 is over

Game 3:

In this game, I replaced the directives with *come on* and its equivalent in Arabic *Ta'al*, and *Close the door* and its equivalent in Arabic *Gafli albab*.

The directives	**Children's performance**
Come on	they came
Talo	they came
Close the door	they immediately went and closed the door

Gafli albab they went and closed the door
Game 3 is over

The table below represents the results of the game:

Participants	**Game 1**	**Game 2**	**Game 3**
Subject 1	-1	0	0
Subject 2	0	0	0

Table 3: points that participants lost in each game.

4.3 Item-pointing task

(The aim is to examine their ability to identify items in both languages).

In this experiment, a doll was used. I asked the children individually to point to 5 parts (hand, nose, mouth, eye, and ear). This experiment was done in Arabic first and then in English. The results were recorded by using video-tap.

Procedures: In this experiment, I held the big doll and I asked Subject 1 to point to each part. Tables below show the conversations that occurred between the subjects and myself during the task:

Conversation 1 done in Arabic	Conversation 2 done in English
O: Wayne Ainuha? *Where is her eye?* Subj. 1: Aien, Hada (pointing to the doll's eye) *eye this* O: Wayne Anfoha? *Where is her nose?* Subj. 1: Hada (pointing to the doll's nose) *this* O: Wayne Famoha? *Where is her mouth?* Subj. 1: Hada, (pointing to the doll's mouth) *this* O: Wayne yaduha? *Where is her hand?* Subj. 1: Hada, Yad (pointing to the doll's hand) *this hand* O: Wayne Athnuha? *Where is her ear?* Subj. 1: …. (pointing to the doll's ear)	O: Where is her eye? Subj. 1: eye (repeating the word without pointing to the doll's eye) O: where is her mouth? Subj. 1: dis (pointing to the doll's mouth) *this* O: Where is her nose? Subj. 1: …… (no response) O: Where is her hand? Subj. 1: hand (pointing the doll' hand) O: Where is her ear? Subj. 1: ……. (no response)

Table 4: Transcript of the conversation between the experimenter and subject 1. (English translation is written in *italics*).

Afterward, I held a big doll again and I asked subject 2 to point to 5 parts as shown in table 3:

Conversation 1 done in Arabic	Conversation 2 done in English
O: Wayne Ainuha? *Where is her eye?* Subj. 2: Aienh (pointing to the doll's eye) *eye* O: Wayne Anfoha? *Where is her nose?* Subj. 2: Hada (pointing to the doll's nose) *this* O: Wayne famoha? *Where is her mouth?* Subj. 2: Hada (pointing to her mouth and to the doll's mouth) O: Wayne Yehuda? *Where is her hand?* Subj. 2: Hada (pointing to the doll's hand) *this* O: Wayne Athnuha? *Where is her ear?* Subj. 2: Hada (pointing to the doll's ear) *this*	O: Where is her eye? Subj. 2: …. (pointing to her hair) O: where is her mouth? Subj. 2: ……. (no response) O: where is her nose? Subj. 2:…… (no response) Where is her hand? Subj. 2: hand (pointing the doll' hand) O: Where is her ear? Subj. 2: ……. (no response)

Table 5: Transcript of the conversation between the experimenter and subject 2. (English translation is written in *italics*).

The table below shows the points that children gained in this task.

Participants	**Points of correct responses in Arabic. (of 5)**	**Points of correct responses in English. (of 5)**
Subject 1	5	2
Subject 2	5	1

Table 6: The number of the points.

5 Results and discussion

5.1 Observation

Based on table 2 aforementioned, it should be noted that the Arabic and English vocabularies were dramatically different in the size overall. At home, the number of words comprehended and produced in Arabic was higher than the number of English

words. In addition, there is a slight difference between Subject 1 and Subject 2 in vocabulary size. Based on the list of words compiled by the parents, all of their English vocabulary was already known in Arabic, but not vice versa.

During the Arabic conversation, Subject 1 used Arabic. All words she used or understood are found on the list of vocabulary compiled by parents. In the English conversation, Subject 1 mixed two languages here but she used English more. All English words she used have their Arabic equivalents that she already acquired. One the other hand, Arabic words she used in this conversation have their English equivalents reported on the list. The phrase 'pick up' was produced by Subject 1 and was not on the vocabulary list, but she has its Arabic equivalent. This reflects an increase in her vocabulary size in English. On the other hand, Subject 2 produced Arabic words during Arabic conversation and all these words were on the list. In the English conversation, she used English with few Arabic words that she knows their equivalents in English. All English words used have their translation equivalents in Arabic. It was observed that the number of Arabic words used by Subject 1 and Subject 2 in the Arabic conversation was higher than the number of English words used in the English conversation.

Looking at the children's background and the above results, it can be argued that there is an imbalanced exposure to the two languages. The children had been exposed to Arabic from birth while English for only 4 months. Clearly, they received a much larger amount of Arabic input, which has lead to greater vocabulary development in Arabic. Thus, these findings show that the amount of exposure influences the lexical development and vocabulary growth.

5.2 Sit-stand game

The Bilingual children's performance in the game is represented in table 3. In game 1, it can be noted that their performance was different. One of them, Subject 1, lost one point in this game. She sat down when I asked them both to stand up. However, she laughed when this occurred. This seems to reflect that she understood that she made a mistake during playing. In game 2, they performed the game similarly. They followed the directions, performed quickly, and no one lost points.

Throughout playing this game, the children demonstrated their ability to comprehend both Arabic and English vocabularies. They responded to directions and requests given by the observer by following them and performing actions. They showed that they are able to understand and separate between both languages' vocabulary. Despite of the fact that Subject 1 lost one point, it does not mean that she misunderstood directives since she did very well in most of the game time. Most importantly, these directive phrases are used more frequently in the home by their parents (Arabic and English directives) and in the daycare by the caregivers (English directives). This helps to store these directions in their lexicons. We can consider them as daily directives. Therefore, this shows that frequency has a pivotal role in the development of the lexicon and vocabulary size in bilingual children. Finally, it can be concluded that the children have the ability to comprehend and separate between two languages simultaneously.

5.3 Item-pointing task

In this experiment, the children's performance was similar in Arabic. They could identify all 5 parts (nose, hand, mouth, eye, and ear) in Arabic. More specifically, in the Arabic task, Subject 1 used body language when she pointed to the part and verbal language when she said '*hada'* (in her pronunciation, the correct form is *hatha*, which is one of Arabic demonstratives meaning *this*) in order to identify each part. Sometimes she repeated some words, such as '*Aein'* and *'Yad'*. On the other hand, she identified parts in English. She only pointed to two parts correctly (hand, and mouth). She did not respond to some questions such as 'where is her eye' and 'where is her ear?'. Moreover, she repeated the word 'eye' when I asked her 'where is her eye?' but she could not refer to it. However, Subject 1 showed her ability to switch to English in English conversation when she said 'dis' *this*. With respect to Subject 2's performance, in the Arabic task, she also used the gesture (pointing to the target) and she said *'hada'* (in her pronunciation, the correct form is 'hatha'). In contrast, she only identified one part in a correct way in English (hand) while she failed in pointing to the eye (she referred to the doll's hair). She did not respond to the other questions about mouth, ear, and nose

The data presented so far demonstrates that there are differences in the children's performance in both languages. Pointing to the parts correctly during the Arabic conversation indicates that these bilinguals have already acquired Arabic vocabulary given in the task. Moreover, it can be expected that the reason why these children could identify some parts in English (hand and mouth) may be due to the frequent usage, whether at home or daycare. The directives, such as 'wash your hand' and 'open your mouth' are used frequently at daycare and that might enable them to acquire these English vocabularies. Furthermore, going back to the background of these children, it can be noticed that these children are exposed more frequently to Arabic than English. They have been exposed to Arabic from birth whereas they have been exposed to English only for four months. Therefore, it can be reported that the amount of exposure to languages plays an effective role in the development of vocabulary in this task. Like the result of previous studies (Pearson et al 1997; David & Wei 2008), there is a strong correlation between the exposure amount and early vocabulary growth.

6 Conclusion

Taken together, the current study targeted two children aged 2 years old who are acquiring two languages, Arabic and English. The main aim of this study was to examine whether the exposure amount of language is an important factor that may affect lexical development; vocabulary size and to investigate whether bilingual children can understand and separate the two languages at the same time. The results of this study demonstrate that those children got different amounts of language exposure to each language which influences their vocabulary size, especially in English because they have been exposed to English for four months and it is not used much in the home. Moreover, the number of their Arabic vocabulary is more than the number of English vocabulary because of the huge amount of Arabic input that children receive. Therefore, we can say that Arabic is the dominant language. Despite of the fact that the children receive a

different amount of input in each language, they can understand and distinguish between Arabic and English vocabulary. Following and performing the actions appropriately during the game and having the translation equivalents of English in Arabic reflect their differentiation of two languages. Thus, this study provides contrary evidence for the Unitary Language System Hypothesis and an additional support for the Independent development hypothesis. For further research, I suggest conducting another study on the same children to examine whether the amount of exposure still affects their lexical development or if there is a parallel development in their vocabulary growth in both Arabic and English.

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The touchscreen as an attention measure: Evidence from a dative alternation study

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Abstract

Eyetracking is an established measure of attention and processing, and has been useful in linguistic investigations of issues ranging from syntactic ambiguity to semantic word recognition (Roberts & Siyanova-Chanturia 2013). However, eyetrackers are expensive and difficult to set up, and they often make for uncomfortable and unnatural experimental tasks. One recent trend to address these problems has been to use touchscreen devices (Dufau et al. 2011, Hatfield to appear): due to the prevalence of smartphones and tablet computers, many research participants will be familiar with touchscreens. Because touchscreen devices do not restrict participants' heads, they are more comfortable as well. However, touchscreen input is less quick and automatic than eye movements are. A parallel study of touchscreen input and eye gaze would allow direct comparison of the data from these two measures.

I present data from an experiment that used an interactive visual-world paradigm presented on a touchscreen computer together with eye-tracking to measure the expectations or biases in the processing of English dative alternation sentences. Following corpus studies by Wasow (2002) and Bresnan et al. (2007), psycholinguists have viewed the dative alternation as a choice between constructions that is driven by features of the two objects, such as their length, animacy, and grammatical number. The touchscreen-eyetracker comparison study presented here investigated the acquisition of this choice by testing four-year-olds as well as adults. I discuss how adults' and children's data from the two attention-measure methodologies compare, and what implications these results have for future experimental work in psycholinguistics and other cognitive sciences.

1 Attention measures

Some eye movements are conscious and directed, but others are subconscious and automatic. Eyetracking, the recording of a person's eye movements and subsequent extraction of the point in the focus of their gaze at any given time from that data, has therefore been a very useful measure of what they attend to. This has provided insights into processing, expectations, and biases. However, eyetracking technologies are not the most subject-friendly: some eyetrackers are mounted on the head, and some fix a subject's head on a chin-rest and

*I am grateful to Ailsa Walker for running the participant sessions of this experiment. It was conducted at the University of Canterbury and funded in part by the University of Canterbury's School of Language, Social and Political Sciences as well as the New Zealand Institute of Language, Brain, and Behaviour. I also thank Cornelia Loos for comments on an earlier version of this paper. All errors in this paper are, of course, my own.

a mouthpiece to bite on. Others (glasses and desk-mounted infrared eyetrackers) are less intrusive, but tend to return data of worse quality because they cannot rely on the participant's head remaining in a fixed position.

Touchscreen devices, on the other hand, are very comfortable and easy to use for people of all ages. Previous studies have used them to emulate eyetracking for a reading task (by only uncovering the letters directly under the subject's index finger, Hatfield to appear) and to administer a lexical decision task to thousands of subjects very easily (by rolling it out as an iPhone app, Dufau et al. 2011), for example. We were interested in evaluating how well touchscreen and eyetracker data compare, with both adults and children as subjects.

2 The English dative alternation

A number of English[1] ditransitive verbs that express transfer, in one way or another, can be used in two distinct constructions:

(1) a. Rick gave Kate a coffee.
b. Rick gave a coffee to Kate.

For most speakers, these constructions are also available with *show*, *tell*, *promise*, and many other transfer verbs (including innovations, like *text*). This phenomenon of some verbs alternating between two constructions is called the dative alternation (or dative shift). Previous work examined it from the intuitive availability of one of the two constructions. For example, it has been claimed that the preposition-less construction as in (1a) does not allow interruption of the transferring act expressed by the verb (Gropen et al. 1989, Ogawa 2008). In other words, both constructions in (2) are fine, but when the transfer is explicitly unsuccessful, some speakers reject the preposition-less (3a) but accept (3b).

(2) a. Kate taught Rick Croatian.
b. Kate taught Croatian to Rick.

(3) a. ?? Kate taught Rick Croatian, but he didn't learn much.
b. Kate taught Croatian to Rick, but he didn't learn much.

However, Rappaport Hovav & Levin (2008: 150) found examples of explicitly interrupted preposition-less uses of *teach*:

(4) Sandy taught the children the alphabet, but only got as far as the letter 'R'.

Others studied idioms that contain an alternating verb: idioms are frozen items of several words in a specific construction, so an idiom containing a verb that alternates elsewhere should provide insight into the types of meanings associated with the construction in that idiom (Oehrle 1976). For example, the speaker in the sentences in (5) acquires possession, as it were, of the headache; it is not being transferred to them from the addressee. The fact that the clear transfer-of-possession meaning is combined in this idiom with the preposition-less construction could serve as evidence for an account that ascribes this transfer-of-possession meaning to the preposition-less construction in general.

[1] Other languages seem to have an equivalent phenomenon, for example Dutch (Colleman 2010), Chinese (Liu 2006), and Croatian (Zovko Dinković 2007).

(5) a. You're giving me a headache.
b. * You're giving a headache to me.

Bresnan & Nikitina (2003)'s corpus study, however, did find items with such idioms in the non-idiomatic construction:

(6) . . . guaranteed to give a headache to anyone who looks hard at the small print. (Bresnan & Nikitina 2003: 8)

Examples like this render the assumption of idioms being absolutely frozen in one construction untenable. If the transfer of possession that is inherent in the *give someone a headache* idiom can evidently be expressed using either of the two dative alternation constructions, then there can be no absolute deterministic mapping between meanings and constructions.

Similarly, much has been made of some ditransitive verbs that express transfer but do not participate in the dative alternation:

(7) a. * I pulled John the box.
b. I pulled the box to John.

There is no immediately apparent reason why *pull* should only go with the prepositional construction, but the intuition behind the acceptability judgements in (7) appears to be strong. If this verb thus can only be used with the prepositional construction, the meaning of the verb should provide insights into the meaning associated with the construction. However, the supposedly unavailable construction is again attested:

(8) He pulled himself a steaming piece of the pie. (Bresnan & Nikitina 2003: 6)

Therefore, no clear mapping between meaning and construction can be derived from supposedly non-alternating verbs either.

A different point of view on the dative alternation is to see the two different constructions as two different orders of the objects: the preposition-less construction places the recipient object before the theme object, while the prepositional construction uses the opposite ordering. From this point of view, the interesting question is: What drives the choice between the two different orderings or constructions? Previous research (most prominently Wasow 2002 and Bresnan et al. 2007) found that several features of the two objects affect this choice. For example, they showed that shorter objects are preferentially placed before longer ones, as in (9), objects that are given in context are preferred before new ones, as in (10) and (11), and that objects with animate referents are preferred before inanimate ones, as in (12).

(9) a. Rick gave *Kate* a grande skim latte with two pumps of sugar-free vanilla.
b. ?? Rick gave a grande skim latte with two pumps of sugar-free vanilla to *Kate*.

(10) What did Kate do with the letter?
a. ?? She mailed *Rick* the letter.
b. She mailed the letter to *Rick*.

(11) What did Kate do to Rick?
a. She mailed Rick *the letter*.

b. ?? She mailed *the letter* to Rick.

(12) a. Rick gave Kate *a coffee*.

b. ? Rick gave *a coffee* to Kate.

The effects of length and givenness are also attested in other phenomena (see for example Wasow 2002), but the animacy effect is less well attested. It appears to vary in different varieties of English and with speakers of different ages (Bresnan & Hay 2008), and two separate studies of child language corpora failed to find it (de Marneffe et al. 2012, Bürkle 2011). Therefore, we were interested in testing experimentally whether this animacy effect does indeed exist, in both adults and children. This paper reports preliminary findings of an experiment designed for this purpose.

3 Experiment

3.1 Methodology

We designed an interactive visual world paradigm, combining a Tobii X120 head-free eye-tracker with an HP touchscreen laptop running PsychoPy (Peirce 2007, 2009). Our subjects were twenty adult native speakers of New Zealand English and eighteen four-year-olds. Each trial (16 per block, 4 blocks) consisted of four images, either three 'themes' and one 'goal' (as in Fig. 1a) or three goals and one theme (as in Fig. 1b). Each trial had a pre-recorded instruction sentence using *give*. One of the objects in that sentence was explicit and matched the image that there was only one of—the goal, *dogs*, in Fig. 1a; the theme, *keys*, in Fig. 1b. The other object was masked with Brownian noise, making the instruction sentence not unlike a cloze task. Shirakawa (2013) showed that Brownian noise works very well for this purpose even with young children. Thus, the instruction for the trial shown in Fig. 1a was either *Now give the* _____*to the dogs!* or *Now give the dogs the* _____*!*, and the instruction for Fig. 1b was either *Now give the keys to the* _____*!* or *Now give the* _____*the keys!*

(a) Theme-gapped trial (b) Goal-gapped trial

Figure 1: Examples of the two trial types used

The 'theme' image(s) could be moved by dragging on the touchscreen, and each trial ended as soon as a theme was detected inside the white box surrounding a goal. An automatic demonstration and eight training trials made this clear to subjects. The choice of

theme or goal was recorded, along with eyetracking data (where available) and touchscreen input.

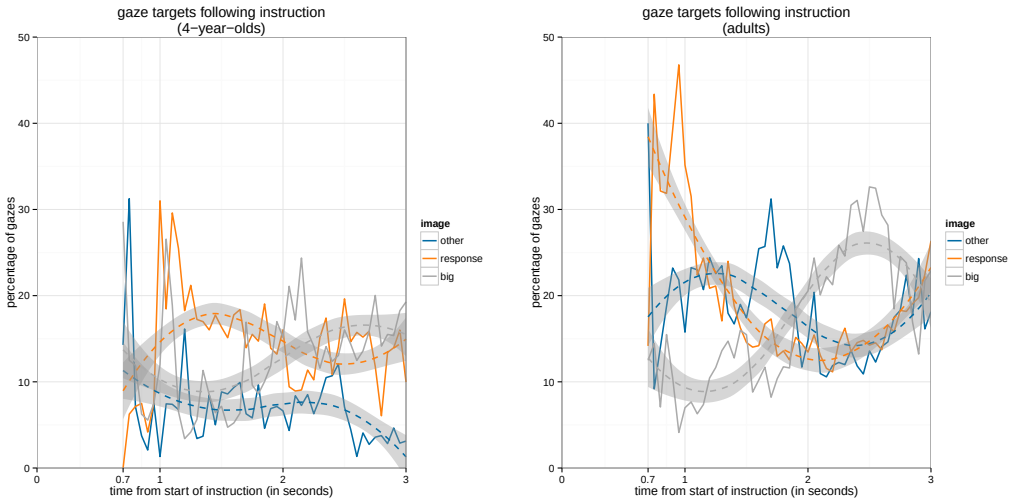
Eye gaze data was recorded successfully for about 60% of participants. For some participants, eye gaze is very difficult to record due to idiosyncratic features like eyelash length and density. As the eyetracker used here is a head-free model, there was nothing that stopped participants from moving their heads out of the narrow field of view of the eyetracker. Four-year-old participants in particular did this frequently. As it is unable to record the gaze of eyes outside its field of view, the head-free eyetracking hardware used also contributed to the relatively low data capture rate.

Eye gaze data was analyzed using growth curve analysis (GCA; see Mirman et al. 2008 or `www.danmirman.org/gca` for details and worked examples). GCA means analyzing the percentages of gazes on various regions by time bins (here: 50 ms) rather than at individual time points (which would mean very narrow time bins, 16.6 ms with a 60-Hz eyetracker for example). A mixed-effects regression model is fit to these percentage values, which allows variance of individual participants to be considered—if, for example, one participant was very fond of dogs, they might be more likely to gaze at the image of dogs than other participants. Noise in the data like this decreases statistical power, so accounting for it (with random participant effects) is beneficial for the analysis and the inferences drawn from it.

3.2 Results

Fig. 2a shows the percentages of what the four-year-olds eye gaze fell on (solid lines) and the growth curve model of that data (dashed lines with ribbons). Fig. 2b shows the same data for the adults. The orange lines correspond to the one out of the three smaller images (themes or goals) that the participant chose later in that trial. The blue lines are for the two other options, and the grey line is for the fourth, 'big' image (dogs or keys in Fig. 1). The orange line is higher than the blue line in Fig. 2b and their confidence intervals do not overlap. This means that adults tended to look first at the one of the three choices (themes or goals) that they would later end up choosing, and that this preference is significant. The same preference is apparent in the children's gazes, but with a slight delay. Various interaction terms in both models (parameters not shown here) reach significance under the standard assumptions discussed above, which suggests that these time-linked preferences are significant.

As Fig. 3 shows, the paths of dragging a theme to a goal were very straight for both four-year-olds and adults. The integrals of the recorded dragging paths over the corresponding straight line from start to end of that path (top plots) cluster around 0, as do the differences between the path length and the individual straight line length in pixels (bottom plots). The minimal time necessary to complete a trial is around 5 seconds (depending on the exact length of the sound files, which were always played sequentially and never concurrently). Participants took much longer than that (see Fig. 4). The straight paths and the fairly long trial completion time together suggest that participants made their choices before reaching out to the touchscreen, and that their touchscreen input is thus unlikely to be affected by the position of other images (as found in Spivey et al. 2005, for example). In other words, the touchscreen input in this experiment is effectively an offline measure. This means that the



(a) Four-year-olds

(b) Adults

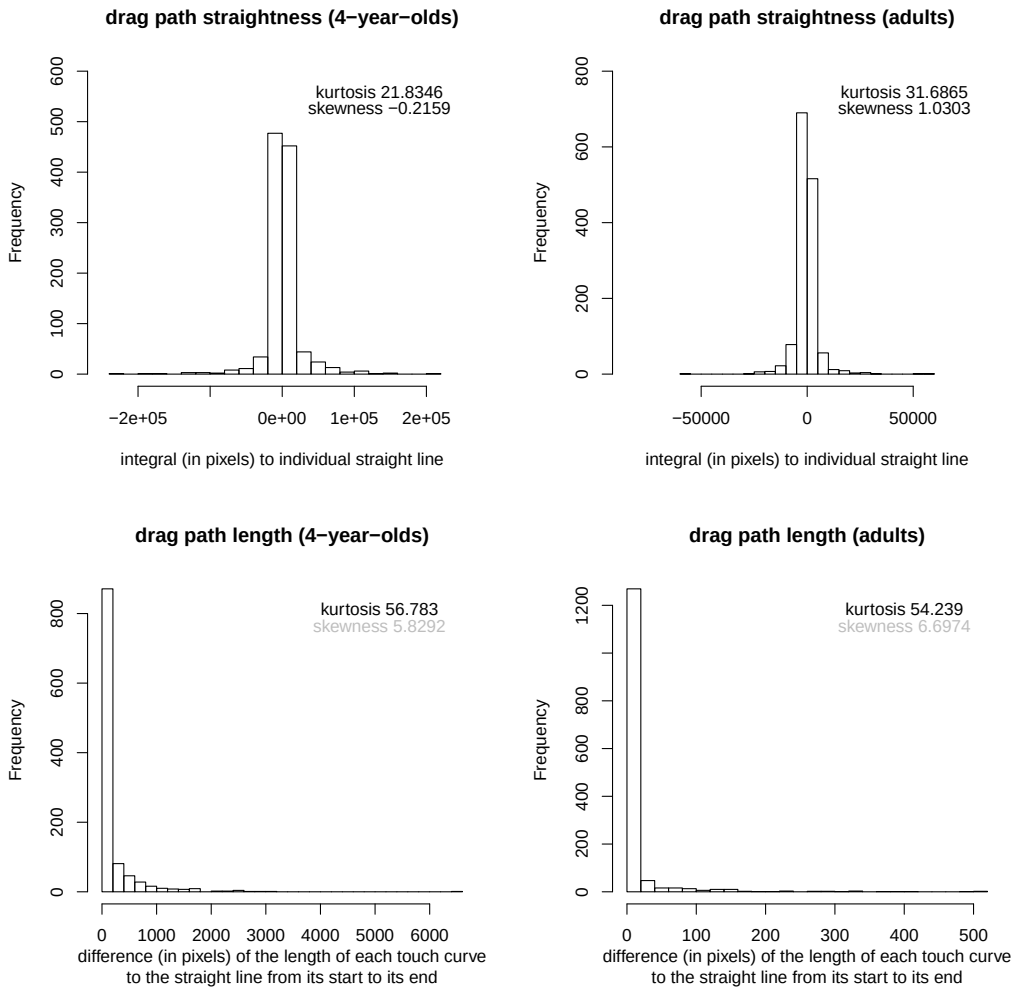
Figure 2: Eye gaze targets over time

paths made by participants' touchscreen input are unlikely to provide further insights (like minor but systematic deviations toward another option image). Therefore, the touchscreen input data was not analyzed further.

4 Conclusion

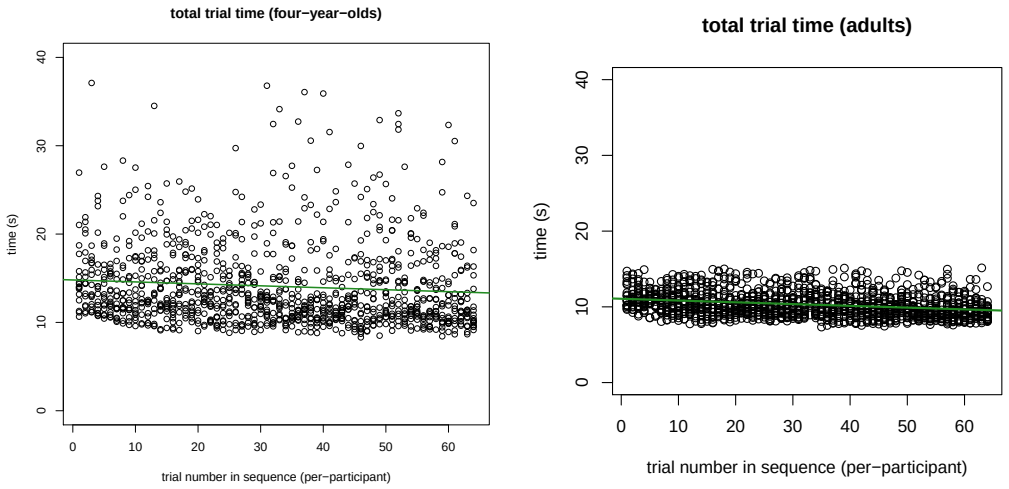
Unconstrained touchscreen use, as in the experiment presented here, is not an attention measure of the same quality as eyetracking. Nevertheless, as is evident from the immediate preference for looking toward the eventual response, the task did reveal underlying preferences or expectations with participants as young as four years. Moreover, while the eyetracking data was very lossy (no or no useful data was recorded from about 40% of participants, due to the eyetracker having trouble keeping track of their eyes), the touchscreen worked perfectly and without explicit instruction. Future studies using touchscreens are definitely a fruitful possibility, but should restrict or constrain touchscreen use to maximize the quantity and quality of the recorded data.

With more compliant participants (such as adults), a simple instruction to keep their finger on the screen at all times would be quite effective. Moreover, in line with the mouse-tracking method of Spivey et al. (2005), instructing or even training them to be as quick as possible may lead to more insightful touchscreen input data, such as deviations toward a distractor item in a touch-and-drag path. This may not be feasible with very young participants or participants with delays or disorders: even if they want to be very quick in their touchscreen, their motor control and neural development may not allow this speed and precision. However, encouraging these participants to keep their finger on the screen at all times should still be possible with appropriate methods (such as reminders built into the experiment, for example by having audio reminders being 'said' by characters in a visual world experiment). In a short experiment, this is unlikely to lead to great discomfort in participants (unlike head-fixing eyetrackers) while still guaranteeing a large quantity of



(a) Four-year-olds (b) Adults

Figure 3: Histograms of touchscreen dragging path integrals and lengths



(a) Four-year-olds (b) Adults

Figure 4: Total time taken per trial

high-quality data (unlike head-free eyetrackers).

This will be particularly important for experiments that are designed specifically for touchscreens as an input/measure device and as such rely on the spatial nature and high temporal resolution that touchscreen input data can provide, such as the masked reading paradigm of Hatfield (to appear). Used this way, a touchscreen is a viable alternative to eyetracking. Dufau et al. (2011), on the other hand, used the touchscreens of smartphones merely as a way to present two buttons. Studies like this are not specific to touchscreens (they could be conducted with other input devices like computer mouses or button boxes, and indeed are), do not take advantage of time-locked spatial touchscreen data, and thus do not need to constrain participant input. The experiment presented in this paper is at neither extreme: the touchscreen data was not central to it, though with improvements (like constrained input) it could use this high-resolution spatial and temporal data to provide further insight into expectations in and distractions to how dative alternation sentences are processed.

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Minimal Sufficiency Readings in Conditionals

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Abstract

We discuss minimal sufficiency readings of exclusives like *just*, as in *Just the thought of him sends shivers down my spine*, which does not mean the same thing as *Only the thought of him sends shivers down my spine*. We provide a set of diagnostics for identifying minimal sufficiency readings in conditionals and in simple clauses, and identify a generalization as to where the latter type appear: only in arguments that have a 'causer' thematic role. For this reason, we see minimal sufficiency readings in conditionals as basic, and provide an analysis of them building on Kratzer's notion of a modal base. The idea is that the exclusive particle signals an upper bound on the assumptions that have to be added to the modal base before the consequent follows.

1 Introduction

In this paper we are concerned with the contrast between the most prominent reading of (1) and the most prominent reading of (2).

(1) **Only** the thought of food made me hungry.

(2) **Just** the thought of food made me hungry.

Although *just* can be classified as an exclusive, it is not clearly behaving as one in (2). Coppock & Beaver (2014) suggest that what defines exclusives is that they can be paraphrased with *at least* and *at most* or *no more than*. For example:

(3) **Only** John smokes.
   a. ≫ At least John smokes. (≫ means presupposes)
   b. ⇒ At most John smokes. (⇒ means entails)

(4) John is **only/just** an assistant professor.
   a. ≫ John is at least an assistant professor.
   b. ⇒ John is at most an assistant professor.

(5) (Northwest was not liable because) it was a **mere** conduit for another's infringing conduct.
   a. ≫ Northwest was at least a conduit.
   b. ⇒ Northwest was at most a conduit.

(6) (She better be glad that) falsifying student records is the **only** thing she is being investigated for!

a. ≫ She is being investigated at least for falsifying student records.

b. ⇒ She is being investigated at most for falsifying student records.

(7) (We cannot accept the premise that) it is the **sole** responsibility of those Member States.[1]

a. ≫ It is at least the responsibility of those Member States.

b. ⇒ It is at most the responsibility of those Member States.

(8) (It just annoys me that) NBC has **exclusive** rights to televising the Olympics in the US.

a. ≫ At least NBC has rights to televising the Olympics in the US.

b. ⇒ At most NBC has rights to televising the Olympics in the US.

(9) Deflation is not a **pure** monetary phenomenon. (It is the absence of real demand.)

a. ≫ Deflation is at least a monetary phenomenon.

b. ⇒ Deflation is not at most a monetary phenomenon.
(Thus, deflation is more than just a monetary phenomenon.)

(10) Treatment did not consist of chemotherapy **alone**.

a. ≫ Treatment consisted of at least chemotherapy.

b. ⇒ Treatment did not consist of at most chemotherapy.
(Thus, treatment consisted of chemotherapy and something else.)

The use of *just* in (2) does not obviously have this property: It does imply that at least the thought of food made the speaker hungry, but it does not have the upper-bounding inference, that nothing more than the thought of food made the speaker hungry. In this respect (2) contrasts with (1), which does imply an upper bound on what made the speaker hungry. Adopting terminology from Grosz (2012), we call the phenomenon in (2) a 'minimal sufficiency reading'.

Grosz (2012) applies the term 'minimal sufficiency reading' primarily to uses of exclusives (or exclusive-homonyms) in conditionals. According to Grosz (2012), the following sentence is ambiguous between an exclusive reading and a minimal sufficiency reading:

(11) If just two people get on the boat, the boat will sink.

According to Grosz, this sentence has a reading that can be paraphrased, "If (at least) two persons (i.e. ≥2 people) get into the boat, which is not a lot, it will sink." Here again we

[1] A reviewer points out that this example is ambiguous out of context. It could mean either that those Member States have no other responsibilities, or that noone other than the Member States has responsibility for 'it'. In context, the intended interpretation is the latter; here is the full passage (from the EuroParl corpus): *Mr President, for us the problem of implementation should be a shared problem, and I personally cannot accept what Commissioner Barnier has said, when he simply washes his hands of the problems of four or five Member States. The problem is a shared one, the solution is a shared one. The fact that we have EUR 100 billion of outstanding commitments should be a problem for all the Community's institutions. We cannot accept the premise that it is the sole responsibility of those Member States. We certainly want to see action by all the institutions, including the Commission, and this Parliament in particular, as a matter of urgency.*

seem to have a non-exclusive reading of *just*, although it is a bit more difficult to articulate the contrast between an exclusive and a minimal sufficiency reading in this case.

There are two existing solutions to this puzzle in the literature. On what we will call the *Ambiguity hypothesis*, exclusives like *just* are typically ambiguous between a genuine exclusive reading and another reading on which they are truth-conditionally vacuous (Guerzoni 2003, Grosz 2012). On what we will call the *Scope hypothesis*, the scope of *just* is within the NP, and there is an implicit existential quantifier (Coppock & Beaver 2014). So (2) can be paraphrased:

(12) Something that is at most the thought of food (presupposing that it is at least the thought of food) made me hungry.

In this paper we argue that neither of these solutions is entirely satisfactory, and propose a third way. Our solution is based on the new observation that minimal sufficiency readings in non-conditional sentences like (2) are limited to noun phrases that have a 'causer' thematic role (henceforth the 'causativity generalization'). This suggests that causation is key to the analysis of minimal sufficiency readings, and that the cases involving conditionals most clearly reflect their logical structure. We therefore treat minimal sufficiency readings in conditionals as basic, and offer an analysis of such cases using Kratzer's notion of *modal base*, seen as a stock of assumptions. In a crude nutshell, the analysis is that minimal sufficiency readings say: "The only thing you need to add to your stock of assumptions is X, and then Y follows." Thus rather than postulating an ambiguity as under Grosz's account, we propose to treat words like *just* as exclusives, as under Coppock and Beaver's treatment of minimal sufficiency readings. But our proposal, unlike Coppock and Beaver's, accounts for the causativity generalization.

In §2, we offer a number of diagnostics that can be used to tease apart minimal sufficiency readings from ordinary exclusive readings, in order to circumscribe the phenomenon in question, and establish the causativity generalization. In §3, we review the theories of minimal sufficiency readings that have been offered. In §4, we sketch our own proposal and discuss its implications.

2 Data on minimal sufficiency readings

2.1 Conditionals

As mentioned above, the term 'minimal sufficiency reading' has been applied both to sentences like (2) and to conditionals like (11). According to Grosz (2012), (11) has two readings, which he glosses as follows:

(13) If just two people get on the boat, the boat will sink.
   a. Exclusive reading (according to Grosz): "If no more than two persons (i.e. <3 people) get into the boat, it will sink."
   b. Minimal sufficiency reading (according to Grosz): "If (at least) two persons (i.e. ≥2 people) get into the boat, which is not a lot, it will sink."

Note that the presuppositions are not represented in the gloss. Grosz assumes there to be an 'at least' presupposition on the exclusive reading, so it is presupposed that at least two

people get into the boat on that reading. Both readings come with a lowness presupposition, namely that two people getting on the boat is low on the scale of pragmatic strength. Restricting our attention to cases where the presuppositions of the exclusive reading are satisfied (i.e., where at least two people get on the boat, and that is not a lot), Grosz's glosses yield only a very subtle difference in truth conditions. Both require that the boat sinks if exactly two people get on the boat. But if it is considered possible that three people get on the boat, and it doesn't sink, then the sentence is false under the minimal sufficiency reading, but true on the exclusive reading. The state of affairs that the exclusive reading allows for and the minimal sufficiency reading rules out, in other words, is one where the boat would sink if two people got on, but not if three people got on – quite an implausible scenario to begin with. So the contrast is quite subtle.

Other examples allow us to see the distinction somewhat more clearly. Consider (14), a naturally-occurring web example.

(14) He'd be too boring if he just used regular punches.

On the most prominent reading of this example, the exclusive has an effect on the truth conditions; if we remove the exclusive to produce *He'd be too boring if he used regular punches*, the sentence would imply that under any (normal) circumstance in which he used regular punches, regardless of what else he used, he would be too boring. Example (14) makes a weaker claim (in addition to presupposing that he uses regular punches): as long as he fails to combine his regular punches with other moves, he'll be too boring, but in principle he could use regular punches and not be too boring, as long as there was enough variety among his moves. So the presence of the exclusive particle has a truth-conditional effect.

Now consider the following variant, which has a minimal sufficiency reading:

(15) He could win if he just used regular punches.

On the most prominent reading of this case, *just* has no detectable effect on the truth conditions; if we remove *just* to form *He could win if he used regular punches*, the resulting sentence conveys the same information. A closely related point is that (15) can be paraphrased by saying 'Him using regular punches is sufficient for him to win.' Example (14) cannot be paraphrased in the corresponding way: 'Him using regular punches is sufficient for him to be too boring' (even setting aside stylistic awkwardness).

The presence of a truth-conditional effect correlates with whether or not the sentence gives rise to a conditional perfection implicature.[2] Example (14) has a conditional perfection implicature: 'If he didn't just use regular punches (i.e., used other things as well), he wouldn't be too boring.' In contrast, (15) does not have the corresponding implicature, which would be 'If he didn't just use regular punches, he couldn't win.'

Related, on a minimal sufficiency reading, a conditional can felicitously be continued using *let alone* with a stronger alternative antecedent. For example ... *let alone if he used roundhouse kicks* is a felicitous continuation for (15) (*He could win if he just used regular punches, let alone if he used roundhouse kicks*), but not (14) (*??He would be too boring if he just used regular punches, let alone if he used roundhouse kicks*).

[2] *Conditional perfection* is the move from 'If A then B' to 'If not A then not B'.

Grosz (2012: 245) provides a nice pair of examples involving *just once* that can be used to illustrate these differences:

(16) One good thing about pu-erh is that you can use the same cake over and over for multiple infusions. If you use it just once, you're wasting tea.

(17) But it does work reasonably well, and if you use it just once, you've saved more than the purchase price.

Removing *just* would change the truth conditions of example (16), but not those of (17). And there is a conditional perfection implicature for (16) ('If you use it more than once, you're not wasting tea') but not for (17) ('If you use it more than once, you haven't saved more than the purchase price').

There also appears to be a correlation with emphasis and intonation. Compare the following two intonational variants:

(18) a. If he just *worked out* a little, he'd be hot.

b. ??If he *just* worked out *a little*, he'd be hot.

The emphasis pattern in (18a), consistent with broad focus on the whole sentence, is natural on a minimal sufficiency reading, where it is implied he doesn't work out at all, and would be even hotter if he worked out a lot. Focal emphasis on *a little* plus emphasis on the exclusive more naturally reads to a funny exclusive interpretation where he works out too much, and should work out less to become hotter – funny because normally the more one works out the hotter one becomes. (This is dependent on intonation as well as emphasis; with the right tone of exasperation, it is possible to get a minimal sufficiency reading with emphasis on *just* and *a little*.) A more natural consequent for the exclusive reading is *he wouldn't be as hot*. Then emphasis on *worked out* becomes relatively odd:

(19) a. ??If he just *worked out* a little, he wouldn't be as hot.

b. If he *just* worked out *a little*, he wouldn't be as hot.

In Swedish, the difference is reflected in word order. The Swedish word *bara* 'only' can be found either in adverbial position or in the position of a conditional subordinator (Wijk-Andersson 1991, Rosenkvist 2014). The conditional subordinator can be used in cases like (15) and (17) but not (14) and (16).

(20) a. Om du **bara** använder den en gång så har du redan tjänat in pengarna.
'If you only use it once, you've already gotten your money's worth.'

b. Om du **bara** använder den en gång så är det inte värt pengarna.
'If you only use it once, it's not worth the money.'

(21) a. **Bara** du använder den en gång så har du redan tjänat in pengarna.
'If you only use it once, you've already gotten your money's worth.'

b. ??**Bara** du använder den en gång så är det inte värt pengarna.
'If you only use it once, you've already gotten your money's worth.'

We may summarize the situation as follows: On minimal sufficiency readings of exclusives in conditionals, there is no truth-conditional effect, no conditional perfection implicature, and conditional subordinator *bara* can be used in Swedish. These properties do not hold for ordinary exclusive readings.

2.2 Simple transitive sentences

Now let us consider minimal sufficiency readings in simple transitive sentences, such as the variant of the following sentence with *just*:

(22) Just/??Only the thought of him sends shivers down my spine.

The variant with *only* tends strongly toward an exclusive reading, which we can identify on the basis of a number of features.

First, on the minimal sufficiency reading, the sentence has the same truth conditions with or without the exclusive:

(23) The thought of him sends shivers down my spine.
(implies *just* version but not *only* version)

Second, the version with *just* can be paraphrased with *sufficient*:

(24) The thought of him is sufficient to send shivers down my spine.
(good paraphrase of *just*-version, not *only*-version)

Third, the version with *only* on the other hand can be paraphrased with *necessary* and *nothing other than* or *the only thing*:

(25) The thought of him is necessary to send shivers down my spine.
(good paraphrase of *only*-version, not *just*-version)

(26) Nothing other than the thought of him sends shivers down my spine.
(good paraphrase of *only* version but not *just* version)

(27) The only thing that sends shivers down my spine is the thought of him.
(follows from *only* version but not *just* version)

Fourth, as Coppock & Beaver (2014) point out, the minimal sufficiency reading can be paraphrased with an indefinite and *only*:

(28) Something that is only the thought of him sends shivers down my spine.
(good paraphrase of *just* version, not *only*-version)

Fifth, it can also be paraphrased with *mere*.

(29) The mere thought of him sends shivers down my spine.

Sixth, *let alone* can be combined only with a minimal sufficiency reading, hence combines more easily with *just*:

(30) Just/#Only the thought of him sends shivers down my spine, let alone the sight of him.

Seventh, and finally, notice that NPIs are licensed by the *only* version and not the *just* version:

(31) ??Just/Only a smile from him would make any difference.

These are all features that set exclusive readings apart from minimal sufficiency readings. In the following, we will focus on the 'and nothing/nobody else' diagnostic.

Now let us observe that minimal sufficiency readings are not always available in non-conditional sentences. For example, when modifiying the object of a perception verb, *just* does not give rise to minimal sufficiency readings:

(32) I **saw** *just the beginning*. [no MSR]
→ I saw nothing else.

Here are some additional cases in which a noun phrase in an object position fails to give rise to a minimal sufficiency reading:

(33) I **had** *just the thought of him*. [no MSR]
→ I had nothing else.

(34) I **gave** *just the book* to John. [no MSR]
→ I gave nothing else to him.

(35) I **told** John *just the beginning of the story*. [no MSR]
→ I told him nothing else.

In these cases the thematic role that the noun phrase plays in the sentence is not a causer, but rather a theme or undergoer.

The stimulus argument of an experiencer verb, on the other hand, can give rise to a minimal sufficiency reading:

(36) She **resents** *just the fact that she exists* [MSR]
↛ She resents nothing else.

(37) I **fear** *just the idea of such memories coming back to haunt me* at times. [MSR]
↛ I fear nothing else.

So minimal sufficiency readings are possible with grammatical objects.

Unaccusative subjects, on the other hand, appear not to be associated with minimal sufficiency readings:

(38) *Just the ship* **arrived**. [no MSR]
→ Nothing else arrived.

(39) *Just the window* **broke**. [no MSR]
→ Nothing else broke.

A causer argument can have a minimal sufficiency reading:

(40) *Just the rock* **broke** the window. [MSR]
↛ Nothing else broke the window.

Agentive subjects, however, seem to have only exclusive readings:

(41) *Just the boy* **broke** the window. [no MSR]
→ Nobody else broke the window.

Taken together, these observations lead us to the following generalization:

(42) **Causativity generalization:** NP-modifying *just* has a minimal sufficiency reading within a single clause when the NP plays a non-agentive causer role.

This generalization forms the basis of our analytical strategy to treat minimal sufficiency readings in conditionals as the more basic case, as the underlying causal structure is explicit there.

3 Theories

3.1 Background: Beaver & Clark

Let us now review the two theories of minimal sufficiency readings that have been proposed, Grosz (2012) and Coppock & Beaver (2014). Building on Beaver & Clark 2008, both build on the background assumption that exclusives like *only* and *just* (on the exclusive reading) depend for their meaning on the Question Under Discussion, an implicit or explicit question (formalized as the set of its answers) which is congruent with the focus alternatives of a sentence.[3] Both theories of minimal sufficiency readings furthermore assume that ordinary exclusives come with an *at least* presupposition, which says that some answer to the QUD at least as strong as the prejacent holds, and make a typically at-issue *at most* contribution, which says that no answer to the QUD that is stronger than the prejacent is true.

Here, we make this precise using a logical representation language to represent the meanings of the natural language expressions. In order to specify the semantics for this logic, let us stipulate that expressions of the logic will be interpreted with respect to a model M, a world w, an assignment function g, and a state s, which determines a pragmatic strength relation $\geq_s$ over propositions in the QUD $\hat{s}$. We will have QUD as a constant in our language, representing a predicate that holds of a proposition-denoting expression π in a given state s if π's denotation is among the answers to the QUD in state s.

(43) $[\![\text{QUD}(\pi)]\!]^{M,g,w,s}$ = T if $[\![\pi]\!]^{M,g,w,s} \in \hat{s}$ and F otherwise.

Following a notational convention from Geurts & Nouwen (2007), we will use a triangle in our logic to represent the pragmatic strength relation:

(44) $[\![\pi_1 \trianglerighteq \pi_2]\!]^{M,g,w,s}$ = T if $\langle [\![\pi_1]\!]^{M,g,w,s}, [\![\pi_2]\!]^{M,g,w,s} \rangle \in \geq_s$, and F otherwise.

The 'at least' component of the meaning of *only* is represented with the constant MIN, defined as in (45) (modified according to Coppock & Beaver 2014), and the 'at most' component is represented with the constant MAX, defined as in (46).

(45) $\text{MIN}(p) \equiv \lambda w\,.\,\exists p'[\text{QUD}(p) \wedge p'(w) \wedge p' \trianglerighteq p]$
'There is a true answer to the QUD that is at least as strong as p'

(46) $\text{MAX}(p) \equiv \lambda w\,.\,\forall p'[[\text{QUD}(p') \wedge p'(w)] \rightarrow p \trianglerighteq p']$
'There is no true answer to the QUD stronger than p'

[3] For example, *John$_F$ laughed* is congruent to the question *Who laughed?* where as *John laughed$_F$* is congruent to the question *What did John do?*.

The MIN component is presupposed by *only*, and the MAX component is part of its at-issue meaning. To make this distinction, we assume furthermore three truth values: T (true), F (false), or # (undefined). We use Beaver & Krahmer's (2001) ∂ operator to handle presupposition:

(47) $[\![\partial[\phi]]\!]^{M,g,w,s}$ = T if $[\![\phi]\!]^{M,g,w,s}$ = T. Otherwise $[\![\partial[\phi]]\!]^{M,g,w,s}$ = #.

The Beaver and Clark lexical entry for *only* can then be represented as follows, where the $\rightsquigarrow$ arrow signals a translation from natural language to our formal representation language:

(48) Beaver and Clark lexical entry for *only*
only $\rightsquigarrow \lambda p \lambda w\,.\,[\partial[\textsc{min}(p)(w)] \wedge \textsc{max}(p)(w)]$

Grosz's lexical entry for exclusive-*only* specifies an additional 'lowness' presupposition, that the prejacent is low on the scale of pragmatic strength. We can represent this as follows:

(49) Grosz's lexical entry for *only*
only $\rightsquigarrow \lambda p \lambda w\,.\,[\partial[\textsc{min}(p)(w) \wedge \textsc{low}(p)] \wedge \textsc{max}(p)(w)]$

Following Grosz (2012), we might interpret $\textsc{low}(p)$ to mean that most answers to the QUD are higher than p. We will not formalize this here.

Coppock & Beaver (2014) adopt Beaver & Clark's (2008) analysis of *only* (modulo the definition of MIN), so as far as ordinary exclusive *only* goes, the lowness presupposition is the only place where the two analyses differ, and this is not a substantive difference; the lowness presupposition was not omitted by Coppock and Beaver for any particular reason. Where the two analyses differ is in how minimal sufficiency readings are treated. Coppock and Beaver aim to unify minimal sufficiency readings with exclusive readings, invoking (48) in both cases. Grosz on the other hand posits an ambiguity for words that allow for minimal sufficiency readings, with a second *only* that retains the lowness presupposition but is otherwise vacuous.

3.2 Grosz's theory

According to Grosz (2012), following Guerzoni (2003: ch. 4), exclusives sometimes have an additional reading, which Grosz calls *only*$_2$, defined as follows:

(50) *only*$_2$ $\rightsquigarrow \lambda p \lambda w\,.\,[\partial[\textsc{low}(p)] \wedge p(w)]$

So for *just the thought of him sends shivers down my spine*:

- It is presupposed that 'the thought of him sends shivers down my spine' is low on the scale of answers to the QUD
- It is entailed that the thought of him sends shivers down my spine.

There is no 'at most' component in this case. (When *just* is used as an ordinary exclusive, it is interpreted as (48), with an 'at most' component as well. Grosz calls this an *only*$_1$ reading.)

Minimal sufficiency readings and optative uses of exclusives as in (51) both involve *only*$_2$ according to Grosz.

(51) Oh, if only he knew!

This assumption is supported by a cross-linguistic correlation between use of exclusives in optatives and minimal sufficiency reading in conditionals. For example, *solo* in Spanish supposedly not allow a minimal sufficiency reading and does not appear in optatives:

(52) a. Si **solo** dos personas se montan en esa barca, se hundira
'If only two people get on that boat, it will sink.'
(How do we know that this is not a minimal sufficiency reading?)

b. Si ⟨***solo**⟩ Juna hubiera ⟨**al menos**⟩ escuchado a María!
'If only John had listened to Maria!'

Brazilian Portuguese *só* and *apenas*, Greek *mono*, Catalan *només* reportedly have the same property. All these languages use their equivalent of 'at least' in optatives. Conversely, German *bloß*, Italian *solo* and *solamente*, Lebanese Arabic *bass*, Czech *jen*, Polish *tyklko*, Serbian *samo*, and Norwegian *bara* reportedly allow minimal sufficiency readings and occur in optatives. The ability to account for this generalization is a virtue of Grosz's theory, but it also comes with certain difficulties; for example, the generalization is violated by English *only*, which is used in optatives but not in minimal sufficiency readings, and English is not alone, as Grosz admits. (We offer no theory of optatives here.)

However, Grosz's theory does not explain the limited distribution of minimal sufficiency readings, i.e., the causativity generalization. Nothing prevents $only_2$ from modifying non-causer noun phrases. For example, take *I saw just the beginning.* Why doesn't this have an $only_2$ reading?

3.3 Coppock & Beaver's theory

Coppock & Beaver make a distinction between two kinds of readings that exclusives can have, depending on the type of scale that lies in the background.

- *Complement exclusion readings*. These can be paraphrased with *and nothing/nobody else*. For example, *Only John smokes* implies *John smokes and nobody else smokes*.
- *Rank-order readings*. These involve a scale where higher-ranked alternatives do not entail lower-ranked alternatives and cannot be paraphrased with *and nothing/nobody else*. For example, *John is only an assistant professor* does not mean that John is an assistant professor *and nothing else*; it means that he is an assistant professor *and nothing more*, i.e., nothing higher on the scale. Here, higher-ranked alternatives such as 'John is a full professor' do not entail lower ranked alternatives such as 'John is an assistant professor'.

Some exclusives allow only complement-exclusion readings, as one can see in the following paradigm, where the frame requires a rank-order reading.

(53) a. She is a mere assistant professor.
b. She is just an assistant professor.
c. She is merely an assistant professor.
d. She is only an assistant professor.
e. #She is exclusively an assistant professor.
f. #She is purely an assistant professor.

g. #She is simply an assistant professor.

h. #She is solely an assistant professor.

And there is a correlation between exclusives that allow minimal sufficiency readings and those that allow rank-order readings, as we can see in the following paradigm.

(54) a. The mere thought of food makes me hungry.

b. Just the thought of food makes me hungry.

c. ?Merely the thought of food makes me hungry.

d. ?Only the thought of food makes me hungry.

e. #Exclusively the thought of food makes me hungry.

f. #Purely the thought of food makes me hungry.

g. #Simply the thought of food makes me hungry.

h. #Solely the thought of food makes me hungry.

Note that the correlation is not perfect; *only* for example allows rank-order readings (in positive sentences[4]) but resists minimal sufficiency readings.

According to Coppock & Beaver (2014), minimal sufficiency readings as in (54) are simply rank-order readings with NP-internal scope. Let us adopt the following abbreviation for the translation of *only* according to the Beaver and Clark analysis:

(55) $\text{ONLY} \equiv \lambda p \lambda w\,.\,[\partial[\text{MIN}(p)(w)] \wedge \text{MAX}(p)(w)]$

A minimal sufficiency reading gets the following formal representation, which is achieved through a sequence of type-shifting operations:

(56) *Just the thought of him$_z$ sends shivers down my spine* $\rightsquigarrow$
$\exists x[\text{ONLY}(x = \iota y\,.\,\text{THOUGHT-OF}(y, z)) \wedge \text{SENDS-SHIVERS}(x)]$

where the alternatives are of the form 'x is the sight of him$_z$', etc. In other words, *just the thought of him* means 'something so insignificant as the thought of him'. (See the appendix for the details of the derivation.)

4 Toward a proposal

Both of the foregoing approaches have disadvantages. One disadvantage of Grosz's approach is that minimal sufficiency readings and exclusive readings are derived via two distinct lexical entries; ideally we would unify them. A disadvantage of Coppock & Beaver's approach is that it is unclear what motivates the sequence of type-shifts that is thought to be involved, if type-shifting is a last resort. A disadvantage of both approaches is that they overgenerate, failing to account for the causativity generalization.

The causativity generalization suggests that minimal sufficiency readings in (causal) conditionals are basic, and that in NP-modifying cases the causal structure is playing an important role. In this section, we sketch a treatment of minimal sufficiency readings that

[4]Negated *only* does not appear to do so, as Larry Horn has observed (e.g. Horn 2011); see Coppock & Beaver (2014) for discussion of this point.

starts with the analysis of conditionals. The idea is that the exclusives that figure in minimal sufficiency readings retain their exclusive nature, but operate at an abstract level, where the question under discussion is what assumptions one needs to make.

The idea builds on Stalnaker's (1968: 102) characterization of how conditionals work:

> First, add the antecedent (hypothetically) to your stock of beliefs; second, make whatever adjustments are required to maintain consistency (without modifying the hypothetical belief in the antecedent); finally, consider whether or not the consequent is the true.

In these terms, minimal sufficiency readings (in conditionals) say, "You **only** need to add the antecedent to your stock of beliefs to make the consequent follow." Or: "If you add the antecedent **and no more** to your stock of beliefs, the consequent follows." Some examples:

- If you assume **only** that I think of him (i.e., you assume that I think of him, and you assume **nothing more**), you will derive the consequence that he sends shivers down my spine.
- If you assume **only** that he works out a little, you will derive the consequence that he is hot.

This view, like that of Coppock & Beaver (2014), aims for a unified and genuinely exclusive treatment of minimal sufficiency readings. They turn out to be truth-conditionally vacuous, as under Grosz's treatment, but this strategy allows us to capture their limited distribution.

To formalize our analysis, we build on Kratzer's (1983) analysis of conditionals, which is based on the analysis of modals. Modals are interpreted with respect to a *modal base* and an *ordering source*.

- A modal base is a function from worlds to sets of propositions. It assigns to each world a set of *facts* that are known or assumed to be the case at that world.
- An ordering source is also a function from worlds to sets of propositions. It assigns to each world a set of *ideals* that hold at that world, derived for example from what is legal, moral, or normal. Here, the purpose of the ordering source is to limit the scope of the claim to normal circumstances (so it does not play a starring role in the story).
- "if Φ then Ψ" is interpreted as "must Ψ", where, if f is the modal base for the antecedent, then f_p^+ is the modal base for "must Ψ" and p is the proposition expressed by the antecedent Φ.
- f_p^+ is that function from possible worlds to sets of propositions such that for any world w, $f_p^+(w) = f(w) \cup \{p\}$. Let us assume that this notation is present in the formal representation language as well.

To formalize "must Ψ", we adopt the following. Let Ψ be an expression of type $\langle s,t\rangle$, ω a variable over possible worlds, β a variable over modal bases, and γ a variable over ordering sources. Then:[5]

(57) $[\![\Box_{\omega,\beta,\gamma}\Psi]\!]$ = T iff $[\![\Psi]\!](w')$ = T for every $w' \in O([\![\omega]\!],[\![\beta]\!],[\![\gamma]\!])$
where $O(w,f,g) = \{u \in f(w) \mid \neg\exists v \in f(w) : u <_{g(w)} v\}$
and $u <_{g(w)} v$ iff the set of propositions in $g(w)$ that are true in v is a subset of the propositions in $g(w)$ that are true in u.

[5] Formalization inspired by Condoravdi & Lauer (2014).

The logical representation for *If he just worked out a little, he'd be hot* is then:

(58) $\lambda w \exists A[\partial[\textsc{min}(A = \{\textsc{wo}\})(w)] \wedge \textsc{max}(A = \{\textsc{wo}\})(w) \wedge \Box_{w,f^+_A,g}[\textsc{hot}]]$

where WO means 'He works out a little' and HOT means 'He'd be hot'.

We assume that the QUD is 'What is A?', i.e., 'What do we add to the modal base?' The answers include different sets of assumptions. If X is a subset of Y, then $A = Y$ is a stronger answer than $A = X$. So the sentence says: 'if we assume no more than that he works out a little (presupposing that we assume at least this), it follows that he would be hot'.

Assuming that causal statements can be explicated similarly to conditionals, the same kind of analysis can apply. In causal non-conditional sentences like *Just the thought of him sends shivers down my spine*, we may assume that there is a relevant modal base which gets augmented by the assumption that the causal factor is instantiated. For example, the modal base may be augmented by the assumption that the speaker has the thought of him. What the exclusive signals is that more need not to be added in order for the consequent to follow. Minimal sufficiency readings are not predicted to exist outside of causal environments under this view.

It is also predicted that the exclusive should not affect the truth conditions under a minimal sufficiency reading, and yield the kinds of paraphrases with *sufficient* that we saw above. Insofar as the truth conditions are not affected, we also explains the lack of NPI-licensing by exclusives in non-conditional sentences on minimal sufficiency readings. This approach also explains the lack of a conditional perfection implicature with *more than* (e.g. if he worked out more than a little, he wouldn't be hot). This approach also predicts that minimal sufficiency readings should arise with diverse exclusives, not being limited to lexical items that happen to have lost their 'at most' component. We should even find them with expressions like *no more than*, which consists entirely of an 'at most' component. This prediction is borne out.

(59) Everyone feels how his evil inclination ceases to exist even if he **no more than** focuses his mind and thought strongly upon God.

Why minimal sufficiency readings are limited to certain exclusives is one of the many questions we must leave for further research.

5 Summary

We have argued for and sketched an approach to minimal sufficiency readings that starts with the case of conditionals, a move justified on the grounds of the 'causativity generalization' we have identified: that minimal sufficiency readings in non-conditional sentences are found only in connection with causer roles. The idea behind the analysis is that the exclusive signals an upper bound on what assumptions need to be added to the modal base in order for the consequent to follow. This approach can then be extended to non-conditional causative sentences insofar as they have a similar underlying structure to conditionals. We have thus outlined a unified analysis of exclusives that can account for the causativity generalization.

Appendix: Coppock & Beaver's (2014) analysis of MSRs

Coppock & Beaver (2014) analyze NP-modifying *just* as follows. First, they use a meaning for *just* that is the same as Beaver & Clark's (2008) entry for *only* except that it has the semantic type of a property modifier. Among the translations for *only* is G-ONLY ('Geached ONLY'), which is an abbreviation in the formal language defined as follows:

(60) $\text{G-ONLY} \equiv \lambda P_{\langle e,p\rangle} \,.\, \lambda x \,.\, \text{ONLY}(P(x))$

It is called G-ONLY because it is the result of applying the Geach rule to (48).[6]

For *Just the thought of him sends shivers down my spine*, the analysis can be paraphrased:

(61) Something that is only the thought of him sends shivers down my spine.

Coppock & Beaver (2014) obtain this by analyzing the NP as a property, obtained through type shifting, and analyzing *just* as G-ONLY.

The property denoted by the NP is formed by starting with a Fregean analysis of *the thought of him*$_z$:

(62) *the thought of him*$_z$ $\rightsquigarrow \lambda x \,.\, \iota y \,.\, \text{THOUGHT-OF}(y, z)$

Then it is coverted to a generalized quantifier via Partee's (1986) LIFT as defined in (63), yielding (64):

(63) $\text{LIFT} \equiv \lambda j \,.\, \lambda P \,.\, P(j)$

(64) *the thought* $\rightsquigarrow \lambda P \,.\, P(\iota y \,.\, \text{THOUGHT-OF}(y, z)))$

Then Partee's (1986) BE, defined in (65), applies, yielding (66).

(65) $\text{BE} \equiv \lambda Q \,.\, \lambda x \,.\, Q(\lambda y \,.\, y = x)$

(66) *the thought of him*$_z$ $\rightsquigarrow \lambda x \,.\, x = \iota y \,.\, \text{THOUGHT-OF}(y, z)$

It is to this property that G-ONLY applies, yielding:

(67) *just the thought* $\rightsquigarrow \lambda x \,.\, \text{ONLY}(x = \iota y \,.\, \text{THOUGHT-OF}(y, z))$

Finally, existential closure, defined in (68), applies, yielding (69):

(68) $\text{EX} \equiv \lambda Q \,.\, \lambda P \,.\, \exists x[Q(x) \wedge P(x)]$

(69) *just the thought of him* $\rightsquigarrow$
$\text{EX}(\text{G-ONLY}(\text{BE}(\text{LIFT}(\iota y \,.\, \text{THOUGHT-OF}(y, z)))))$
$\equiv \lambda P \,.\, \exists x[\text{ONLY}(x = \iota y \,.\, \text{THOUGHT-OF}(y, z)) \wedge P(x)]$

When this combines with *sends shivers down my spine*, we get:

(70) *Just the thought of him sends shivers down my spine* $\rightsquigarrow$
$\exists x[\text{ONLY}(x = \iota y \,.\, \text{THOUGHT-OF}(y, z)) \wedge \text{SENDS-SHIVERS}(x)]$

[6] The Geach rule converts a function f with type $\langle a, b\rangle$ into a function f' with type $\langle\langle c, a\rangle, \langle c, b\rangle\rangle$ of the form $\lambda R \,.\, \lambda x \,.\, f(R(x))$, where R has type $\langle c, a\rangle$. In the case of (60), a and b are p, and c is e, and f is ONLY.

So the sentence means 'There is an x that is [presupposed: at least the thought of him and] at most the thought of him which sends shivers down my spine. Higher-ranked alternatives in the QUD could be: 'x is his presence', 'x is his touch', etc. The sentence does not mean that such things do not send shivers down the spine; only that there is something which is not higher on the scale which does.

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Truth value judgments vs. validity judgments*

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Abstract

This paper undertakes a direct comparison between two methodologies for getting at semantic intuitions: (i) validity judgments, where subjects judge the validity of arguments, e.g. *There are three bananas; therefore there are at least three bananas,* and (ii) picture verification tasks (also known as 'truth judgment tasks'), in which, for example, one sees a picture of three bananas and judges a statement like *There are at least three bananas*. It has been suggested that validity judgment tasks are more sensitive to ignorance implicatures than picture verification tasks, but these two methods have not been compared directly using comparable stimuli. The present work aims to close that gap. The results show that validity judgment tasks do not in fact robustly pick up on ignorance implicatures, so they cannot be relied upon for that, although both validity judgment tasks and truth value judgment tasks are sensitive to violations of particularly strong pragmatic requirements. In general, the two kinds of tasks gave quite similar results. This raises the question of why validity judgment tasks sometimes pick up on ignorance implicatures and sometimes do not.

1 Introduction

Recent work has suggested that *validity judgment tasks*, where subjects evaluate the validity of arguments, differ from *picture verification tasks* (or *truth judgment tasks*), where subjects judge sentences as true or false vis-à-vis a depicted scenario (Coppock & Brochhagen 2013a; henceforth C&B). C&B suggest that "truth-value judgments are less sensitive to pragmatic infelicity than inference judgments," and in particular, "ignorance implicatures do not affect truth-value judgments even though they do affect inference judgment tasks," although some pragmatic principles are so strong that violations of them "can cause true sentences to be judged as false." These conjectures were not based on a sufficiently controlled comparison between the two types of task, however. The present paper aims to provide one, so as to gain a better understanding of what these tests can be used to diagnose.

The story begins with the validity judgment experiments carried out by Geurts et al. (2010), in which participants were asked to judge the validity of inferences from one sentence to another. The results showed a difference between comparative modifiers (*more than* n, *less than* n) and their mathematically equivalent superlative counterparts (*at least* $n+1$, *at most* $n-1$). An argument like the following was unanimously judged to be a valid argument:

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(1) Berta had three beers. Therefore, Berta had more than two beers.

In contrast, only 50% of their participants judged the following to be a valid argument:

(2) Berta had three beers. Therefore, Berta had at least three beers.

A similar constrast was found between *fewer than* and *at most*. While it was not unanimous, the overwhelming majority of participants considered the following a valid argument (93%):

(3) Berta had three beers. Therefore, Berta had fewer than four beers.

But only 61% considered the variant with *at most* valid:

(4) Berta had three beers. Therefore, Berta had at most three beers.

These findings can be understood broadly under the uncontroversial assumption that superlative modifiers (*at least*, *at most*) carry some kind of ignorance implication that *more* and *less* do not. To say *Berta had at least three beers* signals at some level that one does not know how many beers Berta had. To say *Berta had more than two beers* does not carry the same sort of ignorance implication.

There are several classes of theories about this ignorance implication. Geurts & Nouwen (2007) proposed that it was a logical entailment. On Geurts & Nouwen's (2007) ignorance-as-entailment view, *Berta had at least 3 beers* is true if and only if:

The speaker considers it necessary that Berta had 3 beers or more
and considers it possible that Berta had more than 3 beers.

Although details differ, the majority of views on superlative modifiers take the ignorance component to be an implicature (Büring 2008, Cummins & Katsos 2010, Cohen & Krifka 2011, Biezma 2013, Coppock & Brochhagen 2013b, Mayr 2013, Schwarz 2013, to appear: i.a.). On an ignorance-as-implicature view, *Berta had at least 3 beers* is true if and only if

Berta had 3 beers or more.

The ignorance implication is not part of the truth conditions on this view.

One instantiation of the ignorance-as-implicature view is given by Büring (2008) (followed by Cummins & Katsos 2010 and Biezma 2013). On this view, *at least p* 'amounts to a disjunction' between *p* and *more than p*, and there is an 'implicature schema' that says, if a speaker says *A or B*, then the speaker considers both *A* and *B* to be possible. As Coppock & Brochhagen (2013b) discuss, this raises the question of what it means for a speaker to 'say' *A or B*. Clearly there is no *or* in the surface string in a sentence containing *at least*. Büring describes no syntactic transformation that would transform the surface string to to an LF containing an LF. The only place where an 'or' shows up in Büring's theory is in the characterization of the denonation of *at least*, where it is part of the meta-language, one cannot hang implicatures on distinctions made in the meta-language.

Coppock & Brochhagen (2013b) offer a view building on a similar intuition which is not subject to this problem. On the Coppock & Brochhagen 2013b view, saying *at least p* is not saying *p or more than p*, but superlative modifiers have an important property in

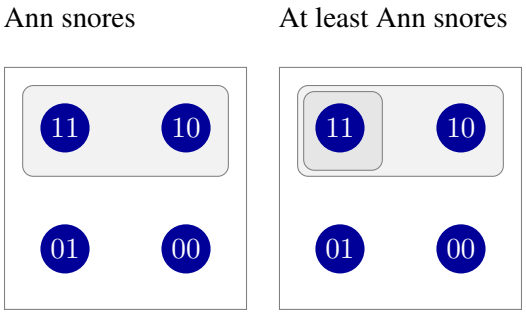


Figure 1: *Ann snores* vs. *At least Ann snores*

common with disjunctions, one which is also shared by questions: They raise issues. This issue-raising property is expressed with the use of inquisitive semantics (Groenendijk & Roelofsen 2009).

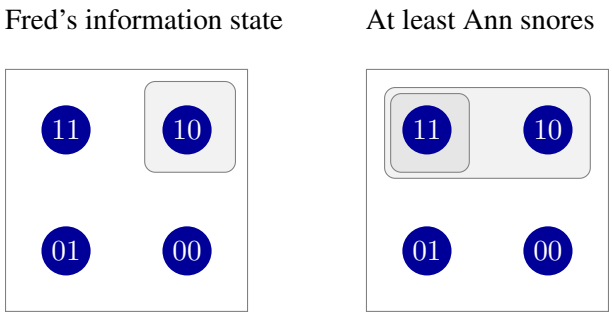
To illustrate, let us consider a simple example, with four worlds: Ann and Bill snore (w_{11}), Ann snores and Bill doesn't (w_{10}), Ann doesn't snore and Bill does (w_{01}), and neither snore (w_{00}). The sentence *Ann snores* picks out the possibility that Ann snores, which is true in two worlds: the one where both Ann and Bill snore, and the one where Ann snores and Bill does not. The sentence *At least Ann snores* (with focus on *Ann*) picks out two possibilities: the possibility that Ann snores, and the possibility that *something stronger* holds – in this case, that Ann and Bill snore. This is depicted in Figure 1. So the two sentences are true in the same set of possible worlds, but the *at least* sentence differentiates among these possible worlds more finely.

This theory makes it possible to articulate the ignorance-as-implicature view as follows. Let us say that a sentence meaning is *interactive* if it raises an issue, and let us define this technically by saying that ϕ is interactive iff the denotation of ϕ contains more than one possibility. An ignorance implicature arises with an interactive (or issue-raising) sentence based on the following reasoning: If the speaker already knew how to resolve the issue, then there would be no reason to bring it up. An issue raised by a speaker should be unresolved in the speaker's mind. (In fact this is a bit strong, because there may be many reasons to raise an issue; cf. Sven Lauer's discussion of 'Need A Reason' implicatures, but we simplify here for the sake of discussion.) Call the set of possible worlds that are epistemically accessible to the speaker the speaker's *information set*, and let us say that a sentence is *interactive in an information set* if, when we restrict its denotation to the worlds in the information set, the result still contains multiple possibilities (Groenendijk & Roelofsen 2009). The Gricean maxim by which the implicature arises can then be codified as follows (Coppock & Brochhagen 2013b):

(5) Maxim of Interactive Sincerity
If ϕ is interactive, then ϕ is interactive in the speaker's information set.

This can be glossed, 'don't bring up an issue that you already know how to resolve'. For example, if Fred's information state is as in Figure 2, then he should not assert *At least Ann snores* (with focus on *Ann*), because the issue is already resolved in his information set.

Another class of theories of superlative modifiers that is not subject to Coppock &



Fred should not assert *At least Ann snores*.

Figure 2: A violation of the Maxim of Interactive Sincerity

Brochhagen's (2013b) criticism of Büring's analysis appeals to lexically specified alternative expressions of the kind that figure in Horn scales ('scalar alternatives', also sometimes called 'formal alternatives'). This group includes both neo-Gricean theories, on which the relevant implicatures are computed on the basis of Gricean reasoning about alternative expressions (incl. Schwarz & Shimoyama 2011, Schwarz 2013, and Kennedy 2015) and theories based on the grammatical view of scalar (and ignorance) implicatures (Chierchia et al. 2008), on which they owe their presence to a silent exhaustivity operator, advocated by Mayr (2013). Many such theories assume the relevant alternatives for *at least* n to be n and *more than* n (Schwarz & Shimoyama 2011, Schwarz 2013, Kennedy 2015), thereby implementing Büring's idea that *at least* n sentences 'amount to a disjunction' between n and *more than* n. Mayr (2013) assumes that the alternatives are *at least* n, *at least* $n+1$, *at least* $n+2$, etc., along with *at most* n, *at most* $n+1$, *at most* $n+2$, etc. There is ongoing discussion under this umbrella as to what alternatives should be stipulated. Common to these approaches however is that ignorance implicatures are derived on the basis of a so-called 'symmetry problem', which prevents a hearer from concluding that a speaker disbelieves any of the alternatives. As far as I know, there has not been much work done comparing the predictions of these various approaches, although McNabb & Penka (2014) report a set of experimental findings that partially go against all of the theories on the market. It thus appears to remain an open question which of these approaches is to be preferred, if any.

But the purpose of this paper is not to adjudicate among theories of superlative modifiers. This paper is focussed on methodology. The goal is to better understand the nature of the validity judgment task used by Geurts et al. (2010), and compare it more directly to *picture verification tasks*, where truth-judgments are given with respect to a depicted scenario. These appear to give slightly different results, as described in the next section, and this paper aims to make a small step towards understanding why.

2 Picture verification tasks

Recall Geurts et al.'s (2010) results:

(6) a. *Liz had 3 beers* $\Rightarrow$ *Liz had more than 2 beers.* 100%

b. *Liz had 3 beers* $\Rightarrow$ *Liz had at least 3 beers.* 50%

c. *Liz had 3 beers ⇒ Liz had fewer than 4 beers* 93%

d. *Liz had 3 beers ⇒ Liz had at most 3 beers* 61%

Prima facie, such results may be taken to support the view of ignorance as entailment. Indeed, this is how Geurts et al. (2010) argue. But this interpretation of the results depends on a particular view of validity and how validity judgments work: That validity amounts to *truth-preservation* ('A therefore B' is true if and only if B is true whenever A is true), and that validity judgments reflect this view of validity.

Kaplan (1999) promotes a view of validity as *information delimitation*. According to his intuitions, the inference in (7) is valid, but the inference in (8) is not.

(7) That damn Kaplan was promoted.
Therefore, Kaplan was promoted. (valid)

(8) Kaplan was promoted.
Therefore, that damn Kaplan was promoted. (valid?)

The premise is true under all the same circumstances as the conclusion in both cases. But the conclusion contains more information in the case of (8), namely information about the speaker's attitude toward Kaplan. This can explain a feeling of resistance to saying that (8) is a valid inference.

The view of validity as information delimination is one that can be combined with the ignorance-as-implicature view to account for the pattern of validity judgments found by Geurts et al. (2010). Sentences with superlative modifiers carry extra information in the form of ignorance implicatures, so when they appear as the conclusion of an argument and this ignorance is not present in the premise, there is a hesitancy to judge the argument as valid.

Some authors have, in effect, expressed the intuition that the arguments in (6) are truth-preserving. Regarding Geurts & Nouwen's (2007) proposal that superlative modifiers semantically encode speaker ignorance, Cohen & Krifka (2011) write:

> Suppose John committed exactly four traffic violations, but nobody knows this, not even the police (who are the authority on the subject), and not even John himself. Then, it would still be truth that he committed at least three traffic violations, and these truth values depend only on what actually happened, not on anybody's beliefs.

If we *suppose* that John committed four traffic violations, and then ask ourselves whether it is true or false that John committed at least three (or four) traffic violations, then our intuitions become a bit clearer than they were in the case of validity judgments.

This passage suggests an alternative way of getting at speakers' intuitions about information-preservation: rather than asking for validity judgments, *depict* a scenario where the premise is true, and then ask whether the conclusion is true or false.[1] The experiments

[1] In fact, Geurts et al. (2010) did carry out this kind of experiment. They used sentences of the form 'There are Q N Xs', where Q was *exactly*, *at least*, *at most*, *more than* or *fewer than*; N was a number, and X was a letter (either A or B). The sentences were accompanied by a display consisting of some number of instances of the relevant letter, either A or B, and the participants were asked to evaluate the truth of the sentence. They do not report 'accuracy' results for this experiment, however, only response time.

Figure 3: Sample stimuli used in Coppock & Brochhagen (2013a)

reported in C&B work in this way. Some sample stimuli are shown in Figure 3. A picture with n objects (six dogs, four bananas, etc.) is shown along with a sentence and the participant is asked to judge whether the sentence is true or false. The sentences were all of the form *There are ____ [nouns] in the picture*, where the blank is filled in with a modified numeral.

In their first experiment, C&B presented subjects with pictures containing three, four, five or six objects of a given type (e.g., six puppies), in one of eight conditions, given n objects in the picture:

1. *at most* n
2. *fewer than* $n+1$
3. *at least* n
4. *more than* $n-1$
5. *at most* $n-1$
6. *fewer than* n
7. *at least* $n+1$
8. *more than* n

Conditions 1-4 are ones where the sentence is 'mathematically true' as it were, given the depicted scenario, i.e., true on an interpretation of *at least 3* as ≥ 3, etc. Conditions 5-8 are ones where the sentence is 'mathematically false'. Since subjects consistently rated the sentences in the 'mathematically false' condition as false, they can be ignored.

In this experiment, C&B found that their participants' truth judgments perfectly matched the 'mathematical' predictions: They were at ceiling (with sentences very nearly unanimously judged 'true') in the 'mathematically true' conditions, and at floor (nearly unanimously 'false') in the 'mathematically false' conditions. These results accord with Cohen and Krifka's intuition that the *at most* n sentence is true in a situation where there are n objects of the relevant type, regardless of who believes or knows what. In other words, it supports the idea that the inference is in fact truth-preserving.

So C&B's picture verification task results do not match Geurts et al.'s inference judgment task results (summarized above in (6)). What can explain this contrast? One imaginable hypothesis is that picture verification tasks are just completely impervious to impli-

catures. C&B's second experiment shows this not to be the case; picture verification tasks do pick up on some implicatures. In their second experiment, the stimuli involved the same pictures, but the pictures were paired with sentences featuring expressions depicting a value range whose boundary does not coincide with n:

1. *at most* $n + 1$
2. *fewer than* $n + 2$
3. *at least* $n - 1$
4. *more than* $n - 2$
5. *at most* $n - 2$
6. *fewer than* $n - 1$
7. *at least* $n + 2$
8. *more than* $n + 1$

Again, the first four were 'mathematically true' and the second four were 'mathematically false', and again, the second four were systematically judged as false by the informants. But in this case, there was one 'mathematically true' condition, namely *at most* $n+1$, where the sentences were judged as false at a significant rate (76%). A third experiment was carried out pitting *at most* n against *at most* $n + 1$ against each other directly, and again the *at most* $n + 1$ condition got a low rate of 'true' responses (44%), while *at most* n remained at ceiling.

So there is a particular difficulty that arises when the subject is looking at a picture of n objects and asked to judge whether it is true or false that there are *at most* $N + 1$ objects in the picture. This is supported by qualitative comments given by the participants (not reported by C&B). Among the comments that participants gave for such cases were the following:

- Looking at a picture of five Buddhas, asked to judge whether there are at most six, one participant wrote: "At most, there are 5," and marked it "false".
- Looking at a picture of three candles, asked to judge whether there are at most four, one participant wrote, "Technically true, but a very weird thing to say," and marked it "true".
- Looking at five mugs, asked to judge whether there are at most six, one participant wrote, "This one is hard. I'm marking it true, but it's super-weird."

Again, with respect to a picture containing n objects, it is unproblematic to judge a sentence with *at most* n as true (Experiment 1), but English speakers resist judging a corresponding sentence with *at most* $n + 1$ as true (Experiments 2 and 3).[2]

This pattern of results cannot be explained purely on the basis of ignorance implicatures, because there are other cases where an ignorance implicature arises and participants have no problem judging the sentence to be true. For example, *There are at least 4 butterflies* signals epistemic uncertainty with respect to the possibility that there are five butterflies, but participants nearly unanimously judge the sentence to be true even when it is clear exactly how many butterflies there are. Something beyond ignorance implicatures is needed for this case.

C&B explain this pattern with the help of the concept of *highlighting* in inquisitive semantics and a new Gricean maxim, the Maxim of Depictive Sincerity. The idea is that *at most* n highlights the possibility that there are n objects of the relevant kind, as depicted in

[2]Spychalska (2013) found this effect as well using sentences like 'At most three stars are red' and corresponding pictures.

Figure 4, for an example where exactly four objects of the relevant kind are pictured (e.g. four butterflies).

Figure 4: C&B's highlighting analysis

The red color on '4' marks that possibility as the actual one. The orange color indicates the highlighted possibility. For *at most five*, the highlighted possibility is distinct from the actual possibility, but for *at most four*, the highlighted possibility is the actual possibility. The Maxim of Depictive Sincerity requires that the speaker find the highlighted possibility epistemically accessible, so it is violated in the case of *at most five* but not in the case of *at most four*. The idea is that depictive sincerity implicatures are particularly strong, so strong that they can case participants to judge true sentences as false when they are violated.

Regarding methodology, C&B make the following conjecture. The picture-verification task methodology draws a line between two classes of implicatures: ignorance implicatures, which disappear in the picture-verification task, and depictive sincerity implicatures, which can be detected. In other words, picture scenario true/false judgement tasks can cut through certain types of pragmatic infelicity that complicate the interpretation of inference judgments, but even such true/false tasks are not impervious to particularly strong pragmatic requirements.

3 Towards a more direct comparison

Before C&B's methodological conjecture can be elevated to the status of a scientific finding, quite a bit more work needs to be done, as there were some potentially important differences between Geurts et al.'s paradigm and C&B's, besides truth judgments vs. validity judgments. C&B's participants were English speakers while Geurts et al.'s participants were Dutch speakers. The nature of the sentences was different; C&B used presentational *there* constructions (e.g. 'There are three bananas in the picture'), while Geurts et al. had the superlative modifier in object position (as in 'Berta drank three beers'). C&B's experiment was online, included pictures, and involved participants recruited via Mechanical

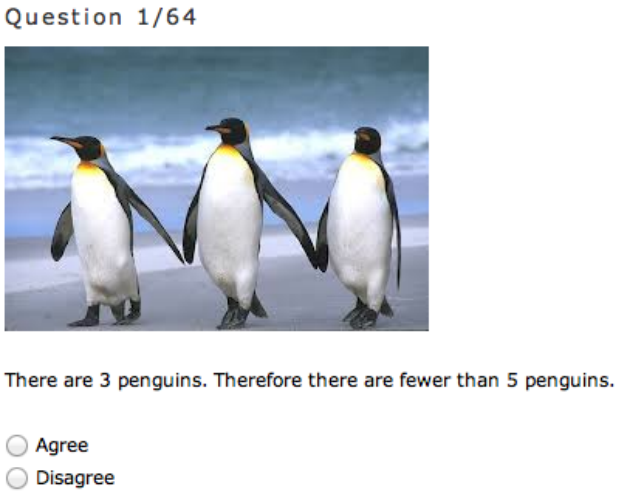


Figure 5: Example stimulus for validity judgment task (with pictures)

Turk. Geurts et al.'s participants were students who completed a written questionnaire not including pictures with paper and pencil. The question we investigated here was what happens if we eliminate these differences.

In service of a more controlled investigation of the effect of task, a validity judgment task using the stimuli from C&B's picture verification experiments was carried out. An example stimulus is shown in Figure 5. In one version of the experiment, the argument to be evaluated was accompanied by a picture, as in the picture verification task (Validity + Pictures). In the other version (Validity), there was no accompanying picture, as in Geurts et al.'s (2010) task. The stimuli in this condition are just as in Figure 5 except that no picture is shown. Varying whether there is an accompanying picture allows us to investigate whether the mere presence of a picture is responsible for the previously observed contrast between validity judgment tasks and picture verification taks. If so, then the version of the validity judgment task with a picture should yield similar results to the picture-verification task and the one without the picture should replicate the Geurts et al. (2010) pattern.

In total, four versions of the validity experiment were run. In addition to whether or not there was an accompanying picture, it was varied whether the modified numeral depicted a range ending on the numeral (as in C&B's Experiment 1), or off the numeral by one (as in C&B's Experiment 2). We will refer to these conditions as 'On Boundary' and 'Off Boundary', respectively. In all versions of the validity experiment, the arguments to be judged were of the form *There are* n *[nouns]. Therefore, there are* ___ *[nouns]*. In the true sentences of the 'On Boundary' condition, the blank was filled in *more than* $n-1$, *less than* $n+1$, *at least* n, or *at most* n. In the 'Off Boundary' condition, the blank was filled in by *more than* $n-2$, *less than* $n+2$, *at least* $n-1$, and *at most* $n+1$.

The results for all four experiments, alongside the results from C&B's picture verification experiments 1 and 2, are shown in Figure 6.[3] Visual inspection of the graphs shows

[3]Only the results for the 'mathematically true' stimuli are shown; the judgments for the 'mathematically false' stimuli were extremely close to 100% 'false' in all conditions.

that the pattern of responses turned out to be roughly the same across tasks. In particular, in the 'On Boundary' conditions depicted on the left, all responses are at ceiling, regardless of which modified numeral is used, in both variants of the validity judgment task as well as in C&B's picture verification task. However, the validity experiments did pick up on depictive sincerity implicatures, just like the picture verification experiment. This is shown by the graphs on the right, where the mean for *at most* $n + 1$ is consistently substantially lower than the others.

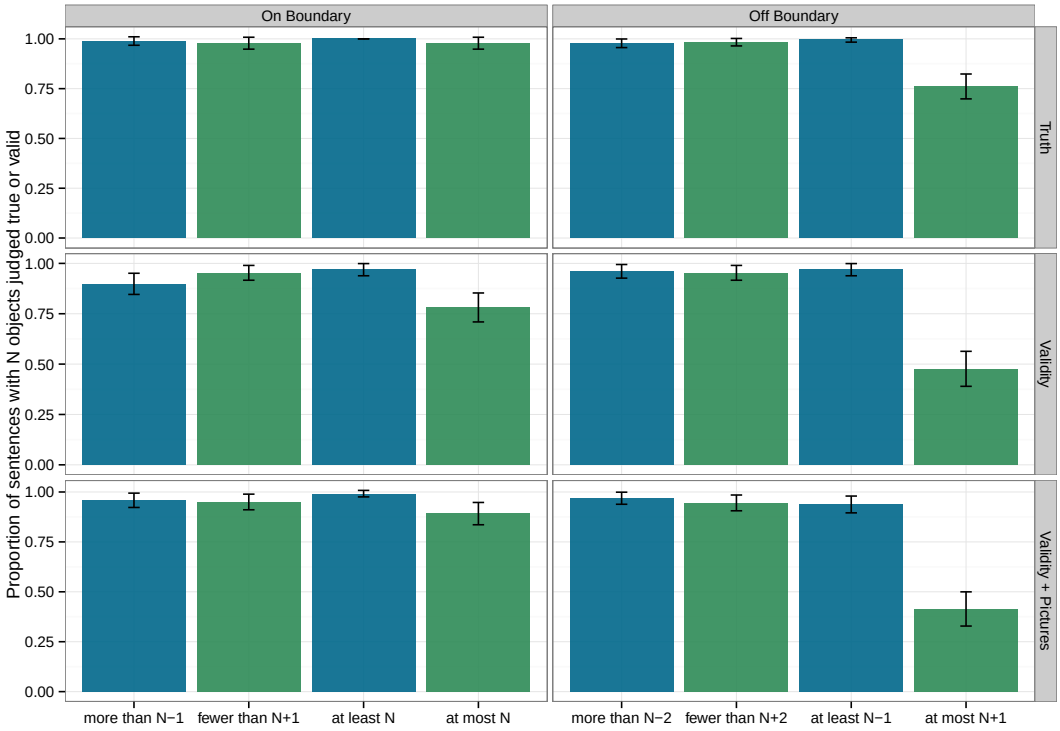


Figure 6: Results from picture verification ('truth') and validity experiments (picture verification results reported in Coppock & Brochhagen 2013a). The vertical axis of each graph shows the proportion of cases judged true or valid. Error bars show a 95% confidence interval.

These visual impressions are supported by the statistical analysis shown in Table 1, a mixed-effects regression model with random effects for subject and item, and fixed effects for the following four factors and their interactions.

- Modifier type (comparative vs. superlative)
- Upper- vs. lower-bounding (where *more than* and *at least* are lower-bounding and *fewer than* and *at most* are upper-bounding)
- 'On boundary' (e.g. *at most* n, as in C&B's Experiment 1) vs. 'off boundary (e.g. *at most* $n + 1$, as in C&B's Experiment 2)
- Task (picture verification vs. validity)

Presence vs. absence of pictures is not included in the model because it correlates very strongly with task (as the picture verification task always has a picture), and this factor is not significant either on its own or in combination with other factors for the dataset restricted

	Coeff.	Std. Err	Sig.
(Intercept)	0.98	(0.02)	***
modtype=sup	0.02	(0.03)	
bounding=upper	0.01	(0.03)	
cut=on	0.01	(0.04)	
task=validity	−0.01	(0.03)	
modtype=sup × bounding=upper	−0.24	(0.04)	***
modtype=sup × cut=on	−0.01	(0.04)	
bounding=upper × cut=on	−0.02	(0.04)	
modtype=sup × task=validity	−0.03	(0.03)	
bounding=upper × task=validity	−0.02	(0.03)	
cut=on × task=validity	−0.05	(0.05)	
modtype=sup × bounding=upper × cut=on	0.23	(0.06)	***
modtype=sup × bounding=upper × task=validity	−0.25	(0.05)	***
modtype=sup × cut=on × task=validity	0.07	(0.05)	
bounding=upper × cut=on × task=validity	0.06	(0.05)	
modtype=sup × bounding=upper × cut=on × task=validity	0.09	(0.08)	

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 1: Coefficients, standard errors, and significance levels for fixed effects in `lmer` model

to the validity judgments.

The model in Table 1 is constructed using the `lmer` function of `lme4` package in `R` with the formula:

```
result ~ modtype*bounding*cut*task + (1|subj) + (1|noun)
```

where `modtype` is modifier type, `bounding` refers to upper- vs. lower-bounding, `cut` refers to where the numerical description makes a cut between true and false, and `task` is either 'picture verification' or 'validity'. Significance levels are based on t-tests as estimated by the `lmerTest` package.

The table shows significant effects for three interaction factors.

1. First, *at most* is special, as shown by the significance of the factor 'modtype=sup × bounding=upper', which had a relatively large negative coefficent (so *at most* is generally difficult, even controlling for interactions with other factors).
2. Furthermore, *at most* $n + 1$ is different from *at most* n, as shown by the effect of the interaction factor 'modtype=sup × bounding=upper × cut=on'. The direction of this factor indicates that, as can be seen clearly in the graphs, *at most* $n + 1$ is harder than *at most* n. Note that the model includes an interaction with task, so this factor is not driven purely by the picture verification task; it also plays a role for validity judgments.
3. The effect of *at most* turned out to be more pronounced in the validity task, hence significance for the interaction factor 'modtype=sup × bounding=upper × task=validity'.

Crucially, there was no main effect of modifier type (comparative vs. superlative), and nor

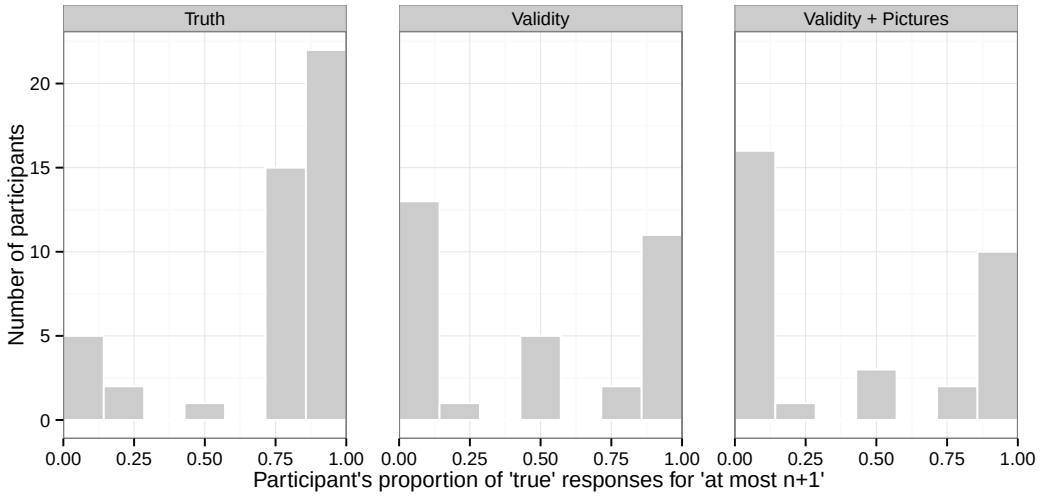


Figure 7: Histogram of responses for 'at most $n + 1$'

did this factor have substantially more of an effect in the validity task; there was *no* interaction between task and modifier type. This constitutes a failure to replicate Geurts et al. (2010), where acceptance rates for both *at least* n and *at most* n were substantially lower than for their comparative counterparts *more than* $n - 1$ and *fewer than* $n + 2$. This also goes against C&B's hypothesis that validity judgment tasks are more sensitive to ignorance implicatures than picture verification tasks.

Note that the validity judgment task using the Coppock & Brochhagen items was not completely immune to pragmatic oddity, however. It did pick up depictive sincerity violations. As in the picture verification task, the inference from *n* to *at most* $n + 1$ is accepted about half of the time. Inspection of the histograms in Figure 7 shows that this is the result of a bimodal distribution among the participants, where some consistently judge the relevant inferences as invalid, and some judge them as valid. So there appear to be two kinds of speakers: those that treat depictive sincerity violations as grounds for judging an inference to be invalid, and those that adhere to more 'mathematical' intuitions.[4]

4 Conclusion

The methodological conclusions we may tentatively draw from these investigations as follows. Validity judgment tasks may be more sensitive to ignorance implicatures than picture verification tasks under some conditions, but validity judgments do not robustly pick up on ignorance implicatures, so they cannot be relied upon for that, whether or not there is an accompanying picture. Validity judgments, like truth value judgments, *are* sensitive to depictive sincerity implicatures. However, there appear two classes of individuals: Those who treat depictive sincerity violations as grounds for invalidity, and those that adhere to more 'mathematical' intuitions.

[4]The distribution of responses in the picture verification task was not bimodal; this difference may be interesting to study further.

Much more work needs to be done to determine the conditions under which Geurts et al.'s (2010) findings replicate. Note that Cummins & Katsos (2010) *did* replicate Geurts et al.'s (2010) findings in a validity judgment task (called 'implication judgment task' there), using 15 native English speakers in Cambridge. The inference from *three* to *at least three* was accepted 62% of the time, whereas the inference from *three* to *more than two* was accepted 100% of the time. The inference from *three* to *at most three* was accepted 42% of the time, and the inference from *three* to *fewer than four* was accepted 84% of the time. These numbers roughly correspond to Geurts et al.'s (2010) findings. So the difference of language seems an unlikely culprit. It may have to do with the way the question is phrased, however. The experimental paradigm used there is described as follows (p. 289): "They were informed that they would see a series of pages, each with two sentences written on them, and that they should circle the answer 'yes' if the first sentence implied the second and 'no' if it did not." There are many additional possible explanations for the present failure to replicate, as there are many differences between this validity experiment and previous ones. The lack of effect may be due to the syntactic position in which the superlative modifier was places (pivot of an existential construction vs. object of a transitive verb), the way that the question was phrased, the mix of experimental items and fillers, or a difference in the sample of participants. These factors should be investigated systematically in future research.

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Resolving null and overt pronouns in Italian: An experimental investigation of syntax-semantics interactions

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Abstract

We provide evidence that null and overt pronouns in Italian, with grammar specific referential biases, are sensitive to verb semantics (i.e., implicit causality) and can be pushed to refer to either the subject or object, depending on the verb-bias. However, this sensitivity is also modulated by other factors. More specifically, we find that while verb effects influence null pronouns, these pronouns also show a modulation with grammatical role and sentence boundaries. Overt pronouns show an overall stronger sensitivity to verb semantics, than sentence boundaries. Ultimately, our study supports a more fine-grained analysis of pronoun resolution than the current theories of null and overt pronouns consider. Our findings fit with the idea that anaphor resolution is not determined by one constraint, but rather can be the result of the interaction of many constraints, that do not have to carry the same weight for all referential forms (i.e., Form-specific, multiple-constraint approach, Kaiser & Trueswell 2008).

1 Introduction

Research focusing on reference resolution, in particular pronoun resolution, in the past few decades has aimed to better understand how speakers and hearers produce and interpret pronouns. Pronouns (e.g. *she, he, it*) are semantically under-informative forms and must get their interpretation from the surrounding context. Research on pronoun resolution suggests that it is influenced by numerous factors. For example, some researchers note that pronouns tend to prefer antecedents in subject positions (e.g. Crawley, Stevenson, & Kleinman 1990, Gernsbacher & Hargreaves 1988), while others suggest that pronouns are resolved to antecedents occupying a matching argument position (e.g. Smyth 1994, Chambers & Smyth 1998). In recent years, Kehler (2002), Rohde and Kehler (2009), and others argue for an approach that focuses on the semantic coherence relations between clauses (Hobbs 1979, 1990, Kehler 2002, Kehler, Kertz, Rohde, & Elman 2008, Rohde 2008). This approach suggests that comprehenders' inferences about the relations between sentences play a crucial role in guiding reference resolution.

The current paper presents two psycholinguistic experiments investigating the influence of coherence relations on pronoun resolution in Italian. This paper has three main aims. Our first aim is to shed light on coherence effects on the production and interpretation of pronouns in a language with a more complex pronominal paradigm than

English. Crucially, much of the existing work on semantic effects has focused on English pronouns (e.g. Rohde & Kehler 2009), and it is not yet fully understood to what extent different pronoun forms (e.g. null, overt) in languages with richer anaphoric paradigms are influenced by semantic factors (but see Ueno & Kehler 2010 on Japanese, and Kaiser 2011 on German).

Our second aim is to investigate how within-sentence pronoun resolution differs from cross-sentential pronoun resolution. Current research on this issue is very limited. Existing work by Miltsakaki (2002, 2003) suggests that (i) within-sentence pronoun resolution is more sensitive to semantic and discourse factors such as verb semantics and connectives, whereas (ii) across-sentence pronoun resolution is more sensitive to syntactic factors such as subjecthood.

Our third main aim is to test Kaiser and Trueswell's (2008) claim, originally formulated on the basis of Finnish, that anaphor resolution is not determined by one constraint, but rather is the result of the interaction of multiple constraints, which can be weighted differently for different anaphoric forms. As will become clear over the course of this paper, our results from Italian are in line with this view. We argue in favor of a theory that can capture this differing sensitivity to effects of verb semantics and discourse structure for different types of referring expressions.

1.1 Coherence relations and implicit causality

Hobbs (1979) argues that pronoun interpretation is not an independent process but rather a side effect that falls out from general discourse level processing. Kehler (2002) extended work by Hobbs suggesting that comprehenders draw inferences about the coherence relations between sentences and interpret pronouns accordingly.

The question of how comprehenders infer what coherence relation holds between two clauses is an important one. The presence of connectives (e.g. *because, then, and, so, as a result*) plays a key role. In addition, semantic factors such as verb aspect (i.e., perfective vs. imperfective) and verb type (e.g. implicit causality) (e.g. Garvey & Caramazza 1974, Kehler 2002, Rohde 2008, Hartshorne & Snedeker 2012) also contribute. In particular, recent research on coherence relations and pronoun interpretation has demonstrated that coherence relations combined with a specific type of verb, implicit causality (IC) verbs, play a crucial role in determining coreference. In this paper, we will focus on implicit causality verbs.

The influence of implicit causality on pronoun resolution is a well-studied area in language comprehension. Researchers agree that implicit causality is a property of certain verbs, and it can bias pronoun resolution. For example, *annoyed* biases a subject interpretation (1a), whereas *blamed* biases an object interpretation (1b).

(1) a. Lisa annoyed Mary because she broke the vase (subject-biasing)
b. Lisa blamed Mary because she broke the vase (object-biasing).

IC verbs have inherent semantic information that brings with it an implicit understanding about who is likely to be the cause of the action expressed by the verb (Garvey & Caramazza 1974). This semantic information ultimately creates within people's minds

expectations about who is likely to be mentioned next. This is particularly apparent with ambiguous pronouns where the semantic properties of implicit causality verbs influence the interpretation of ambiguous pronouns. One of the first studies to investigate this is Garvey and Caramazza (1974) where subjects were given sentences with IC verbs and needed to provide continuations. People were more likely to use the ambiguous subject pronoun to refer back to the subject of the preceding clause with the IC verb biasing the subject. Garvey and Caramazza noted that some verbs bias the subject and others bias the object as the cause of the event (Garvey & Caramazza 1974). We will refer to these as NP1 verbs (subject-biasing, 1a) and NP2 verbs (object-biasing, 1b).

1.2 Connectives and pronoun interpretation

A number of researchers have been concerned with implicit causality, generally confirming the results from Garvey and Caramazza (1974), and Caramazza, Grober, Garvey, & Yates (1977) (e.g. Garnham, Traxler, Oakhill, & Gernsbacher 1996, Hartshorne & Snedecker 2012). In a study especially relevant for our work, Rohde (2008) explored the role of connectives and coherence relations with implicit causality verbs (see also McDonald & MacWhinney 1995). Most prior work on implicit causality verbs used stimuli that had an explanation relation, signaled by the connective 'because', between the clause with the IC verb and the subsequent clause, as shown in (1) above. Rohde tested whether next mention IC biases typically found after explicitly marked explanation relations (marked with *because)* also occur when two clauses stand in an explanation relation that is *not* marked with a *because* connective. In a sentence completion task that manipulated verb type (NP1/NP2/Non-IC) and connective type (*because/*full-stop), Rohde finds no significant difference between next mention biases in sentences with and without the connective *because* (2). In full-stop conditions, Rohde looked at just those trials where people produced explanation relations and found that IC verbs create a bias towards upcoming explanation relations, and are more likely to elicit explanation continuations in a full-stop condition. Without the 'because' connective, NP1 and NP2 biases are still observed with implicit causality verbs when looking at explanation relations. IC verbs show the expected NP1 and NP2 biases but only when they involved an explanation relation (which can occur with or without an explicit 'because' connective). Example from Rohde (2008).

(2) Mary infuriated$_{NP1}$/scolded$_{NP2}$ John./because…

Miltsakaki (2002, 2003) pursues the relationship between connective type (e.g. *because* versus a full-stop) and pronoun resolution/production. Based on the results of a sentence-completion experiment, Miltsakaki claims that subordinate clauses, like those in Rohde's *because* conditions (2), are not processed the same way as clauses separated by a full stop, and this ultimately affects pronoun resolution. According to Miltsakaki, when the pronoun and its antecedent are both in the same sentence (intra-sentential), pronouns are resolved according to the semantic focusing properties of verbs and connectives. She further suggests that when the pronoun and its antecedent are in different sentences (inter-sentential), pronouns are resolved according to structural salience, reflecting the

topicality of discourse entities. Miltsakaki proposes that a processing unit is defined as a matrix clause and all of its subordinate clauses, and that as a result, entities in subordinate clauses are less salient than entities in matrix clauses.[1]

While Miltsakaki did not specifically investigate IC verbs in her experiments, what is important to note here are the differences she observed when (i) a pronoun and its antecedent are in the same sentence vs. (ii) in different sentences. This asymmetry has implications for Rohde's study, discussed above. Rohde finds equally strong effects of implicit causality bias on next mention biases in both inter- and intra-sentential contexts (the full-stop and *because* conditions, (2)). This seems to be at odds with Miltsakaki's finding (using somewhat different structures) that pronoun interpretation in inter-sentential contexts shows stronger effects of subjecthood/topicality, whereas intra-sentential contexts show stronger effects of verb semantics. If IC biases were equally as strong in both inter – and intra- sentential sentences, than we would expect pronoun resolution to be strongly influenced by verb semantics, in both sentence structures. However, Miltsakaki's work shows that pronoun resolution differs between these two contexts. These divergent results highlight the importance of looking more closely at the potential differences between intra-sentential and inter-sentential pronoun resolution.

2 Previous work on null and overt pronouns

Most research on coherence relations and implicit causality has focused on English personal pronouns (*she, he*). However, many languages have a wider range of referring expressions for human entities, such as null and overt pronouns. In this paper, our focus is on Italian, which is well-suited for studying coherence relations and their impact on pronoun resolution: Italian has both null and overt subject pronouns, but prior work has not investigated effects of coherence on their resolution. In this section, we review existing psycholinguistic work on Italian null and overt pronouns.

The widespread view regarding the Italian pronominal system is that null pronouns typically refer to preverbal subjects, while overt pronouns typically refer to objects, and can signal a topic shift (3) (e.g. Carminati 2002, Belletti, Bennati, & Sorace 2007).

(3)

Mario$_i$	*ha*	*telefonato*	*a*	*Giovanni*$_j$	*quando*	*Ø*$_{i/?j}$/*lui*$_{?i/j}$
Mario	has	telephoned	to	Giovanni	when	*Ø*$_i$ /he
aveva	*appena*	*finito*	*di*	*mangiare*		
had	just	finished	of	eating		

'Mario has telephoned a Giovanni, when /he had just finished-eating.'

(example from Carminati 2002)

Carminati (2002) provides experimental work in the form of questionnaires and self-paced reading studies supporting the observation that Italian null pronouns prefer subject antecedents, and overt pronouns prefer object antecedents. Based on her results,

[1] Miltsakaki also extended her study to Greek, a language with null and overt subject pronouns. She found similar results to English: pronouns in subordinate clauses were more likely to be interpreted as referring to objects, while pronouns in full-stop conditions were more likely to be interpreted as referring to subject antecedents.

Carminati proposes a structural approach to subject pronoun processing in Italian, the *Position of Antecedent Hypothesis* (PAH), for intra-sentential anaphora: "The null pronoun prefers an antecedent in the Spec IP position, while the overt pronoun prefers an antecedent not in the Spec IP position" (Carminati 2002:57)

According to the PAH, pronoun resolution is determined by syntactic factors. Although Carminati does not discuss potential effects of semantic factors, the PAH does not explicitly rule them out. However, since the PAH is cast in terms of syntactic preferences, it does not easily lend itself to a semantics-based approach.

The PAH focuses on subject-position pronouns in intra-sentential configurations. Recent evidence looking at antecedent preferences in both anaphora and cataphora in Italian poses some challenges for the PAH, suggesting that a more fine-grained analysis to null and overt pronoun resolution may be needed. For example, Fedele and Kaiser (2014) looked at the interpretation of anaphora (4a) and cataphora (4b) in Italian and found that clause order has a significant impact.

(4) a. *Maria* *abbraccia* *Rita,* *mentre* *Ø /lei* *parla*
Maria hugs Rita, while Ø/she speaks
del *viaggio* *a* *Londra*
of-the trip to London
'Maria hugs Rita, while she talks about the trip to London.'

b. *Mentre* *Ø$_i$/lei* *parla* *del* *viaggio* *a* *Londra,*
while Ø/she speaks of-the trip to London
Maria *abbraccia* *Rita*
Maria hugs Rita
'While she talks about the trip to London, Maria hugs Rita.'

In the Fedele & Kaiser (2014) work, we found that when participants were asked questions probing the referent of the pronoun in sentences like (4a-b), null and overt pronouns show an asymmetry in pronoun preference depending on clause order. In cataphora sentences (4a), where the anaphor precedes its antecedent, both null and overt pronouns show a strong subject preference. In contrast, in anaphora sentences (4b), where the antecedent precedes the anaphor, null pronouns are nearly split between subject and object antecedents, and overt pronouns show a strong preference for object antecedents. We attribute these patterns to comprehenders being "impatient parsers" who actively try to resolve pronouns held in memory as soon as possible. As a consequence, in the cataphora condition where the subject is encountered before the object, comprehenders have a bias to link any pronoun to the subject, in order to 'get rid of' the cost of keeping an unresolved pronoun in memory. We suggest that this processing bias interacts with and seems to be stronger than the null and overt pronoun's default preferences for subject and object antecedents respectively. As a whole, this study suggests that a more fine-grained analysis of pronoun resolution, where different factors influence pronoun

resolution, is needed.[2]

3 Experiment 1: within-sentence pronoun interpretation and production

Experiment 1 used a sentence completion task to investigate whether Italian null and overt pronouns are sensitive to semantic effects in reference resolution. In particular, we wanted to test whether implicit causality verbs that have known biases towards the preceding subject or object (when followed by an explanation relation) can influence the interpretation of null and overt pronouns in the subsequent clause. We were interested to see if these pronouns are more sensitive to discourse-level processing of coherence relations, allowing for greater flexibility in their antecedent preferences, or if are restricted to picking up antecedents in specific positions, as argued by Carminati (2002).

3.1 Method, materials and design

A total of 36 native speakers of Italian participated in a sentence-completion task conducted online using Qualtrics, a web-based software. Participants saw sentences in all conditions and were instructed to provide natural sounding continuations to the provided context sentence.

We manipulated: (i) verb type (implicit causality verbs biasing NP1 vs. NP2), and (ii) the nature of the prompt type people saw at the start of the next clause (null pronoun/overt pronoun),[3] for a total of 6 conditions (5). In all conditions, the clauses were connected by *perché* 'because', maintaining an explanation relation in all critical items. In the overt conditions, the connective was followed by the overt pronoun *lui/lei* ('he/she') followed by a third-person form of the auxiliary *avere* 'to have'. In the null pronoun conditions the connective was followed by a third-person form of the auxiliary *avere* 'to have', which allowed us to signal the presence of the null pronoun.

(5) a. *Lo student ha deluso$_{NP1}$/ criticato$_{NP2}$ lo chef perché lui ha…*
the student has disappointed criticized the chef because *he has…*
'*The student has disappointed$_{NP1}$/criticized$_{NP2}$ the chef because he has…*'
[overt]

b. *Lo student ha deluso$_{NP1}$/ criticato$_{NP2}$ lo chef perché Ø ha…*
the student has disappointed criticized the chef because Ø *has…*
'*The student has disappointed$_{NP1}$ / criticized$_{NP2}$ the chef because has…*' [null]

[2] Our studies have focused on Italian. However, it seems that Romance languages may differ from each other. Existing studies have obtained different results for referential biases for different languages, and in some cases different results even for the same language. See: on Spanish, Runner & Ibarra (submitted), Alonso-Ovalle, Fernández-Solera, Frazier, & Clifton 2002, Filiaci 2010, Filiaci, Sorace, & Carreiras 2013, de la Fuente & Hemforth 2013, Jegerski, VanPatten, & Keating 2011, on Catalan, Mayol & Clark 2010.

[3] We also included a no-prompt condition where the sentence ended in a connective. We included this condition so that people were able to freely choose what kind of referring expression to use. The results from the no-prompt condition are largely in line with the prompt results, and pattern the same. For the purposes of this paper, and due to space limitation, we will not be discussing the no-prompt condition since it is not central to our main aims.

The two potential referents always matched in gender (signaled by the articles in Italian) and gender was balanced across items (12 female, 12 male). Thus, neither null nor overt pronouns disambiguated between potential referents based on gender. A total of 24 stimuli had context sentences with either NP1 or NP2 verbs (12 NP1, 12 NP2).

The implicit causality verbs with NP1 and NP2 biases were chosen based on Hartshorne and Snedeker's (2012) detailed study of implicit causality verbs and pronoun interpretation in English, and Goikoetxea, Pascual, and Acha's (2008) investigation of implicit casualty verbs in Spanish. We primarily based our NP1 and NP2 verbs on Goikoetxea *et al.*'s characterization of NP1 and NP2 verbs; Italian and Spanish are closely related Romance languages, and share similar argument structures, thus we assumed that Goikoetxea *et al.*'s taxonomy is also relevant for Italian. To further ensure that our chosen verbs were clearly NP1- or NP2-biased, we cross-referenced the verbs we chose from Goikoetxea *et al.* with Hartshorne and Snedeker's (2012) verb-bias taxonomy for English. We only chose NP1 and NP2 verbs that had an 80% or higher bias for subject preference or object preference, respectively, in both English and Spanish.

Fillers included sentences similar in structure to target stimuli (a context sentence followed by a connective). Fillers included a range of connectives, such as *mentre* 'while', *anche se* 'even so' and *quando* 'when'. They also included a range of verbs (both non-IC and IC verbs), but did not repeat any verbs from the targets.

A total of 24 experimental stimuli, each in one of four conditions, were distributed among 3 lists in a Latin Square design. Verb type was manipulated between items. 30 fillers separated experimental stimuli. Participants were randomly assigned to each list and no participant saw any item in more than one condition. Participants' continuations in the prompt condition were analyzed in terms of what the given pronoun referred to – the preceding subject, the preceding object, other, or unclear.[4]

3.2 Predictions

The *grammatical function view*, exemplified by Carminati's PAH (2002), predicts that null pronouns will consistently prefer subject antecedents, and overt pronouns will prefer object antecedents. If we apply this view directly to the current study, then regardless of whether the IC verb biases NP1 (subject) or NP2 (object), we expect to see null pronouns referring to subjects and overt pronouns referring to objects.

In contrast, the (strong) *verb semantics view* predicts that in the null and overt conditions, verb semantics bias pronoun interpretation, ignoring grammatical function. This means that NP1 verbs should result in both null and overt pronouns being interpreted as referring to the preceding subject antecedent, and NP2 verbs should result in null and overt pronouns referring to the preceding object antecedent.

A third alternative is that both grammatical function and verb semantics play a role; we will refer to this as the *interactive view*. If both factors contribute, they may differ in how influential they are relative to each other and/or relative to the anaphoric form in

[4] Sample continuation for NP1 verb:
La cantante ha annoiato la segretaria perché ⦸ ha… cantato una canzone noiosa
The singer has annoyed the secretary because ⦸ has… sang a song boring
"The singer annoyed the secretary because she sang a boring song."

question. Let us first consider null pronouns. We may find that (i) null pronouns show a subject preference, but that this preference is modulated by verb semantics (if the subject preference is weighted more than the verb effects). Alternatively, we may find (ii) the interpretation of null pronouns is largely determined by verb semantics, with modulating effects of subjecthood (if the verb effects are weighted more than the subject preference). Turning now to the overt pronoun, we may see that (i) overt pronouns show an object preference but that this preference is modulated by verb semantics (if the object preference is weighted more than the verb effects). On the other hand, we may find (ii) the interpretation of overt pronouns is primarily determined by verb semantics, with some effects of referring to the object (if the verb effects are weighted more than the object preference).

3.3 Results

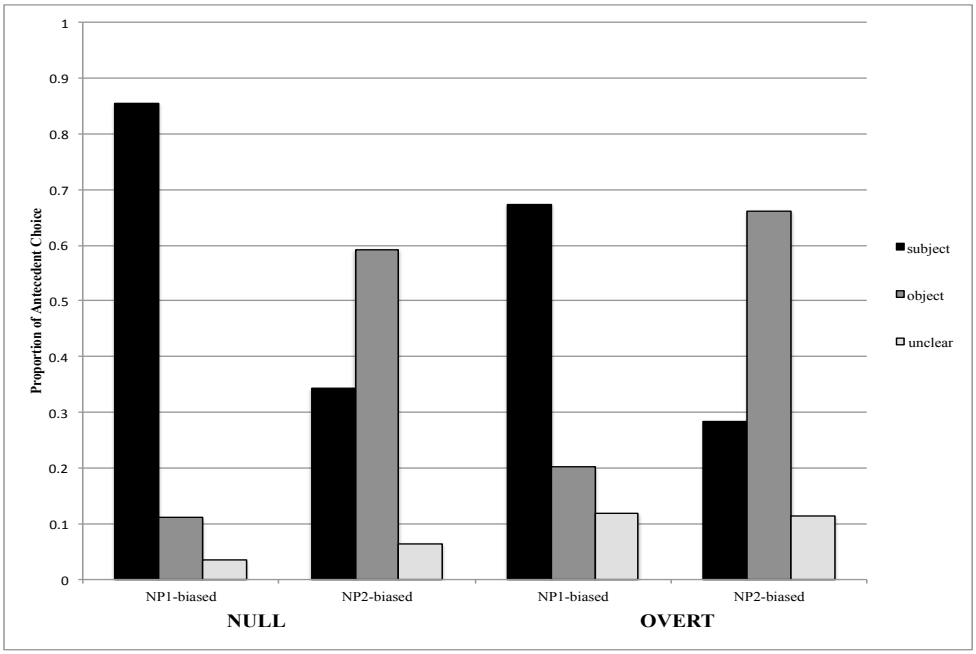

Figure 1: Proportion of Antecedent choices for null and overt pronouns.[5]

Let us first consider the prompt conditions with ***null pronouns***. When participants saw a sentence with an NP1 bias verb followed by a null pronoun (5b), they mostly interpreted the null pronoun as referring to the subject (85.5%, Figure 1). However, when the verb was NP2 biased, null pronouns no longer showed a subject bias: participants only interpreted the null pronoun as referring to the preceding subject in 32.2% of the cases (Figure 1). This already goes against the predictions of the *grammatical function view*,

[5] Some continuations were coded as "unclear" and this was 5% of the data. This makes up a small portion of the data and do not influence the overall trends.

and shows that the widespread view that null pronouns prefer the preceding subject does not hold with NP2 bias verbs. We see here that when verb semantics is taken into account, they can "override" these preferences and influence pronoun resolution.

For ***overt pronouns***, we see similar trends. When given an overt pronoun after an NP1 bias verb, participants mostly use the overt pronoun to refer to the preceding subject (67.3% subjects vs. 20% objects). After an NP2 bias verb, overt pronouns tend to refer to object antecedents (66.6% objects vs. 33.3% subjects, Figure 1). In essence, just like with null pronouns, people's interpretation of overt pronouns is influenced by verb type.

To test the strength of these patterns for the prompt conditions statistically, we used a mixed-effects logistic regression model to analyze the proportion of subject and object antecedent continuations as a function of the verb type (NP1 vs. NP2) and form (null vs. overt). Participant and item were included as random effects.[6] A mixed effects regression model was used because of the categorical nature of the data (see e.g. Jaeger 2008 for discussion).

***Testing for verb effects with null pronouns*:** When provided a null pronoun prompt, participants' continuations reveal a significant difference for subject and object preference for NP1 and NP2 verbs. We looked separately at the proportion of subject continuations and the proportion of object continuations with null pronouns. The rate of subject continuations shows a significant effect of verb type (β = -3.7089, Wald Z = -5092, p<.001): Null pronouns exhibit a clearer (verb-compatible) subject bias with NP1 verbs than with NP2 verbs. When we look at the rate of object continuations, we also find a significant effect of verb type (β = 4.2767, Wald Z = 4.809, p <.001): Null pronouns have a clearer (verb-compatible) object bias with NP2 verbs than with NP1 verbs.

We see for null pronouns that verb semantics is important for interpretation: null pronouns have a higher rate of verb bias compatible antecedent choices for both NP1 and NP2 verbs. However, null pronouns also show an effect of grammatical role: null pronouns have a higher rate of verb bias compatible choices when the verb bias compatible antecedent is a subject (i.e., subject antecedent with NP1 verbs), than with object antecedents with NP2 verbs (by subjects, $t_1(35) = 1.9898$, $p = .05$, but not by items, $t_2(8) = .9632$, $p = .36$).

In terms of our predictions, the observed trends are pointing to the *interactive view*, where we see a subject preference modulated by verb semantics. A pure *grammatical function view* or a pure *verb semantics view* isn't sufficient to account for the data.

Testing for verb effects with overt pronouns: When provided an overt pronoun prompt, participants' continuations show that overt pronouns also reveal a *significant* difference for subject and object preferences for NP1 and NP2 verbs. As with null pronouns, we looked separately at the proportion of subject continuations and the proportion of object continuations with overt pronouns. The rate of subject continuations shows a significant effect of verb type (β = -2.7370, Wald Z = -4.755, p<.001): Overt

[6] We arrived at our random effects structure by following Jaeger using model comparison. We started with fully crossed and fully specified random effects, and then tested to see if the model converges, and reduced random effects until the model converged starting with item effects. We used model comparison to test each random effect and included those that significantly contributed to the model. All models contained random intercepts for subjects and items.

pronouns exhibit a clearer (verb-compatible) subject bias with NP1 verbs than with NP2 verbs. When we look at the rate of object continuations, we also find a significant effect of verb type (β = 3.0948, Wald Z = 5.540, p <.001): Overt pronouns have a clearer (verb-compatible) object bias with NP2 verbs than with NP1 verbs (NP1.

Similar to null pronouns, we see that verb semantics also have a significant effect on antecedent preferences for overt pronouns. However, unlike null pronouns, overt pronouns do not show significant effects of grammatical role. In other words, the strength of the verb-compatible object bias after NP2 verbs does not differ from the strength of the verb-compatible subject bias after NP1 verbs (t_1(35) = 1.3929, p = .1724, t_2(8) = .4829, p = .6396.). In terms of our predictions, the observed trends are pointing to the *verb-semantics view* for overt pronouns, where verb semantics largely determine antecedent choices.

Now, having tested for effects of verb type separately for null and overt pronouns, we look at the data from a different angle, by assessing antecedent choices separately for subject and object antecedents. We looked separately at how verb effects and pronoun form modulate the rate of subject antecedents choices and the rate of object antecedent choices.

Proportion of subject choices: The overall proportion of subject choices shows a significant effect of verb type: β = 3.4586, Wald Z = 5.295, p <.001. This means that whether or not a comprehender chooses a subject antecedent is affected by verb type. We also found a significant effect of pronoun form: β =1.6782, Wald Z = 5.514, p <.001, where subject antecedent choices are also modulated by the form of the pronoun. Finally, we see a significant interaction (verb type X form): β = 1.5496, Wald Z = 2.384, p <.0171: verb type influences the proportion of subject antecedent choices, and this is modulated through pronoun form. We saw above that NP1 verbs have a larger number of subject antecedents, and null subjects are more likely to pick a subject antecedent than an overt pronoun.

***Proportion of object choices*:** The patterns observed for object choices are largely in line with what we saw for subject choices (recall that some continuations were unclear, so the rate of subject and object choices are not perfect inverses of one another). The overall rate of object choices shows a significant effect of verb type: β = -3.5491, Wald Z = -6.515, p <.001, meaning the choice of an object antecedent is influenced by NP1 and NP2 verbs. There is also a significant effect of pronoun form: β = -.08159, Wald Z = -3.072, p = .002, where form of the pronoun, null or overt, affects the choice of an object antecedent. We found no significant interaction (verb type X form): β = -.05521, Wald Z = -1.035, p =.3.

4 Discussion: Experiment 1

This experiment investigated whether Italian null and overt pronouns are sensitive to semantic effects in reference resolution in an intra-sentential context, where the pronoun and its potential antecedent are in the same sentence. We considered three possible outcomes (see section 3.2). The null pronoun results support our third prediction, the *interactive view*, where null pronouns are sensitive to both grammatical role and verb semantics. In contrast, we see a different picture emerge for overt pronouns supporting

the *verb semantics view*. It is commonly thought that Italian null pronouns typically prefer subject antecedents (e.g. Carminati 2002, Belletti *et al.* 2007, Filiaci *et al*. 2013). However, we see here that this tendency can be influenced by verb semantics, where NP2-biased implicit causality verbs can push a null pronoun to prefer object antecedents, seemingly violating its grammatical preference for subjects. We also see corresponding verb effects with overt pronouns: Participants interpret overt pronouns as referring to either subject or object antecedents, depending on the verb's bias. However, with null pronouns, we still see influences from grammatical function: null subject antecedent preferences are clearer after NP1 biased verbs, whereas overt pronouns do not show a clearer object antecedent preference after NP2 biased verbs. Our results show that different pronoun forms are sensitive to different factors and verb semantics play an important role, ultimately influencing Italian null and overt pronoun preferences.

5 Experiment 2: cross-sentential pronoun interpretation and production

Experiment 1 investigated effects of verb semantics on null and overt pronoun resolution in intra-sentential contexts, where the pronoun and its antecedent are in the same sentence (albeit in different clauses). As discussed in the introduction, there is debate regarding the question of whether pronoun resolution patterns are different in intra-sentential and inter-sentential contexts. In particular, building on work by Miltsakaki (2002, 2003) leads to the prediction that verb effects will be weaker across sentences than within sentences, whereas the results of Rohde (2008) lead us to expect verb effects to be equally strong in both contexts. To shed light on this debate, in Experiment 2 we test how verb semantics influences the interpretation of overt and null pronouns in Italian in inter-sentential contexts, where the pronoun and its potential antecedents are in different sentences.

5.1 Method, materials and design

The method for this sentence completion experiment was the same as Experiment 1. The materials and design were the same as Experiment 1, except now we had a full stop separating the clauses, instead of the connective *because*. We again manipulated (i) verb type (NP1 biased vs. NP2 biased) and (ii) prompt type (null pronoun / overt pronoun)[7], for a total of 6 conditions (6).

(6) a.

Lo	*studente*	*ha*	*deluso*$_{NP1}$/	*criticato*$_{NP2}$	*lo*	*chef*
the	student	has	disappointed	criticized	the	chef
.	*lui*	*ha…*				
.	he	has…				

'The student has disappointedNP1 / criticizedNP2 the chef. He has…' [overt]

b.

Lo	*studente*	*ha*	*deluso*$_{NP1}$/	*criticato*$_{NP2}$	*lo*	*chef*
the	student	has	disappointed	criticized	the	chef
.	*x Ø*	*ha…*				

[7] Similar to Experiment 1, we also included a no prompt condition, but restrict our analyses to the prompt conditions.

. *x* Ø has…
'The student has disappointed NP1 / criticized NP2 the chef. Has…' [null]

Participants' continuations were analyzed similarly to Experiment 1. In the prompt condition, continuations were analyzed in terms of what the given pronoun referred to – the preceding subject, the preceding object, other, or unclear.[8]

5.2 Predictions

Miltsakaki (2002, 2003) predicts sentence boundaries have an effect on pronoun interpretation. For her, intra-sentential clauses (within-sentence) are processed as one unit, and issues of verb semantics influence pronoun interpretation. In contrast, inter-sentential sentences (across-sentences) are processed as different units and therefore pronouns are more influenced by other factors, such as topicality. Applying this to our current study, *our first view* predicts that inter-sentence pronoun resolution patterns the same as intra-sentence pronoun resolution. In other words, the verb effects we found in Experiment 1 will not translate inter-sententially (across-clauses), and null and overt pronouns will not be influenced by verb semantics. Instead, in line with Miltsakaki's claims, we would predict that issues of grammatical role might be stronger inter-sententially (i.e., null pronouns referring to subject antecedents, overt pronouns referring to object antecedents).

In contrast, *our second view* predicts that inter-sentence pronoun resolution is less sensitive to verb effects than intra-sentence pronoun resolution. If sentence boundaries do not matter for pronoun interpretation, we predict that comprehenders will show similar verb effects in Experiment 2 as in Experiment 1 – in other words, we expect that verb biases will influence null and overt pronouns will show the same kinds of patterns as we saw in Experiment 1.

5.3 Results

To be maximally comparable to Experiment 1, where *because* forced explanation relations, we focus on continuations with *explanation* relations, which are the most frequent.[9]

[8] Sample continuation for NP2 verb, across sentences:
Il poliziotto$_i$ *ha ammirato il sarto*$_j$. *Lui*$_i$ *ha cucito delle divise ottime*
The policeman has admired the tailor. He has stitched of-the uniforms excellent
'The policeman admired the tailor. He stitched excellent uniforms.'

[9] The total percentage *explanation* relations produced for the prompt condition was 60 %. The other coherence relations produced were *elaborations* (4.1% of data), *occasion* relations (3.1% of data), and *result* relations (8.1% of data).

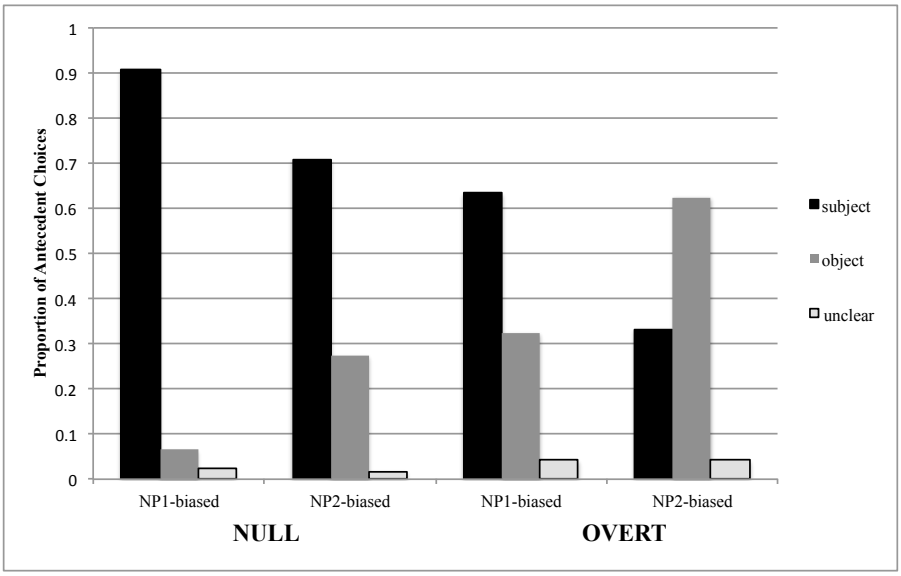

Figure 2: Proportion of Antecedent choices for null and overt pronouns.

As can be seen in Figure 2, null and overt pronouns pattern quite differently from each other. Unlike in Experiment 1, we now see an asymmetry emerge between null and overt pronouns: *Null pronouns* overwhelming elicit subject continuations, regardless of the verb (NP1: 90.8% subject, NP2: 70.8% subject). However, similar to Experiment 1, overt pronouns show a flip from object to subject bias based on verb bias: NP1 verbs elicit move subject continuations (65.8% subject), and N2 verbs have more object continuations (62.5%). So, in an inter-sentential context, participants' continuations for null pronouns no longer exhibit the clear verb bias effects found in Experiment 1. Overt pronouns still show the same verb bias effect as in Experiment 1.

For the prompt conditions, we used the same analysis procedure as for Experiment 1: mixed-effect logistic regression. We analyzed the proportion of subject and object antecedent preference biases, and the proportion of subject and object antecedent continuations. In other words, the rate at which null and overt pronouns prefer subject and object antecedents, and the rate at which subject and object antecedents are preferred overall.

***Testing for verb effects with null pronouns*:** When participants were provided a null pronoun prompt, both the rate of subject continuations and the rate of object continuations show a significant verb effect (subject continuations: $\beta = -3.5648$, Wald $Z = -4.140$, $p<.001$; object continuations:$\beta = 3.5647$, Wald $Z = 4.140$, $p < .001$). Thus, the rate of subject continuations is significantly higher after NP1 verbs than NP2 verbs, and the rate of object continuations is significantly higher after NP2 verbs than after NP1 verbs. To further analyze the null pronoun data, we conducted a one-sample t-test which reveals that the rate of subject antecedent continuations triggered by NP2 verbs is higher than chance: $t_1(29)$: 3.6985, $p<.004$, $t_2(11)$: 2.5975, $p<.0124$. This means that null pronouns show a stronger preference for subject antecedents, even with NP2 biasing verbs.

In sum, null pronouns in inter-sentential contexts exhibit (i) a significant sensitivity to verb type, as well as (ii) a significant preference for subjects over objects with both NP1 and NP2 verbs. This second point clearly contrasts with what we found in Experiment 1, with intra-sentential contexts. To directly test the patterns we observed for null pronouns in the two experiments, we conducted further regression analyses that included experiment (Experiment 1 vs. Experiment 2) as a factor. We find a significant effect of experiment for null pronouns for the rate of subject continuations (β = -1.1440, Wald Z = -4.014, p <.001), and for the rate of object continuations (β = 1.0288, Wald Z -= 3.324, p = .00887). Thus, verb semantics have a significantly weaker effect when a null pronoun, is separated from its antecedent by a sentence boundary than when they are in the same sentence. This is in line with Miltsakaki's claims.

Testing for verb effects with overt pronouns: When participants were provided an overt pronoun prompt, both the rate of subject continuations and the rate of object continuations show a significant verb effect (subject continuations: β = -2.424, Wald Z = -4.570, p<.001; object continuations: β = 2.9001, Wald Z = 5.4.245, p<.001). Thus, the rate of subject continuations is significantly higher after NP1 verbs than NP2 verbs, and the rate of object continuations is significantly higher after NP2 verbs than after NP1 verbs. Thus, overt pronouns in Experiment 2 pattern like overt pronouns in intra-sentential contexts in Experiment 1: Overt pronouns are influenced by verb type, regardless of the presence/absence of a clause boundary separating the pronoun from its antecedent.

These parallels are confirmed by additional analyses that we conducted directly comparing the rate of object continuations triggered by overt pronoun prompts in Experiment 1 vs. Experiment 2, which show that there is no significant effect of experiment on the rate of object continuations (β = -.2167, Wald Z = -1.029, p = .303), or the rate of subject continuations (β = -.2053, Wald Z = -.989, p = .323). In other words, the rate of object and subject continuations in Experiment 1 and Experiment 2 do not differ significantly – suggesting that the strength of verb effects is equally strong in both experiments. This is in striking contrast to what we found for null pronouns. We discuss this asymmetry in more depth below.

Now, having tested for effects of verb type separately for null and overt pronouns, we now assess antecedent choices separately for subject and object antecedents. We looked separately at the rate of subject choices and the rate of object choices to see how verb effects and pronoun form modulate antecedent choices.

***Proportion of subject choices*:** The proportion of subject choices shows a significant effect of verb type: β = 1.6344, Wald Z = 6.257, p <.001. This means that comprehenders choose a subject antecedent at a higher rate for NP1 biased verbs than NP2. We also find a significant effect of form: β = 1.9978, Wald Z = 7.716, p = <.001, where subject antecedent choices are modulated by pronoun form; null pronouns select a subject antecedent significantly more so than overt pronouns. We do not find a significant interaction: β = .1292, Wald Z = .257, p = .797.

***Proportion of object choices*:** The proportion of object choices shows a similar patter to subject choices. There was a significant effect of verb type: β = -2.6401, Wald Z = -3.756, p <.000173, where object antecedents show a higher rate with NP2 verbs. There is also a significant effect of pronoun form: β = 2.2074, Wald Z = 2.801, p = .005, meaning

the form of the pronoun, null or overt, has a significant effect on the rate of object antecedents. Here, overt pronouns refer to object antecedents more strongly than null pronouns. We find no interaction: $\beta = 2.2074$, Wald $Z = 2.801$, $p = .0791$.

6 Discussion: Experiment 2

In contrast to Experiment 1which focuses on intra-sentential (within-sentence) contexts, Experiment 2 investigated inter-sentential (across-sentence) contexts. An interesting pattern emerges with Experiment 2: null and overt pronouns show an asymmetry in terms of how sensitive they are to verb effects, in comparison to Experiment 1. In Experiment 2, null pronouns are less sensitive to verb type than in Experiment 1. In Experiment 1, in intra-clausal contexts, null pronouns showed a strong influence of verb semantics, but in Experiment 2, this effect of verb type is significantly weaker, and indeed we see a significant subject preference emerging regardless of verb type. Therefore, for the null pronoun, we see that pronouns being separated from their antecedents by sentence boundaries have a significant impact on pronoun interpretation. This supports our first prediction. Overt pronouns, however, demonstrate a verb effect, in both experiments: overt pronouns refer to subjects with NP1 verbs, and objects with NP2 verbs. This shows that for overt pronouns, the presence/absence of a sentence boundary does not matter significantly, supporting our second prediction.

7 General discussion

The current research investigated the sensitivity of Italian null and overt pronouns to verb biases and the presence/absence of sentence boundaries, to better understand the impact of discourse factors on subject pronoun interpretation. We had three main aims: (1) To shed light on coherence effects on the production and interpretation of pronouns in a language with a more complex pronoun paradigm than English; (2) To investigate how within-sentence pronoun resolution differs from cross-sentential pronoun resolution; and (3) To test Kaiser and Trueswell's (2008) claim that anaphor resolution is not determined by one constraint, but rather is the result of the interaction of multiple constraints, which can be weighted differently for different anaphoric forms. We will address each aim individually.

7.1 Verb effects on the interpretation of null and overt pronouns

The experiments in this paper investigated whether Italian null and overt pronouns are sensitive to semantic effects in reference resolution. Carminati (2002) states that null and overt pronouns have specific antecedent preferences: null pronouns prefer antecedents in Spec IP, and overt pronouns prefer antecedents lower in the clause, typically objects (see section 3.2 for Exp. 1 predictions, and section 5.2 for Exp. 2). The results provide the first reported evidence that null and overt subject pronouns in Italian are sensitive to verb biases, and shows that their interpretation does not clearly follow a division of labor as suggested by the Position of Antecedent Hypothesis (PAH).

The sentence completion study in Experiment 1, with the clauses separated by the connective 'because', revealed that both null and overt pronouns are influenced by implicit causality verbs: When the preceding clause has an NP1-biased verb, both null and overt pronouns in the subsequent clause show a subject bias, and when the preceding clause has an NP2-biased verb, both forms show an object bias. In Experiment 2, with the clauses separated by a full-stop, we also see that null and overt pronouns are sensitive to verb-biases.

We find that once verb semantics are taken into account, the general tendency for null pronouns to prefer subject antecedents, and overt pronouns to prefer object antecedents can be overridden by verb semantics. This is in line with recent research from Mayol and Clark (2010) on Catalan (see footnote 2, section 2), another Romance language: Catalan null and overt subject pronouns, if context biases are strong enough, can be processed without difficulty, even if a null pronoun is being used to refer to an object. We find similar results with Italian: implicit causality verbs provide strong contextual biases about the agent of cause in a specific context, subsequently biasing pronouns to specific antecedents.

Furthermore, these results are in line with Rohde (2008), who suggests that implicit causality cues in English emerge with explanation relations ('because' relations), shifting comprehenders' expectations about where the discourse is going. We see this in both experiments also for Italian null and overt pronouns. The grammatical tendency of null and overt pronouns to prefer subject and object antecedents, respectively, is ultimately weakened by verb semantics. This suggests that Italian null and overt pronoun resolution reflects deeper discourse-level biases, not accounted for in previous studies (i.e., Carminati's 2002 PAH).

However, in both experiments we also see that these verb effects are modulated by other factors, especially for null pronouns. In Experiment 1, verb effects for the null pronoun are modulated by the grammatical role of the antecedent, indicating that both verb semantics and grammatical role biases guide the interpretation of null and overt pronouns in Italian, but do not influence both forms equally (see also section 7.2 below). Ultimately, these results our view where both verb biases and grammatical function can influence pronoun interpretation, but may differ in how influential they are. In Experiment 2 (discussed also below in 7.2), we also see how null and overt pronoun resolution differs in inter vs. intra sentences.

7.2 Inter vs. intra sentential pronoun resolution

Previous studies on null and overt pronouns seem to present conflicting results on null and overt pronoun interpretation (see footnote 2 in section 2). Some of the divergent results of existing work may be due to the fact that some researchers look at intra-sentential environments (e.g. Carminati 2002, Filiaci 2010, Mayol & Clark 2010), while others looked at inter-sentential environments (e.g. Alonson-Ovalle *et al.* 2002). Experiment 2 aimed to shed light on this more complex question, looking at effects of discourse organization on the interpretation of pronouns (Miltsakaki 2002, 2003). Our aim for Experiment 2 was to investigate how intra-sentential (within-sentence) pronoun resolution differs from inter-sentential (across-sentence) pronoun resolution. In this

experiment, we had two main predictions: (i) sentence boundaries have an effect on pronoun interpretation, and (ii) sentence boundaries do not matter for pronoun interpretation, and we will see verb effects within and across sentences. The results revealed an interesting asymmetry between null and overt pronouns: null pronouns referred to subject antecedents, regardless of verb bias, supporting our first view, while overt pronouns show an influence of verb-bias on antecedent preference across sentences, similar to Experiment 1, supporting our second view.

When participants are given null and overt pronouns after a full stop, for *null* pronouns we see a very strong subject bias emerge for both NP1 and NP2 verbs, regardless of verb type. In comparison to Experiment 1, where we saw a strong shift in comprehenders' continuations depending on verb type, in Experiment 2, we see this verb effect weaken. We find that pronouns and antecedents being in different sentences have a strong impact on null pronoun interpretation: in inter-sentential contexts (across-sentence, Experiment 2), the grammatical function of null pronouns to prefer subject antecedents is stronger than verb semantics. For overt pronouns, we see just the opposite: overt pronouns are still strongly influenced by verb semantics inter-sententially, just like in Experiment 1 (intra-sententially).

The asymmetry that emerges between null and overt pronouns shows that these pronouns have differing sensitivities to verb semantics and being separated from their antecedents by sentence boundaries. Miltsakaki (2002, 2003) hypothesizes that pronoun resolution differs intra-sententially versus inter-sententially, in English and Greek. We find strong evidence in the current study that this is also the case for Italian null and overt pronouns. Our results point to differing sensitivities to sentence boundaries for null and overt pronouns. Pronouns and antecedents being in different sentences matters more strongly for null pronouns, whereas verb semantics is the primary concern for overt pronouns.

7.3 Form specific multiple constraints approach

In both Experiment 1 and Experiment 2, we find an interesting asymmetry emerge between null and overt pronoun interpretation. Null pronouns are more sensitive to sentence boundaries, and overt pronouns are more sensitive to verb effects. Previous research on the processing of pronouns in other languages (e.g. Finnish), suggests that anaphoric pronouns vary in their sensitivity to different types of information (Kaiser & Trueswell 2008); languages have different anaphoric expressions that may be sensitive to a different extent to several factors. Under this view, one type of anaphor, such as a null pronoun, can be primarily sensitive to one type of constraint, while another anaphoric form, like an overt pronoun, can be primarily sensitive to a different constraint. Ueno and Kehler's (2010) demonstrate this for Japanese where Japanese null pronouns show a strong grammatical bias toward a subject antecedent, while Japanese overt pronouns seem to be more "flexible" in their interpretation, referring to both subject and object antecedents. In order to account for this, we adopt the Form Specific Multiple Constraints Approach by Kaiser and Trueswell (2008): null and overt pronouns in Italian each seem to differently assign a different weight to multiple constraints, namely verb biases and sentence boundaries.

Support for this view also comes from additional work on Italian and Spanish null and overt pronouns. Filiaci *et al.* (2013) tested the assumption that the contextual restrictions on the interpretation of null and overt subject pronouns in Italian and Spanish are equivalent, exploring the influence of structural positions on antecedent preferences in intra-sentential contexts (i.e., PAH). The results suggest that Italian and Spanish null and overt pronouns are not influenced to the same processing biases in intra-sentential contexts: Null subjects are resolved more easily in both languages when they refer to subjects, while overt pronouns show differing sensitivities to syntactic position. Our work here shows that both null and overt pronouns show sensitivity to verb effects, though overt pronouns demonstrate this more strongly (see also Runner & Ibarra (submitted) for more on Spanish). In Experiment 1, we found that null pronouns' sensitivity to verb semantics is modulated by grammatical role. This trend is also present in Experiment 2, where null and overt pronouns show a different sensitivity to verb biases and sentence boundaries.

The difference between null and overt pronouns and their sensitivity to verb biases is more clearly defined in Experiment 2. Experiment 2 aimed to see the influence of a full stop on antecedent preferences. Miltsakaki (2002, 2003) suggests that due to sentence boundaries, subordinate clauses are processed as a single unit with a main clause, and pronoun resolution is more greatly affected by semantics and connectives; clauses separated by a full stop influence pronoun resolution differently, where pronouns are more constrained by factors such as topicality. Our results did in fact demonstrate such a difference revealing an asymmetry between null and overt pronouns' sensitivity to verb biases and sentence boundaries: null pronouns show a strong subject preference regardless of verb type, while overt pronouns show a strong verb-effect and more sensitivity to verb biases than null pronouns. In comparison to Experiment 1, where both pronouns showed an effect of verb semantics, Experiment 2 reveals how null and overt pronouns react differently to verb biases with sentence boundaries. Null pronouns seem to primarily be influenced by their grammatical tendency to prefer subject antecedents. We saw hints of this in Experiment 1 with null pronouns. This fully emerges in Experiment 2: when clauses are separated by a full stop, the influenced verb-effects weaken for null pronouns, and their grammatical function to prefer subject antecedents strengthens. In contrast, overt pronouns demonstrate a verb-effect in both experiments.

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Exploring Word Fields Using the Free-Sorting Method

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Abstract

Centering on German self-motion verbs, this paper demonstrates the advantages of free-sorting over creating and delineating word fields with more traditional methods. In particular, I draw a comparison to Snell-Hornby's (1983) work on German descriptive verbs, which produces lexical fields with the help of dictionary entries, a thesaurus, a small corpus of written text and limited speaker feedback. While these methods have benefits, they are limited in their ability to represent the average organization of semantic fields in the mind of everyday speakers. Free-sorting, by contrast, does not rely on academic resources, corpora or singular speaker judgments. In sorting, a group of informants creates visible sets of items according to perceived similarity. Psycholinguists have used the method to quantitatively explore the perception of color terms across cultures (c.f. Roberson et al. 2005). With a sufficiently large number of informants, one can generate lexical sorting data that is apt for cluster analysis, the results of which are represented by dendrograms. The experiment I conducted involved 33 school children from a middle class neighborhood in Braunschweig, Northern Germany. My experiment shows that Snell-Hornby's (1983) representation of the self-motion field can be improved by integrating further dimensions of meaning, such as body-space relations and sound, that young speakers find salient in the grouping procedure.

1 Introduction

This paper suggests a procedure for quantitatively exploring lexical fields in a language or variety while relying on cognitively salient, semantic distinctions made by a substantial number of speakers in a group. By allowing them to sort and arrange words by perceived semantic similarities and by calculating clusters of verbs that most often co-occur in such a free-sorting test, one arrives at a result that is more representative of a speaker group's actual understanding of words in a certain field than by using dictionary definitions or text corpora. The method and its future development could also lead to valuable contributions with regard to a current bottleneck in language technology: the development of lexical semantic resources with (a) sufficiently large vocabularies and (b) a good representation of the semantic relations between words and word fields that are immediately accessible to speakers. Tackling these issues has relevance for translation devices, automatic text interpretation, dictionary applications and language learning. Projects such as WordNet (Miller 1995, Fellbaum 1998) and FrameNet (Ruppenhofer et al. 2010) are dedicated to developing large databases of lexical entries and semantic relations, in order to provide a basis for research in these areas. However, like many other approaches, these resources are based on dictionaries, thesauruses and text corpora – all

of which require academic individuals to make ultimate judgments over similarity and relatedness. An overview of traditional approaches is offered by Budanitsky & Hirst (2004:14-17) who evaluate five different WordNet-based measures of semantic relatedness by comparing them to human ratings and by testing their performance in application. The authors preface the comparison by stating that "insofar as human judgments of similarity and relatedness are deemed to be correct by definition, this clearly gives the best assessment of the 'goodness' of a measure" (Ibid:23). At the same time, they list a number of severe methodological drawbacks that ultimately shake their confidence in the comparison: often data sets are unreliably small to be subject-independent, the experiments are difficult to design and stimuli in form of words are problematic when the goal is to better understand concepts (see Section 4 of this paper).

Human judgment of similarity as a resource for creating good measures of similarity remains to be fully tapped. The goal of this paper is to offer a methodological suggestion towards making experimental data more easily attainable, and perhaps circumventing some of the issues mentioned above. To this end I will conduct a free-sorting test of German self-motion verbs with school children and draw an initial comparison with the diagrams of German self-motion verbs in Snell-Hornby (1983). This dictionary and corpus-based work involved a very limited number of native speakers commenting on perceived semantic differences.

The paper is structured as follows: I will compare motion verbs of English and German to exemplify some of the differences that exist in word fields even between closely related languages. In section 2, I will discuss Snell-Hornby's (1983) approach to the structural differences of English and German word fields. For the rest of the paper I will focus on German to show how German lexical fields may be better described using experimental and quantitative methods rather than traditional means. Section 3 gleans the idea of a free-sorting test from research on word categorization, cross-cultural color perception and cross-linguistic color terminology. Here, I discuss the advantages and drawbacks of the free-sorting method for an investigation of word fields. The method of the free-sorting test as applied to German motion verbs and conducted with children at a school of a mid-sized city in Northern Germany is presented in section 4. Section 5 presents the results of this study and section 6 contains a comparison of these free-sorting results with the suggestions of Snell-Hornby. The conclusion and an outlook on future research form the last section of the paper.

2 Semantic differences: the example of "crawling" in German

Even when they are considered to cover similar meanings, individual lexical terms across languages differs substantially with regard to the way they map onto perceived concepts in the world. This holds for single terms and by extension for the composition of lexical fields. The field of motion verbs in German and English, two languages from the Germanic branch of IndoEuropean, offers a point in case. At an individual level, the verbs "to crawl" and krabbeln "to crawl with 4+x feet" share an etymological root, and yet have come to cover quite different meanings over time: the crawling action in English is broadly defined and can be applied to all situations exemplified in (1)-(3) below.

(1) His son is crawling around everywhere.

(2) Snakes sometimes crawl through the cracks.

(3) The couple waited patiently for the old man to crawl past the checkout.

Of the three sentences, only (1) can be translated into a German sentence that uses the German verb *krabbeln* with an equivalent meaning. Because *krabbeln* involves at least four feet (and more in the case of most insects), it cannot be applied to snakes in (5) or the slowly moving elderly man in (6). Alternatively, the verbs *kriechen* 'to crawl along the floor' and *schleichen* 'to sneak' (or better 'to move silently and slowly') can be employed in the translation.

(4)	Sein	Sohn	krabbelt	überall	herum.	
	POSS.3.m	son	crawl	everywhere	around	
	'His son is crawling around everywhere.'					

(5)	Schlangen	kriechen	manchmal	durch	die	Ritzen.
	snakes	slither	sometimes	through	the	cracks
	'Snakes sometimes crawl through the cracks.'					

(6)	Das	Paar	wartete	geduldig	bis	der	alte	Mann	an	der
	DET	couple	waited	patiently	until	the	old	man	at	the
	Kasse	vorbei-geschlichen	war.							
	checkout	past-sneak.PST	AUX.PST							
	'The couple waited patiently for the old man to crawl past the checkout.'									

While these considerations examine the individual word level, they imply consequences for the level of the whole field of motion verbs in German: the fact that *krabbeln* does not cover the same meaning as 'to crawl' also leads to differences in meaning between a verb like *schleichen* and its apparent English equivalent 'to sneak.' The actual definition of *schleichen* would have to include a notion of slowness which is missing from the English word 'to sneak.' The fields of motion verbs in English and German therefore overlap but cannot be directly mapped onto each other. The next section shows how Snell-Hornby (1983) compared precisely how English and German descriptive verbs differ and visualized such differences between subfields in field diagrams.

3 Snell Hornby (1983)

The previous comparison of German and English self-motion verbs led me to compare lexical entries in FrameNet, an English resource for the analysis of conceptual relations based on the British National Corpus, with those in SALSA, a German resource reapplying 'frames' of FrameNet to a corpus of German newspaper articles (Burchardt et al. 2006). However, a comparison of lexical entries quickly proved impossible due to a

lack of many motion verbs in the German newspaper sources. A more traditional translation resource proved more reliable for a comparison of verb fields, even if some verbs were not shared with my data and vice versa: Mainly with the goal in mind of providing semantic maps for translators, Snell-Hornby (1983) set out to organize and compare word fields of so-called "descriptive verbs" in English and German. In both languages, descriptive verbs are verbs that "describe rather than state an action" (Snell-Hornby 1983:15). The category of motion verbs would include verbs like 'to crawl,' 'to hop,' 'to sneak' or 'to run.' The core notion of descriptive verbs is the 'act-nucleus', which is surrounded by a descriptive, modifying complex of elements, termed the 'modificant.' The non-core elements can be semantically extracted from the core: for example, by decomposing the descriptive verb *schleichen* 'to sneak' into a nucleus of motion and several modificants, we arrive at a separation of the pure motion event and the modifying mannerisms that define part of the German concept.

(7)

Der	Mann	schleicht.
the.m	man	sneaks.

'The man is **sneaking.**'

(8)

Der	Mann	bewegt sich	leise,	vorsichtig	und	langsam.
the.m	man	move himself	quietly	carefully	and	slowly.

'The man is moving quietly, carefully and slowly.'

Leise 'quiet'*, vorsichtig* 'careful' and *langsam* 'slowly' are some, but not all of the modificant's components. Arriving at an exhaustive list of modifying elements within a language is difficult because there are many ways in which modifiers operate and are perceived. The decomposition of (7) into (8) showcases how descriptive verbs can include a modification of the agent and/or of the action itself. In cases of 'direct descriptivity' the action itself is modified in the description. 'Indirect descriptivity' applies when the modification occurs by way of an agent, as with the word *vorsichtig* 'careful' which denotes someone moving with care. The verb *schleichen* shows that the direct and indirect perspectives can thus be combined in the modificant of a descriptive verb.

Crucially, modificants are also subject to the speaker's judgment and perception: there is no single possible interpretation of a modification. With regard to motion verbs, Snell-Hornby notes, for instance:

> The speed norm is among the most common of such individually set norms in verb-descriptivity, whether the action is experienced as being slow, as with *dawdle*, *trödeln*, *plod* and *bummeln*, or as being excessively fast, as with *rush*, *dash*, *rasen* and *sausen*. (Snell-Hornby 1983:38)

In other words, how a speaker actually perceives the speed of a motion event influences their description of the event. Accordingly, individual speakers could employ different descriptive verbs for the same event or interpret the same descriptive verb in a different way. In her effort to discover structure and order in the relationships between

words in the field of descriptive verbs, Snell-Hornby consulted two dictionaries (Duden and Wahrig), a thesaurus (Egger), and a corpus with around 15 sentences per target word. She also consulted three native German speakers (two of which had an academic background) as she created the German verb fields.

'Subfields' are the smallest field-unit Snell-Hornby (1983) introduces. For instance, the major field of 'Movement and Position' contains the areas of 'Walking and running' and 'Movement in air and water' and 'Static and negative.' (See Figure (1) below).

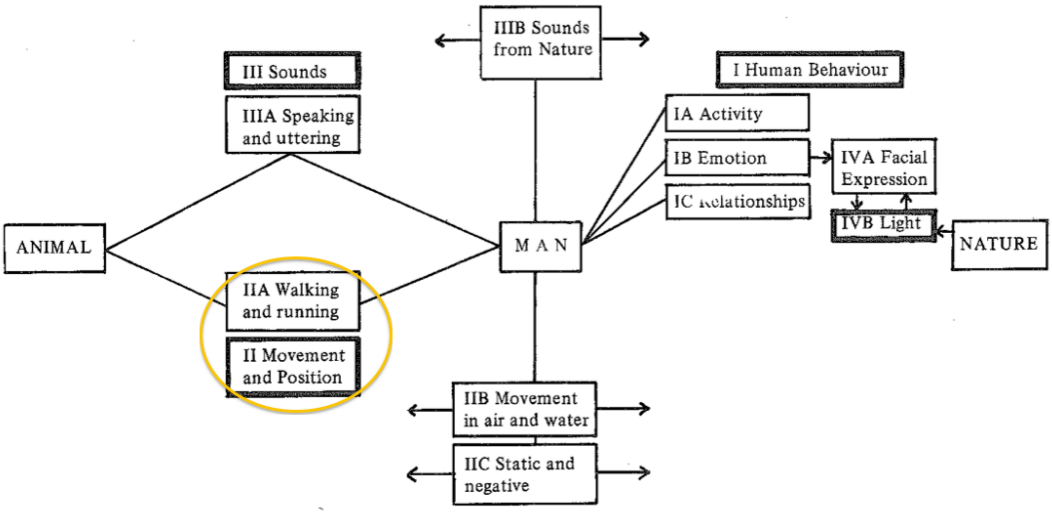

Figure 1: Overview of major fields and areas of descriptive verbs in Snell Hornby (1983) with focus on Major Field II and Area IIA.

Figure (2) shows that the area of 'Walking and running' contains four subfields, namely 'Leisurely, aimless' 'Measured, laborious,' 'Clumsy, unsteady' and 'Nimble, with energy.' The diagram of the third subfield is presented as an example in Figure (3) below. The arrows represent relationships between the clusters within the subfield. Although the meaning of these arrows is not further specified by Snell-Hornby, they can be intuitively understood to point to an intensification or shift in the modificant. For instance, the largest cluster in Figure (3) consists of the verbs *watscheln* 'to waddle,' *torkeln* ' to stagger,' *taumeln* 'to totter,' *wanken* ' to reel' and *schwanken* ' to reel' (all translations approximated). To the right we find the verb *stolpern*, which means 'to trip, to stumble.' Further to the right we read *hinken* and humpeln which both mean to 'to limp, to hobble.' The arrangement can therefore be understood as an intensification of the unsteadiness inherent to the verbs in the largest cluster.

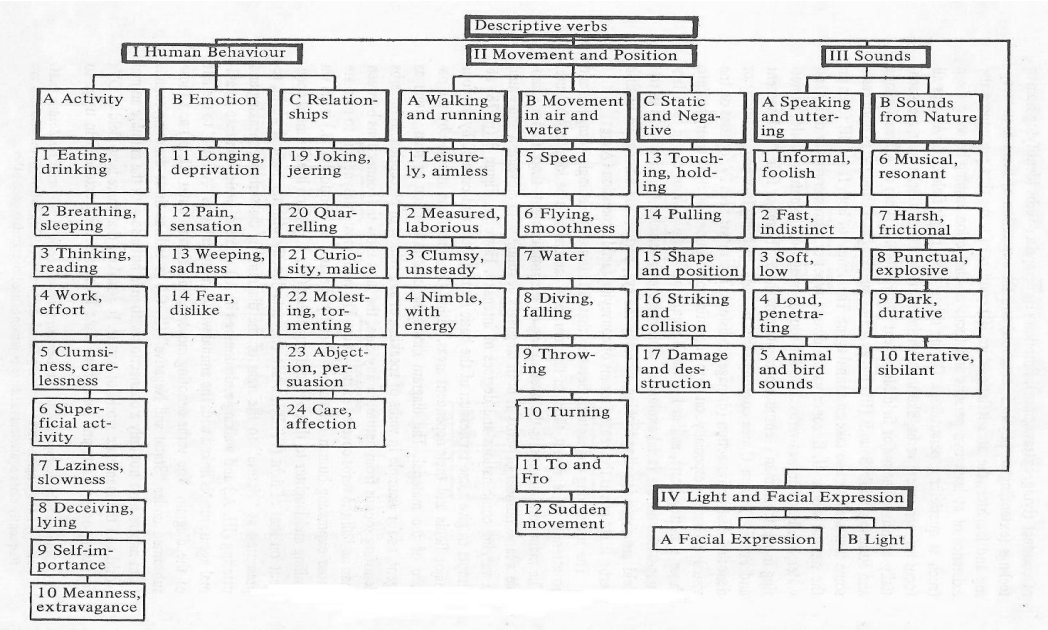

Figure 2: Overview of major fields and areas of descriptive verbs in Snell Hornby (1983)

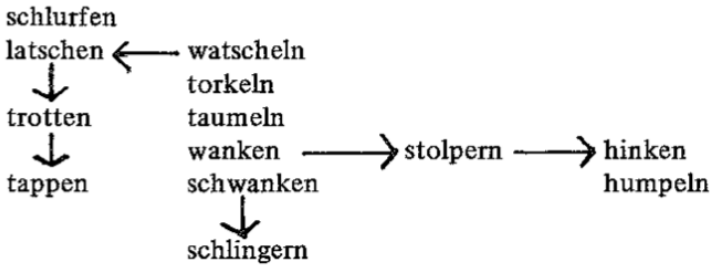

Figure 3: Snell-Hornby's (1983) subfield 'Clumsy, unsteady'

The four subfields under the area 'Walking and running' have in common, that they only contain self-motion verbs. Another subfield of self-motion verbs, namely 'Speed,' is placed somewhat counter-intuitively under the area 'Movement in Air and Water.' For the purposes of this paper, it makes sense to limit the examination of German motion verbs to these five subfields. The main reconsideration of Snell-Hornby's work that I suggest is the choice of sources that are supposed to establish these subfields. Relying on dictionaries, thesauruses, written text corpora and individual speaker judgments may be a good starting point when approximating the structure of the Standard German motion verb lexicon of upper and middle class adults, but for the same reason Snell-Hornby's results do not necessarily reflect the lexicon as it is cognitively structured for a majority of speakers. Rather, she presents hypothetical cardinal clusters in these diagrams that call for further verification. Lexical tests across social groups, dialect regions or age groups

may actually lead to very different representations of the same major fields or areas.[1] A fundamentally different way of arriving at representations of word fields would be to shift from individual sources to a quantitative study that actually elicits speaker choices. The next section discusses how this idea arose and what adaptations were necessary to create my study.

4 The word-color analogy

My project of taking self-motion verbs to an elementary school in a middle-class neighborhood in a Northern German city where fourth graders sorted the verbs by perceived similarity, was inspired by Snell-Hornby's (1983) own analogy between word fields and color terms. In her work, she alludes to the color continuum which according to Berlin & Kay (1969) consists of "focal areas, blurred edges and overlappings" (Snell-Hornby 1983:68). Analogous to the color continuum, descriptions of motion types contain focal areas (core notions) such as 'to walk' or 'to run' that are salient in their difference across languages, apparently based on universal principles. At the same time, there are blurred edges (hazy or non-prototypical modificants) that give witness to substantial differences in the way motion types are perceived across cultures, as with the verb 'to crawl,' discussed above. Just as color cards help us visualize the solid and fluid components of continuous color fields, Snell-Hornby's field diagrams break down the complex field into atomic units and relationships.

Two issues arise, however: first, Snell-Hornby excludes generic verbs (such as 'to walk' or 'to go') from her fields for reasons that are unclear. She appears to avoid generic verbs because they are not *per se* descriptive. One could argue, however, that her subfields are incomplete without the focal notions that generic motion types provide. Excluding them from the field analysis amounts to excluding focal colors from the color continuum. Consequently, a 'core notion' cannot be contrasted with a more heavily modified type. In my own study, I therefore included generic verbs such as *gehen* 'to walk,' *laufen* 'to walk, run' and *kommen* 'to come' along with descriptive verbs.

Another problem is that Snell-Hornby (1983) does not employ experimental methods that support her classification. Again, research on color perception used in relativity research could serve as the basis for solving the issue. One experimental method, in particular, appears nicely transferable: with the goal of better comprehending focal points and borders in color perception and color terminology across languages and cultures, Roberson et al. (2005) conducted a free-sorting task of color squares with speakers of 17 distinct languages and cultural backgrounds. Participants freely grouped color terms "so that ones that looked similar were placed together in the way that members of a family go together" (Roberson et al 2005:9). The reasoning for using unconstrained free-sorting in this task was that it allowed for a comparison of naming practices without limiting possible groupings of colors, and the potential relationships between them. Roberson et al. found "evidence of both broad generalities of grouping behavior… and of some systematic differences." (Ibid:19). The existence of focal colors was confirmed due to a

1 Such an application of the free-sorting method is presented in Huenlich (forthcoming), but has not been included in the scope of this paper.

broad generality of sorting behavior across participants and languages. At the same time, there was strong variability between individual speakers, and also a genuine influence of sorting behavior due to learned color categories. In other words, there was an interaction of universal, individual, and sociolinguistically-acquired influences.

Applying Roberson et al.'s method to the problem of establishing word fields requires several adaptations. In order for speakers to make grouping decisions, the test would have to use written words or phrases. If speakers process written language in a fundamentally different way from spoken language, or if a word categorization task is by default not representative of actual conceptual categories this adaptation would be problematic. Nevertheless, sorting of written word stimuli into categories of semantic similarity has been widely applied in psychology and psycholinguistics. The experiments span from testing recall and recognition (e.g. Mandler et al. 1969, Schwartz & Humphreys 1972), to determining human "synonymy judgements" (e.g. Rubenstein & Goodenough 1965, Miller & Charles 1991). All these attempts appear problematic, due to the possible effect that "the dominant sense of the target words or mutually triggering related senses" influences participant choices, so that the actual interest in research, namely the "relatedness of word-senses" is obscured by the word stimuli, which "are merely surrogates" of meaning (Budanitsky & Hirst 2004: 32). This paradox appears to be an insoluble problem. It may be mitigated though in two ways, though.

First, many of the traditional experiments limit the conditions under which participants judge similarity: they are either asked to decide over an extremely limited number of cases, such as word pairs or word clusters (e.g. Rubenstein & Goodenough 1965, Miller & Charles 1991, Divjak & Gries 2007) or they are prompted to create a limited number of categories (e.g. Rosenberg & Kim 1975:491, "a minimum of 2 categories and a maximum of 15"). Of course, research design is usually geared towards specific research questions. However, when applied to similarity measures, such restrictions may exacerbate the effect of a "dominant sense" of a word over other possible senses or relationships. Leaving the decision of the number of categories in sorting completely up to the test-takers, as Roberson et al (2005) did in their color experiment, and not forcing speakers to create any specific number of categories can allow for the most salient meaning or relationship to emerge across the decisions of a large enough group of participants.

Second, it may actually matter, who the experiment is conducted with. I chose to test students in a school setting: students deal with written language on a daily basis and are familiar with tasks that use written words to refer to spoken language and conceptual categories. It can also be assumed the children in a Western school are accustomed to making distinctions based on categories of meaning, regardless of whether categories influence naming practices, or whether naming practices are the basis of categorizations. It is also established that category creation and word learning go hand in hand as children mature, more generally speaking. The so-called 'naming spurt', a major leap in vocabulary acquisition at around 18 months, is attributed to this relationship (Gopnik & Meltzoff 1997). Making inferences about conceptual organization based on a written test, therefore seems valid for this group.

A separate problem could be that students are unlikely to visualize motion events the same way when a written prompt merely contains the infinitive verb form. I used a

simple sentence frame, to present the data with more context, making clear that all cards represent self-motion events with a mover involved.

A final problem I anticipated was that speakers may simply not know certain words. Not being able to decide on a color label is a fundamentally different problem for the final sorting result, because a speaker may still decide one way or another. Participants in a word sorting task could, however, end up with words that are completely opaque, so that results become skewed. To prevent this, I included pseudo-verbs (verbs with no meaning) in my study and asked participants to sort all unknown verbs onto a separate stack. This way the results not only give an impression of the structure of the actual field of self-motion verbs, but also of the scope of verbs that were known to my participants, who were students in their final year of elementary school at the time of the test.

5 Methodology

5.1 Participants

I tested the field of German self-motion verbs with 29 fourth graders[2] (10-11y) from three different classes at an elementary school in the mid-sized German city of Braunschweig (253,000 inhabitants), about 2 hours from Berlin in the federal state of *Niedersachen* (Lower Saxony). The neighborhood from which all participants came from is a middle class neighborhood with around 6000 inhabitants. Basic background information was provided: all participants were monolingual, born in Germany and most were raised in Braunschweig. Several children in the school have parents who are academics and work in a nearby research facility.

5.2 Verbs

To keep the free-sorting task manageable, I had to limit the number of verbs. Snell-Hornby (1983) mentions over 60 self-motion descriptive verbs, but my final list only includes 38 of this type. I decided to add generic verbs, and also included words that are more frequent in written and spoken Standard German. Table 1, below, contains the final 52 self-motion verbs I chose for unconstrained free-sorting, along with the three pseudo-verbs that I created for control purposes. The translations are loose approximations to the meaning covered by the German verbs.

2 Originally, there were 33 test-takers. However, four students had to be excluded due one student getting distracted and three students loosing cards during the sorting procedure. Such losses could be seen as a disadvantage of conducting the experiment in a school or with children.

German Verb	Translation	German Verb	Translation
bummeln	‘to saunter’	schlendern	‘to saunter’
eilen	‘to hurry’	schlurfen	‘to shuffle’
flanieren	‘to stroll’	schreiten	‘to stride’
flitzen	‘to whisk’	spazieren	‘to stroll’
gehen	‘to walk, go’	springen	‘to jump’
hasten	‘to hasten’	sprinten	‘to sprint’
hechten	‘to jump’ (like a pike)	spurten	‘to spurt’
hinken	‘to limp’	stampfen	‘to stomp’
hoppeln	‘to scamper’	stapfen	‘to trudge, tramp’
hopsen	‘to skip’	steigen	‘to mount, rise’
hüpfen	‘to hop’	stiefeln	‘to march’
humpeln	‘to hobble’	stolzieren	‘to strut’
huschen	‘to whisk’	tappen	‘to toddle’
joggen	‘to jog’	taumeln	‘to totter’
klettern	‘to climb’	tippeln	‘to pad’
kommen	‘to come’	torkeln	‘to stagger’
krabbeln	‘to crawl’	traben	‘to trot’
kraxeln	‘to scramble’	trampeln	‘to trample, stomp’
kriechen	‘to creep’	trotten	‘to tread heavily’
latschen	‘to shamble’	wandern	‘to hike’
laufen	‘to go, walk, run’	wanken	‘to reel’
marschieren	‘to march’	watscheln	‘to waddle’
purzeln	‘to somersault, tumble’	wetzen	‘to speed, race’
rasen	‘to race’		
rennen	‘to run’		
robben	‘to crawl’ (like a seal)	Pseudo-verbs:	
rollen	‘to roll’	53. schlopern	
sausen	‘to dash’	54. somen	
schleichen	‘to sneak’	55. workeln	

Table 1: List of 52 verbs and 3 pseudo-verbs used for free-sorting

5.3 Procedures

I prepared students with a hands-on example of sorting, and presented them with five German verbs of emotion on a blackboard, namely *Sie lacht.* ‘She is laughing,’ *Sie weint.* ‘She is crying,’ *Sie lächelt.* ‘She is smiling,’ *Sie grinst.* ‘She is grinning,’ *Sie heult.* ‘She is weeping.’ I also included the meaningless pseudoverb sentence, *Sie bammert*. ‘She is bammering.’ Students were asked to group the verbs by perceived similarities. All students agreed that there was a perceivable group of ‘happy’ vs. ‘sad’ verbs in the example, but they could not categorize the pseudoverb. I told students I had ‘tricked’ them and that they were to put verbs that have no meaning on a separate stack when coming across such words in the task ahead. The precise instructions students were then given with regard to the sorting task were

(a) to sort the cards into groups that “fit” together, and

(b) to remove all invented verbs out of the set. These 'pseudo-verbs' should be placed on the side of each table, in an area marked by a colored number sticker.

Sorting was conducted separately in each of the three classes. Communication between classes was impossible during the time of the experiment, and copying and collaboration were prohibited. Due to space restrictions, not all students were in separate rooms but desks were spaced out to the largest extent possible, so that no interaction occurred. All students were under observation either by my assistant, the teacher of the class, or me.

All verbs were presented in a sentence frame with the third person feminine singular present tense form, e.g. *Sie rennt.* - "She is running." This provided a uniform context for students. The short sentences were printed on white business cards of solid paper with 8.5 cm length and 5 cm width. Free-sorting took place on large school tables, with enough space to ensure every student could arrange clusters freely without interfering or interacting with others. My participants had 30 minutes to conclude the task, but no one took longer than 20 minutes. A colored sticker with the student's number at the right corner of the table marked the area where students placed the perceived pseudo-verbs. If a student did not understand the instructions, they were repeated. Students used different strategies to reach their sorting goals: Some spread the cards out on the table, sorting out perceived pseudo-verbs first, and organizing the other cards afterwards. Others sorted the cards by working from a stack, subsequently creating new stacks. At the completion of the tasks, my assistant took pictures of each table. Figure 4 contains an example of the final sorting results. The pictures varied in their structure, but groups were generally identifiable. If a grouping appeared ambiguous, I consulted with my assistant, basing the final decision on the most probable intention of the student.

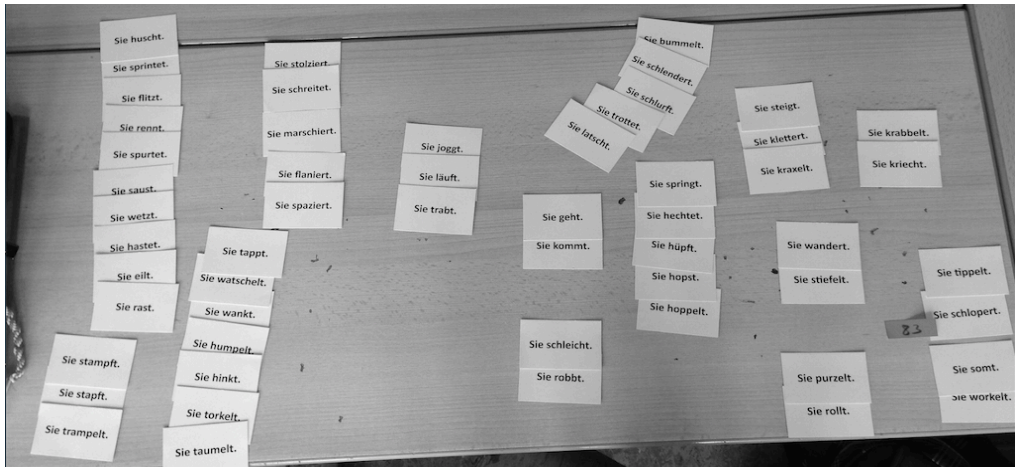

Figure 4: Example of a final sorting result (pseudoverbs and unknown verbs are in the lower right corner with the number sticker).

5.4 Analysis

The pictures of students' desks were coded into a co-variation matrix, where a co-occurrence either equaled 1 (the verbs co-occur in a sorting group) or 0 (the verbs do not co-occur in a sorting group). Tables of all speakers were added up, divided by the total number of speakers and converted into Euclidean distances. These distances were used

for for hierarchical clustering analysis (HAC) which leads to a dendrogram that serves the purpose of a field exploration. HAC can be conducted with different algorhithms, resulting in different trees. I chose the 'complete linkage' algorithm for the following reasons: the algorithm creates clusters based on the longest distance between any two members of two clusters, thereby emphasizing outliers in the dendrogram and producing overall smaller, more compact clusters. The lowest nodes in all trees will be those with the most similarities in the distance matrix. Hence, they represent the words that were most commonly associated with each other. The higher the distance measure on the vertical axis the less reliable are the similarities between branches. Smaller groups minimize the blurriness in the dendrogram. Also, those clusters that students produced most consistently will result in outliers: they are very closely aligned and do not align with the other, more variable groupings in the data. Outliers should be immediately visible.

6 Results

Figure 5 below shows the dendrogram derived from the data of the 29 participants from Braunschweig. Boxes were placed around clusters to visualize similarity. Solid boxes cut off at the 0.5 mark of the distance axis, indicating that at least 15 speakers (around 50%) grouped these words together. In most of the cases between 20 and 28 speakers considered these pairs similar. Dashed boxes indicate looser but still visible clusters that branch off around the 1.5 mark. Greek letters to the left of the final nodes facilitate referencing the clusters in a summary of results. Clusters α, β, and γ were grouped together consistently across speakers and are the three major outliers in the dendrogram. For instance, cluster α contains a core of speed verbs, that can be roughly translated as *flitzen* 'to whisk,' *rasen* 'to race,' *sausen* 'to dash,' *rennen* 'to run,' *sprinten* 'to sprint.' The clusters that loosely surround this 'fast core' are slightly less speedy in nature, involving verbs such as *joggen* 'to jog' or *traben* 'to trot' above, and verbs such as *eilen* 'to hurry,' *laufen* 'to run, to walk' and *hasten* 'to hasten' below. They were not always placed in the same group with the 'fast core,' as the distances show. Overall, however, all verbs of this group co-occurred often enough for the algorithm to treat it as a cluster.

Cluster β is an outlier because it contains the three pseudoverbs that evidently were identified quite consistently. Also in the cluster is the rare and old-fashioned word *flanieren* 'to stroll.' A word from the Hamburg dialect of German, *wetzen* 'to run,' is placed above the cluster or off to the side of it. *Wetzen* 'to run' probably was recognized by some students since the Braunschweig is not too far from Hamburg and mutual influences between German dialects exist. Nevertheless it was often placed in the group of unknown verbs.

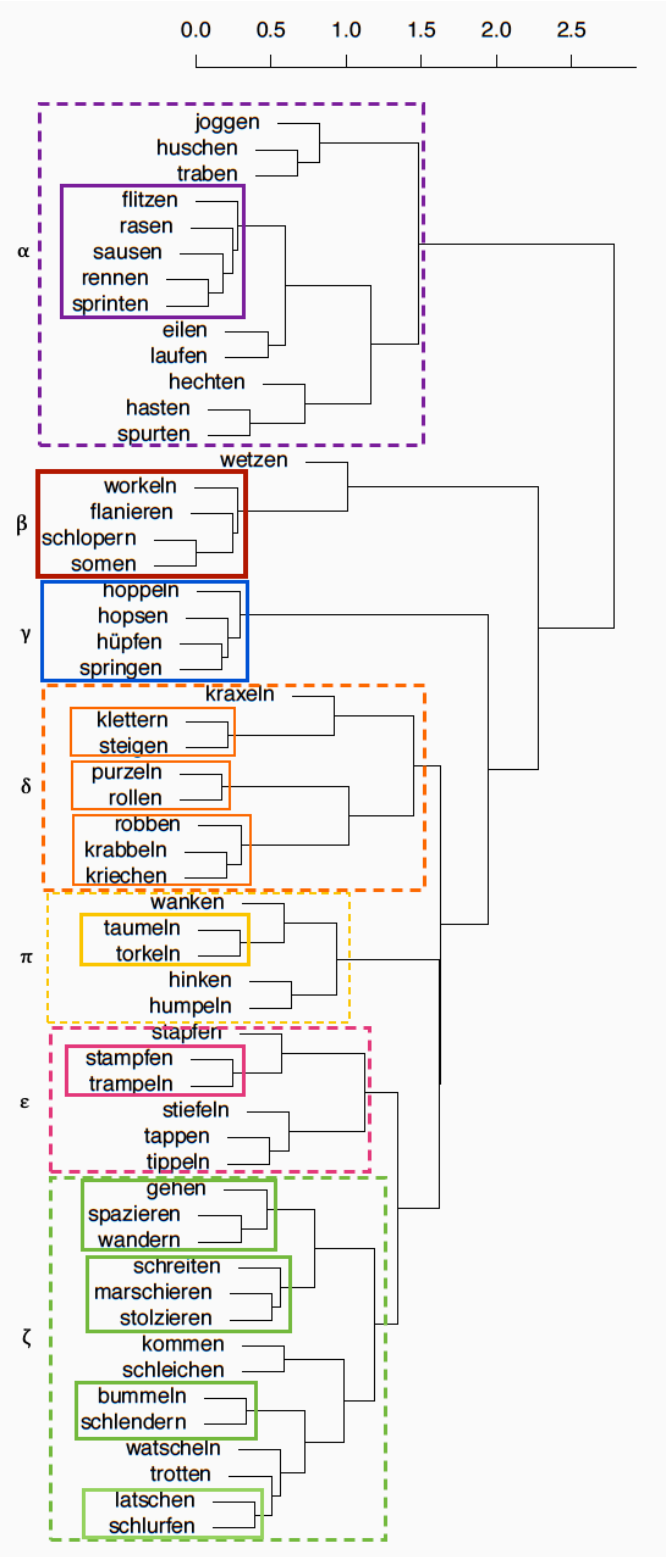

Figure 5: Dendrogram of self-motion verbs based on 29 students' free sorting results.

Cluster γ with the 'jumping verbs' *hoppeln* 'to scamper,' *hopsen* 'to skip' and *hüpfen* 'to hop' along with the more prototypical *springen* 'to jump' also forms a consistent outlier. The short distances between the verbs suggest that students identified this cluster consistently as a group.

Things get more complex for the remaining clusters δ, π, ε, and ζ. Cluster δ contains several core pairs that are separated by a distance of about 1 to 1.5, but nevertheless co-occurred often enough to be placed in a cluster together. The core clusters are *klettern* 'to climb' and *steigen* 'to ascend, mount' (with the adjacent verb *kraxeln* 'to climb'), purzeln 'to tumble, roll unsteadily' and *rollen* 'to roll,' as well as *krabbeln* 'to crawl with feet' and *kriechen* 'to creep, crawl on the floor' (with the adjacent verb *robben* 'to crawl like a seal'). All these verbs have in common that they do not denote regular upright motion types. One could posit that they are part of a group of verbs that participants perceived as 'along the ground,' or 'involving hands and feet.'

Cluster π, labeled after the Greek word *πάροινος* 'drunk,' features a core cluster of verbs that denotes upright, but extremely instable motion events. The verbs *torkeln* 'to stagger' and *taumeln* 'to totter' with the adjacent verb *wanken* 'to reel' are all associated with lack of control in a motion event. The pair *hinken* and *humpeln* 'to limp, hobble' is more loosely affiliated with this core cluster, but the unsteadiness and insecurity involved in these injured motion types fits the same pattern and connotation of 'lack of control.'

At the very bottom of the dedrogram we find twenty remaining verbs, that is, over a third of the verbs in the overall data set. This group fall into two or possibly even three major clusters. I decided to label them preliminarily as clusters ε and ζ, while the latter cluster may actually be further separated out.

Cluster ε appears to group together verbs that have an audible characteristic to them. The verbs *stampfen* 'to stomp' and *trampeln* 'to trample' together with the adjacent *stapfen* 'to trudge, tramp' all are motion types that require effort and produce noise. So does the verb *stiefeln* 'to march' that is often associated with military motion and is derived from the German word *Stiefel* 'boot'. While involving less effort, the verbs *tippeln* 'to pad' and *tappen* 'to toddle' both also have an audible component – although with these verbs the characteristic noise is rather light, often surreptitious, but attention grabbing for precisely that reason.

Within the large cluster ζ, four core clusters stand out that are quite different in nature. The very first cluster involves rather generic motion types such as *gehen* 'to walk, go,' *spazieren* 'to take a walk' and *wandern* 'to hike.' All three simply denote a motion event – not a specific motion type. This unmarked group is juxtaposed with a cluster of verbs that are clearly descriptive: *schreiten* 'to stride,' and *stolzieren* 'to strut,' and *marschieren* 'to march' all convey a sense of pride and determination. The modification of the motion type to reach this state is, however, rather minor compared to all clusters above the generic group. Simply exhibiting a more decided gait (perhaps with a slightly lifted chin) might already be awarded with a description of this type in reports, poems or simple conversation.

The lower bundle of branches within cluster ζ, is headed by a somewhat puzzling pair: The verbs *kommen* 'to come' and *schleichen* 'to sneak' show up together here. Reasons for this co-occurrence are not altogether clear. Research I conducted with students with a migration background in an adjacent neighborhood suggests that

schleichen has an intentional and directional component to it that facilitates the pairing with a clearly directional verb such as *kommen* 'to come.' Perhaps the inclusion of *kommen* was not a good choice for this reason, because it brings in a component of directionality that is not found elsewhere in the data set.

As mentioned above, *schleichen* 'to sneak' has a slow modificant in German, similar to the verb 'to crawl' in English. It is not surprising therefore that the verb occurs close to a 'slow' core cluster: Right below it we find the verbs *bummeln* and *schlendern* which both denote a sauntering, slow motion event. The core cluster *latschen* 'to shamble' and *schlurfen* 'to shuffle' is accompanied by the more loosely associated verbs *watscheln* 'to waddle,' *trotten* 'to tread heavily.' All describe a motion event that is taking place and meets some sort of resistance, either of a physical or psychological nature. In any case, the last clusters all contain decelerated motion types.

7 Comparison with Snell-Hornby (1983)

From these results it already became clear that some of Snell-Hornby's (1983) subfield categorizations are confirmed in the present data, while others differ substantially. The subfield 'Clumsy, unsteady' that was presented above in Figure 3, contains several verbs from cluster π, for instance – verbs that are commonly associated with lack of control in a motion event. However, the subfield also involves verbs from cluster ζ. My participants found this cluster more characteristic of slow motion types. An association with 'clumsiness' or 'unsteadiness' is not evident from the sorting results.

Other comparisons with Snell-Hornby's (1983) suggested subfields and the dendrogram in Figure 5 point to similar commonalities and disparities. Largely compatible categories are found in the subfield 'Speed' and the cluster α, for instance. However, many of the speed verbs in my test are missing from Snell-Hornby's analysis. This makes the comparison somewhat difficult. Yet, the similarities are tangible.

Snell-Hornby's subfield 'Leisurely, aimless' presented below in Figure 6 contains a number of verbs that show up in cluster ζ and suggest similar grouping criteria: they are either generic or slow. The attribute 'aimless' actually characterizes the lowest portion of cluster ζ in Figure 5 very well. However, Snell-Hornby misses the component of slowness that permeates the field and leads to additions such as *schleichen* 'to sneak.'

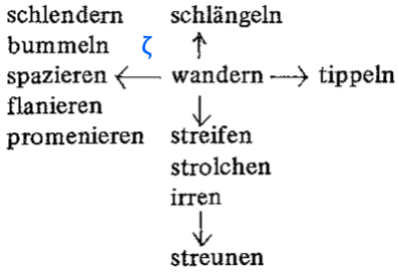

Figure 6: Snell Hornby's (1983) subfield 'Leisurely, aimless' compared with the dendrogram in Figure 5.

Clear differences exist with regard to the subfield 'Nimble, with energy,' presented below in Figure 7. The clusters γ with the 'jumping verbs' and δ with 'quadrupedal or ground' motion types are both contained in this subfield, but are separate clusters in my participants' sorting results. Interestingly, even Snell-Hornby (1983) cannot find a connection between these groups in her hypothetical subfield 'Nimble, with energy,' so that there is no connecting arrow between the two.

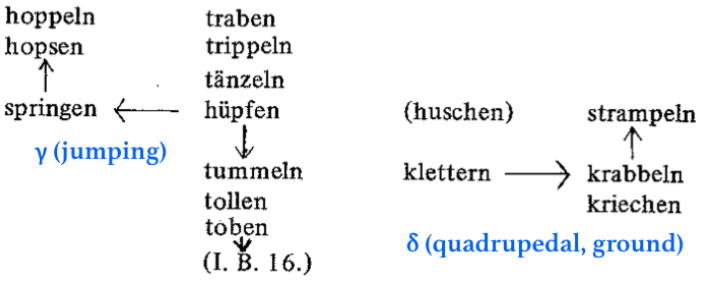

Figure 7: Snell Hornby's (1983) subfield 'Nimble, with energy' compared with clusters γ and δ in Figure 5.

Based on the results of free-sorting, it therefore seems reasonable to view cluster δ as a separate category from γ, even if the two clusters occur adjacent to each other in the dendrogram. The distance of the branches shows that the association between the two clusters is not very strong. Cluster δ appears to be salient not due to the energy level or 'nimbleness' involved in the motion event, but due to the way the motion is performed with a non-vertical body posture. Jumping is a different performance that involves two feet and an at least partially upright trajectory.

Another subfield that falls apart into two clusters in my data is presented in Figure 8: The subfield 'Measured, laborious' groups verbs that fall into the 'noisy cluster' ε and the miscellaneous cluster ζ. A closer look reveals that the verbs from ζ in this subfield are those with a modificant conveying 'pride' or determination. While it is reasonable how Snell-Hornby arranges these verbs and the cluster ε and ζ are also neighboring clusters in the dendrogram in Figure 5, the children's sorting results show that sound is a salient feature for them that has a stronger descriptive value than Snell-Hornby's characterization which apparently aims at qualities such as the difficulty and deliberateness of the performed motion.

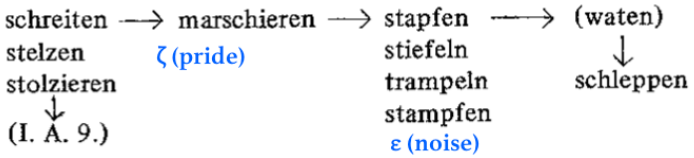

Figure 8: Snell Hornby's (1983) subfield 'Measured, laborious' compared with clusters ζ and ε in Figure 5.

We can summarize that while Snell-Hornby (1983) provides a preliminary overview of the way descriptive verbs in German might be organized, the experimental method

fine-tunes her suggestions considerably. The results that represent the way 10-11 year old native speakers of German perceive motion types differ almost always in favor of more fine-grained distinctions. In addition, they bring to our attention the important role of body-space relations (as in cluster δ) as well as of features such as speed (or the lack thereof in cluster ζ), and sound (as in cluster ε).

The next section concludes this paper by suggesting improvements to be implemented in future applications of the free-sorting method.

8 Conclusion and outlook

The method introduced in this paper should be seen as a first step in establishing fine-grained word fields through experiment rather than following intuitive academic or text-based choices. As such, the project leaves much room for refinement and improvement, and it would be problematic to regard the lexical fields of children as representative of all speakers of German. Every speaker group and speech community deserves its own test. What became clear from the test, however, is that traditional methods cannot claim to be representing lexical fields as all speakers see them. If Snell-Hornby's (1983) field categorization should be representative of Standard German, it would likely be necessary to conduct a free-sorting experiment with speakers that are most representative of this variety of German, such as adult academics from Middle and Northern German regions. I would assume that some of the differences found in the lexical organization of middle class children in Northern Germany would also be reflected in the way the adult lexicon in the same speech community is organized. But this needs to be verified in future research.

More generally speaking, there are many possibilities for improvement of the free-sorting test. For instance, test-takers could organize a lexical field online, so that all subsequent calculations are immediately automated. A computer-based test could also take into account metaphorical distances between clusters. In that case, the sorting test could also consider the possibility that word clusters may better relate to each other in three dimensional space – a feature that can be replicated on a testing screen. Multitudes of speakers (e.g. from a platform such as Mechanical Turk) could conduct a sorting experiment online, resulting in an immediately visible, highly reliable representation of the respective word fields. The resulting data could be used for multiple purposes, facilitating translation work, text interpretation and language learning. Also, where words are now used as sorting stimuli in experiments that are actually aimed at the organization of concepts, one could have speakers free-sort other stimuli (e.g. pictures, animations, videos snippets). This could possibly allow future research to circumvent the paradox that arises when words act as placeholders for concepts.

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Copulas and the semantics of location

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Abstract

Work on copula systems has been a rich field of inquiry in syntax and semantics, with a particular interest in languages with multi-copula systems. In such languages, different forms are used for specific syntactically and/or semantically distinct copula constructions. To date, however, there is no discussion of the copula system in Kinyarwanda, a Bantu language spoken in Rwanda. In this paper, I provide a description of the distribution of the two copulas in Kinyarwanda, showing that their use does not fit previous typologies of copula constructions. I argue that the choice of copula hinges on both the predication of a location as well as the semantics of central coincidence, which is tied to the neutralization of the contrast of the two copulas in the first- and second-person.

1 Introduction

Work on the meaning of copulas — and on semantics more generally — is limited for the Bantu languages; there has been no work that discusses the copula system in Kinyarwanda (Bantu; Rwanda) which has two: *ni* and *–ri*. This paper fills this gap by documenting the distribution of these two copulas, and situates this system into typological work on copulas, arguing for an analysis that hinges on the semantics of location and central coincidence. For instances where the two copulas differ, whether the predicate is a location is the crucial predictor for which copula will be used. However, not all persons and tenses have a contrast, and I argue that central coincidence — distance from the deictic center of conversation (i.e. 1st- and 2nd- person present) — conditions when there will be a contrast between the two copulas.

A copula has been understood as a linker between subjects and predicates with lexemes that do not form predicates on their own (Pustet 2003, Crystal 1980). As Stassen (1997) puts it: “the copula is basically a ‘hat rack’ for categories of verbal morphology" (66); in other words, copulas often serve as grammatical hosts for tense, aspect, and mood morphology for elements that can’t encode this themselves (e.g. nominals and adjectives).

Work on the semantics of copular clauses has found different kinds of constructions that use a copula. For example, Standard English makes use of the verb *be* for various kinds of copular phrases (cf. Mikkelsen (2005, 2011)).

(1) a. Kyle is happy. — predicational
b. The man I met was was John. — specificational
c. That woman is Mary. — identificational
d. Mary is HER. — equative

Many languages have morphologically distinct copulas for these (or other) semantic functions (cf. Section 4). In this paper, I document and analyze the copula system in Kinyarwanda, which has two copulas: *–ri* and *ni*. The two differ in their uses, with the first being reserved for statements about locations, while the second has several semantic uses, including the four in (1). A further component to the copula system is that the distinction between the two morphological forms is neutralized in the first- and second-person. I argue that this due to an interrelation of the notions current relevance and central coincidence, the former giving privilege do events that are happening in the present, and the latter giving delimiting participants in proximity to deictic center.

Finally, I engage with work on the copula system in Swahili, specifically on the origins of the form *ni*, which has been argued to be an innovation in Swahili (McWhorter 1992). I show that the use of *ni* in Kinyarwanda (and other related Bantu languages) casts doubt upon the proposal that *ni* is an innovation in Swahili. I instead propose that *ni* originated in an earlier stage of the East Branch of Bantu.

The paper proceeds as follows: in the next section, I give a brief description of the morpho-syntactic structure of Kinyarwanda and then in §3 I provide a description of the two copulas in Kinyarwanda and their cognate forms in related Bantu languages. I then turn to a summary on previous work on multi-copular systems, showing that they fail to capture the semantic distinction between the two forms in Kinyarwanda. In §5 I outline an analysis of the Kinyarwanda data, proposing that the distinction between the two copulas hinges on the semantics of location and central coincidence. I conclude in §6, outlining future research questions in the semantics of copulas in Bantu languages.

2 The Structure of Kinyarwanda

Kinyarwanda is a Bantu language spoken in Rwanda and neighboring countries by approximately 12 million people. It predominantly has SVO word order, and rich agreement and valency-changing morphology. Verbs in the language agree with the subject in number and noun class, of which there are 16.[1] The data in (2) provides an example of the agreement morphology in the language.

(2) a. Umu-gabo a-ra-shaka iki-jumba.
1-man 1S-PRES-want 7-sweet.potato
'The man wants a sweet potato."

b. Aba-gabo ba-ra-shaka ibi-jumba.
2-man 2S-PRES-want 8-sweet.potato
'The men want sweet potatoes.'

In (2a), the class 1 subject agrees with the class 1 agreement marker on the verb. The plural, class 2, changes the agreement shown on the verb.

Research on Kinyarwanda has mainly focused on valency-changing morphology, especially applicatives (Gary & Keenan 1977, Dryer 1983, Perlmutter & Postal 1983, Kimenyi 1980, Polinsky & Kozinsky 1992, McGinnis 2001, McGinnis & Gerdts 2003, Zeller 2006, Zeller & Ngoboka 2006, Jerro 2015) or on agreement (Jerro 2013, Jerro & Wechsler 2015).

[1] These are indicated in the glosses with Arabic numerals. Odd classes are singular; even classes are plural.

To date, there has been no investigation into the copula system of the language; in fact, little work has looked at the semantics of copulas in Bantu languages (though see McWhorter (1992) on Swahili for a diachronic account on Swahili — cf. the discussion below).

3 Copulas in Kinyarwanda

There are two copulas in Kinyarwanda: *–ri* and *ni*. The two contrast in meaning in the third person, but the distinction is neutralized for first- and second-person in favor of the copula *–ri*. In this section I discuss the semantic contrast of the two forms.

3.1 *–ri*

The copula *–ri* is traceable to Proto-Bantu **de*, and is widespread throughout Bantu (Wald 1973). It requires a subject agreement marker, and it hosts tense morphology in the future and past tenses.[2] For example, in (3) there is no tense morphology in the present tense, while there is past tense morphology in (4).

(3) Karemera a-ri m'u Rwanda.
Karemera 1S-COP in Rwanda
'Karemera is in Rwanda.'

(4) Karemera y-a-ri m'u Rwanda.
Karemera 1S-PAST-COP in Rwanda
'Karemera was in Rwanda.

Semantically, *–ri* is only felicitous to predicate of locations, as in (5a); it is not available with predicate nominals (5b) or adjectives (5c):

(5) a. Mukamana a-ri mu rugo.
Mukamana 1S-COP in house
'Mukamana is at home.'

b. *Mukamana a-ri umwarimu.
Mukamana 1S-COP teacher
Intended: 'Mukamana is a teacher.'

c. *Mukamana a-ri munini.
Mukamana 1S-COP big
Intended: 'Mukamana is big.'

In addition to classes 1 and 2, which are reserved for humans; this contrast is found with other third-person gender classes. Examples from classes 7/8 (for inanimate objects) and 9/10 (for animals) are given in (6) – (9), respectively:

[2] I am grateful to Gilbert and Felicite Habarurema and Solange Nirere for their native speaker intuitions regarding the Kinyarwanda data.

(6) a. Igi-tabo ki-ri mu-cyumba.
7-book 7S-COP IN-room
'The book is in the room.'

b. *Igi-tabo ki-ri ubururu.
7-book 7S-COP blue
'The book is blue.'

(7) a. Ibi-tabo bi-ri mu-cyumba.
8-book 8S-COP IN-room
'The books are in the room.'

b. *Ibi-tabo bi-ri ubururu.
8-book 8S-COP blue
'The books are blue.'

(8) a. In-zovu iri mu Kagera.
9-elephant 9-COP in Akagera
'The elephant is in Akagera (National Park).'

b. *In-zovu iri ikigera.
9-elephant 9-COP grey
'The elephant is grey.'

(9) a. In-zovu zi-ri mu Kagera.
10-elephant 10-COP in Akagera
'The elephant are in Akagera (National Park).'

b. *In-zovu zi-ri ikigera.
10-elephant 10-COP grey
'The elephants are grey.'

3.2 *ni*

The copula *ni* — unlike *–ri* — does not show agreement of any kind, and does not host any tense morphology.

In the third-person, *ni* is used with predicate nominals and adjectives.

(10) a. Kyle ni mu-nini.
Kyle NI 1-big
'Kyle is big.'

b. Kyle n' umwarimu.
Kyle NI teacher
'Kyle is a teacher.'

Crucially, *ni* is in complementary distribution with *–ri* and can never be used with locative predicates:

(11) *Kyle ni mu rugo.
Kyle NI in house
Intended: 'Kyle is at home.'

Several other semantic functions are captured by *ni*, such as the various semantic categories discussed by Mikkelsen (2005, 2011).

(12) a. In-gofero ni mini.
9-hat NI big
'The hat is big.' predicative

b. Umu-curanzi njye nahuye nawe ni Michael Jackson.
1-singer I met I NI Michael Jackson
'The singer that I met is Michael Jackson.' specificational

c. Uriya ni John.
that.DIST NI John
'That (over there) is John.' identificational

d. Superman ni Clark Kent.
Superman NI Clark Kent
'Superman is Clark Kent.' equative

Crucially, none of these can be used with the *–ri* copula.

(13) a. *In-gofero a-ri mini.
9-hat 9S-COP big
'The hat is big.' predicative

b. *Umu-curanzi njye nahuye nawe a-ri Michael Jackson.
1-singer I met I 1S-COP Michael Jackson
'The singer that I met is Michael Jackson.' specificational

c. *Uriya a-ri John.
that.DIST 1S-COP John
'That (over there) is John.' identificational

d. *Superman a-ri Clark Kent.
Superman 1S-COP Clark Kent
'Superman is Clark Kent.' equative

The two also differ in their use with bare plurals. *ni* is used with bare plurals, while *–ri* cannot.

(14) a. In-zovu ni nini.
10-elephant(s) NI big
'(Generally), elephants are big.'

b. Aba-ntu ni b-eza.
2-people NI 2-kind
'(Generally), people are friendly.'

(15) a. *In-zovu zi-ri nini.
10-elephant 10S-COP big
'(Generally), elephants are big.'

b. *Aba-ntu ba-ri b-eza.
2-people 2S-COP 2-kind
'(Generally), people are friendly.'

The first-pass generalization of the distribution of the two copulas is quite straightforward: *–ri* is used for locative predicates, while *ni* is used for all other semantic constructions commonly associated with copulas, such as with predicate nominals/adjectives with specificational, identificational, equative, and bare plural readings.

3.3 The Neutralization of *ni* and *–ri*

The characterization discussed in the previous section, however, is only present in the third-person; for first- and second- person (singular and plural), *–ri* is the copula used for all types of predicates covered by *ni* in the third person. For example in (16), *–ri* (or it's allomorph *–di*) is use with predicate nominals and adjectives.

(16) a. N-di mu-nini / umu-zungu / mu rugo.
1SGS-COP 1-big 1-foreigner in house
'I am big / a foreigner / at home.'

b. U-ri mu-nini / umu-zungu / mu rugo.
2SGS-COP 1-big 1-foreigner in house
'You are big / a foreigner / at home.'

(17) a. Tu-ri ba-nini / aba-zungu / mu rugo.
1PLS-COP 2-big 2-foreigners in house
'We are big / foreigners / at home.'

b. Mu-ri ba-nini / aba-zugu / mu rugo.
2PLS-COP 2-small 2-foreigners in house
'You (plural) are big / foreigners / at home.'

This is crucially different from the pattern for the third person outlined above — cf. (5) above. In other words, for first- and second-person copula constructions, there is only one copula: *–ri*. In the third person, there is a contrast between *–ri* and *ni* where the former is restricted to locative predicates and the latter is used in all other semantic contexts. The pattern is schematized as in Table 1. Note that the different noun classes are all types of third-person categories; the ones specifically included in the table roughly correspond to classes for humans (1/2), inanimate objects (7/8), and animals (9/10).

The descriptive generalization outlined in the previous section is neutralized in first- and second- person; *–ri* is used across the board for all semantic and syntactic types of predicates.

3.4 A Comparison With Copulas in Other Bantu Languages

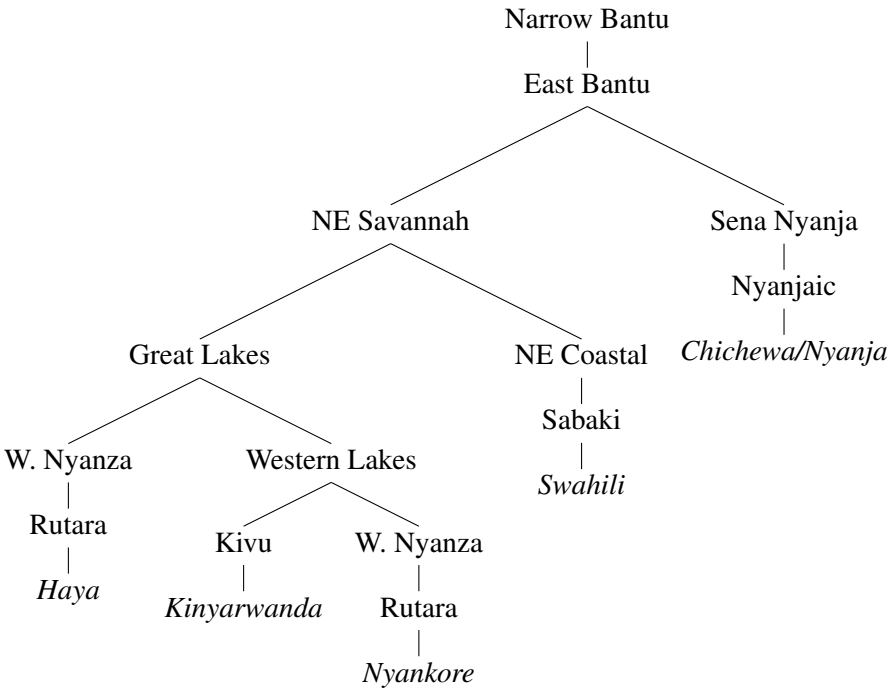
The copula *–ri* is traceable Proto-Bantu, reconstructed as **de*, and there are cognate forms throughout the Bantu-speaking region (Wald 1973). *Ni*, on the other hand, has been argued to be an innovation in Swahili, a Bantu language spoken in Tanzania, Kenya, and DR Congo

Class/Person	Copula(s)	
First Sg	ndi	
Second Sg	uri	
First Pl	turi	
Second Pl	muri	
Class 1	ari	ni
Class 2	bari	ni
Class 7	kiri	ni
Class 8	biri	ni
Class 9	iri	ni
Class 10	ziri	ni

Table 1: Interaction of *–ri* and *ni* copulas with first-, second- and third-person in the present

(McWhorter 1992). The claim of the Swahili innovation hypothesis is that *ni* originated as a focus particle which was reanalyzed as as a copula in Early Modern Swahili. However, *ni* is also found in several other East Bantu languages, such as Kinyarwanda, Runyankore (Bantu; Uganda), Haya (Bantu; Tanzania), and Chicheŵa *ndi*. The family tree in (18) gives a visualization of the languages under discussion in the East Bantu family (Schoenbrun 1997, Nurse 1999, Williamson & Blench 2000, Nurse & Phillippson 2003, Hammarström et al.).

(18)



The Swahili innovation hypothesis could be maintained if it is assumed that *ni* was spread by contact through East Africa. While the focus of this paper is not on the historical origins of this copula, I provide two arguments against the Swahili innovation hypothesis: (i) that the use of *ni* is too far-reaching in places that do not have sufficient contact with

Swahili for *ni* to have been borrowed, and (ii) that the semantic space of the copula systems is too variegated to have had various languages have borrowed form from Swahili.

The first argument against the Swahili innovation argument is that if *ni* is indeed an innovation in Swahili, its presence in other languages would be most easily explained from language contact. However, many of the languages that have *ni* have had little to no prolonged contact with Swahili, such as Kinyarwanda and Runyankore. In addition to the phonological dissimilarity between Chicheŵa *ndi* and Swahili *ni*, though the contact has also been minimal between Swahili and Chicheŵa.

Another piece of evidence against the Swahili innovation hypothesis is that the distribution of *ni* in the languages is different. In Kinyarwanda, there is the restriction of *ni* to use only with the third person. In Swahili, *ni* is used for first-, second-, and third-person (plural and singular).

(19) Hamisi / Mimi / Wewe *ni* mpishi.
Hamisi / I / you COP cook
'Hamisi/I/you is/am/are a cook.'

(20) Sisi / Ninyi / Wao *ni* wapishi.
We / You / They COP cook
'We/you/they are cooks. McWhorter 1992

Additionally, *ni* in Swahili can be omitted in specific contexts, but no work has provided a detailed explanation of what licenses these contexts (though see (McWhorter 1992 and (Pustet 2003) for brief discussions. Kinyarwanda, on the other hand, never allows the omission of the copula.

Another parallel system is found in Chicheŵa, where the distribution of the two cognate copulas shows a separate semantics from either Kinyarwanda or Swahili. Chicheŵa has *–li*, the derivative of the Proto-Bantu **de*. Like Kinyarwanda, this form agrees in person with the subject. In addition, Chicheŵa has a second copula *ndi*, which shows no agreement and is the putative cognate to *ni* in the East Bantu languages.[3] Note that the first-singular subject marker and the copula are both *ndi*.

(21) a. Ndi-ne m-phunzitsi.
COP-1SSG 1-teacher
'I am a teacher.'

b. Ndi-nu a-phunzitsi.
COP-2SPL 2-teacher
'You (formal) are a teacher.'

c. Ndi m-phunzitsi.
COP 1-teacher
'S/he is a teacher.'

(22) Ndi-ne osangalala.
COP-1S happy
'I am a happy person.'

[3] I am grateful to Geoff Mlongoti for providing the Chicheŵa examples presented here.

(23) Ndi-li bwino.
1SGS-COP good
'I am well.'

The copula *ndi* is used to convey inherent properties of the predicate, such as with professions, as shown in (21). The copula *–li* is used for temporary descriptions, centered around a specific event or point in time (see the distinction between stage- and individual-level predicates in §4). Note the use in (22), where a predicate like *osangalala* 'happy' indicates that the subject is inherently happy.

This system is distinct from both Kinyarwanda and Swahili; the *–li* copula is used with stage-level predicates, while *ndi* is used with individual-level predicates. Assuming that this form is cognate to Swahili and Kinyarwanda *ni*, it is unlikely that it was recently borrowed from Swahili. I argue that this means that the *ni* copula is traceable to the East Bantu sub-branch.[4]

Moving to other copulas in Bantu languages, Swahili has a special set of copulas for locations: *–ko, –po,* and *–mo*. In grammars, each of the three are described as depending on the nature of a location (at, inside, etc), but crucially, all are specifically used for kinds of locations.

(24) a. Mohammed yu-ko wapi?
Mohammed CL1S-COP where
'Where is Mohammed?'

b. Sukari i-ko wapi?
Mohammed CL1S-COP where
'Where is the sugar?' Russell (2003:18)

Interestingly, the cognate to *–ri* in Swahili grammaticalized into the verbal past tense morpheme *li–*.

(25) A-li-taka mvinyo.
3SGS-PST-want wine
'He wanted wine.'

Because of grammatical reanalysis of the copula as a tense marker, there is no synchronic cognate copula to *–ri* in Swahili.

Another pattern for expressing identification in some languages is a change in tone on the first syllable of the noun. This is found in languages like Shona (Bantu; Zimbabwe).

(26) a. mùnhù
person
'person'

b. múnhù
person.PRED
'it is a person' Shona; Welmers 1973:323

This option, however, does not seem exploited in the East Bantu branch of the family.

[4]Given the tendency for languages to delete sounds, it is possible that the earlier form would be *ndi*, and the /d/ is deleted in some of the cognate languages.

4 Work on Multi-Copular Systems

Moving outside of the Bantu family, there are several languages with multi-copula systems where the choice of copula depends on the syntactic nature of the predicate and/or the semantics of the copular construction. In this section, I outline three different kinds of multi-copular systems that have been discussed in the literature, which I call lexical category systems, stage- and individual-level systems, and particular-characterizing systems. I go through each of these kinds of systems and show that the Kinyarwanda pattern does not fit with the generalization for the other languages discussed in the literature.

In some languages with multiple copulas, the use of a particular copula depends on the lexical category of the predicate. For example, Bambara (Niger-Congo; Mali) has four copulas used with nominals, adjectives, verbal predicates, and "quantificational, temporal, and participial predicates, among other things" (Pustet 2003:46,[2.75-2.78]), as in (27a-d), respectively.

(27) a. nìn ye námása ye
this COPa banana COP
'This is a banana.'

b. so ka sùrun
house COPb small
'The house is small.'

c. ne bɛ taa
1SG COPc leave
'I am leaving.'

d. caman dòn.
many COPd
'There are many.'

It is possible that the distinction between *ni* and *–ri* is simply a difference in the category of the predicate; *–ri* always appears with a PP, while *ni* can appear with nouns and adjectives, there seems to be something a deeper explanation to be uncovered.

A frequently noted semantic difference between copulas is between stage- and individual-level predicates (Carlson 1977, Kratzer 1988, Fernald 2000, Bochnak et al. 2011). A stage-level predicate is one that describes an accidental or transitory property of an individual. Individual-level predicates, on the other hand, describe an essential, time-stable property of an individual. For many languages, it has been argued that their two copulas are used in line with these two kinds of predicates. Examples of this distinction have been given for many languages, including Spanish in (28) and Washo (29).

(28) a. María es rubia.
Maria is(*ser*) blond
'Mary is blonde.'

b. Maria está cansada.
Maria is(*estar*) tired
'Mary is tired.' (Maienborn 2005:156,[1])

(29) a. daʔmóʔmoʔ de-meléʔyigi k'éʔi
woman NOM-drunk-ATTR COP
'The woman is a drunkard.'

b. daʔmóʔmoʔ meléʔyigi
woman drunk
'The woman is drunk.' (Bochnak et al. 2011:5,[25])

The (a) sentences have the individual-level interpretation, while the (b) sentences have a stage-level interpretation. For example, in (29), the crucial distinction is between whether the woman is currently drunk at the time of the utterance (a stage-level reading) or whether drunkenness is a time-stable property of the woman (an individual-level reading).

Another distinction proposed in the literature is between particular and characterizing interpretations, which intersects with the distinction between stage- and individual-level predicates (Deo 2011). A particular claim is one where some situation holds at the evaluation index (e.g. now), while a characterizing claim is a generalization which holds across indices (including now). In short, a characterizing claim is one that holds generally or is a habitual action. An example of this distinction comes from Marathi:

(30) a. anu vyasta āh-e
Anu busy COP1-PRES
'Anu is busy (right now).'

b. anu vyasta as-t-e
Anu busy COP2-PRES-F
'Anu is (generally) busy.' (Deo 2011:4,[8])

In (30a), the interpretation is that the person is busy at the relevant point in time (i.e. the present), while (30b) says that the person is generally busy, including being busy at the relevant point in time (the present).

None of the three patterns outlined above for multi-copular systems fits the pattern found in Kinyarwanda. As I show in the following section, the crucial component to the Kinyarwanda system is that the *–ri* copula is a predicate for locations.

5 An Analysis of the Copula System in Kinyarwanda

5.1 Determining *–ri* vs. *ni* in Kinyarwanda

Returning to the copulas *ni* and *–ri* in Kinyarwanda, a central question is what captures the distribution of the two forms. I entertain three hypotheses for capturing the distinction between the two copulas: morphological suppletion, the stage- and individual-level distinction, and locatives. I elaborate on the predictions of each of these hypotheses and ultimately argue for the locatives analysis of the Kinyarwanda copula.

The first hypothesis is that that the two are two suppletive phonological forms of the same paradigm, comparable to the distinction between *is* and *are* in Standard English. This hypothesis can be ruled out since the two forms always contrast semantically. There is another form *–ba* which is used in the future and infinitive (i.e. *ku-ba* 'to be'), and this

form can be considered suppletive. There is no contrast in meaning with *–ba*; all copular meanings take *–ba* in the future. I return to this point in (43) and (44). Because *ni* and *–ri* are in complementary distribution semantically, I rule out the suppletion hypothesis.

A second hypothesis is that the difference aligns with the distinction between stage-level and individual-level predicates (cf. Bochnak et al. (2011) on Washo), where *ni* is for individual-level predicates and *–ri* is for stage-level predicates. While this is technically an accurate portrayal of the two forms because locations are a subset of stage-level predicates, but it's not strongly predictive of the distribution of *–ri*, which is only used with locations and no other stage-level predicates. There is no negative evidence for other non-locational stage-level predicates because the language uses verbs to convey stage-level states. The sentences in (31) are examples of the types of stage-level predicates are indicated with verbs.

(31) a. Karemera a-ra-huz-e.
Karemera 1S-PRES-busy-PERF
'Karemera is busy.'

b. Mukamana a-r-ishim-ye.
Mukamana 1S-PRES-happy-PERF
'Mukamana is happy.'

c. Mama a-ra-baba-ye.
Mama 1S-PRES-sad-PERF
'Mama is sad.'

The distinction between stage- and individual-level predicates does not quite fit the system in Kinyarwanda since there are no non-locational stage-level predicates to test against the hypothesis.

I propose a new system for the copulas in Kinyarwanda, which is that *–ri* is reserved for explicit statements about locations.

(32) Umw-ana a-ri i Kigali / mu rugo / kw' ishuri.
1-child 1S-COP in Kigali / in home / at school
'The child is in Kigali / at home / at school.'

All other semantic types of copular sentences are left for *ni*, such as (33) and (34), repeated from (44) and (15) above.

(33) a. Kyle ni mu-nini.
Kyle NI 1-big
'Kyle is big.'

b. Kyle n' umwarimu.
Kyle NI teacher
'Kyle is a teacher.'

(34) a. In-zovu ni nini.
10-elephant(s) NI big
'(Generally), elephants are big.'

b. Aba-ntu ni b-eza.
2-people NI 2-kind
'(Generally), people are friendly.'

There is one instance where the two forms overlap in use, though they still contrast in meaning. In sentences that indicate a permanent location of a place, such as a city located within a country, both copulas may be used. Consider the examples in (35) – (36), which describes that Kigali is a city in Rwanda.

(35) Kigali i-ri mu Rwanda.
Kigali 9S-COP in Rwanda
'Kigali is in Rwanda.'

(36) Kigali ni mu Rwanda
Kigali COP in Rwanda
'Kigali is in Rwanda.'

If stage-level and individual-level interpretations where the crucial interpretive distinction between *–ri* and *ni*, it would be expected that *ni* would be used with permanent locations, and *–ri* would be unavailable in a sentence like (35). The ability for *–ri* to appear is predicted by its semantics of location, while the use of *ni* in (36) is predicted from its use as an individual-level predicate.[5]

A possible counterargument to the analysis presented so far is that *–ri* is actually categorized to appear with prepositional phrases. In the data presented so far, each use of the *–ri* copula appears with a prepositional phrase. However, *–ri* may does appear with locative adverbials, such as *hano* 'here' and *aho* 'there.'

(37) a. Umw-ana a-ri hano.
1-child 1S-COP here
'The child is here.'

b. Umw-ana a-ri aho.
1-child 1S-COP there
'The child is there.'

The data in (37a) show that the use of *–ri* is not restricted by lexical category (i.e. prepositional phrases); prepositional and adverbial locatives are permitted with *–ri*, as long as the predicate is a location.

The locational analysis can also be extended to Swahili, where there is a class of locative copulas *–ko, –po,* and *–mo*. In fact, these forms are arguably reanalyses of locative clitics are found in several other Bantu languages. For example, in Lubukusu (Bantu; Kenya) and Kinyarwanda, the locative clitics *mo* and *ho* can be added to verbs to replace a location.

[5]Speakers do note that there is a semantics contrast between (35) and (36), where the sentence with *–ri* is more "about a location." More data needs to be collected to investigate the exact semantic difference between the two forms. However, the crucial point here is that the analysis outlined in this paper predicts that this *should* be a place where the two forms overlap, given that statements about the location of a city are both locations (indicated with *–ri*) and individual level predicates (indicated with *ni*.

(38) ku-mw-iti kw-a-kw-ile-**mo**.
3-3-tree 3SM-PST-fall-pst-18
'A tree fell in there.' Lubukusu; Diercks (2011:68,(7))

(39) Umu-gore y-ohere-je-**ho** umw-ana.
CL1-woman CL1-send-PERF-LOC CL1-child
'The woman sent the child there.' Kinyarwanda

From the morphological evidence, it can be concluded that when the *–li* was reanalyzed as a tense marker in Swahili (cf. (25) above), it was replaced by another form to predicate over locations, the locative clitic. The innovation of locative clitics as the replacement for *–li* suggests that *–li* in Swahili had a locational use comparable to the synchronic pattern for Kinyarwanda.

Furthermore, Pustet (2003) suggests that Swahili allows stage-level predicates, using *ni*, though she doesn't give any full examples. This suggests the locative hypothesis for Swahili copula *–ko*; if *ni* can truly appear with stage-level predicates, then the crucial contrast between *–ko* and *ni* in Swahili is not stage-level and individual-level readings, but rather whether the predicate is locational.

(40) a. *changamfu* 'be in a good mood, entertaining, entertainer'
b. *oga* 'afraid, cowardly, timid'

An interesting point in interest in Swahili is the seeming stage-level and individual-level distinction, with the *–ko* form being used with a comitative to create a stage-level reading, as in (41). The verb *ku-na* 'to have' is used for individual-level interpretations. [6]

(41) Ni-ko na njaa.
1SGS-COP with hunger
'I am hungry (right now).'

(42) Ni-na njaa.
1SGS-have hunger
'I am hungry (in general).'

Crucially, this contrast does not exist in Kinyarwanda; there is no comparable comitative possession construction in the language. While more remains to be investigated in the Swahili system, it is clear that location is the crucial component for the Kinyarwanda system.

5.2 Person Neutralization in Kinyarwanda

The distinction just discussed for *ni* and *–ri* holds for third-person subjects, but with first- and second-person, recall that both use *–ri* for all the different semantic and syntactic environments. In other words, the contrast between copula is neutralized in first- and second-person.

[6] I am grateful to Justine and Hellen Sikuku for their explanation of this contrast in Swahili. See also Diercks & Halpert 2013 for discussion of constructions of the type in (42).

I propose that the heightened attention to location (i.e. a form dedicated to expressing the location of third-person entities) is related to the neutralization in the third person, through a notion of *central relevance*. I define central relevance as information that is privileged in relevance to interlocutors in a given discourse. Given that *–ri* introduces a semantics of location, I argue that the location of third-party entities is more relevant to the immediate discourse than the location of the first- and second-person entities, which can be taken for granted, since they are participants in a conversation at a specific place and time. The location of third parties, however, is not as easily taken for granted. Hence, the distinction between the locative copula *–ri* and the general copula *ni* is not relevant for first- and second-person because the location of these participants can be assumed from real-world knowledge.

This notion has been used in other places in research on semantics, specifically a mix of the notions of current relevance and central coincidence. The notion of current relevance has been used in work on tense and aspect as a way of understand perfect tenses (see McCoard (1978), Li et al. (1982), Dahl & Hedin (2000)). In this work, current relevance is defined as "the continuance of the result of a past event into the present" (Dahl & Hedin 2000:391). When a sentence with a verb in the perfect is used (e.g. *I have eaten*), it is implicated that the event is relevant to the present conversation.

Central coincidence has been a notion invoked in literature that has noticed various instances where third person behaves differently from first- and second- person, especially in instances of split ergativity (Hale 1986, Demirdache & Uribe-Extebarria 1997, Coon & Preminger 2013, Ritter & Wiltschko 2014). The distinction between *ni* and *–ri* is only present for third-person entities because describing the third-person's location is the most relevant; first- and second-person are both present and can be taken for granted in the conversation. This is because the notion of central relevance makes third-person present information more privileged, predicting a distinction between different forms in third-person present. If the division between the two copulas is due to the relevance of the current location of a third-party, then it is predicted by this analysis that the distinction between *ni* and *–ri* will also be neutralized in non-present tenses.

The prediction, then, is that there will be neutralization with third person in the past and future tenses regardless of semantics. This prediction is borne out; locatives and predicate nominals both use *–ri* in the past and the form *–ba* in the future ((b)-(c), respectively.)

(43) a. John a-ri i Kigali.
John 1S-COP in Kigali
'John is in Kigali.'

b. John y-a-ri i Kigali.
John 1S-PAST-COP in Kigali
'John was in Kigali.'

c. John a-za-ba i Kigali.
John 1S-FUT-COP in Kigali
'John will be in Kigali.'

(44) a. John ni umwarimu.
John NI teacher

'John is a teacher.'

b. John y-a-ri umwarimu.
John 1S-PAST-COP teacher
'John was a teacher.'

c. John a-za-ba umwarimu.
John 1S-FUT-COP teacher
'John will be a teacher.'

The data in (43) – (44) show that the contrast in the present between *ni* and *–ri* is neutralized in the past and future. The (a) sentences exhibit the contrast between *–ri* and *ni*, which must be used with locations and non-locations, respectively. In the (b) and (c) sentences, however, locations and non-locations are marked with tense-marked *–ri* in the past and tense marked *–ba* for the future. This situation is summarized in Table 2.

Tense	Copula	
present	ari	ni
past	yari	
future	azaba	

Table 2: Interactions with Tense and Person

The neutralization of the two copulas with past and future tenses supports the hypothesis that the distinction between *ni* and *–ri* in Kinyarwanda is contingent upon the notion of current relevance.

6 Conclusion and Unresolved Research Questions

In this paper, I have documented the distribution of *ni* and *–ri* in Kinyarwanda. I showed that in Kinyarwanda (and Northeastern Bantu languages more generally), copulas are distinguished by whether the predicate is a location. Furthermore, I claimed that the neutralization of the contrast between *ni* and *–ri* is explained by locational current relevance, resulting in the contrast only appearing in the third-person singular.

Finally, I argued that against earlier work on the copula *ni* in Swahili, claiming that this copula is more likely a form from an earlier stage of the Northeastern Branch, capturing its distribution throughout Northeastern members of the family.

While this paper has focused on description and analysis of the copula the system in Kinyarwanda, many questions on the semantics of copulas remain for these languages, and the variation found across the Bantu family is fruitful for future typological investigation.

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Experimental evidence for a tenseless declarative clause type in English

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Abstract

This paper proposes that the amalgam pseudocleft construction in English (e.g., *What she likes is she likes coffee*) is atemporal, in contrast to the canonical pseudocleft (e.g., *What she likes is coffee*). Evidence from informal acceptability surveys and controlled judgment tasks shows that the amalgam pseudocleft's copula fails to combine with TP material and fails to support a temporal interpretation. The amalgam pseudocleft is nevertheless finite: its copula is inflected, and it is anchored to the utterance context. Anchoring in the amalgam pseudocleft obtains in an unusual way, namely, via a direct relation between the copular predication and the deictic utterance context.

1 Introduction

A key property of finite clauses is that they are anchored to the utterance context (e.g., Bianchi 2003, Sigurðsson 2004, Ritter & Wiltschko 2014, among others). They can express propositions about displaced events and individuals, but they are evaluated from the point of view of the utterance participants. In a tense-based language like English, finite declarative clauses are generally *temporally* anchored. A Topic Time under discussion is anchored to the indexical Utterance Time via (expressions in) the functional structure of the clause (e.g., Zagona 1990, Klein 1994, Stowell 1996, 2007, Demirdache & Uribe-Etxebarria 2000, 2007, Kratzer 1998). While it is often assumed that a declarative finite clause *must* be tensed, I argue that anchoring can obtain in the absence of tense.

The central claim of this paper is that English has a clause type, the amalgam pseudocleft, which is declarative and finite, but nevertheless tenseless. The amalgam pseudocleft is exemplified in (1), where a finite form of the copula relates two clausal constituents: an indirect question and a bare finite clause (see also Ross 1972, 2000, den Dikken et al. 2000, Lambrecht & Ross-Hagebaum 2006, O'Neill 2015).

(1) a. [What she wants] **is** [she wants that brisket].
b. [She wants that brisket] **is** [what she wants].

I will argue that the amalgam pseudocleft clause, which is morphologically and functionally finite, lacks a Topic Time and does not encode a temporal relation. Instead, the clause expresses a direct relation to the utterance context.

Since the null hypothesis is that finite declaratives in English are temporally anchored, I provide experimental evidence for the absence of semantic TENSE in amalgam pseudoclefts.[1] The experiments compare the amalgam pseudocleft and its close structural relative, the canonical pseudocleft, (2).

[1] Since tense phenomena occur in the morphological, syntactic, and semantic components of the grammar, I

(2) a. What she wants is that brisket.
b. That brisket is what she wants.

The canonical pseudocleft exhibits a restricted set of tense forms and interpretations (see Higgins 1979, Declerck 1988, Sharvit 2003, Romero 2004, O'Neill 2015), due to the structural relationship between the embedded verb and the copula, as well as the meaning of the specification relationship. Since the canonical pseudocleft shares these restrictions with the amalgam pseudocleft, it offers a useful control in testing the status of tense in the amalgam pseudocleft type.

Experiment 1 involves an acceptability judgment task showing that while the copula of a canonical pseudocleft can support the future modal *will*, the copula of an amalgam pseudocleft cannot. In Experiment 2, an interpretation task provides evidence that the copula *was* in a canonical pseudocleft can contribute a PAST-shifted temporal interpretation, while *was* in an amalgam pseudocleft clause contributes no temporal interpretation. The results of these experiments support the conclusion that the amalgam pseudocleft clause is atemporal.

Since the amalgam pseudocleft clause is atemporal, but nevertheless finite, I propose that its finiteness stems from an anchoring relation that takes place entirely in the clausal left periphery. The clause is directly anchored to the indexical utterance context, without the mediation of a temporal relation. Support for this analysis comes from the relatively unconstrained distribution of speech-act and speaker-oriented modifiers in amalgam pseudoclefts, in contrast to temporal and aspectual modifiers. Given that only modifiers that are associated with the utterance context in the left-peripheral domain of the clause can occur in the amalgam pseudocleft, I conclude that only the utterance context participates in the anchoring relation. The amalgam pseudocleft thus exemplifies a theoretically possible, but previously unattested tenseless finite clause type in English.

2 Amalgam and canonical pseudoclefts

This section provides a brief description of the amalgam pseudocleft in comparison to its canonical pseudocleft counterpart, in order to set the stage for the analysis.

2.1 Components of the amalgam pseudocleft

Under the rubric of the amalgam pseudocleft, I include any sentence of the following form.[2]

will use the following typographical conventions to indicate which module is under discussion. Small capitals (e.g., PAST, PRESENT, TENSE) are used to refer to tenses in the semantic component; square brackets (e.g., [past], [present]) are used to refer to the morphological expression of tense; sentence case (e.g., Tense) is used to refer to the syntactic projection associated with temporal argument structure. Plain text is used to refer to the topic of tense in a more general way.

[2]In the interest of space, I set aside a variant of the amalgam pseudocleft clause type, which features a concealed question DP in place of an indirect question CP:

(i) a. [The dish that she ordered]$_{DP}$ was she ordered that brisket.
b. She didn't order the brisket was [her mistake]$_{DP}$.

This clause type patterns with amalgam pseudoclefts with respect to the crucial properties under discussion in this paper (see O'Neill 2015: Chapters 4 and 5 for a detailed analysis).

(3) a. [XP] BE [YP] OR
b. [YP] BE [XP] where
(i) [XP] is a CP in the form of an indirect question;
(ii) [YP] is a CP in the form of a root finite clause that provides an answer to the question in [XP];
(iii) and BE is a finite form of the copula.

(3-a–b) entails that the question and answer constituents are reversible: they can "switch places" around the copula.

(4) a. [She drinks coffee] is [what she drinks].
b. [What she drinks] is [she drinks coffee].

The term "amalgam" (pseudo)cleft originates in Declerck (1988). These sentences were labeled as "amalgams" because they seem to consist of two sentences overlapping on a shared constituent (see Lakoff 1974, among many others). For example, the pseudocleft in (5) appears superficially to be an amalgamation of the sentences in (5-a) and (5-b). The area of apparent overlap is identified with angle brackets.

(5) I want a vacation is what I want.
a. I want <a vacation>.
b. <A vacation> is what I want.

Although I adopt the label "amalgam", I do not in fact treat these sentences as amalgamations. Instead, the two clauses flanking the copula are separate constituents.

What sets the amalgam pseudocleft apart from other sentence types is that a *bare finite clause* serves as the subject of predication, rather than a nominal category. Moreover, this bare finite clause can serve as the structural subject of the copular clause, as in (4-a) and (5), which is impossible in other clause types, like (6).

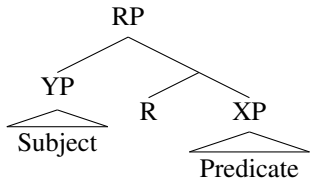
(6) a. *She drinks coffee will stunt her growth.
b. *She drinks coffee is unfortunate.
c. *She drinks coffee upsets me.

This unusual property of the amalgam pseudocleft—the presence of a root clause, rather than a nominal category, as subject—is related to its unusual functional spine. Since, as I will propose, the spine of the amalgam pseudocleft lacks TP, it does not manifest the same agreement and case patterns as ordinary clauses, and permits a non-nominal category as its subject.

2.2 Structure of amalgam and canonical pseudoclefts

Following Williams (1983), Partee (1986), Mikkelsen (2005), den Dikken (2006), and others, I adopt a(n inverse) predication approach to specificational copular sentences (including pseudoclefts), where the two constituents flanking the copula originate as the subject and predicate of a small clause, as in (7), where R stands for Relator, in the sense of den Dikken (2006).

(7)



Specificational sentences are marked in their reversibility: either the subject or predicate of the small clause ultimately comes to occupy the structural subject position. The less referential expression (the *wh*-clause, in pseudoclefts) serves as the underlying predicate, and the focused referential expression is the small clause subject. Specificational sentences have a fixed information structure, which many previous studies have related to the availability of the marked alignment of the predicate with the subject position (e.g., Mikkelsen 2005, den Dikken 2006). The predicate is always the topic and the subject is the focus.

Pseudoclefts, where the predicate is a *wh*-clause, exhibit clear parallels with question-answer pairs. Just as in a question-answer pair, the focused subject identifies *who* or *what* the value of the predicate is. In canonical pseudoclefts, the focus directly specifies the value of the variable, while in amalgam pseudoclefts, the focus is a full propositional "answer". In the canonical pseudocleft in (8-a), for example, the focus *that brisket* specifies the content of the variable in the predicate *what she wants*. Similarly, in the amalgam pseudocleft in (8-b), the focused proposition *she wants that brisket* specifies the content of the variable in the indirect question CP *what she wants*, if questions include variables ranging over propositions that serve as their potential or true answers (Karttunen 1977, Groenendijk & Stokhof 1997, Schlenker 2003).

(8) a. [What she wants]$_{topic}$ is [that brisket]$_{focus}$ canonical pseudocleft
b. [What she wants]$_{topic}$ is [she wants that brisket$_{F}$]$_{focus}$ amalgam pseudocleft

Canonical and amalgam pseudoclefts are thus similar, not only in their information structure, but also in their syntactic configuration. They allow predicate inversion, and they exhibit restrictions on A′-extraction (related to their frozen information structure), embedding, and ellipsis (see O'Neill 2015 for an empirical overview).[3] In the interest of space, I will set aside these properties in order to focus on tense phenomena in the two pseudocleft types.

2.3 Tense properties of pseudoclefts

Both pseudocleft types exhibit some restrictions in their morphological [tense] properties. The formal similarity between the two obscures the deeper difference: the absence of Tense domain structure and temporal semantics in the amalgam pseudocleft. The straightforward morphological facts are summarized here, while section 4 examines the distribution of syntactic and semantic tense.

[3]There are speakers for whom only the *wh*-initial order of the amalgam, as in (8-b), is acceptable (den Dikken et al. 2000). In O'Neill (2015), I propose that for these speakers, the predicate-initial order is a base-generated Topic-Comment structure, as in den Dikken et al. (2000), while for the other speakers, amalgam pseudoclefts are derived from the predicational small clause source, as in (7).

Both the canonical and amalgam pseudocleft clauses tend to feature a simple form copula which matches the [tense] of the lexical verb in the predicate ((a)–(d) examples below). A mismatched pattern is also possible, where the lexical verb is [past], while the copula remains [present] ((e)–(f) examples below). The copula must not be [past] while the lexical verb is [present], however ((g)–(h) examples below), which is striking, since this combination is grammatical, albeit marked, in other clause types.

(9) Canonical pseudocleft: tense combinations

a. What they **need is** a vacation.
b. A vacation **is** what they **need**.
c. What they **needed was** a vacation.
d. A vacation **was** what they **needed**.
e. What they **needed is** a vacation.
f. A vacation **is** what they **needed**.
g. *What they **need was** a vacation.
h. *A vacation **was** what they **need**.

(10) Amalgam pseudocleft: tense combinations

a. What they **need is** they **need** a vacation.
b. They **need** a vacation **is** what they **need**.
c. What they **needed was** they **needed** a vacation.
d. They **needed** a vacation **was** what they **needed**.
e. What they **needed is** they **needed** a vacation.
f. They **needed** a vacation **is** what they **needed**.
g. *What they **was** they **need** a vacation.
h. *They **need** a vacation **was** what they **need**.

The literature on tense patterns in pseudoclefts goes so far as to claim that the copula in specificational contexts *must* remain bare, or that it does not really indicate matrix TENSE (Sharvit 2003). Instead, the copula's [tense] form is supposed to depend on the TENSE of the embedded verb. For example, Higgins (1979: 294) states that "the tense of the copula in a specificational pseudo-cleft sentence is not an independent variable", and Declerck (1988) proposes that the tense meaning (and form) of the copula is "neutralized" in the environment of the embedded lexical verb. Given these patterns, it is not straightforward to detect the distinction between these two pseudocleft types with respect to TENSE; however, I will show that while the restrictions on canonical pseudoclefts are real, they are less stringent than those that hold of amalgam pseudoclefts.

3 Proposal

Finite declarative clauses must be anchored to the utterance context, but it does not follow that the anchoring relation involves the same elements in all languages or in all clause types. While anchoring is normally modeled as a temporal relation, recent work has argued that the same kind of relation obtains in so-called tenseless languages, where the deictic anchor is not the utterance *time*, but instead a *person, location*, or *world* element of the utterance

context (e.g., Shaer 2003, Amritavalli 2013, Ritter & Wiltschko 2014). English, as we know, is not a tenseless language. Amalgam pseudoclefts, however, are a tenseless clause type—they lack the syntactic domain of Tense and the corresponding temporal semantics.

I propose that amalgam pseudoclefts lack the projection of T, so they fail to support the syntactic trappings of TP, including temporal modifiers, auxiliaries, deontic modals, and negation. They have the basic small clause structure illustrated in (7), like their canonical counterparts, but R is instantiated directly by a clausal functional head above T: lower functional structure is absent.

The amalgam pseudocleft clause, lacking T, also lacks temporal argument structure. It includes no relation between a Topic Time under discussion and a temporal anchor. The amalgam pseudocleft is instead anchored *directly* to the utterance context, a relation that takes place entirely in the CP structural domain. This unusual anchoring strategy has the result that the copular clause in the pseudocleft does not express a property of a time. Instead, it expresses a property of an utterance context.

This analysis relates the amalgam pseudocleft's tenselessness to its more obvious unusual property, which is the fact that its subject is a bare, root-like finite clause, and not a nominal expression. While canonical clauses ascribe properties to individuals, then to Topic Times, and lastly to indexical elements of the utterance context, amalgam pseudoclefts ascribe properties only to propositions and utterance contexts.

3.1 Analytical framework

Before introducing the specific predictions of the proposal, which will be supported by experimental evidence, I briefly outline my approach to the syntax and semantics of temporal anchoring.

3.1.1 Temporal primitives

This paper takes a neo-Reichenbachian approach to TENSE, where TENSE involves temporal pronouns and ordering predicates (see, e.g., Partee 1973, Zagona 1990, Klein 1994, Stowell 1996, Kratzer 1998, Demirdache & Uribe-Etxebarria 2000, 2007). The ordering predicates serve to locate temporal pronouns with respect to each other. Abstracting away from Aspect, I assume that ordinary clauses include a relation between a contextually presupposed Topic Time (TT) and a Reference Time (RT). In a finite matrix clause, a binding relation anchors RT to the indexical Utterance Time (UT), while in an embedded clause, RT may be anchored to/bound by a superordinate TT.

The examples in (11) illustrate these components of temporal argument structure.

(11) a. Joe was a swimmer.
b. I heard [that Joe was a swimmer].

In (11-a), some contextually salient time under discussion (TT) is a time where Joe has the property of being a swimmer. A temporal ordering predicate locates TT in the past with respect to a RT. Abstraction over times in the resulting proposition leaves a temporal variable, which is then fed the indexical UT referring to the speaker's NOW in the matrix left periphery. The sentence therefore means that in a contextually salient time that is past

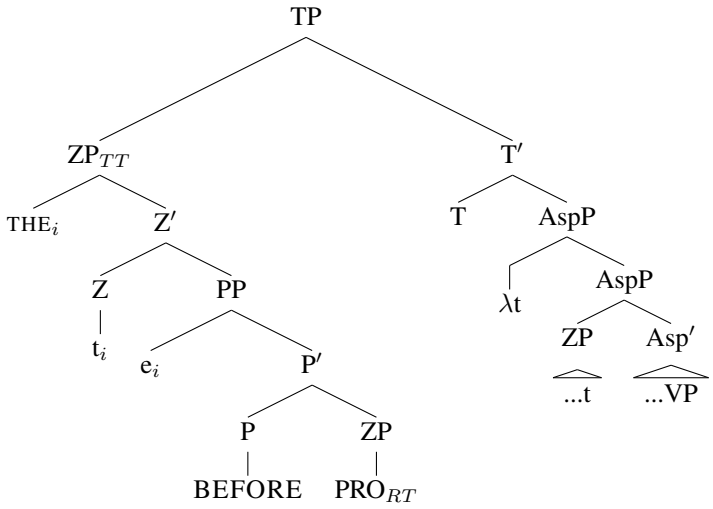
with respect to the speaker's NOW, Joe was a swimmer. The relation between TT and RT and the relation between RT and UT together satisfy the anchoring requirement of finite clauses.

In the embedded clause in (11-b), anchoring proceeds differently. The predicate abstract over RT applies to matrix TT, since no UT is present in the embedded clause. If the clause contains a PAST tense relation, then it is interpreted as past-shifted with respect to the matrix clause. In that case, (11-b) means that Joe was a swimmer at some salient past time that precedes the time where I heard about it. If, on the other hand, the embedded clause contains a zero-TENSE (a simple TT, rather than one that contains a temporal relation to an RT, e.g., Kratzer 1998), the predicate abstract applies directly to the superordinate TT, yielding an interpretation of simultaneity (sequence-of-tenses). In English, both options are available for stative predicates and copular *be*.

3.1.2 Syntax of TENSE

The syntactic implementation of this framework treats TP as the locus of TT and the anchoring relation to RT. Consider the tree in (12), which has the paraphrase in (13).

(12)



(13) 'The contextually relevant time that is before RT has the property of standing in some aspectual ordering relationship with an Event Time that has the property VP.'

Temporal pronouns are labeled ZP, following Zagona (1990). TP denotes a predicate of times, which applies to an indexical UT in the left periphery. The role of T in the syntax is to relate the projection of the verb (vP or AspP), a property of times, to the TT-ZP in its specifier.[4] ZP is a complex expression, headed by a generalized quantifier analogous to a definite determiner. ZP includes a PP restrictive modifier locating it with respect to RT. This model of temporal argument structure follows that of Demirdache & Uribe-Etxebarria (2007) closely, but unlike their model, I do not locate the temporal ordering predicate in T; I locate it in a restrictive small clause modifier of TT. Like the small clause head, T serves

[4]The nominal structural subject must therefore be accommodated in a neighboring specifier position like Subj, made available in the dense functional field surrounding TP in the cartographic framework.

as a vacuous Relator of temporal individuals and properties.

The C-domain, whose lower bound in the cartographic framework is Fin, introduces the utterance context itself. This approach directly exploits the idea found in, e.g., Bianchi (2003), Schlenker (2004), Sigurðsson (2004), and Giorgi 2010, that elements of the extralinguistic context are structurally represented in the clausal left periphery. Fin, like T, is semantically vacuous, simply mediating the predication relation. The utterance context is an indexical expression that is essentially a set of coordinates pointing to the time, location, participants, and world of the utterance context (Schlenker 2004). The utterance context therefore includes UT, but also *author*, *location*, etc.

This model distinguishes between semantic TENSE and morphological [tense], a necessary distinction in view of the data from amalgam pseudoclefts, where the copula is inflected for [tense] although it does not associate with semantic TENSE. The copular clause of the amalgam pseudocleft lacks temporal argument structure altogether: it includes no ZP-TT and therefore no temporal ordering modifier.

3.2 Predictions of the analysis

The tenseless analysis of the amalgam pseudocleft predicts that it should not support temporal markers or functional structure from the T-domain. According to the structural analysis of TENSE sketched above, it should also lack a temporal relation to RT. Any [tense] *forms* found in the amalgam pseudocleft clause should be devoid of TENSE *meaning*.

The process of verifying these predictions is complicated by the fact that the canonical pseudocleft's temporal marking and interpretation is also restricted, according to claims in the literature; however, given the ordinary distribution of nominative case, [ϕ]-agreement, and [tense] inflection, there is no reason to suppose that the canonical pseudocleft is Tenseless/TENSE-less. Both pseudocleft types have a limited range of combinatorial possibilities when it comes to functional elements from the T-domain and temporal interpretation, but the present analysis predicts an asymmetry between the two sentence types. The next section presents judgment data showing that these predictions are borne out when the pseudocleft types are directly compared.

4 Evidence for the tenseless analysis of amalgam pseudoclefts

First, this section presents informal acceptability judgment contrasts between canonical and amalgam pseudoclefts consistent with the presence of TP in canonicals and the absence of TP in amalgams. Next, we take a closer look at the asymmetry in the acceptability of temporal markers in Experiment 1, a study of the acceptability of future *will* in the two pseudoclefts. Finally, Experiment 2 teases out the asymmetry in the temporal semantics of the two constructions, demonstrating that not only do amalgam pseudoclefts lack a TP projection; they also lack semantic TENSE.

4.1 Temporal markers in pseudoclefts

Although both types of pseudocleft exhibit a restricted set of [tense] marking patterns, the amalgam pseudocleft copula is incompatible with functional material and modifiers from

the AspP and TP domains of the clause, while the canonical pseudocleft copula is much more permissive, behaving like a bona fide occupant of T.

Speakers accept canonical pseudoclefts like those in (14) (given in predicate-initial order, which is the more restricted of the two orders), particularly when contextual support is provided.

(14) a. What they'll need **will be** a vacation.
b. What she liked **had always been** brisket.
c. **Yesterday, when I saw him**, what he had was an iPhone.

Negation and deontic modals, located immediately below T in English, are compatible with the canonical pseudocleft as well.

(15) a. What he wanted **wasn't** the brisket.
b. If they want to be in compliance, then what the offer is/must be **must legally be** four weeks of paid leave.

Amalgam pseudoclefts show a starkly different pattern when it comes to such functional material. Their copula fails to combine with temporal, aspectual, and deontic modal markers, as well as negation.

(16) a. *What they'll need **will be** they'll need a vacation.
b. *What she liked **had always been** she liked brisket.
c. ??**Yesterday, when I saw him**, what he had was he had an iPhone.
d. *What he wanted **wasn't** he wanted the brisket.
e. *If they want to be in compliance, then what the offer is/must be **must legally be** they (must) offer four weeks of paid leave.

In contrast to the canonical pseudocleft copula, the amalgam copula does not appear to be an ordinary occupant of T.

4.2 Experiment 1: Future marking

Speaker judgments of functional material in pseudoclefts are notoriously variable. Consider the distribution of the temporal auxiliary *will* in pseudoclefts, as a case study.

Akmajian (1979), Sharvit (2003), and others report that *will* is incompatible with the specificational copula. This claim is controversial, however. Declerck (1988) and Ross (2000) observe that particularly when *will* also occurs in the embedded *wh*-clause, the pseudocleft remains perfectly acceptable.

(17) What you**'ll** want **will be** the daily special.

Moreover, Hedberg (2008) gives the following example, cited from a written corpus, where the copula alone bears future marking.

(18) But what really may be at issue when this comes to term **will be** deployment of SDI.

In addition, in (18), the adverbial *when*-clause indicates that the specification relation itself has a future-time interpretation: the copula associates with a FUTURE-ZP.

Given the variation reported in the literature on canonical pseudoclefts, and the lack of literature on amalgam pseudoclefts, I conducted a controlled survey of the availability of future marking in the two pseudocleft types. The experiment addresses the question: do canonical and amalgam pseudoclefts behave the same way with respect to the future marker *will*? An asymmetry between the canonical and amalgam sentence types is predicted. Only the canonical specificational pseudocleft is expected to allow the future auxiliary in combination with the copula.

4.2.1 Experiment 1: Design

The experiment used a 4x3 design, crossing sentence type with future marking. The sentence type factor had four levels: *wh*-initial canonical pseudocleft, focus-initial canonical pseudocleft, *wh*-initial amalgam pseudocleft, and focus-initial amalgam pseudocleft. The future-marking factor had three levels: bare (simple copula), future on the copula alone, and future on both the copula and the lexical verb. The latter two levels were differentiated in order to test whether the "harmonious" configuration, with future on both the copula and the lexical verb, was indeed the only grammatical option.

The experiment's 12 conditions were represented in 48 lexicalizations, distributed among randomized blocks and ultimately into 12 versions by Latin square. Each version included 48 experimental items (4 items per condition) and 48 randomized fillers (half acceptable, half unacceptable). The design is summarized in Table 1.

	Bare	[will be [pres]]	[will be [will V]]
wh-canonical	What they'll need is a good rest.	What they need will be a good rest.	What they'll need will be a good rest.
foc. canonical	A good rest is what they'll need.	A good rest will be what they need.	A good rest will be what they'll need.
wh-amalgam	What they'll need is they'll need a good rest.	What they need will be they need a good rest.	What they'll need will be they'll need a good rest.
foc.-amalgam	They'll need a good rest is what they'll need.	They need a good rest will be what they need.	They'll need a good rest will be what they'll need.

Table 1: Factor design for future experiment

Participants were recruited via Amazon Mechanical Turk (AMT), and accessed the survey outside of the AMT environment. The survey was administered using the web-based survey platform Ibex Farm. Participants were instructed to rate the "naturalness" of the sentences they read on a 9-point Likert scale, and trained on practice items. 48 participants completed the survey.

4.2.2 Results

Each participant's results were normalized using the distribution of their ratings for filler items. The participant pool included 17 participants who rated amalgam pseudoclefts with plain *is* below a floor of z=−0.5. These participants were excluded for two reasons. First, this study focuses on the behavior of the amalgam pseudocleft in the grammars of speakers who accept them. Secondly, if the plain amalgams are rated at the floor, no potential contrast between *is* and *will be* can be detected. The results are summarized in Figure 1.

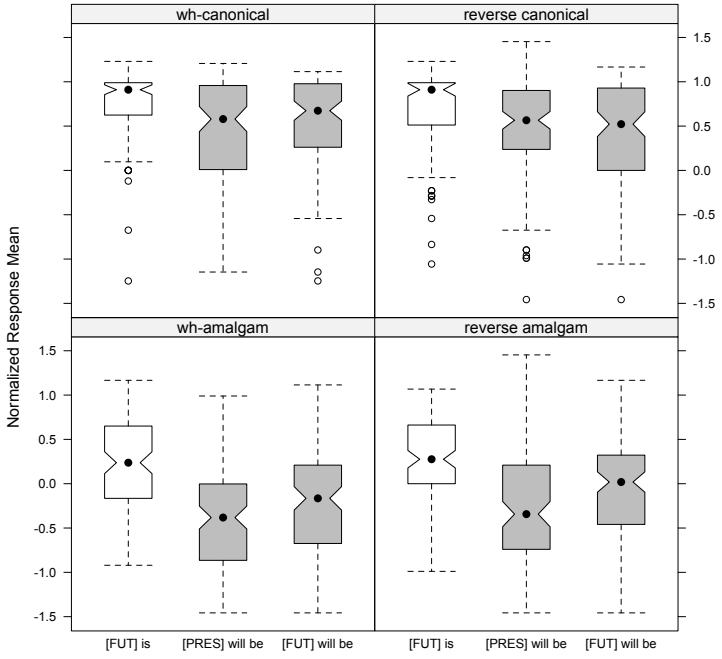


Figure 1: Effect of future copula on specificational pseudoclefts (n=31)

The summary shows that future marking on the copula reduces acceptability in all conditions, but the effect is stronger in the amalgam conditions, resulting in negative acceptability. Contrary to the claims in the literature, future marking on the copula alone is judged as acceptable in canonical pseudoclefts: over three-quarters of the responses are distributed in the positive acceptability range. In the amalgam condition, however, well over half of the responses are in the negative range.

A linear mixed effects model including the interaction between sentence type and copula form is significant ($p<0.01$) with respect to a null model lacking the interaction term (Table 2).

4.2.3 Discussion: Future interpretation

The high error rate in the results warrants further discussion. Notice the wide distribution of responses to the future form copula in Figure 1. I speculate that the skew is due to a

Model	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
Null	9	1869.3	1916.1	−925.67	1851.3				
Test	15	1862.9	1940.8	−916.43	1832.9	18.467		6	0.005165**

Table 2: Effect of future marking on specificational pseudoclefts

confounding factor. There is a salient epistemic use of the modal *will* (e.g., (19)), which may make future *marking* more acceptable in environments where future *semantics* is not.

(19) A: Who's that at the door?
B: Oh, that **will be** John.

This speculation is corroborated by informal survey findings that disambiguate the meaning using context and temporal adverbials. In these contexts, informants judged the canonical sentences as acceptable, and the amalgams as unacceptable. The informal judgments of the following contrasts are extremely robust, matching my own intuition.

(20) a. John has been drinking too much lately. If he keeps this up, soon what he needs **will be** rehab.
b. *John has been drinking too much lately, If he keeps this up, soon what he needs **will be** he needs rehab.

(21) a. John has been drinking too much lately. He thinks he needs to cut back a little, but I think that if he keeps this up, then rehab **will be** what he needs.
b. *John has been drinking too much lately. He thinks he needs to cut back a little, but I think that if he keeps this up, then he needs rehab **will be** what he needs.

Epistemic modals contrast with deontic modals not only in meaning, but also in their syntactic position (e.g., Condoravdi 2002, Hacquard 2009). Epistemic modals are projected above T, while deontic modals are projected below. The present model of amalgams, which includes higher structure in the CP, but no TP, successfully predicts the unavailability of deontic *will*, in contrast to the (variable) availability of epistemic *will*.

To summarize, participants in formal and informal surveys find future marking on the amalgam copula to be unacceptable, in contrast to the canonical copula. On the semantics side, informal surveys show that the contrast between canonical and amalgam sentences with a true FUTURE-tense copula is categorical.

4.3 Experiment 2: Past-shifting

Experiment 2 examines the distribution of PAST tense associated with the copula in the two pseudocleft constructions.

4.3.1 Experiment 2: Background and predictions

It is not a straightforward matter to determine whether the copula *was* conveys PAST in pseudoclefts, because, recall from section 2.3, the copula may only take [past] form if the lexical verb in the embedded clause(s) is [past]. The temporal interpretation in these cases is one of simultaneity: the two [past] forms map to coreferential PAST interpretations.

Since the copula and the lexical verb in canonical pseudoclefts do not have disjoint reference, many diagnostics for tense vs. tenselessness are unavailable. That is, under normal circumstances, we might expect to find a contrast between the canonical and amalgam copulas with respect to whether they support independent temporal modification, but such evidence is elusive.[5]

Moreover, canonical and amalgam pseudoclefts allow the same morphological [tense] combinations. Unlike with the other temporal markers considered in section 4.1, the two constructions exhibit no surface difference with respect to the availability of *was*. Since the forms are the same, it may at first seem unwarranted to analyze the tense patterns in the two sentence types differently. However, since there is independent syntactic evidence that the Tense domain is absent in amalgams, a difference in temporal semantics is also expected.

There is one environment where the difference between canonical and amalgam pseudocleft tense emerges: embedded contexts. In *embedded pseudoclefts*, the TENSE properties of the copula can be detected and manipulated. If an embedded copula associates with its own TT, it should show the same patterns of form and interpretation available to embedded statives in other sentences types; the tenseless amalgam copula should not.

Specifically, an embedded PAST copula should show a preference for zero-TENSE (Kratzer 1998) (sequence-of-tenses), which is indistinguishable from tenselessness, but crucially, it should also allow a shifted PAST interpretation as well. The predicational example in (22) illustrates the two possibilities.

(22) I thought that John's house was blue. Ordinary embedded stative

a. thought-TT λt_{ZP-0} [blue(john's house) at t_{ZP-0}]

b. thought-TT λt_{ZP-0} [[ZP-TT BEFORE t_{ZP-0}] blue(john's house) at ZP-TT]

The amalgam pseudocleft copula, however, which has no TENSE at all, will not support a PAST-shifted interpretation. Since English embedded statives allow both types of ZP: zero-TENSE and PAST, the unavailability of the shifted reading provides evidence of tenselessness.

While the simultaneous PAST interpretation is the default, the shifted interpretation can be supported using context. The preference for the simultaneous zero-TENSE can also be overridden by contrastively stressing the copula. The contrastive stress opens a domain of focus alternatives. Since the copula has no lexical semantic content, but simply holds the predication together, contrastive stress is consistent with only two types of focus alternative sets (Rooth 1985): {true, false} (verum focus) and {zero-TENSE, bound PAST, indexical PRESENT, etc.} (see also Klein 1998).[6]

Consider the following example with contrastive stress on the embedded [past] copula of a pseudocleft.

(23) I thought that what John was $[\text{WAS}]_F$ intelligent.

a. Alternative set 1: {I thought that what John was **was** intelligent, I thought that what John was **was not** intelligent}

b. Alternative set 2: {I thought-t that what John was was-**ZP-0** intelligent, I

[5]For some adverbial modification data showing such a contrast, see O'Neill 2015: Chapter 8.4.

[6]I simplify the structure of verum focus somewhat here, for reasons of space.

thought-t that what John was was-**ZP-PAST** intelligent, I thought-t that what John was is-**ZP-PRESENT** intelligent, etc.}

The past-shifted interpretation is not the default, but (23) shows that it is available. If the shifted reading emerges under focus, a true TENSE is present in the structure. Since the judgments are delicate, the pattern was tested in a controlled experiment.

4.3.2 Experiment 2: Design

The experiment consisted of a semantic judgment task to distinguish a true embedded PAST ZP from a zero-TENSE in embedded [past]-under-[past] pseudoclefts. Experimental items were distributed among four experimental conditions: two sentence types (amalgam and canonical pseudocleft) and two copula forms (stressed and unstressed). Four randomized lists were created by Latin square, with a total of 16 experimental items per list, each from a different lexicalization. Each item was associated with a follow-up context that *canceled* the default simultaneous interpretation in favor of the past-shifted interpretation, as in Table 3, below. A total of 36 participants from AMT completed the task, hosted by Ibex Farm.

	Unstressed **was**	Stressed **WAS**
Canonical	I said yesterday that what he liked was coffee	I said yesterday that what he liked WAS coffee
Amalgam	I said yesterday that what he liked was he liked coffee	I said yesterday that what he liked WAS he liked coffee
Cancelation	I also know that he stopped liking coffee five years ago	

Table 3: Factor design for past-shifting experiment

The experiment used the following procedure. Participants read experimental items, consisting of two sentences each. The first was an embedded pseudocleft in a recent past context, specified by an adverbial modifier like *yesterday* or *last week*. They then pushed a button to reveal a second sentence, which entailed that the state of affairs expressed by the pseudocleft had ceased to hold at a more distant past time. The second sentence thus explicitly canceled the simultaneous interpretation, entailing a past-shifted interpretation. They were instructed to rate on a 7-point Likert scale how surprising they found the second sentence in light of the first one, assuming the speaker to be generally truthful. Participants were trained on a warm-up task to interpret capital letters as stress and to judge strong implicature cancelation. For example, they were trained to recognize the cancelation of scalar implicatures and exhaustivity implicatures as surprising.

Figure 2 illustrates a sample item from the experimental protocol. In this example, participants are expected to prefer an interpretation where the proposition that *what Jane was studying was art history* is true of a time that overlaps *yesterday*, and to be surprised when that interpretation is canceled by the assertion that *she changed her major to political science last semester*. The degree of surprise is predicted to be significantly lowered in the condition depicted in Figure 2, due to the presence of contrastive stress on the copula. In this condition, contrastive stress makes salient an interpretation locating the proposition that

what Jane was studying was art history in a time interval prior to *yesterday*, which is free to have a closing bound prior to *last semester*, compatible with the claim that Jane changed her major last semester. The same lowering of the surprise rating is not expected in the amalgam pseudocleft condition, under the analysis of the copula as atemporal.

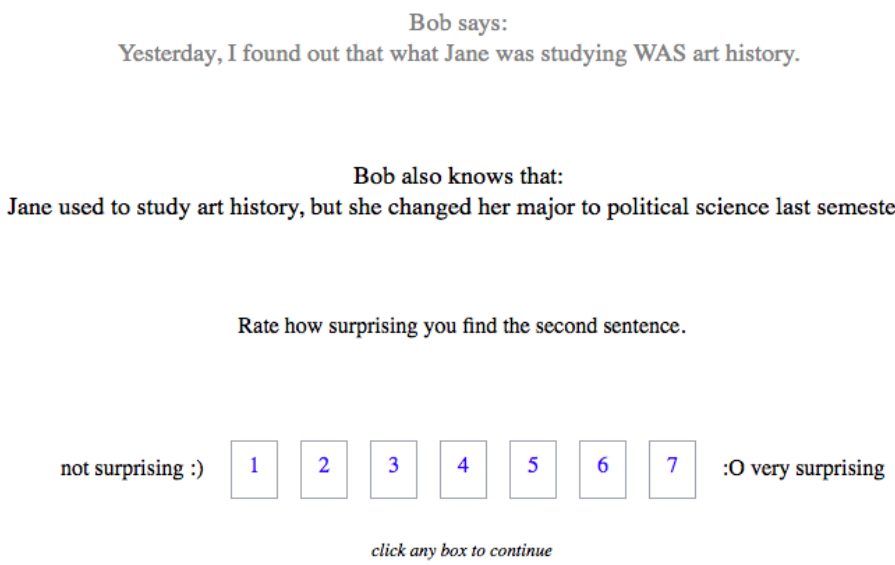


Figure 2: Sample item presentation

Because of the complexity of the interpretation task, the survey also included 32 filler items, each paired with a context that was either compatible with or incompatible with a strong implicature. Fillers served as controls to identify and exclude five participants who failed to distinguish "surprising" and "unsurprising" examples. The distribution of each participant's responses to filler items was also used to normalize the results for experimental items. The lists also included an acceptability judgment sub-task ensuring that all remaining 31 participants accepted baseline amalgam pseudoclefts. A follow-up informal judgment task with five speakers established that the stressed copula in amalgams is indeed acceptable with the verum focus interpretation, so high surprise ratings of the amalgam pseudocleft cannot simply be attributed to unacceptability.

4.3.3 Results

The normalized results are summarized in Figure 3. Results were analyzed using a linear mixed effects model, with random intercepts for item and subject. The analysis found a significant interaction between pseudocleft type and contrastive stress ($p<0.05$), when a model with the interaction term was compared to a null model.

A past-shifted interpretation is thus contributed by the copula in canonical, but not amalgam pseudoclefts, which follows from the tenseless analysis of amalgam pseudoclefts. Since amalgam pseudoclefts contain no temporal argument structure, there can be no true PAST-tense associated with the copula. The [past] form is purely morphological.[7]

[7] A discussion of the source of morphological [tense] in amalgam pseudoclefts is beyond the scope of this

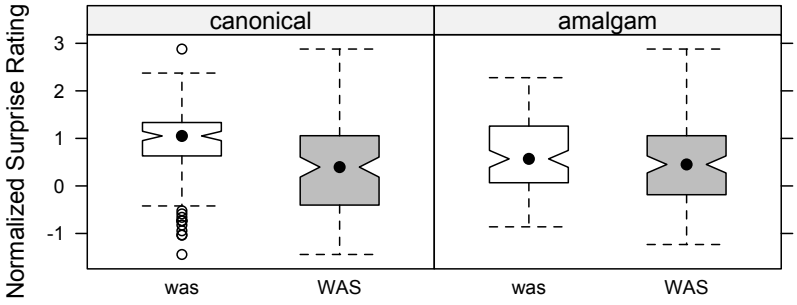


Figure 3: Surprise rating for past-shifted reading by sentence type and copular stress

4.4 Summary

The distribution of temporal markers and TENSE interpretation in the two clause types shows that the canonical pseudocleft instantiates the anchoring property of finite clauses in the ordinary way: via TENSE; however, the amalgam pseudocleft does not. It lacks syntactic elements associated with TP and lacks temporal semantics. Since the copula can associate with verum focus alternatives, however, it does have some assertive content—it is an anchored declarative clause. How that assertion is anchored in the absence of Tense/TENSE is the topic of the final section.

5 Anchoring the tenseless clause

Despite its tenselessness, the amalgam pseudocleft is functionally finite: it is anchored to the utterance context. In uttering an amalgam pseudocleft, the speaker performs a declarative speech act asserting the proposition that the "answer" clause specifies the missing information in the "question" clause. Some direct evidence that the amalgam pseudocleft clause is anchored comes from examples where the copular clause bears different illocutionary force from the embedded root "answer" clause. Since the "answer" clause is itself typically declarative, relevant examples are those where the "answer" is a question, and the "question" is a *meta*-question. Consider (24).[8]

(24) a. Why did she fetch a pail of water? is what is at issue.
b. What is at issue is why did she fetch a pail of water?

Although the embedded root in these pseudoclefts is interrogative, the copular pseudocleft clause is declarative, and determines the force of the whole sentence. (24) could be followed

paper. See O'Neill (2015: Chapter 8.6) for a proposal appealing to feature concord.

[8]The reader may notice that in these examples, there is no repeated material, but they nevertheless satisfy the definition of amalgam pseudocleft given in (3), because their subject is a root-like finite clause—something that cannot occur as a structural subject in other clause types.

(i) *Why did she fetch a pail of water puzzled everyone.

in a discourse by something like (25), which disputes the copular clause.

(25) No it isn't—everyone knows she just wanted a drink.

They also support tag questions, which indicate declarative force.

(26) Why did she fetch a pail of water? is what is at issue, right?

The presence of declarative force in the amalgam pseudocleft indicates that it is anchored—force entails a relation between the proposition and the utterance context.

I propose that the proposition relating the two clausal constituents is directly related to the author coordinate of the utterance context. (Recall that the utterance context is a set of deictic elements, including the speaker as well as the time.) Unlike temporal modifiers, which are licit only in the environment of temporal argument structure and a temporal anchor, epistemic and speech-act-oriented modifiers, which are evaluated with respect to the speaker (i.e., the modal base consisting of the belief worlds of the speaker), can occur in amalgam pseudoclefts, for many speakers.

(27) a. What she needs **might be** she needs a vacation.
b. They lived in Canada was **perhaps** where they lived.
c. What he likes **must be** he likes the brisket. (*epistemic reading only*)

The asymmetry between the acceptability of these modifiers and the unacceptability of temporal and aspectual modifiers is expected in the present analysis, since the amalgam pseudocleft is directly anchored to the author coordinate of the utterance context.

Recall from section 3 that the amalgam pseudocleft clause is a projection of Fin. While TENSE and its syntactic associates are absent from the amalgam pseudocleft clause, the utterance context and its associates, such as epistemic modals and speech-act modifiers, are available, since they occupy the left periphery.

In the amalgam pseudocleft, abstraction over contexts converts the copular predication into a property of contexts. The utterance context in the left periphery then combines with the clause to return an anchored finite clause. This relation is mediated by the copular relator. The anchoring process in these tenseless clauses thus proceeds in the same way as the final step in anchoring an ordinary finite clause. The difference between amalgam pseudoclefts and ordinary clauses lies in the fact that amalgams lack the additional process of abstracting over Topic Times at the level of TP.

Anchoring in amalgam pseudoclefts is purely *deictic*: there is no temporal displacement of the proposition. The topic situation in amalgams is bound by the utterance context itself, just like RT in a canonical clause. Since the speaker serves as the deictic anchor, the copular assertion is indirectly interpreted as holding of the utterance time (the temporal coordinate of the utterance context). Notice that even if the matrix copula is morphologically [past], as in (28), the copular proposition relating question to answer is true of the speaker's NOW.

(28) Sue stormed out was what she did.
$\longrightarrow$ *At utterance context, it is true that "Sue stormed out" answers the question of "what Sue did".*

Table 4 summarizes the distribution of syntactic and semantic material associated with

the two different clause types, highlighting the fact that while the amalgam pseudocleft is finite and anchored to the utterance context, it is not tensed.

	Canonical	Amalgam
Temporal auxiliaries and modifiers	✓	✗
Negation	✓	✗
Deontic modals	✓	✗
Root clause subject	✗	✓
Tense meaning	✓	✗
Tense inflection	✓	✓
Epistemic modals	✓	✓
Independent Force	✓	✓
Anchoring to utterance context	✓	✓

Table 4: Properties of two English pseudocleft types

6 Conclusion

This paper has shown that although the morphological [tense] properties of canonical and amalgam pseudoclefts are similar, their syntactic Tense and semantic TENSE properties differ. Experimental evidence supports the claim that the understudied amalgam pseudocleft clause lacks a projection of T and is atemporal.

In most clause types and languages that have been investigated in the generative tradition, particularly in languages with obligatory morphological [tense], the anchoring relation is treated as temporal. There is a tendency in the literature on finiteness to assume an implicational relation between finiteness (independent anchoring) and tense. Some works, however, (e.g., Shaer 2003, Giorgi 2010, Amritavalli 2013, Ritter & Wiltschko 2014) have argued for other means of anchoring. My contribution to this enterprise is the proposal that even in a tensed language like English, there can be finite, but tenseless declarative clauses.

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Explicit and Implicit Exhaustivity in Focus

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Abstract

Previous work on exhaustivity has often blurred the notion of exhaustivity with focus in a uniform analysis of the two. In this paper, I will refine the distinction between focus and exhaustivity and draw a further distinction between types of exhaustivity in focus environments. Experimental data from Greek Cypriot adults supporting this proposal will be presented. Data from languages using similar focus strategies, show that exhaustivity effects vary based on different focus environments. Exhaustivity effects appear to be uniformly strong with *only*, but the effect of exhaustivity is weaker with clefts and bare intonation focus. The paper contributes to the already existed theoretical and experimental literature exploring the nature of exhaustivity, argues against stricter theories positing a uniform treatment of exhaustivity with focus and divides exhaustivity into an implicit and explicit type based on whether exhaustivity is an entailment (*only*) or implicature (clefts, prosodic focus).

1 Introduction

Exhaustivity, as a term, has been widely overgeneralized in the literature and overseen as a property of focus. As it is often discussed as only a part of focus, exhaustivity is often assumed to be the property that provides the added meaning of everything with the property X participating in the given context and is commonly found in questions and focus structures. Focus constituents, or in more technical terms structures or words *associated with focus* (Jackendoff 1972), involve items or certain syntactic configurations that traditionally show semantic effects of focus.

Exhaustivity was firstly seen as a syntactic phenomenon following the assumption of a Foc position in the syntax. It was, therefore, argued in the past that exhaustivity can have its own projection with a null operator that provides the exhaustive reading in focus environments (Szabolcsi 1981b, Horvath 2000). In other cases, it has been treated as a syntactic feauture of structural focus (Kiss 1998), relating to a syntactic approach to exhaustivity. Other approaches have dealt with the interpretation of focus as always being exhaustive and have posited an exhaustivity operator equivalent to *only* (Chierchia et al. 2013) to capture the effect.

The general nature of the claims above underlies one of the core claims of the paper and challenges the assumption that all focus structures that are prototypically found with exhaustivity show the same degrees of exhaustivity within and across languages and structures. In fact, what will be explicitly argued here is that not all focus structures show semantic effects of exhaustivity and that exhaustivity as a condition or property of the semantics of the sentence only appears in the case of focus functional operators (Beaver & Clark 2003) for the environments studied here. In other environments, it is a result of non-semantic

factors and can be canceled or omitted (as also discussed in Wedgwood 2005). Based on this differentiation, exhaustivity, just like focus cannot be treated uniformly (for focus, see Beaver & Clark 2003), but considered in terms of its meaning as *Explicit Exhaustivity* or pragmatic properties as *Implicit Exhaustivity*. The paper will firstly discuss proposed theories of focus and exhaustivity and summarize the findings of recent experimental studies and then argue against the claim that focus structures make use of a covert *only* on the basis of the exhaustive interpretations that they carry.

By referring to focus structures here, I address syntactic and semantic configurations that are prototypically assumed to be as such (i.e. cleft structures), focus movement (i.e. DP fronting) and focus operators. Additionally, Cypriot Greek (CG) makes extensive use of the focus or cleft particle *embu* (Grohmann et al. 2006 among others) and data related to it will also be presented here, but the main interest lies on the effects of focus particles as such. Lastly, phonological focus is also discussed and refers to a higher pitch on any phrase in the sentence (in this case, a DP) as a strategy adopted by speakers to express focus. The paper will address the above structures with regard to their meaning and interpretation of exhaustivity by a given population and compare the results with those found in Hungarian, German and French.

Section 2 will discuss the main arguments about theories of exhaustivity, as mentioned above, and data from Cypriot Greek related to the tests for showing exhaustivity. Section 2.1 summarizes previous experimental work. The motivation for this paper is based on this literature and the need to further explore these questions in the variety in discussion. Section 3 introduces the experimental task adopted by (Onea & Beaver 2011) and replicated in CG and Sections 3.1-3.3 present the participants, the design and procedure of the experiment. Section 3.4 gives the results from the sample of data provided by Greek Cypriot speakers focusing on the exhaustivity effect in the different focus environments and Section 3.5 suggests another possible pattern from a second look in the individual responses of the subjects. The discussion of the results is provided in Section 4, which is divided in the comparison with previous experiments and the theoretical implications in Section 4.2. Data from this particular methodological approach to the measurement of exhaustivity are available for Hungarian and German (Onea & Beaver 2011) and French (Destruel 2012) and this provides the ground for a more general picture and cross-linguistic comparison. In addition, a comparison of the findings of this methodology with previous methodologies applied in a different sample of the same population and testing similar questions (Leivada et al. 2013, Pavlou et al. 2013) will be also provided. Section 4.2 will focus on the theoretical implications of the findings, setting a distinction of exhaustivity in two types, Explicit and Implicit Exhaustivity. Last, Section 5 summarizes the paper and the findings and posits some future questions.

2 Exhaustivity

Focus is often thought as accompanied by exhaustivity. (Kiss 1998) argues that the preverbal focus position in Hungarian is associated with a [+exhaustive] feature. Exhaustive identification is defined as in (1):

(1) *a focus operator which operates on the set of contextually determined elements for which the predicate of the sentence can potentially hold, and exhaustively identifies the proper subset of this set for which the predicate actually holds, excluding the complementary subset.* (Kiss 2010)

For (Kiss 2010), preverbal focus in Hungarian is a specificational predicate and the focus referentially identifies the exhaustive set by the presupposed section of the sentence. Under this analysis, the exhaustivity of structural focus is not assigned by a focus operator (Kiss 1998), but a semantic condition of the specificational predicate role of the focused constituent.

The most recent approach to a possible null exhaustivity operator comes from (Chierchia et al. 2013), who develop a more general approach of a grammaticalized *only* to produce scalar implicatures. In their paper, they argue that focus phenomena are independent evidence that a silent *only* exists. More specifically, they provide the following example:

(2) a. So, did you see the students?

b. I saw [$_F$ Joe and Sue], where the constituent [$_F$ Joe and Sue] bears focal stress (Chierchia et al. 2013, p. 8)

Focus is not their main point of interest in their work, but it still predicts that the example above should always be interpreted exhaustively, if one assumes that the operator *only* semantically expresses exhaustivity. They explain that (2b) conveys unambiguously that B saw only Joe and Sue, in spite of the fact that there is no overt *only*. They speculate that focus activates alternatives and with those alternatives and a covert *only*, there is only one option available. In their theory, focus is a means of activation of alternatives and a silent *only* is the operator positing a restriction to the alternatives. In earlier work (Chierchia et al. 2009), they call the silent *only* operator an exhaustivity operator.

Exhaustivity has been largely seen as a syntactic feature (Kiss 1998) or a syntactic position by positing a functional projection and a null operator. Similarly, (Szabolcsi 1981a) claims that a PRO operator that is associated with a position F and has stress features in Hungarian provides the exhaustive listing of the salient subset. Therefore, in her account, when a constituent moves to a focus position it is always interpreted exhaustively through the syntactic relation that holds between the focus position and the null exhaustive PRO. To capture the stress effects in pre-verbal and post-verbal focus in Hungarian, Horvath (2000) also posits an operator in syntax and claims that a phonological null Exhaustive Identification (EI) operator that projects a functional head gives the exhaustivity feature in focus positions. More specifically, she assumes that this functional projection is in the specifier of the EIP projection and sister to the focused DP. It requires the presence of prosodic Focus within a c-command domain, to primarily capture data from Hungarian. Horvath (2005) explains that the phonologically empty EI operator, which is 'grammaticalized' in the syntactic representation is similar to *only* and *even* for the cases of prosodic focus.

On the other hand, (Wedgwood 2005) uses the examples first used in (Horn 1981) to illustrate one of his arguments against an analysis involving an exhaustivity operator in focus. Horn (1981) provides a test for the encoded exhaustivity of English *it*-clefts, where *only* provides a lexical encoding of exhaustivity. The use of the cleft proves insufficient to

produce the exhaustive reading that would give a coherent reading when the two clauses are connected.

(3) a. ? I know Mary ate a pizza but I've just discovered that it was a pizza that she ate.

b. I know Mary ate a pizza but I've just discovered that it was only a pizza that she ate.

Horn concludes on the basis of these examples that exhaustivity in clefts may be a conversational implicature and speculates the complexity in processing the special syntactic properties of a cleft makes exhaustivity more difficult to cancel with a cleft than with a focus expressed by phonological emphasis. Just as in the Hungarian data provided by (Wedgwood 2005), the CG data follow Horn's arguments, as shown below.

(4) a. ? Ksero oti i Maria efaen fasoles, alla molis
know.1SG that the.NOM Maria.NOM ate.3SG beans.ACC, but just
anakalipsa oti en fasoles pu efaen.
discovered.1SG that is.3SG beans.ACC that ate.3SG
'I know that it is beans that Maria ate, but I just discovered that it was beans she ate.'

b. Ksero oti i Maria efaen fasoles, alla molis
know.1SG that the.NOM Maria.NOM ate.3SG beans.ACC, but just
anakalipsa oti en monon fasoles pu efaen.
discovered.1SG that is.3SG only beans.ACC that ate.3SG
'I know that it is beans that Maria ate, but I just discovered that it was only beans she ate.'

Based on the contrast in (4), if exhaustivity was a condition of cleft, (4a) and (4b) should be equally acceptable. The fact that they are not, shows exactly that the exhaustivity encoded in *only* gives a different interpretation to the second sentence, while the cleft does not.

These theoretical concerns as well as the common conclusions drawn from empirical findings lead to further investigation of these claims in other languages, such as CG, in order to question previous theoretical approaches to the phenonmenon of exhaustivity. The next section will provide the data to support the argument that exhaustivity does not function in the same way in all focus environments. In fact, the exhastivity effect with *only* is lexically encoded (hence, Explicit), but exhausitivity in other structures is pragmatically inferred (hence Implicit).

2.1 Experiments on Exhaustivity

The idea for conducting an experiment solely for investigating the interpretation of exhaustivity in the current paper was inspired from previous work (Pavlou et al. 2013), which first made the observation that CG clefts appeared to be non-exhaustive. That study used exhaustivity as a means of testing the syntactic structure of the CG *embu* as an underlying

cleft sentence or as a fossilized element. That task was administered online, with the presentation of short stories which were then followed by sentences. The speakers had to judge whether a sentence was true or false according to the story. Surprisingly, the hypothesis that the exhaustivity condition is always necessary for the cleft was not confirmed. Instead, the results showed variation between clefts as being sometimes exhaustive and other times non-exhaustive. More specifically, adults of age 45+ accept less non-exhaustive clefts, but adults belonging in the age group of 18-30 and 30-45 accept more and at similar rates non-exhaustive clefts in this study. This creates then the question whether exhaustivity belongs in the semantics of focus and if so, what the constraints for its appearance are. If exhaustivity is not what is thought to be, then its redefinition and understanding of the context that it can appear is needed.

On a similar note, Onea & Beaver (2011) (also, Onea 2009) wanted to test if the immediately pre-verbal position for focused expressions in Hungarian is interpreted exhaustively (Kiss 1998), as if it is in the scope of *only*. This study aimed to attest the claim that immediately pre-verbal focus is semantically exhaustive and whether exhaustivity is part of the truth conditions of the sentence. Their methodology used natural correlation to judgments of truth and falsity through agreement and disagreement in the conversation. Therefore, the question whether the participant judges an utterance as true or false in that situation might be settled by looking at the extent to which a participant expresses agreement or disagreement, given a forced choice. If they contradict the sentence, then there is incompatibility between the sentence and the given situation. The experimental results showed that immediately pre-verbal focus in Hungarian is significantly less likely to be contradicted for not being exhaustive than *only*-sentences, and that the exhaustiveness effect associated with pre-verbal focus in Hungarian is much stronger than the exhaustiveness effect associated with prosodic focus in German.

Destruel (2012), in the replication of the Onea & Beaver (2011) which included French clefts as an additional condition, found that the results of the experiment clearly show that the exhaustivity effect associated with a cleft is not as strong as the one associated with an exclusive *only*, but much stronger than an underspecified sentence. The results support the prediction that speakers are more likely to overtly contradict a semantically exhaustive sentence (i.e. sentences with an exclusive) than other types of sentences.

These three different studies lead to the same question: What is the nature of exhaustivity and how can we predict its appearance in the different contexts? The different experiments tested several conditions in different populations. The aim of the current experiment is to test all the different focus conditions together and measure the difference between them in order to provide the full picture for the understanding of the different interpretations. The goal here is to define what exhaustivity is for CG focused expressions and compare the results with other languages, where this experiment is already attested.

3 The Experimental Task

In an attempt to test the research questions above, Onea and Beaver's (2011) experiment was adopted in CG. This follows a forced-choice methodology, as in the original experiment, to avoid any metalinguistic judgments appearing in truth value judgment tasks requesting a

'True' or 'False' answer. A detailed description of the experiment is given in the subsections below.

3.1 Hypotheses and Design

The experiment's goal is to address the question of whether exhaustiveness effects associated with focus are pragmatic or semantic in nature and to measure the difference between the different focus structures. The experiment is based on the research questions above, summarized here: If exhaustiveness is a truth conditional effect associated with focus, and if evidence is given that a sentence is incorrectly non-exhaustive, then the participants would contradict a focused expression that is not exhaustive. The null hypothesis, born out of these research questions, is that exhaustivity has the same effect across all conditions.

The design of the experiment largely follows the original experiment in Onea & Beaver (2011), but differs in the number of conditions involved. The current experiment has 5 major conditions with 2 sub-conditions in each. The conditions involved are (a) sentences using the exclusive operator *only*, (b) the CG focus particle *embu*, (c) cleft sentences, (d) sentences with prosodic focus and (e) default sentences, characterized by the unmarked word order. The unmarked word order here is taken to be VOS (Plunkett & Pavlou 2011). The sub-conditions involved are subject and object sentences for all the attested conditions (only object sentences are given as examples here) and all conditions are within subject.

A. *Only-sentences*

(5) Monon to ermarin esasen o Yannis.
only the.ACC closet.ACC fixed.3SG the.NOM John.NOM
'John fixed only the closet.'

Monon 'only' here modifies the object DP, which is moved to a focus position above TP.

B. *Embu-sentences*

(6) Tes fasoles embu ekrusen o Kullis.
the.ACC beans.ACC embu.FOC burned.3SG the.NOM Kullis.NOM
'It is the beans that Kullis burned.'

The focused DP appears in a focus position above TP, since it precedes the focus particle *embu* in C.

C. *Cleft sentences*

(7) En to ermarin pu esasen o Yannis.
is.3SG the.ACC closet.ACC that fixed.3SG the.NOM John.NOM
'It is the closet that John fixed.'

Cleft sentences follow English type clefts, namely introduced with an *it*-clause, which is omitted here since CG is a null subject variety and followed by a secondary clause introduced by the complementizer *pu* 'that'.

Scenario	**Individuals/Names**	**Verbs**	**Objects**
Scenario 1	Kullis, Kostas	kruzo 'burn'	luvin 'black-eyed peas', fasoles 'bean'
Scenario 2	Maria, Olɣa	pit^{h}ono 'crash'	kaʃan 'box', potsan 'bottle'
Scenario 3	Panik^{h}os, Charis	akkano 'bite',	tashinopit^{h}a , appiðin 'pear'
Scenario 4	Yannis, Kostis	sazo 'sazo'	ermari 'closet', motora 'motorbike'
Scenario 5	Eleni,Olɣa	kundo 'push'	sikla 'bucket', kup^{h}a 'bowl'
Scenario 6	Yorkos,Charis	andinasso 'push'	halin 'carpet', patania 'blanket'

Table 1: 6 scenarios in the experimental task

D. *Prosodic Focus*

(8) TO ERMARIN esasen o Yannis.
the.ACC closet.ACC fixed.3SG the.ACC John.ACC
'THE CLOSET John fixed.'

Prosodic focus is focus expressed on the focused DP with an emphasis and a higher pitch on the voice. In the current study, the interest lies on the exhaustivity effects related to the type of focus rather than the phonological model behind it. Lastly, default sentences (non-focused sentences) followed the default word order, taken to be VOS, following (Plunkett & Pavlou 2011).

The current experiment had 10 conditions in total (divided in 5 subject and 5 object clauses) with 3 repetitions for each one, hence making a total of 30 items for each subject. All subjects were presented with the same order of items. The design included 6 stories, using different names for the objects participating in each story, as well as different verbs.

The stories were pseudo-randomized in such a way that the same story would not always appear in the 3 repetitions of each subject or object clause of each condition. In other words, scenarios [1-3] were used to form subject clauses in the conditions of *only*, clefts and prosodic focus. In the conditions of *embu* and default sentences, scenarios [1-3] were used to form object clauses. Scenarios [4-6] were used in all other cases: to form object clauses in the conditions of *only*, clefts and prosodic focus and subject clauses in the conditions of *embu* and default sentences. In addition to the 30 test items, there were 9 fillers in the experiment using intransitive verbs in a VS order, and the choice of the vocabulary used for objects and subjects sentences was pseudo-randomized. There was also a pseudo-randomization on the lexical item that was focused in each test item. Given that exhaustivity is the condition attested here, each scenario would focus on one individual or object from a list of individuals or objects in a given scenario (see also the Procedure section).

The condition sentences were given as the target sentence that should have been matched to the story. They were all recorded in order to capture the prosodic focus or emphasis expressed phonologically in one of the conditions. The DP-movement to a pre-verbal position also marks focus given that the assumed position in the unmarked order is post-verbally, but the particular movement is characterized by phonological emphasis as well.

(9) O KOSTIS esasen to aftokiniton.
the.NOM Costis.NOM fixed.3SG the.ACC car.ACC
'COSTIS fixed the car.'

Age	Number	Male	Female	High School	University
18–54	43	12	31	11	32

Table 2: Participants in the current experiment

The option of having prosodic focus post-verbally exists, with the difference being that movement to a focus-associated position expresses a contrastive focus interpretation (*Kostis*, and not *Yannis*, fixed the car). To sum up, 5 conditions that are associated to focus were used in this experiment. The following section will introduce the procedure followed for all of these conditions.

3.2 Participants

The task was administered to 43 adult speakers of CG, aged 18–54. A division in age groups of 18-30 and 31+ was attempted, but no significant differences were found. Given the task and the fact that the sample consisted of adults, no grouping was deemed as necessary. Therefore, the subjects will appear in one group.

As seen in Table 2, there are 12 male speakers and 31 female speakers with 11 of them being high school graduates and 32 of them being University graduates. Participants were all born and raised in Cyprus and claimed Cypriot Greek as their native language. All speakers were approached by the researcher by e-mail or via social network websites and therefore the current location of the participant was not controlled or considered important for the purposes of the experiment.

3.3 Procedure

As explained before, the reasoning of the experiment was to get the hearer to contradict the sentence or not, or express her displeasure if she avoids complete contradiction. Overt contradiction (no) is expressed for serious types of disagreement and it would be expected when exhaustivity is required (i.e. *only*). If the exhaustiveness effect associated with focus is pragmatic as opposed to semantic (and cancelable), one would expect that people will react by expressing their displeasure, rather than a strong contradiction.

Participants were introduced to a brief setting suggesting that two people or two objects participate in a given action. They were then asked a question and were instructed to judge whether a given non-exhaustive response to the question is completely cancelable or can be accepted if more information is added. The example shows exactly how a participant was presented with a scenario and then was asked to judge a recorded question, by forcing her to choose one of the options from (A)-(D).

(10) John fixed the closet and the motorbike.
Question: What did John fix?
Recorded sentence: John fixed only the closet.
A) Yes, John also fixed the motorbike.
B) Yes, but John also fixed the motorbike.
C) No. John also fixed the motorbike.
D) None of the above.

An example in CG corresponding to (10) is given below. The lack of a standardized spelling system for CG and the written nature of the experiment, forced the introduction of the sentences with latin characters, but following a close adaptation of the CG sounds (but, not IPA). This is a common way Greek Cypriot speakers adopt in order to write in online environments, social network websites and text messages. Previous studies have used this methodology in linguistic experiments (Leivada et al. 2013) and it has been argued to be a valid method to avoid any effects related to the competence of Greek Cypriot speakers in SMG with the use of the Greek alphabet. To give a better illustration, while the name John would be transcribed as /yannis/, the form used is 'Giannis', which is a closer form to the SMG spelling system of the name 'John'. The use of the latin alphabet resembling the Greek standardized spelling system targets to be as close as possible to the common way of writing for Greek Cypriot speakers. Given the administration of the task through website environments, participants were not allowed to change their answer once submitting a response to a question and moving to the next one. Restrictions to changing a submitted answer were considered necessary, since subsequent test items could have triggered a possibly different answer to the test items already presented.

(11) O Giannis esasen to ermarin tzie tin motoran.
Question: Inda mbu esasen o Yannis?
Recorded sentence: Monon to ermarin esasen o Giannis.
A) Ne, tzie esase tzie ti motora o Giannis.
B) Ne, alla esase tzie ti motora o Giannis.
C) Oi. Esasen tzie ti motora o Giannis.
D) Kanena pu ta pupano..

If speakers chose (C) as a possible continuation after the recorded sentence, then they were thought to contradict the previous sentence. If they chose (B), then they didn't overtly contradict the sentence, but they expressed a displeasure due to their exhaustivity requirement and the lack of it in the previous sentence. If they chose (A), then there was no contradiction or displeasure, but simply an addition to the context. This procedure is therefore attempting to capture the normal reactions in a conversation and to show if exhaustivity is really required in these contexts. The following section will show the results of the experiment.

3.4 Results

This section provides a description and the analysis of the results obtained. To start with, we will first present the data regarding the two subconditions of the experiment: subject and object clauses. The overall results for the 10 conditions and then the 5 environments (cleft, prosodic focus etc.) are given in Figure 1. The results of a statistical analysis (2x5 ANOVA) show that there is a significant difference both between subject and object sentences, but also between the environments tested. It will be shown that for all environments, except *only*, the sub-conditions of subject and object sentences played a role and in this way shows the interaction between the 5 major conditions (environment) and their subconditions (subject and object).

The main effect of Subject and Object sentences reflects the observation that there is a general trend that subject conditions received stronger exhaustivity readings than the object

conditions. Interestingly, this observation holds for all environments, except sentences with *only*. *Only*-sentences are treated the same in subject and object environments by receiving a high number of 'no' responses. Object sentences show higher percentages (a 10% difference and more) in all other conditions for 'Yes, but' responses. In other words, subject sentences received more answers expressing overt contradiction, or in more linguistic terms, exhaustivity. Object sentences show higher percentages (a 10% difference and more) in all other conditions for 'Yes, but' responses. In other words, subject sentences received more answers expressing overt contradiction, or in more linguistic terms, exhaustivity.

Overall, the responses given in each type of answer for the 10 different conditions are shown in the figure below:

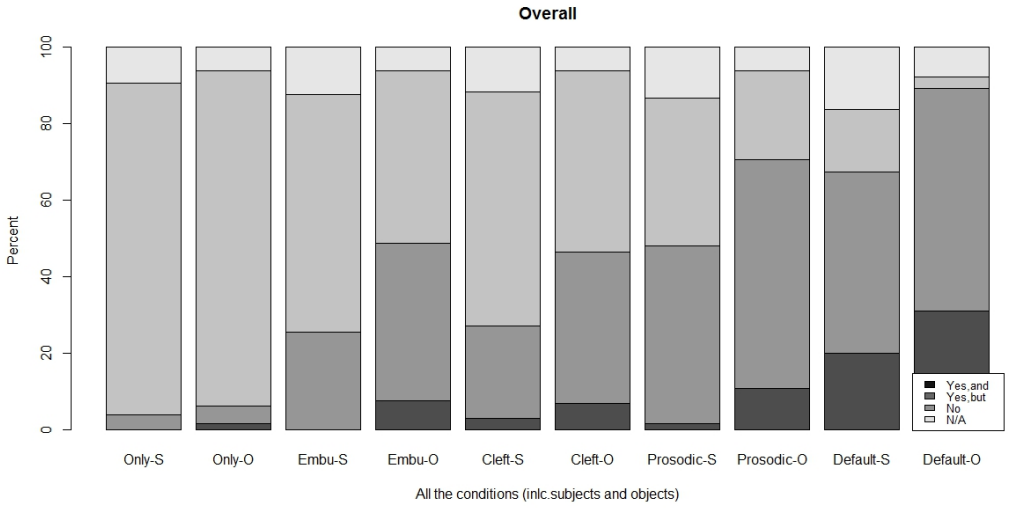

Figure 1: Overall Results for all conditions

Figure 1 shows the percentages of responses for all 10 conditions of the experiment. The object clauses in the cleft environment appear to receive more 'No' responses. In all cases, it appears that the exhaustivity effect is stronger in subject clauses (more responses of the 'No' type) than object clauses. All responses that received a 'No' response in any condition were coded as 1, which meant the expression of exhaustivity. All other responses were coded as 0 for no exhaustivity. A 5x2 ANOVA test showed that the effects of the subject and object sub-conditions were significant $F(1,42)=22.239$, $P<.001$. Paired t-tests showed that the effect of subject and object environment was significant for all conditions, except *only*.

Table 3 shows that there is statistical significance at the value of $\alpha=.05$ regarding the exhaustivity effect in subject and object clauses. In contrast, the exhaustivity responses between subject and object clauses in the *only*-conditions are not statistically different.

The second step of analysis merged the subject and object sub-conditions in order to only examine the difference in the 5 environments.

The percentage for the 'No' response is the clear contradiction to the lack of exhaustivity that makes the hearer judge the utterance as false. When moving from left to right on the

Environment	df=42
Cleft	t = 3.3343, p<.05
Embu	t = 3.0984, p<.05
Prosodic	t = 2.8768, p<.05
Default	t = 3.4098, p<.05

Table 3: Results from paired t-tests

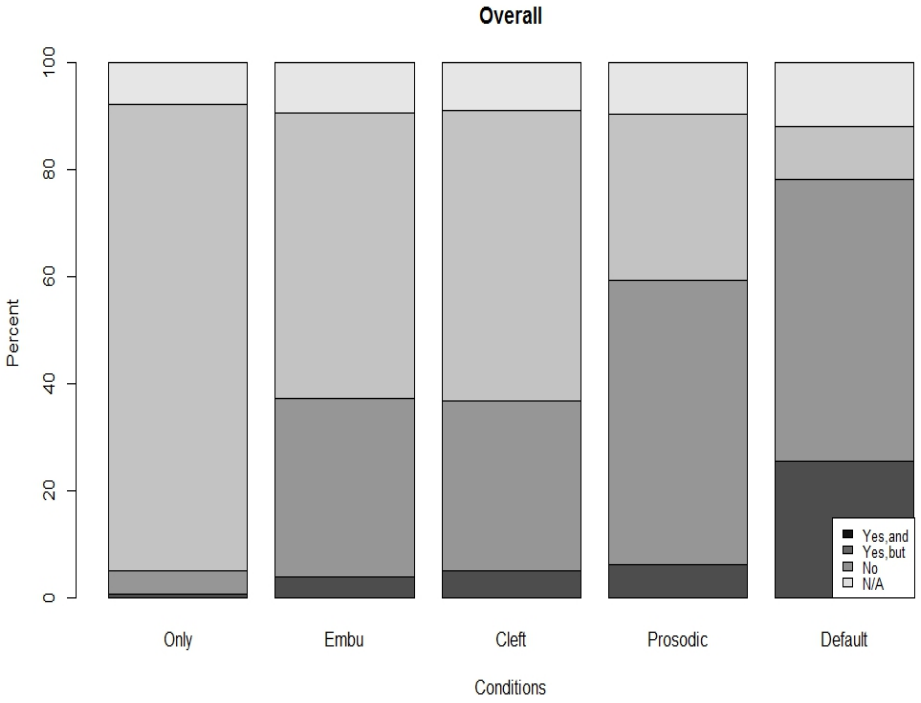

Figure 2: Overall Results for the 5 environments

chart, the percentages for the contradiction (hence, the exhaustivity) is reduced. Sentences with *only* are judged as exhaustive, while sentences with the focus particle *embu* and cleft sentences are less exhaustive and are interpreted the same by the participants. This means that *only*-sentences have received a higher number of continuation responses involving 'No' sentences. As we perceive the 'No' responses to be the clearest indication for contradiction of a non-exhaustive statement stating the need for the exhaustivity condition, we mainly focus on the change of that response across the conditions. Prosodic or phonological focus is interpreted as less exhaustive than other conditions. An ANOVA showed the effects of the environment was highly significant, $F(4,168)=110.123$, $p < .001$. In follow-up paired comparisons, every other focus environment was compared to the *only*-condition, since the latter serves as a benchmark for exhaustivity. Given the difference in Figure 2, a comparison of clefts with the prosodic focus condition was also attempted. Paired t-tests showed that all conditions differ significantly with the *only*-sentences in both subject and object sentences (Table 4).

Comparisons	Subject (df=42)	Object (df=42)
Only-Cleft	t=6.8013, p<.001	t=7.7676, p<.001
Only-Embu	t=5.5122, p<.001	t=11.0104, p<.001
Only-Prosodic	t=10.4876, p<.001	t=13.4464, p<.001
Only-Default	t=15.5788, p<.001	t=34.4571, p<.001
Cleft-Prosodic	t=5.2047, p<.001	t=3.996, p<.001

Table 4: Results from paired t-tests/ Comparisons with *only* and the other environments

Table 4 shows that there is a significant difference between *only*-sentences and all other environments. While the *embu*-sentences and the cleft sentences had similar results and no significant difference between them in a paired t-test (Subject sentences: p>.1, Object sentences: p>.8), there is a significant difference between cleft sentences and prosodic focus, t=5.2047, df=42, p<.001. This difference is the result of the phonological factors involved in Prosodic Focus, which makes it a different case than the syntactically encoded focus in clefts.

The data and statistical analysis provided here show a rejection of the null hypothesis assuming that there is no difference in the exhaustivity effects between the different conditions. Instead, the alternative hypothesis is that exhausitivity is different in subject and object clauses (in all environments, except the *only*-condition) and it is also different in the 5 different focus environments. These results validate the interaction of the conditions involved and create new findings regarding observations that have not been previously noted (e.g. difference in the exhaustivity interpretation according to the environment).

3.5 Strong vs. Weak Exhaustivity: An Alternative Analysis

The data presented so far are based on the division of responses by the participants in a particular way that clearly explains the assumption of the presence or absence of the exhaustivity condition. Alternatively, it could be argued that the 'Yes,but' type of responses show some degree of exhaustivity, but a weaker form of it than the one found in strong exhaustive statements expressed with 'No' responses.

In the data following, responses of the type 'Yes,but' and 'No' were coded as exhaustive and responses of the type 'Yes, and' were coded as non-exhaustive. A 5x2 ANOVA test showed that the effects of the subject and object sub-conditions that were found as significant with the first analysis (see section 3.4) were no longer significant with the recoding of the data. Further analysis of the data showed that the effect of the environment still remained significant, but only for responses to the *Only*-sentences when compared to prosodic focus and default sentences.

These findings suggest that cleft sentences and focus particles like *embu* that intuitively express some exhaustivity indeed show some form of exhaustivity. We will draw the distinction, however, that this is weak exhaustivity that was not evident in a stricter analysis of the data in search of the exhaustivity condition. Prosodic focus was found to differ significantly from the strongest exhaustive environment (*Only*-sentences) in both analyses attempted here. One can therefore safely conclude that the environment of prosodic focus

Comparisons	Subject (df=42)	Object (df=42)
Only-Cleft	t=1.6344, p>.05	t=1.8582, p>.05
Only-Embu	t=1.1593, p>.05	t=1.6664, p>.05
Only-Prosodic	t=2.2878, p<.05	t=2.2281, p<.05
Only-Default	t=4.9999, p<.001	t=5.6789, p<.001
Cleft-Prosodic	t=0.7709, p>.05	t=0.829, p>.05
Cleft-Emby	t=-0.4671,p>.05	t = 0.2554, p >.05

Table 5: Results from paired t-tests/ Comparisons with *only* and the other environments for the alternative analysis

is not interpreted exhaustively (either strong or weak exhaustivity).

In the sections following, the division to strong and weak exhaustivity will be better explained in terms of differences on a theoretical basis, where strong exhaustivity (or Explicit exhausitivity) is exhaustivity that is semantically encoded, but weak exhaustivity (or Implicit Exhaustivity) is derived from pragmatic reasoning.

4 Discussion

The general conclusion that follows from the set of data presented above is that exhaustivity does not appear to be a necessary condition in focus-associated contexts. In other words, the data from CG show that exhaustivity can be canceled as other studies have also argued (Onea & Beaver 2011, Destruel 2012) and is therefore not necessarily part of the meaning and the semantics of a proposition. However, this does not mean that it cannot be part of the meaning at all. In the case of the exclusive *only* and based on the cross-linguistic data, it is concluded that exhaustivity is part of the semantics of focus. The cancellation of exhaustivity appears in the other conditions (clefts, focus particles and prosodic focus). Before interpreting these effects and the theoretical implications to the theory of exhaustivity, the following section will discuss the comparison between the current experiment and previous experiments.

4.1 Comparison with Previous Experiments

As a reminder to the reader, (Onea & Beaver 2011) experiment had three conditions, including *Only*-sentences, pre-verbal prosodic focus on the subject and default intonation sentences. The results from their study show that immediately pre-verbal focus in Hungarian is less likely to be contradicted for not being exhaustive than *only*-sentences and that the exhaustiveness effect with pre-verbal focus in Hungarian is stronger than the exhaustiveness effect with prosodic focus in German. Based on the data, (Onea & Beaver 2011) conclude that Hungarian focus is not semantically exhaustive and that pre-verbal focus in Hungarian is more exhaustive that prosodic focus in German.

Destruel's (2012) experiment in French was using the same methodology attesting the conditions of *Only*-sentences with *seulement*, a canonical sentence (unmarked order) and cleft sentences and the continuation responses involved (a)*oui,et* 'yes, and', (b) *oui, mais* 'yes,but' and (c) *non* 'no'. The results showed that the exhaustivity effect associated with a

Condition	Cypriot Greek	Hungarian	German	French
Only	87% 'No'	82% 'No'	100 % 'No'	85% 'No'
Cleft	54% 'No'			10% 'No'
	35% 'Yes,but'			60% 'Yes,but'
Prosodic focus	31% 'No'	28% 'No'	4% 'No'	
	53% 'Yes,but'	46% 'Yes,but'	42% 'Yes,but'	
Embu	53% 'No'			
	33% 'Yes,but'			

Table 6: Cross-linguistic comparisons: Results from Onea & Beaver (2011) vs. Destruel (2012) vs. present study

c'est cleft is not as strong as the one associated with an exclusive sentence with *seulement*. Destruel concludes that cleft sentences are associated with an inference that is cancelable.

When putting all of these sources together, the similarities in the results are very obvious. The comparison is given in the table below.

Data from all languages tested had similar, if not almost the same, high rates for exhaustivity in sentences with *only*.[1] There is a difference, as the percentages for clefts showed 54% contradiction (Response (C)) here, but the French clefts did not show any contradiction at all, therefore no exhaustivity. With regard to 'Yes,but' responses, French speakers show higher rates of non-overt contradiction (60 %). Prosodic focus had similar percentages of contradiction in the current experiment (31%) and the experiment in Hungarian (28%). However, the German results (4 %) on the contradiction of prosodic focus were significantly lower than Cypriot Greek and Hungarian. The condition with the focus particle in the experiment was not included in any of the other experiments, therefore this merits more investigations for comparison with other languages. From the comparison above, the experiment confirms previous data and validates initial hypotheses about the variation that can be found in the interpretation of exhaustivity in focus-associated expressions.

4.2 A Distinction: Explicit and Implicit Exhaustivity

Previous literature (Wedgwood 2005) refers to inferred and encoded exhaustivity firstly discussed in (Szabolcsi 1981a), hence drawing a distinction. This separation of inferred and encoded exhaustivity relates to the assumption of a functional exhaustive operator, which has been argued in previous works in syntactic and semantics analyses. (Szabolcsi 1981a) discusses exhaustivity as an inference from implicature that contributes via encoding in the syntax to the compositional semantics of sentences. (Wedgwood 2005) disagrees with this distinction and claims that exhaustivity is not encoded in syntax, specifically referring to the Hungarian pre-verbal position. The claim in (Szabolcsi 1981a) that a PRO operator that is associated with a position F and has stress features in Hungarian to provide the exhaustive listing of the salient subset is not supported in the present analysis. While the operator is only structural in her work, it still imposes the interpretation of focus positions as always being exhaustive, a claim that has been disproven throughout the paper. Horvath (2005) explains that the phonologically empty EI operator, which is 'grammaticalized' in

[1]The percentages are an approximate of absolute numbers for some of the studies.

the syntactic representation is similar to *only* and *even*.[2]. Just as with previous accounts, this approach can be falsified in the presence of the data presented here and other aforementioned experimental and theoretical argumments. The existence of such a functional projection in syntax would impose the necessary interpretation of focus as exhaustive, a fact that has been disproven in Hungarian (Onea 2007 among others) and other languages.

Given that both the cleft and the other two conditions targeting the Foc position in syntax have shown absence of exhaustivity, then exhaustivity is arguably not a syntactic feature. If it was a syntactic feature, then one would expect to always find it there, and not checking it at the relevant position or syntactic relation, would cause a derivation to crash. The conclusion, therefore, supports (Wedgwood 2005) analysis that exhaustivity is not (at least solely) part of syntax. This brings further implications in discussion. While the claim is that exhaustivity is not part of the syntactic representation or any feature approach to it, the argument does not necessarily extend to focus. Focus can be seen as a syntactic feature or condition that drives movement in accounts considering focus to be structural (for example, Kiss 2009, Wedgwood 2005, Wedgwood 2009), but exhaustivity and focus can be seen as two separate conditions, even if exhaustivity appears in focus contexts. This separation of focus and exhaustivity leads to the following assumptions:

(12) **Assumption 2**: Focus is essential for exhaustivitiy. It can be semantic or structural or phonological, but exhaustivity is not necessarily all of the above.

The distinction that will be drawn here concerns solely a theory of exhaustivity, and not of focus. We have already ruled out an analysis, where exhaustivity is neither a syntactic feature or a functional projection in a syntactic representation. In fact, the distinction that needs to be drawn to capture the facts is an interplay of semantics and pragmatics, or what will be called here, the *explicit* and *implicit* exhaustivity. Explicit exhaustivity refers to the *linguistically encoded context-free exhaustive listing of a salient subset from the meaning of a proposition*, while implicit exhaustivity refers to the *optionally exhaustive listing of a salient subset from the inferences drawn in context*. The latter, therefore, is not truth-conditional content of the utterance, but it is a conversational implicature that an utterance is likely to convey. In the remaining part, I will focus on the derivation of each kind of exhaustivity, supporting the above distinction.

To start with what appeared from the data to be the clearest and strongest environment for exhaustivity, the exclusive operator *only* always gives exhaustivity effects and therefore falls under the explicit exhaustivity category assumed here.

Traditional approaches to the semantics of *only* (Horn 1996) claim the differentiation between the presupposition and the assertion part of *only*. This approach captures the exhaustive reading of operators like *only*.

(13) Monon o Panik^{h}os esasen to ermarin.
Only. the.NOM Panik^{h}os.NOM fixed.3SG the.ACC closet.ACC
'Only Panikos fixed the closet.'

According to Horn, (13) translates to (14) in the logical form and the meaning of *only* employs a universal quantifier and is equivalent to the negation of an existential.

[2]This analysis does not hold for clefts and pseudoclefts according to (Horvath 2000).

(14) $\forall x[esasen.to.ermarin(x) \rightarrow x = Panikos] =$
$\neg\exists x[x \neq Panikos \wedge esasen.to.ermarin(x)]$

The prejacent of *only* is then the presupposition without the exclusive:

(15) Monon o Panik^{h}os esasen to ermarin.
Only. the.NOM Panik^{h}os.NOM fixed.3SG the.ACC closet.ACC
'Only Panikos fixed the closet.' → 'Panikos fixed the closet.'

(Giannakidou 2006) concludes that the step or inference from the *only*-sentence to the prejacent is veridical. (Atlas 1991) (also, Atlas 1993) *only* is treated in a conjunctive logical form.

(16) *Only* asserts:
$\exists x\forall y[(x = y \leftrightarrow$ Py) & (Py $\rightarrow y = a)]$
=Exactly one individual, and no other than a, has the property P.

This entails the prejacent of *only*. If the prejacent of *only* is an entailment, then the meaning of *only*, as (Giannakidou 2006) argues, is:

(17) $[\![$Only Panikos$]\!] = \lambda P.P(Panikos) \wedge \neg\exists x[x \neq Panikos \wedge P(x)]$

While the approaches above capture the exclusiveness of *only*, they assume a negative component to capture the exhaustivity effect. As an alternative to that, the meaning of *only* in terms of quantification over propositions (Beaver & Clark 2008) can express the meaning of *only* as restricted by the activated alternatives to which the focal meaning refers.

(18) $[\![$Only S$]\!] = \forall p \in$ ALT true(p) $\rightarrow (p = S')$, where S' is the ordinary meaning of the sentence S, and ALT is a salient set of alternatives which is a subset of the focal meaning of S. (Beaver & Clark 2008, p.30)

In earlier work, (Beaver & Clark 2003) call operators like *only* focus functional operators and show that the stressed constituent is the semantic focus of the operator. Their analysis draws a distinction in the homogeneous class of focus operators, such as *only* and *always* and is in line with the distinction drawn for exhaustivity here. In other words, the focus operator *only* stipulates association with a focus constituent by means of its lexical properties and focus sensitivity and exhaustivity is not a uniform phenomenon. Exhaustivity, for focus functional operators like *only*, are therefore part of their lexical semantics as in (18).

A covert focus functional operator *only* for all cases of focus would derive the following semantics, as Onea (2007) explains:

(19) $\lambda P\lambda x P(x) \wedge \forall y P(y) \rightarrow y = x$

Exhaustivity, however, only appears in the semantics of an overt lexical item *only*, while in the rest of the focus environments, such stipulation brings wrong predictions, given that exhaustivity is only optional.

Exhaustivity, in environments that do not encode it in their lexical semantics (hence, *Implicit Exhaustivity*), may be treated as a separate element from a meaning related to focus

and can be captured, for example, with the model of the Question under Discussion. This should focus on the choice of alternatives in focus-associated contexts (Rooth 1992) and the salient answer to the question under discussion (In (Beaver & Clark 2008), this is the Current Question), where the alternatives values for x are compared to the prejacent and ordered according to their strength. The reasoning behind the Question under Discussion is the "rather direct connection to crucial elements of the mutual cognitive environment that felicity in response to a real or imagined question can indicate something about the information structure of an utterance" (Wedgwood 2009, page. 105). A question, therefore, gives a set of possible answers with group of individuals or singletons:

(20) **Question**: What did John burn?
Answer:John burned only [the beans and the lentils]$_F$.
Prejacent: John burned X, X=beans,lentils
Stronger Alt.: {beans, lentils}
Weaker Alt.: {beans}, {lentils}

By generating a conversational implicature, the speaker would seek to be as informative as possible and would choose the stronger alternative in (20). The alternatives in this model are ordered by entailment, where the stronger alternative entails the weaker, and if a speaker accepts a weaker alternative, that is purely because it is an entailment of the stronger alternative and not because the speaker wishes to deny that John burned both the beans and the lentils or the set of them. The weaker alternative, of course, does not entail the stronger alternative, but given that each alternative is always compared with the prejacent (which lists the items of the strongest alternative), then the speaker is allowed to infer the possible weaker alternative as a logical entailment of the prejacent.

A pragmatics modeling that captures the empirical data presented in this paper allows us to draw the distinction between the explicit exhaustivity (lexical semantics) and the implicit exhaustivity (via means of pragmatic inference). This section has argued on the basis of theoretical and experimental arguments presented in the previous sections that exhaustivity, just like focus (Beaver & Clark 2003), does not have a uniform analysis, but instead that explicit exhaustivity is encoded in the lexical semantics of focus functional operators like *only* or in the case of implicit exhaustivity, it is the strongest possible inference that can be drawn as a response to a relevant Question under Discussion.

5 Conclusion

This paper has discussed the variation found in the effects of exhaustivity in focused constituents, by presenting experimental data from Cypriot Greek and comparing them with previously published data from Hungarian, German and French. The variation appearing in the experimental studies shows that exhaustivity appears as part of the meaning of the proposition in some environments, while in others it appears to be optional or not necessary. It has been proposed that exhaustivity should not be dealt with a uniform analysis as part of focus, but that it is divided in two types, the *Explicit Exhaustivity* and *Implicit Exhaustivity*.

This proposal argues against approaches that assume a null exhaustivity operator or an exhaustive syntactic feature (Chierchia et al. 2013, Chierchia et al. 2009, Horvath 2000, Szabolcsi 1981b, Kiss 1998) and suggests that exhaustivity can be part of the lexical semantics

in the presence of focus functional operators (Beaver & Clark 2003), or a pragmatic inference (Wedgwood 2005) in other environments, such as clefts, prosodic focus and the CG focus particle. Clefts and focus particles can be interpreted as non-exhaustive and sentences with prosodic focus appear as non-exhaustive as well, suggesting that exhaustivity in these cases can be canceled. The syntactic differences between these environments do not relate to the exhaustivity effect, but to structural focus. If the two should be treated in a uniform analysis, then exhaustivity should be found in every focus environment. This is clearly not the case for the data discussed here. This, therefore, suggests that exhaustivity and focus should be treated differently. Secondly, a uniform analysis cannot be provided for exhaustivity, as it can appear to be both a semantic and a pragmatic effect.

The division of exhaustivity in two types can be further attested in environments with wh-questions and partial responses, where exhaustivity is not a necessary condition in the response. In addition, data from other languages using an optional focus particle like the CG *embu* could contribute towards a better understanding of the different degrees of exhaustivity in different environments. Further work investigating exhaustivity effects in question-answer pairs in experimental setting following the distinction drawn here remains as future work.

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The degree of the speaker's negative attitude in a goal-shifting comparison

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Abstract

The Japanese comparative expression *sore-yori* 'than it' can be used for shifting the goal of a conversation. What is interesting about goal-shifting via *sore-yori* is that, unlike ordinary goal-shifting with expressions like *tokorode* 'by the way,' using *sore-yori* often signals the speaker's negative attitude toward the addressee. In this paper, I will investigate the meaning and use of goal-shifting comparison and consider the mechanism by which the speaker's emotion is expressed. I will claim that the meaning of the pragmatic *sore-yori* conventionally implicates that the at-issue utterance is preferable to the previous utterance (cf. metalinguistic comparison (e.g. (Giannakidou & Yoon 2011))) and that the meaning of goal-shifting is derived if the goal associated with the at-issue utterance is considered irrelevant to the goal associated with the previous utterance. Moreover, I will argue that the speaker's negative attitude is shown by the competition between the speaker's goal and the hearer's goal, and a strong negativity emerges if the goals are assumed to be not shared. I will also compare *sore-yori* to *sonna koto-yori* 'than such a thing' and show that *sonna koto-yori* directly expresses a strong negative attitude toward the previous utterance. This paper shows that shifting the goal (without accomplishing the previous goal) is negative/offensive in nature, and a speaker expresses various degrees of negative emotion toward a hearer in different ways, i.e., by indirect evaluation (via contrast) or direct evaluation.

1 Introduction

In Japanese, the comparative expression *sore-yori*(*-mo*) ('it-than-MO') can be used at both the at-issue (semantic) and non-at-issue (pragmatic) levels. In (1), *sore-yori*(*-mo*) is used at the semantic level (*sore* refers to a contextually determined object):[1]

(1) Hanako-no keeki-wa sore-yori-(mo) ookii. (*Semantic use*)
Hanako-GEN cake-TOP it-than-MO big
'Hanako's cake is bigger than that.'

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[1]The particle *mo* has meanings like 'also' and 'even,' but in the environment of comparison, it is semantically vacuous.

However, *sore-yori-mo* 'that-than' can also be used to shift the goal of a conversation at the pragmatic level, as shown by B's utterance in (2). *Sore-yori-mo* in (2B) is pragmatic (non-at-issue) in that its presence/absence does not affect the truth condition of the given sentence:

(2) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'

B: Sore-yori-(mo) syukudai-wa owa-tta-no? (*Pragmatic use*)
It-than-MO homework-TOP finish-PAST-Q
'*Sore-yori-mo*, did you finish your homework?'

Kawabata (2002) observes that this version of the expression is "topic-changing." If we consider this topic-changing function in terms of the discourse structure, it becomes clear that *sore-yori-mo* in (2B) serves to shift the goal of the conversation. What is interesting about the goal-shifting use of *sore-yori* is that, unlike ordinary topic-changing/goal-shifting expressions like *tokorode* 'by the way,' *sore-yori* often expresses a speaker's negative attitude toward the addressee. Speaker B rejects Speaker A's goal of playing tennis, and we can infer that B has some kind of negative attitude (or complaint) toward the addressee.[2]

However, the goal-shifting *sore-yori* does not always indicate a speaker's negative attitude. In (3B), the speaker seems not to have a negative attitude toward the addressee (At least, (3B)'s attitude is not as negative as (2B)'s):

(3) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'

B: Tenisu si-tai-nda-kedo, sore-yori-(mo) ore-tachi ashita tesuto-da-yo.
Tennis do-want-NODA-but it-than-MO I-PL tomorrow test-PRED
'I want to play tennis but *sore-yori*-mo we have an exam tomorrow.'

How can we explain the variation in the strength of negativity? Should we assume that the speaker's negative attitude is part of the lexical meaning of *sore-yori*, or should we consider that it is purely pragmatic information? What is the relationship between goal-shifting and a speaker' attitude? In this paper, I will investigate the meaning and use of the expression *sore-yori* and try to answer these questions. First, I will propose that the pragmatic use of *sore-yori*, as in (2) and (3), conventionally implicates that the at-issue utterance that follows is preferable to the previous utterance referred to by *sore*. I will then argue that the meaning of goal-shifting is derived by pragmatic reasoning. Namely, a goal-shifting arises if the goal associated with the at-issue utterance is considered to be irrelevant to the goal associated with a previous utterance (otherwise, there will be no goal-shifting and *sore-yori* instead expresses a comparison between the two utterances based on the same goal).

Regarding the source and variation of negative emotion, I will argue that the speaker's negative emotion toward an addressee is expressed as a result of comparison/competition

[2]As we will discuss in detail later in Section 7, ordinary goal-shifting expressions like *tokorode* do not indicate a speaker's negative emotion and cannot be used in the discourse of goal-shifting comparison like (2).

between the speaker's goal and the hearer's goal. It will be shown that the speaker's negative emotion is strong if the speaker compares his/her personal (i.e., non-shared) goal and the hearer's personal goal, while if the goals can be shared by the speaker and hearer, there is no strong negativity (or maybe no negativity at all). I will also compare *sore-yori* to *sonna koto-yori* and claim that if a speaker uses the marked expression *sonna koto-yori* 'than such a thing,' it always induces a strong negative attitude regardless of the context. An example is shown in (4).

(4) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'
B: Sonna koto-yori-(mo) syukudai-wa owa-tta-no?
Such a thing-than-MO homework-TOP finish-PAST-Q
'*Sonna koto-yori-mo*, did you finish your homework?'

It will be shown that *sore-yori* used for goal-shifting comparison is an indirect expressive, while *sonna koto-yori* is a direct expressive in the sense of Sawada (2014). This paper shows that shifting the goal (without accomplishing the previous goal) is negative/offensive in nature, and the speaker expresses various degrees of negative emotion toward the hearer in different ways, i.e., by indirect evaluation (via contrast) or direct evaluation.

2 The semantic use of *sore-yori*

Before starting the discussion on the meaning and pragmatic use of *sore-yori*, let us analyze the semantic use:[3]

(5) Hanako-no keeki-wa {kore/sore/are}-yori(-mo) ookii.
Hanako-GEN cake-TOP this/that/that-than-MO big
'Hanako's cake is bigger than this/that one.'

The crucial characteristic of the semantic *sore-yori-mo* is that it combines with an explicit gradable predicate, as in (5). Namely, in establishing a comparative relationship between a target and a standard, it makes use of the measure function dimension of a gradable predicate (here, *ookii* 'big') to express comparison. I assume that the standard marker *yori* encodes a comparative meaning (e.g., Kennedy (2007); Hayashishita (2009); Sawada (2013)), as shown in (6):

(6) $[[yori]] = \lambda x \lambda g \lambda y.max\{d' \mid g(d')(y)\} > max\{d'' \mid g(d'')(x)\}$

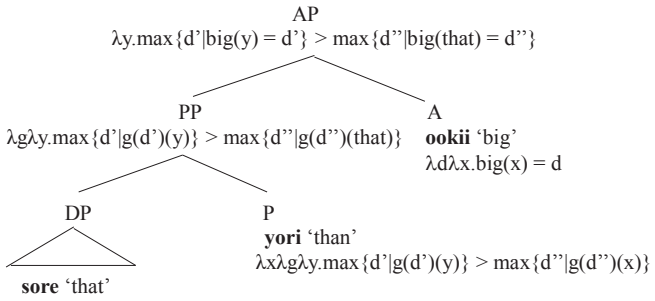
As for the meaning of the gradable predicate, I assume that gradable predicates represent relations between individuals and degrees (e.g., Klein (1991); Kennedy & McNally (2005)), as shown in (7).

(7) $[[ookii]] = \lambda d \lambda x.big(x) = d$

[3]Note that as example (5) shows, various kinds of demonstratives can be placed before *yori*, e.g. *kore* 'this', *are* 'that', *sore* 'it/that', etc.

The tree diagram in (8) shows the logical structure of sentence (5):

(8) Logical structure of (5)



The meaning of the semantic use of *sore-yori-mo* is part of the truth condition of the given proposition.

3 The pragmatic use of *sore-yori*

The pragmatic use of *sore-yori* is very different from the semantic use in that it does not combine with an explicit adjective. Intuitively, it is posited to be at a higher level than the semantic use of *sore-yori*. Furthermore, unlike the semantic comparison found in (5), the pragmatic comparison which we are going to focus on only allows the pronoun *sore*. In this section, we will examine some core characteristics of the pragmatic *sore-yori*. We will also look at the difference between metalinguistic comparison and the pragmatic *sore-yori*.

3.1 The goal-shifting and goal-internal uses

First, the pragmatic use of *sore-yori* can express two types of comparison: goal-shifting and goal-internal. In (9) and (10), Speaker B's utterance is an example of goal-shifting comparison and goal-internal comparison, respectively (*sore* 'that' in (9B) and (10B) refers to a previous utterance):

(9) (Example of goal-shifting comparison)
A: Tenisu-si-yoo-yo.
tennis-do-let's-PRT
'Let's play tennis.'
B: Sore-yori(-mo) syukudai-owa-tta-no?
That-than-MO homework-finish-PAST-Q
'*Sore-yori-mo*, did you finish your homework?'

(10) (Example of goal-internal comparison)
[Context: What kind of person is Hanako?]
A: Hanako-wa kashikoi-desu.
Hanako-TOP smart-PRED.POLITE
'Hanako is smart.'

B: Iya, sore-yori(-mo) yasashii hito-desu.
No that-than-MO kind person-PRED.POLITE
'No, *sore-yori*-mo, Hanako is a kind person.'

To understand the difference between goal-internal and goal-shifting comparison, it is necessary to understand the notion of goal. In this paper, I use the term "goal" in the sense of Roberts's notion of "domain goal" Roberts (1996, 2012). Domain goals are what interlocutors want to accomplish in the world. Note that Roberts's theory also includes the notion of "discourse goal," which is the aim to address particular questions in the conversation (i.e., the questions under discussion). In her theory, the domain goal (question under discussion) and discourse goal are interrelated. She considers that "domain goals, in the form of deontic priorities, generally direct the type of inquiry which we conduct in conversation, the way we approach the question of how things are. We are, naturally, most likely to inquire first about those matters that directly concern the achievement of our domain goals (Roberts 1996, 2012: 7)."

Let us consider the relation between domain goal and discourse goal based on the examples in (9) and (10). In (9), Speaker B rejects A's domain goal (=to play tennis) and introduces his/her own domain goal (=to make A to focus on studying). Since B's utterance is a question, it also introduces a discourse goal (i.e., question under discussion). (Note that goal-shifting comparison can appear in environments other than a question. We will discuss this in Section 3.2). In (10), the two speakers share the same domain goal. Namely, their utterances are intended to answer to the question "What kind of person is Hanako?"

3.2 The meaning of the pragmatic *sore-yori* is a conventional implicature

The meaning of the pragmatic use of *sore-yori* (goal-shifting and goal-internal use) does not contribute to "what is said." I propose that the pragmatic use of *sore-yori* triggers the following conventional implicature (CI):

(11) The lexical meaning of the pragmatic *sore-yori*: *sore-yori* conventionally implicates that the at-issue utterance that follows it is preferable to the previous utterance referred to by *sore*.

Let us begin by confirming that the pragmatic *sore-yori* has the properties of CI. In the Gricean theory of meaning, CIs are considered to be part of the meaning of words, yet these meanings are not part of "what is said" (e.g., Grice (1975); Potts (2005, 2007); McCready (2010); Gutzmann (2012); Horn (2013)). Furthermore, it is often assumed that CIs have the semantic property of speaker-orientedness (by default) Potts (2005, 2007). *Sore-yori-mo* satisfies these criteria. First, the pragmatic use of *sore-yori*-mo is invariably speaker-oriented. Second, its meaning is logically and dimensionally independent of what is said. For example, If utterances (9B) (=goal shifting comparison) and (10B) (=goal-internal comparison) are challenged by saying (12), (12) only targets the at-issue part of (8B):

(12) Iya sore-wa uso-da.
No that-TOP false-PRED
'No, that's false.'

One might consider the possibility that the pragmatic *sore-yori* is a presupposition trigger. However, I assume that the comparative meaning conveyed by the pragmatic *sore-yori* is not a presupposition. It is speaker-oriented, and its meaning is not something that is assumed to be already part of the background between the speaker and hearer.

The crucial point of this analysis is that the goal-shifting and goal-internal types have the same CI meaning. Namely, the information concerning goal-shifting or goal-internal comparison is not part of the meaning of the expression *sore-yori*. In Section 4, I will claim that the difference between goal-shifting and goal-internal comparison can be derived via pragmatic reasoning.

3.3 Pragmatic *sore-yori* operates on a speech act

In Section 3.2, I proposed that the pragmatic *sore-yori* compares two utterances, not propositions. This proposal predicts that the at-issue utterance followed by *sore-yori* can be any kind of speech act. It further predicts that the at-issue utterance and the utterance denoted by sore can have different illocutionary forces. As (13) to (15) show, these predictions are borne out:

(13) A: Ima-kara tenisu si-tai. (Declarative)
Now-from tennis do-want
'I want to play tennis from now on.'
B: Sore-yori-(mo) asita tesuto-da-yo. (Declarative)
It-than-MO tomorrow test-PRED-YO
'*Sore-yori-mo*, did you finish your homework?'

(14) A: Ima-kara tenisu si-tai. (Declarative)
Now-from tennis do-want
'I want to play tennis from now on.'
B: Sore-yori-(mo) syukudai-wa owa-tta-no? (Interrogative)
It-than-MO homework-TOP finish-PAST-Q
'*Sore-yori-mo*, did you finish your homework?'

(15) A: Ima-kara tenisu si-tai. (Declarative)
Now-from tennis do-want
'I want to play tennis from now on.'
B: Sore-yori-(mo) syukuidai-o oe-te! (Imperative)
It-than-MO homework-ACC finish-IMP
'*Sore-yori-mo*, finish your homework!'

There are other combinations as well, but, due to the limitation of space, we cannot show them all. For example, A's utterance can be an interrogative and B's utterance can be an imperative. The pragmatic *sore-yori* allows cross-speech act comparison.

3.4 Difference with metalinguistic comparison

In Section 3.2, I claimed that the pragmatic use of *sore-yori* posits a scale of preference. In this sense, it is similar to a metalinguistic comparison (in terms of attitude). According to Giannakidou & Yoon (2011), a metalinguistic comparison introduces one's point of view regarding a sentence and shows a preference for one sentence over another in a given context, as illustrated in (16):[4]

(16) a. Your problems are more financial than legal. (Accuracy assessment)
b. I would rather die than marry him. (Emphatic preference) (McCawley 1988: 673)

Giannakidou & Yoon (2011) posit the lexical entry in (17) for the emphatic preference type:

(17) (Emphatic preference type: "Would rather type")
$[[MORE_{ML}]] = \lambda P \lambda Q[P \succ_{Des(\alpha)(c)} Q]$ where $\succ_{Des(\alpha)(c)}$ is an ordering function such that, for P and Q and degrees d and d', the degree d to which α desires P in c is greater than the degree d' to which α desires Q in c; α is the anchor of comparison; P and Q are Potts tuples for sentences $\langle \Pi; \Sigma; \alpha : t \rangle$.
(Giannakidou & Yoon (2011: 639))

In the typical emphatic preferential case, the propositions expressed by P and Q are compared. In an accuracy assessment, a speaker compares u and u', which are quotations from sentences P and Q.[5] However, there are several important differences between a metalinguistic comparison and the pragmatic use of *sore-yori*. First, as we discussed in Section 3.3, unlike a metalinguistic comparison, a comparison made with *sore-yori* is made between two utterances, not between two propositions. For example, the pragmatic *sore-yori* can compare a previous assertion and a question, as we observed in (15). Second, while a metalinguistic comparison contributes to what is said, the pragmatic *sore-yori* does not. If we say "No, that's not true" after (16a) and (16b), the denial can target the metalinguistic comparative meaning. However, as we discussed in Section 3.2, the denial cannot target the meaning triggered by the pragmatic *sore-yori*.

3.5 The case without *sore-yori*

Next, we consider the function of the pragmatic use of *sore-yori* through comparison with a situation in which *sore-yori* is not used. Let us compare the dialogues in (18) and (19).

(18) (With *sore-yori*)

[4] Although many researchers have focused on accuracy assessment as a common kind of metalingusitic comparison (see McCawley (1988); Morzycki (2011)), Giannakidou and Yoon assume emphatic preferences and accuracy assessments to form a natural class that involves a speaker's preferential attitude.

[5] Giannakidou & Yoon (2011) posit the lexical entry in (i) for the meaning of accuracy assessment:

(i) (Accuracy assessment metalinguistic comparative)
$[[MORE_{ML}]] = \lambda u \lambda u' [u \succ_{Des(\alpha)(c)} u']$

A: Ima-kara tenisu si-nai?
Now-from tennis do-NEG
'Can't we play tennis from now on?'

B: Sore-yori ore-tachi ashita tesuto-da.
It-than-MO I-PL tomorrow test-PRED
'*Sore-yori*, we have an exam tomorrow.'

(19) (Without *sore-yori*)

A: Ima-kara tenisu si-nai?
Now-from tennis do-NEG
'Can't we play tennis from now on?'

B: Ore-tachi ashita tesuto-da.
I-PL tomorrow test-PRED
'We have an exam tomorrow.' Conversational implicature: I can't play tennis.

In (18) and (19), the Speaker B utterances convey the same semantic meaning. Also, they both conversationally implicate "I can't play tennis." However, B's utterance in (19) sounds more direct than the one in (18). In (18), B implies that he/she cannot play tennis by changing the topic/goal of the conversation. On the other hand, in (19), B implies that he/she cannot play tennis in reply to Speaker A's request/proposal. This difference suggests that although *sore-yori*-mo does not contribute to what is said, it nonetheless has a significant effect on the structure of the discourse.

4 Formal analysis

4.1 The compositional semantics of the pragmatic *sore-yori*

Let us now analyze the meaning of the pragmatic *sore-yori* in a theoretical way. In Section 3, I proposed that *sore-yori* conventionally implicates that the at-issue utterance that follows is preferable to the previous utterance referred to by *sore*. Here, I propose that there is a CI-inducing *yori* 'than' that compares utterances based on the desirability function (cf. Giannakidou and Yoon's analysis of metalinguistic comparison), as in (20) (*a* is the type of speech act; *U* and *U'* are variables for type a; superscript a stands for the at-issue type; and superscript s stands for the shunting type. I will explain these notions later in this section).

(20) $[[yori_{PRAG}]] : \langle a^a, \langle a^a, t^s \rangle \rangle$
$= \lambda U \lambda U' [U' \succ_{Des(\alpha)(c)} U]$ where $\succ_{Des(\alpha)(c)}$ is an ordering function such that, for *U* and *U'* and degrees *d* and *d'*, the degree *d* to which α desires to utter *U'* in *c* is greater than the degree *d'* to which α desires *U* in *c*.

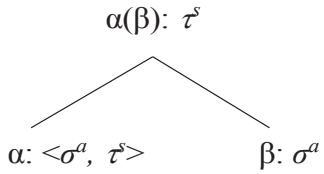
The pragmatic use of *yori* compares two utterances based on a desirability scale. Recall that here, unlike in the case of metalinguistic comparison, the pragmatic use of *sore-yori* compares speech acts.

As for the meaning of *sore*, one must assume it refers to a previous utterance, as indicated in (21):

(21) [[*sore*]] : a^a = the previous utterance

Sore and *yori* are then combined via the shunting operation in (22) (McCready (2010); Gutzmann (2012)), as shown in (23):

(22) The shunting application (McCready 2010)



The superscript *a* stands for the at-issue type, and the superscript *s* stands for the shunting type. Shunting type *s* is utilized for the interpretation of special kind of CI content. The rule in (22) says that an α of type $\langle \sigma^a, \tau^s \rangle$ takes β of type σ^a and returns τ^s. This rule ensures that there is only a CI meaning at the end of derivation. Note that this rule is specific to certain CI meanings, i.e., resource-sensitive CI. The rule is different from Potts's CI function application, which is resource-insensitive.

(23) [[*yori*]]([[*sore*]]) : $\langle a^a, t^s \rangle = \lambda U'[U' \succ_{Des(\alpha)(c)}$the previous utterance]

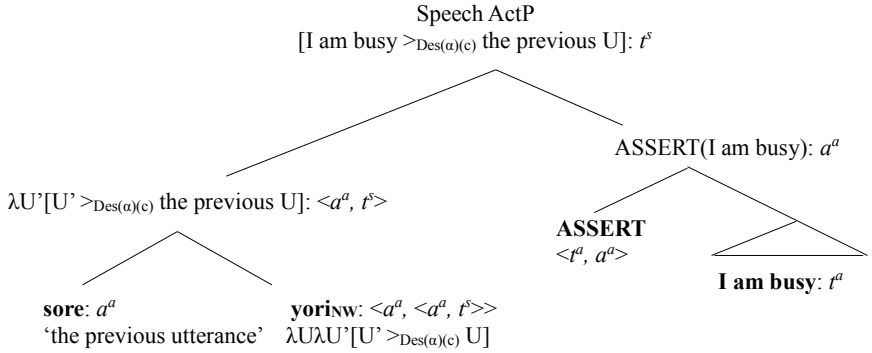
Sore-yori then combines with a main utterance. As for the representation of speech act (Stenius (1967); Krifka (2001)), I will assume that it has the type system in (24):

(24) a. Basic types: *e* entities, *t* truth values, *p* (=*st*) propositions, a speech acts.
b. A speech act operator is a function from the type of sentence radical it selects to type *a*.
c. The variables for type $a = \{U, U', U'', ...\}$

The figure in (26) shows the logical structure of (25):

(25) Sore-yori-(mo) watashi-wa ima isogasii.
That-than-MO I-TOP now busy
'*Sore-yori-mo*, I am busy now.'

(26)



One potential problem with this analysis is that the at-issue speech act (assertion) itself is not represented at the root level even though it is performed. In order to avoid this problem, drawing on the concept of a parse tree in Potts (2005) and McCready (2010), I posit the general rule in (27) for the interpretation of an (embedded) speech act:

(27) Let T be a semantic parse tree with the CI term $\alpha : \sigma^s$on its root node and distinct terms $\beta_1 : a^a, ..., \beta_n : a^a$ on nodes in it. Then, the interpretation of T is $\langle [[\alpha : \sigma^s]], \{[[\beta_1 : a^a]], ..., [[\beta_n : a^a]]\}\rangle$.

With this rule, we can ensure that the final interpretation includes both the CI meaning of type t_s and the embedded speech act of type a^a.

4.2 Deriving goal-internal and goal-shifting comparison via a single lexical item

The question is how to distinguish between goal-shifting and goal-internal comparison.

(28) (Goal-shifting comparison)
A: Tenisu-yara-nai?
Tennis-do-NEG
'Can't we play tennis?'
B: Sore-yori-(mo) syukudai-owa-tta-no?
That-than-MO homework-finish-PAST-Q
'*Sore-yori-mo*, did you finish your homework?'

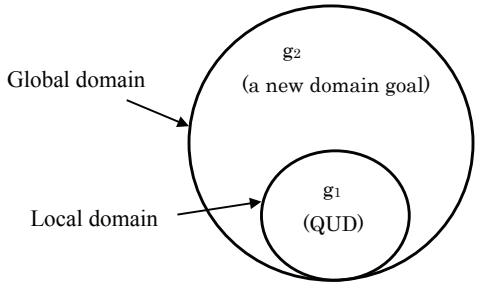
(29) (Goal-internal comparison)
(Context: What are the good points of this sports gym?)
A: Kono jimu-wa sisetu-ga subarasii-desu.
This gym-TOP equipment-NOM great-PRED.POLITE
'As for this gym, the equipment is great.'
B: Iya sore-yori-(mo) mazu insutorakutaa-ga yasashii-desu.
No that-than-MO first instructor-NOM kind-PRED.POLITE
'No, *Sore-yori-mo*, first of all, the instructors are kind.'

I would like to propose that the two types of comparison are distinguished by the pragmatic reasoning in (30):

(30) a. Goal-shifting comparison: If the domain goal behind the speaker's utterance is completely irrelevant to the domain goal behind the previous utterance, it is reasonable to assume that the speaker is trying to shift the goal of conversation (discourse goal).
b. Goal-internal comparison: If the domain goal behind the speaker's utterance is relevant to the domain goal behind the previous utterance, it is reasonable to assume that the speaker shares the same goal as the hearer.

The underlying assumption behind this analysis is that, usually, an utterance promotes the achievement of an accepted discourse goal (QUD) (Roberts (2012)). If B's domain goal is relevant to the domain goal of A's previous utterance, there is no problem with regard to the discourse move. However, if B's domain goal is not relevant to A's domain goal, it is natural to consider that B is trying to reject A's domain goal and make his/her own domain goal the center of the conversation. Recall that one's domain goal (speaker's wish) generally directly promotes the type of inquiry (question under discussion) that we conduct in conversation. This means that by using the goal-shifting *sore-yori*, the speaker tries to shift a discourse goal that is in the local domain to another goal that is in the global domain, illustrated in Figure (31):

(31)



4.3 Some notes on the analysis

Before concluding this section, I will add some notes on the above analysis. First, the relevance-based analysis is concerned with the relevance between domain goals, not between utterances themselves. Since *sore-yori* suggests that the at-issue utterance is preferable to a previous utterance, the two utterances are actually relevant at the utterance level. As (32) shows, if the two utterances are completely irrelevant, it is hard to compare them on the scale of preference:

(32) A: Kyoo-wa atui-ne.
Today-TOP hot-NE
'It is hot today, isn't it?'
B: # Sore-yori-(mo) 3 kakukei-no kakudo-no souwa-wa 180-do-da.
That-than-MO triangle-GEN angle-GEN sum-TOP 180-degree-PRED
'*Sore-yori-mo*, the sum of 3 angles of a triangle is 180 degrees.'

(32B) is odd because there seems to be no reason for the speaker to compare the previous utterance on climate and his/her own utterance concerning the sum of the angles of a triangle.[6]

Another point to note regarding the analysis is that in some cases, the goal related to a previous utterance and the goal related to the at-issue utterance can be understood under a precondition relationship. For example, in the conversation in (33), we can understand that the goal of playing tennis can be accomplished only after A completes his/her homework:

[6]Notice, however, that if we posit a context where B is teaching math to A, (32B) is perfectly natural.

(33) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'
B: Sore-yori-(mo) syukudai-wa owa-tta-no?
It-than-MO homework-TOP finish-PAST-Q
'*Sore-yori-mo*, did you finish your homework?'

However, there are also cases where no precondition relationship between the two domain goals is established. Observe the dialogue in (34):

(34) A: Kyo-wa atui-desu-ne.
Today-TOP hot-PRED.POLITE-NE
'It is hot today, isn't it?'
B: Sore-yori kinoo-no kaigi-wa doo-da-tta?
It-than yesterday-GEN meeting-TOP how-PRED-PAST
'*Sore-yori*, how was yesterday's meeting?'

Here, we do not assume that talking about yesterday's meeting is the precondition of talking about weather.

5 The speaker's negative attitude in goal-shifting comparison

In Section 4, we analyzed the meaning of the pragmatic use of *sore-yori*. Let us now turn our attention to the negative attitudinal characteristic of goal-shifting comparison. As we observed in the Introduction, sentences with the pragmatic *sore-yori* often indicate the speaker's negative feeling toward the addressee:

(35) (Context: A mother and her son are talking.)
A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'
B: Sore-yori-(mo) syukudai-wa owa-tta-no?
It-than-MO homework-TOP finish-PAST-Q
At-issue: Did you finish your homework?
CI: The goal related to my utterance is preferable to the goal related to your utterance. Implicature: I have a negative feeling toward your goal.

By signaling that the speaker's goal is preferable to the addressee's goal, the speaker implies his/her negative attitude toward the addressee's goal. However, as we observed in the Introduction, the pragmatic *sore-yori* does not always indicate a negative attitude:

(36) (Context: Two friends are talking with each other.)
A: Tenisu si-nai?
Tennis do-NEG
'Can't we play tennis?'

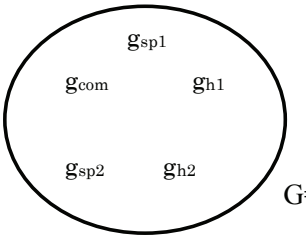
B: Ore-mo tenisu si-tai-kedo, sore-yori-(mo), syukudai-wa owa-tta?
I-also tennis do-want-but it-than-mo, homework-TOP finish-PAST
'I also want to play tennis but, *sore-yori*-mo did you finish homework?'

In B's utterance in (36), there seems to be no strong negativity attitude toward A. The negativity is very weak even if it exists.

How can we explain the defeasibility and various degrees of negative inference? In this section, I will argue that we can explain the various degrees of speaker's emotion and the context in which negativity arises by the competition/comparison between goals. Further, I will argue that the degree of negativity can change depending on whether the goals associated with a previous utterance and an at-issue utterance can be shared between the speaker and hearer.

The key point for my analysis is that a speaker and a hearer can have different goals. Regarding the notion of a domain goal (g), building on the notion of goals in Roberts (1996, 2012), I assume two types: the speaker's goal (g_{sp}) and hearer's goal (g_h). If a goal is shared by the speaker and hearer, then it is a common goal (g_{com}).

(37)



G= { g_{sp1}, g_{com}, g_{sp2}, g_{h1}}

Based on the notions of goals, I propose that there can be five patterns of goal-shifting comparison, listed in (38).

(38) The types of goal-shifting comparison

	The goal of the speaker's utterance (= target)	The goal of the previous utterance (= standard)	Negativity toward the hearer (via pragmatic inference)
Type A	g_{sp}	g_h	Strong
Type B	g_{com}	g_h	Weak
Type C	g_{sp}	g_{com}	Weak/none
Type D	g_{com}	g_{com}	Very weak
Type E	g_{sp}	g_{sp}	None

In Type A, the domain goal associated with the previous utterance is the hearer's personal goal, and the goal of the speaker's utterance is the speaker's personal goal. In this situation, there is a strong negativity by the speaker toward the addressee. A typical example of this type is shown in (39):

(39) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'

B: Sore-yori-(mo) watashi-wa ima isogasii.
That-than-MO I-TOP now busy
'*Sore-yori-mo*, I am busy now.'

Speaker B rejects A's goal and says his/her own goal (i.e., to focus on his/her own agenda). B will likely feel offended by A's utterance.

In Type B, the goal of the previous utterance is the hearer's personal goal, but the goal associated with the speaker's utterance can be considered a shared goal. In this situation, the negativity toward the addressee is weak:

(40) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'
B: Sore-yori-(mo) ore-tati ashita tesuto-da.
It-than-MO I-PL tomorrow test-PRED
'*Sore-yori-mo*, we have an exam tomorrow.'

Notice that in (40), Speaker B uses the first person plural ore (which is a casual form used only by male speakers). Clearly, by using the plural form, B intends that his domain goal "to prepare for an exam") is relevant to A's goal. Since B at least thinks that his domain goal can be shared between A and B, his attitude appears softer than in Type A.

In Type C, the goal associated with the previous utterance is a common goal, but the goal associated with the speaker's utterance is the speaker's personal goal. This type does not indicate a strong negative attitude toward the addressee:

(41) A: Tenisu si-nai?
Tennis do-NEG
'Can't we play tennis?'
B: Tenisu si-tai-kedo, sore-yori-(mo), report-o owarase-naito.ikenai.
Tennis do-want-but it-than-mo, report-ACC finish-have.to
'I also want to play tennis but, *sore-yori-mo* I have to finish writing a report.'

In (41), Speaker B prioritizes his/her own goal ("to finish writing a report") over A's goal ("to play tennis") and rejects A's goal; however, B at least acknowledges A's goal. Since B acknowledges the existence of A's goal, the rejection is mild. Therefore, compared to the situation in Type A, B's negative attitude is mild.

In Type D, both the goal associated with the previous utterance and the goal associated with the speaker's utterance are considered to be a common goal. In this type, the degree of negativity is very low:

(42) A: Tenisu si-nai?
Tennis do-NEG
'Can't we play tennis?'
B: Tenisu si-tai-kedo, sore-yori-(mo), ore-tati asita
Tennis do-want-but it-than-mo I-PL tomorrow
tesuto-da-yo-ne.
test-PRED-YO-confirm.Q

'I also want to play tennis but, *sore-yori*-mo we have an exam tomorrow.'

In this dialogue, B acknowledges A's goal and proposes/confirms another common goal. Since both goals are common goals, there is no personal discrepancy between the speaker's goal and the hearer's goal. Thus, there is only a very low degree of negativity behind B's utterance (or maybe no negativity at all).

Type E is a monologue in which the speaker compares his/her own goals:

(43) A: Tenisu si-yoo-kana.
Tennis do-want-PRT
'Maybe I will play tennis.'
A: Sore-yori-(mo) asita-wa tesuto-da-tta.
That-than-MO tomorrow-TOP exam-PRED-PAST
'*Sore-yori-mo*, I have an exam tomorrow.'

Since (43) is a monologue, there is no negative attitude toward a hearer.

The above discussions strongly suggest that the degree of the speaker's negative emotion is context-dependent. The speaker's negative emotion is strong if he/she compares his/her personal (i.e., non-shared) goal and the hearer's personal goal, while if the goals can be shared by the speaker and hearer, there is no strong negativity (or maybe no negativity at all).

6 Lexically derived negative attitude: *sonna-koto-yori* 'such.a.thing-than'

With the expression *sonna koto-yori* (rather than *sore-yori*), the speaker's negative attitude becomes more salient:

(44) {Sore-yori-(mo)/ sonna koto-yori-(mo)} kinoo-no shiken-wa
that-than-MO/ such thing-than-MO yesterday-GEN exam-TOP
doo-da-tta?
how-PRED-PAST
'*Sore-yori-mo*/*sonna koto-yori-mo*, how was yesterday's exam?'

Sonna koto 'such a thing' is marked (compared to *sore* 'it') and has a negative meaning. Suzuki (2005) claims that *sonna* N is used when the speaker regards the situation as subjectively negative, such as meaningless, worthless, unexpected, or unrealistic. *Sonna koto* can refer to various things. For example, in (45a), it refers to an act that was previously mentioned in the discourse.

(45) a. Sonna koto-wa si-taku-nai. (*sonna koto* = act)
Such thing-TOP do-want-NEG
'I don't want to do such a thing.'
b. Sonna koto-wa atarimae-da. (*sonna koto* = event/fact)
Such thing-TOP a.matter.of.course-PRED
'Such a thing is not surprising.'

In the case of goal-shifting comparison, we can say that *sonna koto* refers to an utterance itself and evaluates it as meaningless. I propose that *sonna koto* is mixed content (e.g., McCready (2010); Gutzmann (2011)), which semantically refers to an utterance, an act, or a situation and simultaneously denotes a CI meaning that a speaker construes them negatively. For instance, we can define *sonna koto* in goal-shifting comparison as in (46): [7]

(46) [[*sonna koto*]] : $\langle a^a, t^s \rangle$ = a previous utterance ♦ I consider the utterance negatively (meaningless)

The negative evaluative indicated by *sonna-koto* is conventional and not defeasible. This is supported by the fact that it cannot be used in a situation where the speaker has a positive evaluation toward the previous utterance, as illustrated in (47):

(47) A: Ima-kara tenisu si-yoo.
Now-from tennis do-let's
'Let's play tennis from now on.'

B: # Tenisu si-tai-nda-kedo sonna koto-yori-(mo) syukudai-wa
Tennis do-want-NODA-but such a.thing-than-MO homework-TOP
owa-tta-no?
finish-PAST-Q
'Sonnna koto-yori-mo, did you finish your homework?'

These discussions suggest that in, a goal-shifting comparison, there are two ways to convey a speaker's negative attitude toward the addressee, i.e., using a specific lexical item (*sonna koto*) or pragmatic inference.

7 Difference with the other goal-shifting marker *tokorode* 'by the way'

Finally, let us briefly compare goal-shifting comparison using *sore-yori* and the typical goal-shifting marker *tokorode* 'by the way', which is shown in (48).

(48) Tokorode siken-wa doo-da-tta?
By.the.way exam-TOP how-PRED-PAST
'By the way, how was the exam?'

The natural context in which *tokorode* is used is one in which the speaker assumes that the conversation has reached a goal (at least for one speaker). The interesting point about *tokorode* is that it cannot be used in a context where the goal-shifting *sore-yori* is used, as shown in (49)(see also Kawabata (2002)):

[7] The adnominal demonstrative *sonna* 'such a' can also combine with various kinds of common nouns, as in (i) and (ii):

(i) sonna {mono/hito}
such.a thing/person
'such a thing/person'

These examples also convey the speaker's negative attitude, i.e., toward the modified noun.

(49) A: Tenisu-si-nai?
Tennis-do-NEG
'Can't we play tennis?'
B: {Sore-yori-(mo)/??tokorode} syukudai owa-tta-no?
That-than-MO/by.the.way homework finish-PAST-Q
'*Sore-yori*-mo/??*tokorode*, did you finish your homework?'

Intuitively, it is odd to use *tokorode* in (49B) because clearly, A and B have not finished talking about tennis. I consider that the expression *tokorode* includes the presupposition in (50):

(50) [[*tokorode*]] = λU: There was a discourse goal in the past, and the speaker and hearer have just reached the goal. U

On the other hand, the goal-shifting *sore-yori* does not have this kind of presupposition. Actually, it is very odd to use the goal-shifting *sore-yori* in a context where the speaker and hearer have just reached a prior discourse goal.

(51) A: Ashita tenisu si-nai?
Tomorrow tennis do-NEG
'Can't we play tennis tomorrow?'
B: Un iiyo. Itumo-no basyo-de yar-oo.
Yes OK always-GEN place-LOC do-let's
'Yes, OK. Let's play at the usual place.'
B: {Tokorode/??sore-yori} syukudai-wa owa-tta?
By.the.way/it-than homework-TOP finish-PAST
'By the way/??*sore-yori*, did you finish your homework?'

It does not make sense to compare the prior discourse goal with B's new goal because the prior discourse goal has already been reached. The prior discourse goal is no longer active in the discourse.

8 Conclusion and theoretical implications

This paper investigated the meaning and pragmatic use of *sore-yori* in Japanese and considered the speaker's negative attitude behind the use of goal-shifting comparison.

As for the meaning of the pragmatic use of *sore-yori*, we observed that it can express a goal-shifting or goal-internal comparison. We argued that goal-internal and goal-shifting comparison have the same CI (i.e., the at-issue utterance is preferable to the previous utterance), and the difference between the two is derived as a result of pragmatic reasoning: if the goal associated with the previous utterance and the goal associated with the at-issue utterance are relevant, the comparison is goal-internal; otherwise, it is goal-shifting.

We then looked at the relationship between goal-shifting comparison and the speaker's negative attitude and showed that goal-shifting comparison can trigger various degrees of

negativity toward an addressee. We explained that the degree of negativity can change depending on whether the goals of utterances can be shared between the speaker and hearer.

We also compared *sore-yori* to the more marked expression *sonna koto-yori* 'than such a thing' and showed that the goal-shifting *sonna koto* is a mixed expressive: it semantically denotes a previous utterance, and at the same time, it conventionally implicates a strong negative attitude toward the previous utterance (thus, toward the addressee).

The theoretical implication of this paper is that shifting the goal without accomplishing the previous goal is highly attitudinal, and speakers can express degrees of negative emotion in various ways. This point is important for the theories of expressives. Especially, the phenomenon of goal-shifting comparison provides deeper insight into the relationship between direct and indirect expressives and the varieties of indirect expressives in natural language. Sawada (2014) proposes that in natural language, there are two types of expressives, direct and indirect:

(52) a. Direct expressives: In direct expressives, the speaker directly expresses his/her attitude/construal toward the target.

b. Indirect expressives: In indirect expressives, the speaker expresses his/her attitude or construal toward the target through comparison/contrast with its alternative.

(Sawada 2014: 241)

For example, Sawada (2014) considers expressives like *bastard* in (53a) and *man* in (53b) are direct expressives:

(53) a. That bastard Kresge is famous. (target = Kresge) (Potts 2007: 168)

b. Man, I got an A on my calculus test!! (target = proposition) (McCready 2009: 675)

Here, *bastard* conventionally implicates that the speaker has a negative attitude toward *Kresge*, and *man* in (53b) expresses a heightened positive emotion toward the proposition that the speaker got an A on the calculus test.

On the other hand, Sawada (2014) assumes that the negative use of the Japanese comparative intensifier motto is an indirect expressive:

(54) Kono mise-no keeki-wa motto ooki-katta. (Negative reading)
this store-GEN cake-TOP MOTTO big-PAST
At-issue: This store's cake was big.
CI: The previous size of this store's cake is much bigger than the current size.
Conversational implicature via CI: This store's cake is small now.

Sawada (2014) analyzes that *motto* in (54) conventionally implicates that there is a large gap between the current degree and an expected degree (the degree in the past) with regard to the size of the store's cake. He then argues that the speaker's negative evaluation of the utterance situation, that the store's cake is small now, comes from the large gap between the expected degree and the current degree.

If we consider the difference between *sore-yori* and *sonna koto-yori*, we can say that *sonna koto-yori* is a direct expressive, while *sore-yori* is an indirect expressive. The goal-shifting *sore-yori* can be regarded as an indirect expressive because the speaker expresses a negative attitude toward the addressee's goal only though comparison/competition with its alternative (i.e., the speaker's own goal). On the other hand, *sonna koto-yori* can be regarded as a direct expressive because the speaker directly expresses a (strong) negative evaluation of the previous utterance. In this paper, I have sought to clarify the expressives involved in the choice of a goal. In a future study, I would like to consider the relation between goal-shifting and politeness. An interesting point regarding the negative attitudinal meaning indicated by *sore-yori* is that it does not disappear even if politeness expressions are used in the same sentence:

(55) A: Kore-kara yuusyoku-ni iki-mas-yoo.
This-from dinner-to go-PRED.POLITE-let's
'Let's go to dinner.'

B: Sore-yori-(mo) repooto-wa owari-masi-ta-ka?
That-than-MO report-TOP finish-PRED.POLITE-PAST-Q
'*Sore-yori-mo*, did you finish your project?'

In (55), Speaker B uses the performative honorific *desu*, which signals a speaker's respect toward an addressee (see Harada (1976); Potts & Kawahara (2004)). However, we can still see a strong negative attitude expressed in (55B). Why is it that politeness markers do not cancel a negative attitude? One explanation is that shifting a goal occurs at a higher level than talking to an addressee in a polite way. I leave this question for future research.

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Modified Proper Names and the Structure of D_e

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Abstract

Though much work has been given to defining the exact nature of the proper name, most semantic theories assume some atomic element in the domain corresponding to the unique referent of the name (cf. Matushansky 2008; Izumi 2013). However, the appearance of proper names in restrictive attributive constructions, such as *drunk Joan* or *the Jewish Saul* show that further division of this "atomic" individual is possible. Whereas previous accounts for these data have relied on spatiotemporal divisions, I introduce a new subclass of examples using inherent properties that suggest that a more complex notion of the individual fractured along property or persona lines is necessary.

1 The Modified Proper Name construction

This paper takes as its focus an English construction wherein proper names in their literal referential usage are modified restrictively. At the core, the question these data raise is how to account for the fact that two such modified proper names (MPNs) formed from the same name can have varying truth values with respect to the same predicate, as in (1):

(1) Though **the drunk Pierre** is very outgoing, **the sober Pierre** is not at all outgoing.

With this paper I aim to provide a compositional account for these data, which keeps this form of modification consistent with more familiar/common attributive constructions (e.g. *pink unicorns* or *the sad elephant*). Furthermore, in highlighting the range of contexts the MPN construction appears in, I introduce a class of MPN ignored by previous literature and use it to argue for an enriched semantic domain wherein the smallest element in D_e is not an individual at a given time (the stage of Carlson 1977), but rather a psychologically-coherent fragment, or *persona* at a given time. To do so I argue that the MPN data can best be accounted for by allowing fracturing of individuals along property-centered lines.

1.1 Nailing down the MPN

Before delving into the problem posed by the MPN, we must properly define the subject at hand. The MPN consists of a proper noun, in its literal usage, under restrictive attributive modification:

(2) **The young W. A. Mozart** visited Paris. (from Paul 1994)

(3) **The Joking Woody Allen** is funny. (from Paul 1994)

(4) **Fat Betty Draper** gets her own song. (Wakeman 2012)

(5) **Drunk me** is a raving lunatic who devises horrible plans and convinces everyone else in close proximity that they are a good idea. (pghbatman 2013)

For the purposes of this paper, I make no distinction between the use of proper names (2-4) and pronouns[1] (5) in the MPN construction, as the latter are subject to the same concerns following variable assignment. Furthermore, there is variation with respect to the inclusion of the definite determiner *the* in the MPN. Naturalistic examples appear both with and without *the*, and there seems to be no fully consistent pattern governing its appearance; in fact, the same adjective-proper name combination might appear both ways. For completeness, the full range can be seen in (6).

(6) a. **Drunk John** is a raving lunatic.
b. **Drunk me** is a raving lunatic.
c. **The drunk John** is a raving lunatic.
d. **The drunk me** is a raving lunatic.

An important distinction should be drawn between MPNs as currently under discussion and two other attributive adjective-proper noun constructions. In the following series of examples, (7a) shows the MPN construction of the sort I describe, followed by superficially similar constructions in (7b-7c).

(7) a. **Blonde Norma Jean Baker** proved much more popular than **brunette Norma Jean**.
b. **Blonde Cheryl** works in HR, while **brunette Cheryl** is in accounts.
c. **Blonde Zahra** wondered where in her Persian ancestry her fair coloring could have come from.

As used in (7a), *blonde Norma Jean Baker* gives a reading that could roughly be paraphrased as "Norma Jean Baker as she exists at such points where she is blonde." Crucially, it is restrictive (as illustrated by the contrast with *brunette Norma Jean*), while at the same time there is only a single person under discussion. The modification in (7b) is also restrictive, but here there are multiple Cheryls (the set of individuals meeting some "being called condition" as in Geurts 1997). Thus, the paraphrase of *Blonde Cheryl* becomes "the person x such that x is named Cheryl and x is blonde." The usage in (7c) is not restrictive at all, but rather appositional. This construction is quite common in broadcast or print news and is typically consistent with a paraphrase of "X, who is Y," e.g. "Zahra, who is blonde." Whereas the intonation of (7a) and (7b) stress *blonde, Zahra* receives heavier stress in (7c).

Both (7a) and (7b) are implicitly contrastive (made explicit in the above examples), but whereas (7b) contrasts from an external set of multiple individuals, (7a) seems to select from within a single individual. The difference hinges on two very different interpretations of the proper noun itself: to borrow the distinction from Fara (2012), the name in the MPN case is being used *referentially*, selecting a unique referent, whereas the non-MPN usage above is a *"bearing the name"* predicate.

Though in many contexts (7a) and (7c) may appear quite similar, the different uses create different entailment patterns. For example, in the following sentence pairs (with

[1] It does seem to be the case that the pronoun is only felicitous for the first and second person. That is, *drunk me, drunk you,* but not *drunk him.*

italicized stress added for clarity), (a) entails (b) only in the appositive case (9), not in the MPN (8).

(8) a. People think the *blonde me* is an idiot.
    b. People think I am an idiot.

(9) a. People think blonde *Jessica* is an idiot.
    b. People think Jessica is an idiot.

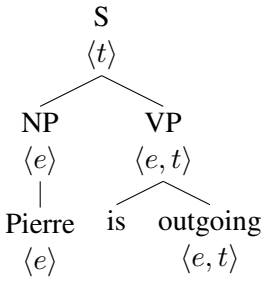
To summarize, in order to qualify as an MPN, a phrase must have two defining properties:

I. The modification on the name must be restrictive.
II. Further, the restriction must be on a a referential usage of a name, that is, not across a larger set of individuals satisfying a "bearing the name" condition.

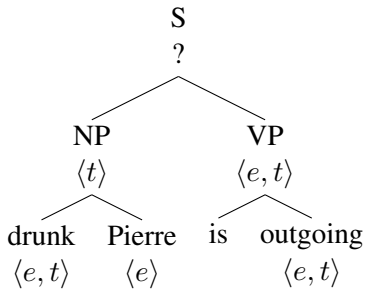
1.2 The MPN puzzle

The MPN proves troublesome for our standard semantics on at least two levels. To begin with, there is the base issue of compositionality. Under a standard analysis for proper names (Heim & Kratzer 1998), proper names are semantically simple objects of type e. When combined with a predicate of type $\langle e, t\rangle$, such as *drunk*, we are left with a fully-saturated expression of type t. The problem with this is obvious, given the previous observation that MPNs seem able to pattern like unmodified proper names. See the figures in (10a) and (10b) for the respective derivations.

(10) a.



b.



The second issue (closely tied to the first) relates to what it even means to modify a proper name restrictively. A typical definition of an intersective adjective such as *drunk* gives a function that takes an individual and returns a truth value (11a). When used attributively, Predicate Modification (Heim & Kratzer 1998) combines *drunk* with a second predicate (e.g. *sailor*, (11b)) to compose the predicate of their intersection (*drunk sailor*). The result can be seen in (11c).

(11) a. $[\![\textbf{drunk}]\!] = \lambda x : x \in D_e$.*x is drunk*
b. $[\![\textbf{sailor}]\!] = \lambda x : x \in D_e$.*x is a sailor*
c. $[\![\textbf{drunk sailor}]\!] = \lambda x : x \in D_e$.*x is drunk and x is a sailor*

Putting aside the aforementioned issue of compositionality, extending the above from *sailor* to *Pierre* brings with it some conceptual strangeness. Even if *Pierre* (in its referential usage) is analyzed as a function of the same type as *sailor*, such a function would hold over only a single atomic individual in the domain, and predicate modification would either return the same function (for properties Pierre has) or one that is always false (for other properties). Put anther way, we are still left unable to account for the difference in truth values with respect to outgoing in our sentence (1):

(1) Though **the drunk Pierre** is very outgoing, **the sober Pierre** is not at all outgoing.

The first puzzle is then: ***how can we characterize the modification of the MPN?***[2] A useful way in which to frame this emerges from the philosophical debate over intrinsic change. The central question of this literature, as paraphrased by Lowe (1988), asks how "we do not run into contradiction in describing such an object as undergoing a change from possessing one such property to possessing another incompatible one." This echoes the central question of the MPN: if *a* is a "persisting object" (e.g., a person across time), and *F* and *G* are two mutually incompatible properties, how do we allow for both *a is F at t* and *a is G at t′*, for the same *a*? As applied to our example (1), *a* is *Pierre*; *F* and *G* are *outgoing* and *not outgoing*, respectively; and *t* and *t′* are then *drunk* and *sober*. The overarching intuition is that the relationship between *Pierre* and *outgoing* is modulated by some form of restriction provided by *drunk* or *sober*; the question is what this modulation is.

So framed, Lowe outlines the three possible ways of splitting up the pie:

I. a is F-at-t, where any property must be qualified: *Pierre is outgoing-when-drunk*
II. a is-at-t F, where any ascription of a property must be qualified: *Pierre is-when-drunk outgoing*
III. a-at-t is F, where any property must be ascribed to a part of a: *Pierre-when-drunk is outgoing.*

As will be discussed in Section 2, the first two options can be dispensed with on semantic grounds. The third option best characterizes the behavior of the MPN, and underlies the most successful analyses of the MPN construction. Thus, we can narrow in on the task at hand slightly:

A. ***What is the appropriate mechanism for an a-at-t division?***

Indeed, this is the question prior approaches seek to answer. But a mechanism for division alone is insufficient; a full account of the MPN cannot be constructed without answering the following consequential questions:

B. ***What types of predicates occur as modifiers within the MPN?***
C. ***What types of predicates can in turn occur with the MPN (i.e., how does the MPN function in the sentence?)?***

[2]My choice of terminology in a sense betrays my preferences, but for the moment we shall keep an open mind.

D. ***How do MPNs relate to their relevant bare proper name?***

1.3 Outline

Over the course of the sections to follow, I will address questions (A-D) in providing an account for MPNs that can address the full range of their behavior. The rest of this paper proceeds as follows: **Section 2** outlines prior approaches to the MPN data, rejecting all non-compositional accounts and presenting two possible alternatives. In **Section 3** I present my new data as counterexample to those prior analyses, and use them to reframe the question of the MPN. In **Section 4** I continue by presenting a sketch of my proposal, which leverages Carlson's (1977) individual/stage distinction alongside the Part Analysis to argue for two possible axes of division for individuals, and introduces a new element into D_e to do so.

2 Prior approaches to the MPN Question

To date there has been only one analysis directed specifically to the MPN construction, Paul (1994), which as such has been the de facto approach to these data (c.f. Musan 1995, Matushansky 2008, Izumi 2013) . However, others have tackled the broader question of how to characterize restriction on individuals. In this section, I outline three approaches for handling MPN-type data. I begin by motivating the view that MPNs show modification at the NP level (Lowe's *a-at-t* approach), dispensing with those proposals that try to offload the modification elsewhere in the sentence (Lowe's *F-at-t* or *is-at-t* approaches). I then discuss in brief two analyses working in the *a-at-t* vein.

2.1 The Adverbial Analysis (Lowe 1988)

As described in Section 1, Lowe formulates the intrinsic change problem as a question of where to place restriction. Returning to this formulation, the Adverbial Analysis proposes that modifiers in MPNs are best analyzed as adverbial, specifying when/where the sentential predicate holds of the individual in question (that is, the *a is-at-t F* approach). The appeal of this analysis is in its relative simplicity; it requires no adjustments to either our definitions of individuals (no *a-at-t*) or predicates (no *F-at-t*). In support of this analysis is the seeming availability of some relevant paraphrases:

(12) a. Though **the drunk Pierre** is very outgoing, **the sober Pierre** is not at all outgoing.

b. Though Pierre **is, when drunk**, very outgoing, he **is, when sober**, not at all outgoing.

However, closer examination of these paraphrases shows that they fail to adequately capture the meaning of the original MPN construction. Because adverbials and individuals can have independent temporal interpretations (Musan 1995), the interaction between the two gives us a means to test the adverbial status of the MPN modifier. An existence-independent predicate such as *famous* must hold contemporaneously with any temporal adverbial, but makes no claims to the timeline of the individual of which it holds. So, for a statement like *Shakespeare is famous today* to be felicitous, Shakespeare's fame must exist

today, but Shakespeare himself need not. Thus, if the MPN modifier is truly adverbial, we should be unable to get a reading of an MPN plus existence-independent predicate wherein the MPN modifier and the predicate do not hold at the same time. This is not the case:

(13) Thanks to the powers of YouTube, Drunk Pierre is famous, even though Pierre hasn't had a drink in two years.

Note that the adverbial paraphrase fails to give us a felicitous reading:

(14) ? Thanks to the powers of YouTube, Pierre is, when drunk, famous, even though Pierre hasn't had a drink in two years.

The temporal independence of *drunk* from *famous* in (13) provides compelling evidence that the modifier is part-and-parcel of the individual, and allows us to dispense with accounts that off-load modification elsewhere in the sentence. Therefore, I turn now to those analyses that take the *a-at-t* tack and seek to find a workable way to fracture the individual. Two approaches are outlined: the first building in restriction through an intensional filtering of a given individual's properties, and the second an extensional splintering of an individual along spatiotemporal lines.

2.2 Intensional Individuals (Landman 1989)

The Intensional Individuals Analysis builds on the analysis in Landman (1989) of the "as an X" (e.g. *John as a judge*) construction. Though this might seem like a rehash of the adverbial paraphrase, treatments of the "as an X" construction cast it as conceptually far closer to the MPN, in that they assume restriction localized to the individual in question. And, just as with MPNs, "as an X" constructions show apparent contradictions with respect to additional predicates.

(15) a. John as a judge is trustworthy.
b. John as president of the football club is corrupt. (Landman 1989)

Citing the non-substitutivity of the "as an X" phrases above, Landman characterizes such constructions as "restricted indviduals": intensional contexts with individuals limited under a certain aspect. Restricted individuals are formalized as sets of properties. Specifically, they are an ultrafilter over the set of properties possibly ascribed to an individual, minimally including the property of being the relevant base individual, and the property of the aspect of restriction. Thus of *John as a judge* (notated as $j \restriction J$) we can say the following:

i. $j \restriction J(\lambda x.x \textit{ is john}) = 1$ "John as a judge is John."
ii. $j \restriction J(J) = 1$ "John as a judge is a judge"
iii. every other property either holds or does not hold of John as a judge

2.3 The Part Analysis (Paul 1994)

Of the approaches to the MPN discussed in this paper, only the Part Analysis of Paul (1994) was developed to directly account for MPN data. This is reflected in the way in which the Part Analysis seeks not only to provide a mechanism for modifying an individual, but to

do so in a way that parallels other attributive structures. As such, his is the only fully compositional account.

To do this Paul recasts the individual as a non-atomic entity, appealing to the notion of a "spatiotemporal region" or "sausage", à la Goodman (1951) and Quine (1960). The intuition here is simple: if restrictive modification wants a set of things to select from, give it a set of things to select from. Broadly, instead of a singular irreducible entity, an individual can be seen as the totality of a number of spatiotemporal parts, or "slices." Crucially, individual slices can be selected and even fused together to refer to specific *parts* of the individual.

A bare proper name is then the power set of all (spatiotemporal) slices of a given individual (i.e. all its parts). *Mozart*, in *the young Mozart* is the power set of all *Mozart* slices, ordered under some spatio-temporal part relation. At the DP level, all names encounter some definite determiner, either explicit (in the case of the MPN) or null (c.f. Burge (1973), Bach (1989)), which selects the maximal element of that set. Thus MPN-internal modification becomes akin to common noun modification more broadly, with a predicate like *young* selecting those relevant *Mozart*-parts just as it would with a predicate like *cats*.

The full denotation for an MPN like *the young Mozart* can the be represented as follows:

(16) $[\![\textbf{The young Mozart}]\!] = max_{\preceq_{st}}\{x|x \in [\![\textbf{young}]\!]([\![\textbf{Mozart}]\!])\}$

Both Paul and Landman's analyses operate under an important if unaddressed assumption: the semantic object represented by the MPN is the same as that represented by the bare PN. This is an important point, especially for a system such as Paul's which relies on a literal division. It is an intuitive claim, given the substitutivity of MPNs and PNs, but one that carries heavy implications with respect to how MPNs interact with sentence-level predicates. I will return to this point in more detail in the following section, but for the time being I will note (in very broad terms) that Landman and Paul's approaches in essence offer opposite claims: for Paul, everything (including a bare PN) is pieces, while for Landman, everything (including an MPN) is a whole.

3 New data

Having presented two previously proposed mechanisms for modification with an individual locus, I now introduce new data which show the limitations of these approaches.

Paul's Part Analysis leverages an enriched semantic domain, where the atomic element is a spatio-temporal slice or "part" of a given individual. Sets of parts, partially ordered under a spatio-temporal relation, form complex individuals, with the maximal upper part selected as the denotation of a given proper noun.

This system handles well Paul's own data, which exclusively features modification that is either explicitly spatial or temporal, e.g. *the young Mozart*, *the Upper Rhine*; or involves properties that are assessed at a specific time (under Carlson's system, stage-level predicates), e.g. *the Joking Woody Allen*. However, naturalistic data offers many cases of modified proper names which fall outside of these two groups. I present below a number of such examples, and discuss their implications for the analysis.

(17) It's funny but **the Jewish me** finds it easier to connect and feel a part than **the gay me**. (Munro 2011)

(18) In my world, instead of an angel and a devil, there is **Chinese me** and **American me** debating with each other all the time…I still don't know which I should listen to—**the Chinese me** telling me this education offers opportunities or **the American me** telling me I should quit school and start working. (He 2010)

(19) In reality, **"blog Katie"** is only a very small portion of who I am outside of the computer world. (Higgins 2013)

In each case, "me" is modified by an inherent property (under Carlson's system, individual-level predicates). Because properties such as ⟦**Jewish**⟧ or ⟦**gay**⟧ hold of all spatiotemporal slices of a given individual (that is, barring conversion, a Jewish person is Jewish irrespective of the time), we encounter two problems:

I. While we can observe the same apparent contradiction with *Drunk Pierre* and *Sober Pierre* (i.e. ⟦**can connect**⟧(⟦**the Jewish me**⟧) = 1 and ⟦**can connect**⟧(⟦**the gay me**⟧) = 0), the Part Analysis is unable to resolve it this time. For any slice in which ⟦**Jewish**⟧ holds, so too does ⟦**gay**⟧, and so the part-based calculation yields the same semantic object.

II. Furthermore, and for the same reason, we are unable to distinguish the modified proper name from the bare proper name. If a person is always Chinese, then ⟦**Chinese Christine**⟧ and ⟦**Christine**⟧ denote the same set of slices.

As these examples make clear, a temporally-grounded account is insufficient to differentiate between the full range of "alter egos."

However, Landman's alternative Intensional Approach is also unsatisfactory. To begin with, as Paul (1994) points out, MPN-containing sentences don't actually seem to constitute intensional contexts. For instance, the following set of sentences cannot all simultaneously be true:

(20) a. The upper Rhine is polluted.
b. The French Rhine is not polluted.
c. The upper Rhine is (identical with) the French Rhine. (from Paul 1994)

Furthermore, Landman's system is unable to capture the behavior of the MPN. Intensionality is invoked so as to allow *John* and *John as a judge* opposing truth values with respect to a given property. Under this account, it would be possible to differentiate between *Christine* and *Chinese Christine*. But the problem is then the opposite extreme: in so doing, the Intensional Individuals account overly erodes the ties between the base name and its modification; not only can a bare proper name and an MPN have different truth values with respect to a given property, but *they are entirely independent of one another*. This is somewhat bizarre: if *the young Mozart went to Paris*, this should bear on the question of whether *Mozart* has been to Paris.

A compromise between the two approaches would be to treat the MPN as a form of quantification over situations, with the modifier setting the minimality condition for a covert conditional. That is, take *the Chinese Christine* not to mean the maximal (extensional) set of spatiotemporal parts wherein Christine is Chinese, but instead the set of minimal (intensional) situations in which Christine is Chinese. To predicate a property on the MPN, would be to assert that any minimal situation selected by the MPN is a part of a larger situation where that property holds true.

On the face of it, this seems an appealing solution, as this treatment renders *the Jewish me* and *the gay me* materially different. However, the matter of separating *Chinese Christine* from *Christine* remains. Namely, any property that holds of the latter must necessarily hold of the former, as any minimal situation wherein *Christine* is Chinese is part of the broader *Christine* situation.

So what is the desired result? Let us examine more closely the question of how MPNs relate with their base proper name. Take, for example, the following scenario, a slightly modified version of the "white horses" paradox:

(21) a. The writer Jennifer Smith appreciated the pun.
b. Did Jennifer Smith appreciate the pun?

By one reading, the answer to (21b) is plainly yes—some part of Jennifer enjoyed the pun. But then again, it is also felicitous to claim the following:

(22) The writer Jennifer Smith appreciated the pun, but Jennifer Smith sure didn't.

Carlson's solution to the "white horses" ambiguity is to allow that both the modified and unmodified term can be individuals in their own right, but are in relationship with some of the same parts.

In his formulation of the Part Analysis, Paul decides to keep parts separate from Carlson's stages in the ontology, because they seem to behave differently. He explains that unlike a bare noun whose denotation varies according to its predicate, "the part-readings we get for the [modified] NPs... do not depend in any way on the involved predicates." However, as the above examples show, the part-readings, and their viability in the Part analysis depend *wholly* on the involved predicates—the modifying predicates. Stages are available because every modifying predicate in among Paul's data is a stage-level predicate. In fact, the distinguishing factor between data that do or do not work under Part analysis is the modifying predicate, and furthermore, the dividing line falls along Carlson's stage-individual predicate distinction. The Part analysis misses this generalization, and in doing so overgeneralizes in the data it can account for. The modification I propose in the following section expands the Part analysis to cover the new data, while simultaneously bringing it into accord with Carlson's analysis. In doing so, this analysis further reiterates the parallels between proper names and kinds.

4 Restructuring the domain

Together, Paul and Landman provide a crucial insight: it is not enough to fracture the individual (a la Carlson's stages), we must be able to use those pieces as a proper individual in its own right. However as the previous section has shown, spatio-temporal lines are not enough to explain how we can get individual-like semantic objects via restrictive modification; the Part Analysis as it stands fails to account for a large swath of data. Still, this is not reason to abandon the Part Analysis entirely: it fails exactly where one would predict it to. The aim of my proposal is to expand the Part Analysis to allow divisions along property lines (what I call "personas"). In the following sections, I explain what division along property lines would actually mean, outlining the intuition behind the approach, and show what such a system would look like in practice.

4.1 The intuition

In comparing the Intensional Individuals and Part analyses, both capture the intuition that MPNs are functionally similar to unmodified individuals, but the latter proves more successful in capturing the ties between the the MPN and its base proper name. While spatiotemporal divisions are the most accessible axis upon which to slice up an object, they are by no means the only imaginable way of doing so. But what does it mean to divide along property lines? One appeal of the Part Analysis is that we have a very clear intuition of how to separate the drunk part of an individual from the non-drunk parts. What would it mean to separate out a Chinese or gay part?

To answer this, I return to an point raised by Landman (1989), namely that for certain roles, "connotations are added." In essence, some predicates have added cultural baggage: to be a judge is to hold a job as a judge, but likely is also to be fair, intelligent, and prudent. Thus to be *Chinese Christine* is not just to be a woman of Chinese descent, but also to have any number of associated cultural values. For this reason, I speak not just of divisions along singular properties, but rather of *personas*, that is sub-individuals who bear those associated properties. A persona can be thought of as an instantiation of one of the many hats a person wears. A given individual object is host to multiple personas–and indeed can be thought of as the collection of those various personas in much the same way that individuals are collections of stages.

4.2 Mechanics

The basis of my proposal is the introduction of an additional level into Carlson's (1977) sorted domain of entities D_e. Personas are individual-like bundles of properties, or psychologically coherent facets. Carlson's object remains, but the minimal entity over which an individual-level predicate holds is the persona. An MPN with an inherent property then picks out a given persona from the set denoted by the bare proper name. But where do personas stand relative to stages? MPNs show a range of behaviors similar to other items of type e. As discussed in section 2, the substitutivity of MPNs and PNs provides evidence for taking them to be the same semantic object. But in light of the more fine-grained distinctions between MPNs with SLP and ILP modifiers, we can be even more precise. Comparing the sortal selectional properties of the predicates in the MPN with those in the larger sentence, we can observe all possible combinations:

(23) a. **stage/stage** :
Sleep-deprived Molly came to the party and was *all sorts of wacky*.

b. **stage/individual** :
Sleep-deprived Molly is *a total weirdo*.

c. **individual/stage** :
With space only for one race, *the black Craig* and *the white Craig fought* over which bubble to fill on the SATs.

d. **individual/individual** :
The black Craig can be a bit *reticent* around new people.

What these examples show is that any MPN must be able to serve as either a stage or individual-sort argument, regardless of its modifying predicate. Put another way, if an individual persona can serve as argument to a stage-level predicate, we need a sub-stage division - the smallest element of the domain of entities is not an entire object at a given time (i.e., a stage), but a given *persona* at a given time (what for lack of a better term I will be calling an *atom*). The relation between stages and objects becomes that between atoms and personas, with additional relations between personas and objects. The overall structure of this new domain can be represented by the schematic in appendix fig. (2) (with appendix fig. (1) representing the prior 3-way division).

The new D_e is then the union of:

(24) a. D_k: the set of all kinds
b. D_o: the set of all objects
c. D_p: the set of all personas
d. D_a: the set of all atoms

Between these sets we extend Carlson's relation *R* (as represented in appendix fig.(2) by the solid lines) between lower-level sorts and the higher-level sorts they realize (e.g. R(*Fluffy, cats*) $= 1$ iff *Fluffy* is a realization of the kind *cats*). So, a given persona is a realization of an object; and likewise an atom is a realization of a persona (and by extension, an object). At the lowest level, atoms also encode temporal information, such that $T(a, t) = 1$ iff *a* is an atom that exists at time *t*.

Instead of the set of parts/stages, the proper name denotes the set of personas which realize a given object in D_o. The denotation of Christine (using subscripts as shorthand for the relevant sort) is then seen in appendix (1).

The addition of a determiner (null or overt) at the DP level joins the relevant personas, here as a plural individual. An unmodified proper name at the DP level would then have the denotation in (appendix (5)).

Here I follow Link (2002) in assuming that the domain contains both singular and plural individuals, with no ontological type distinction between the two. While recasting MPN structure from stages to personas simplifies the creation of MPNs from individual-level predicates, it does complicate the stage-level predicate-based MPNs. Retaining Paul-style parts would require some way to select and group atoms from personas. While there are many possible ways to get around this issue, my proposed solution is to sidestep it entirely, by positing that the stage-level predicates seen in MPNs, by virtue of the same "value added" connotations that enable individual-level predicate MPNs, likewise select personas.

Though this may seem like a dramatic amendment, there are several points to commend this approach. First of all, we can note that not any stage-level predicate can form a felicitous MPN. *Drunk* works well, while *humming* less so. *Sleepy* yes, *gum-chewing* no. The more successful stage-level predicates are those which connote a change in mindset or outlook—alterations on the individual level. Furthermore, just as MPNs can appear in similar environments regardless of whether their modifying predicate is stage-level or individual-level, the two can contrast with one another (25) suggesting sortal similarity.

(25) **Chinese Christine** didn't like the joke, but **Drunk Christine** thought it was hilarious.

With this amendment, the implicit stage to persona transformation can be made explicit in the operator $Personify$. The resulting derivations for both ⟦**the Chinese Christine**⟧ and ⟦**the drunk Pierre**⟧ can be found in appendix (6) and (7), respectively.

5 Conclusion

This proposal extends Paul (1994) so as to account for the newly-introduced set of MPNs formed from individual-level predicates. In doing so, it provides a uniform treatment for MPNs composed of both individual and stage-level predicates, reflecting the full-range of sentential contexts the MPN occurs in. As an extensional account, it does so without eliding the relation between the MPN and its bare proper name. In fact, one further outlet to explore with respect to this relation is the availability of generic and universal persona predication, which speaks to the individualized version of the "white horses" paradox in a way that further emphasizes the parallel between bare proper names and bare plurals.

Appendix: Figures and formulas

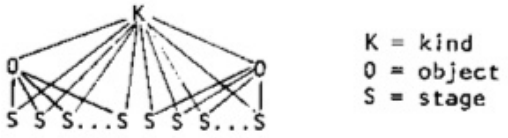


Figure 1: Carlson's (1977) domain

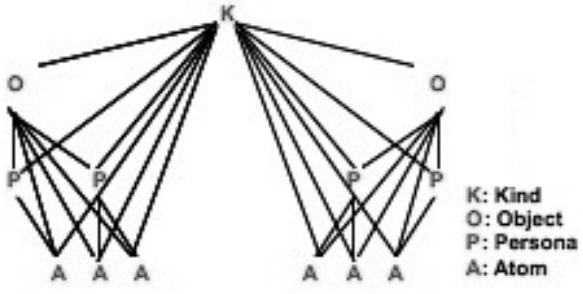


Figure 2: The expanded domain

(1) ⟦**Christine**⟧ $= \lambda x_p.R(x, \textit{christine})$

(2) ⟦**The**⟧ $= \lambda f_{<e,t>}. \sum x \; s.t. \; f(x) = 1$

(3) $[\![\textbf{Chinese}]\!] = \lambda x_p.x \textit{ is Chinese}$

(4) $[\![\textbf{drunk}]\!] = \lambda x_a.x \textit{ is drunk}$

(5) $[\![\textbf{(The) Christine}]\!] = \sum x \; s.t. \; [\![\textbf{Christine}]\!] = 1$

(6) a. $[\![\textbf{Chinese Christine}]\!] = \lambda x_p.R(x, \textit{christine}) \textit{ and x is Chinese}$

b. $[\![\textbf{The Chinese Christine}]\!] = \sum x \; s.t. \; [\![\textbf{Chinese Christine}]\!] = 1$

(7) a. $[\![\textbf{drunk Christine}]\!] = \lambda x_p.R(x, \textit{christine}) \; and \; Personify([\![\textbf{drunk}]\!])(x) = 1$

b. $[\![\textbf{the drunk Christine}]\!] = \sum x \; s.t. \; [\![\textbf{drunk Christine}]\!] = 1$

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Weak and strong NPIs: *nobody* and *anybody* in Albanian and Modern Greek*

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Abstract

In this paper, I present the typology, semantic distribution and interpretation of the emphatic and non-emphatic negative polarity items like **asnjë** 'nobody' and **ndonjë**, whose meaning is close to 'anybody' (albeit with a more indefinite import), in Albanian and compare it to that of another language in the *Balkan Sprachbund*, Modern Greek (Giannakidou (1993a) & Giannakidou (1993b)). Albanian differs from Modern Greek in that it differentiates between the two classes lexically (it has a distinct word for each paradigm), whereas Modern Greek uses the same word for both (**kanénas**) but distinguishes the cases intonationally, by means of emphatic stress. As in the case of Modern Greek, the distribution of the emphatic and non-emphatic NPIs is regulated by nonveridicality; the emphatic class only appears in the scope of antiveridical operators thus having a narrower distribution, while the non-emphatic class appears in a large repertoire of environments which are all, however, nonveridical. Morphology plays an important role in the distribution of the emphatic items since their first morpheme *as* 'even' has always the strict NPI reading (Giannakidou (2007)) which forces *as* to be licensed only in the scope of antiveridical operators, a property that is inherited by the tokens of the emphatic class as well. I conclude with examples from Albanian that seem inexplicable within the existing nonveridicality theory of polarity and might suggest the need for an extension of the current framework.

1 Introduction

In numerous languages, the dividing line between *n*-words[1](nobody, nothing, nowhere, never etc.) and indefinites (anybody, somebody, something etc.) is not well defined, and indefinite negative polarity items (NPIs) serve usually as the bridge between the two domains. Albanian has, to my knowledge, received no attention with regard to the study of NPIs. Motivated by the analysis in Giannakidou (1993a) and subsequent work on the distinction between **KANÉNAS/KANÍS**[2] 'nobody' and **kanénas/kanís** 'anybody' in Modern

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[1]The term was first introduced in Laka (1990).

[2]Throughout this paper, the NPIs appear in bold font and the emphatic NPIs in Greek appear capitalized to indicate the associated prosodic focus

Greek, this paper aims to provide a typology and an interpretation of the corresponding Albanian NPIs (a more transparent case than Modern Greek, as it will be demonstrated) and study licensing conditions for each of them.

1.1 *Nobody* and *anybody* in Modern Greek

The case of Modern Greek has been analyzed in detail in Giannakidou (1993a) and subsequent work. I discuss and summarize the main findings in this section. In Modern Greek the distinction between the *n*-word and the indefinite existential use of **kanénas/kanís** is achieved intonationally, by employing emphatic stress. **KANÉNAS/KANÍS** 'nobody' and **kanénas/kanís** 'anybody' in addition to **TIPOTA** 'nothing' and **típota** 'anything' correspond to these two distinct uses, the indefinite existential use to the latter and the *n*-word use to the former.

Considering the quantificational nature of the two classes of polarity items (PIs), we observe that only **KANÉNAS** or **KANÉNAS N** are modifiable by adverbs such as *shedón* 'almost' and *apolítos* 'absolutely'. The non-emphatic paradigm is consistently ruled out, as exemplified in [1]:

(1) Me tétio skotádhi *dhen* vlépo shedón/apolítos **KANÉNAN/*kanénan**.
with such darkness not see.1SG almost/absolutely nobody
'It is so dark that I see almost/absolutely nobody.'

This diagnostic has been successfully employed in Horn (1972), Hoeksema (1983) and Zanuttini (1991) for the tracing of universal quantifiers and establishes that the tokens of the emphatic class are, indeed, universal quantifiers. The tokens of the non-emphatic class are consistently ruled out in such sentences, therefore making them existential quantifiers.

Turning to the study of the licensing environments, it becomes clear that the items of the emphatic paradigm are only licensed within the scope of sentential negation[3], that is, only in the scope of *dhe(n)* – for clauses whose verb is in indicative mood – and *mi(n)* – for clauses whose verb is not in indicative mood, with the exception of *prin* 'before' and *horís* 'without' clauses[4] where the presence of the negative marker is not required. Examples [2] - [7] illustrate these facts:

(2) *Dhen* írthe **KANÉNAS/kanénas**.
NEG came.3SG nobody
'Nobody came.'

(3) ***KANÉNAS/*kanénas** írthe na me heretísi.
nobody came.3SG SUBJ me greet.SUBJ.3SG
'Nobody came to greet me.'

(4) *Min* pis se **KANÉNAN/kanénan** tin alíthia.
NEG tell.SUBJ.2SG to nobody the truth
'Tell nobody the truth.'

[3]Hereafter, *negation* will mean *sentential negation* unless otherwise specified.

[4]*Horís* 'without' is considered to be an antiveridical operator. For a proof of this fact, the reader may consult Zwarts (1995), Zwarts (1998) and Giannakidou (1993b).

(5) *Pes* se ***KANÉNAN/kanénan** tin alíthia.
tell.IMP.2SG to nobody the truth
'Tell nobody the truth.'

(6) Éfige *horís* na milísi se **KANÉNAN/kanénan**.
left.3SG without SUBJ talk.SUBJ.3SG to nobody
'She left without talking to anybody.'

(7) Éfige *horís* **KANÉNAN/kanénan** distagmó.
left.3SG without any hesitation
'She left without any hesitation.'

The elements of the non-emphatic paradigm, on the other hand, are freely licensed in a wide variety of environments, including questions [8], modals [9] and imperative [10].

(8) Írthe **kanénas/*KANÉNAS** mathitís?
came.3SG any student
'Did any student come?'

(9) Tha féro **kanénan/*KANÉNAN** fílo sto párti.
FUT bring.FUT.1SG any friend to.the party
'I will bring any friend to the party.'

(10) Fére **kanénan/*KANÉNAN** krasí mazí sou.
bring.IMP.2SG any wine with you
'Bring any wine with you.'

The regulating force of the distribution of the Modern Greek NPIs is nonveridicality. Moreover, the fact that the emphatic NPI is only licensed in environments in which there is negative marking suggests that the particular NPI requires antiveridical operators in order to be licensed. As for *horís* 'without', Giannakidou (1993b) proves that it is an antiadditive operator[5]in the structure *horís* S and it can consequently be regarded as an antiveridical environment, as proven by Zwarts (1995). The tokens of the non-emphatic class exhibit a wide distribution that can only be sufficiently explained by nonveridicality. Indeed, the wide repertoire of environments in which the non-emphatic items appear makes it impossible for the classical theory of DM operators[6]to sufficiently capture the entirety of the varying distribution of these NPIs. In the following section, I provide a licensing condition for NPIs (coming from Giannakidou (2002)) which is responsible for the regulation of the emphatic and non-emphatic Modern Greek NPIs, as well.

2 The nonveridicality theory of polarity

Up to this point I have employed the terms *veridical, nonveridical* and *antiveridical* without formally defining them. Before embarking on the discussion of the importance of the nonveridicality theory of polarity in the prediction and interpretation of NPI distributions, I deem it important to provide formal definitions of the aforementioned terms.

[5]An antiadditivephic operator should be thought of as a logical negation. It does not manifest itself as morphosyntactic negation but it has the logical properties of negative operators. A formal definition will be provided in Section [3.4].

[6]Given Boolean algebras $\mathscr{A}, \mathscr{B}$, a function $f : \mathscr{A} \rightarrow \mathscr{B}$ is termed a *downward monotonic* (DM) operator if and only if $\forall x, y \in \mathscr{A}, x \leq y \implies f(x) \geq f(x)$ (Ladusaw (1979)).

Definition 2.1. A propositional operator $\mathscr{F}$ is termed:

1. veridical if and only if for any proposition p, $\mathscr{F}(p) \implies p$
2. nonveridical, otherwise
3. antiveridical if and only if for any proposition p, $\mathscr{F}(p) \implies (\neg p)$

Essentially, $\mathscr{F}$ is veridical if and only if whenever $\mathscr{F}(p)$ is true, p is also true; if this does not hold, $\mathscr{F}$ is nonveridical. A nonveridical $\mathscr{F}$ is antiveridical if and only if whenever $\mathscr{F}(p)$ is true, p is not true. Note, importantly, that antiveridical operators are a proper subset of the nonveridical ones. Modals, intensional operators and questions are typical nonveridical environments while the prototypical antiveridical environments are sentential negation and *without*.

(11) Yesterday, Orest bought an apple. $\implies$ Orest bought an apple.

(12) Did Orest buy an apple? $\not\Longrightarrow$ Orest bought an apple.

(13) Orest may have bought an apple. $\not\Longrightarrow$ Orest bought an apple.

(14) Orest didn't buy an apple. $\implies \neg$ (Orest bought an apple.)

(15) Without Orest buying an apple. $\implies \neg$ (Orest bought an apple.)

An adjustment is necessary when we consider temporal or aspectual operators, hence we modify the previous Definition [2.1] to [2.2]:

Definition 2.2. Let $\mathscr{F}$ be a temporal/aspectual operator, $\mathscr{M}$ a model, $\mathscr{I}$ a (contextually relevant) time interval and $t \in \mathscr{I}$ a fixed time instant. Then:

1. $\mathscr{F}$ is **veridical** if and only if $[\![\mathscr{F}(p)]\!]_t^{\mathscr{M}} = 1 \implies [\![p]\!]_{t'}^{\mathscr{M}} = 1$ for some $t' \leq t$. Otherwise, $\mathscr{F}$ is **nonveridical**.
2. $\mathscr{F}$ is **antiveridical** if and only if $[\![\mathscr{F}(p)]\!]_t^{\mathscr{M}} = 1 \implies [\![(\neg p)]\!]_{t'}^{\mathscr{M}} = 1$ for some $t' \leq t$.
3. given that $[\![\mathscr{F}(p)]\!]_t^{\mathscr{M}} = 1, \forall t \in \mathscr{I}$, $\mathscr{F}$ is **veridical** if and only if $\forall t \in \mathscr{I}$, $[\![p]\!]_t^{\mathscr{M}} = 1$. Else, $\mathscr{F}$ is **nonveridical**. If, instead, $\forall t \in \mathscr{I}$, $[\![(\neg p)]\!]_t^{\mathscr{M}} = 1$, then $\mathscr{F}$ is termed **antiveridical**.

A natural question that arises at this point is "Why is nonveridicality necessary?". Simply because the frameworks that preceded it were insufficient to describe the varying distributions of NPIs crosslinguistically. Indeed, the claim of Ladusaw (1979) that DM operators fully describe the environments in which NPIs occur was inadequate. The condition of Ladusaw (1979) predicts correctly that NPIs will be licensed in the scope of negation, DM quantifiers like *few N, at most n N, no N*, and the restriction of *every*:

(16) No students saw anything.

(17) John didn't see anything.

(18) Few children saw anything.

(19) Every student who heard anything should report to the police

But there are numerous environments[7]which are not DM but are acceptable as NPI licensors. This is precisely where the nonveridicality theory of polarity proves its superiority, as it accounts for the distribution of NPIs in both DM[8]and non-DM environments. Giannakidou (2002) proposes the following licensing condition for NPIs which is then derived form the lexical semantic content of the NPIs:

Criterion 2.1. *A NPI α is grammatical in a sentence $\mathscr{S}$ if and only if α is in the scope of a nonveridical operator β in $\mathscr{S}$.*

This licensing condition accounts for the case of Modern Greek. The English *any* has a weaker licensing condition than Criterion [2.1]. As this is out ofs the scope of this paper, I refer the reader to Giannakidou (2001) and Giannakidou (2002) for a complete discussion of the peculiarities of *any*.

3 The case of Albanian

As it will turn out, the semantic distribution of polarity items in Albanian is not very different from that of Modern Greek (possibly a consequence of the two being members of the *Balkan Sprachbund*), albeit it is different enough to be interesting and deserve a separate analysis.

3.1 Negation in Albanian

Before embarking on the study of the distribution of Albanian NPIs, an overview of the distribution of the Albanian negative operators is in order. A thorough analysis of the latter has been provided in Turano (2000); in this section I summarize her findings. Albanian has three overt negative makers: *nuk*, *s'* and *mos*[9]. I examine them separately, beginning with the first two. *Nuk* and *s'* are identically distributed; in fact, they can always replace each other. They are associated with indicative [20], conditional [21] and admirative[10][22] clauses. The following examples from Turano (2000) illustrate these distributional properties:

(20) *Nuk/S'/*Mos* vajta (më) në bibliotekë.
NEG went.1SG (anymore) in library
'I didn't go to the library (anymore).'

[7]Non-monotone quantifiers like *three students, neither student, nobody but John*; *hardly/barely*; questions; the future; the habitual, generic statements; modals; imperatives; protasis of conditionals; directive intensional verbs etc. A detailed account of these environments can be found in (Giannakidou (2002)).

[8]Zwarts (1995) proves that DM operators are a proper subset of the nonveridical ones.

[9]Turano (2000) mentions *jo* 'no' as a negative element but since I am only concerned with negative elements that actually assume the role of negative operators, I disregard *jo* in my analysis.

[10]Admiratives are used to express surprise or amazement.

(21) Po të mos e kishit lajmëruar, ai *nuk/s'/*mos* do të vinte.
if SUBJ NEG CLT had called.2PL he NEG COND SUBJ come.SUBJ.3SG
'If you hadn't called him, he wouldn't have come.'

(22) *Nuk/S'/*Mos* qenka këtu Maria?
NEG has.been.ADM.3SG here Maria
'Hasn't Maria been here?'

Mos is ungrammatical in these structures. *Nuk* and *s'* appear to the left of the finite verb. They precede the auxiliary in compound tenses [23] and the future [24] and conditional [25] marker *do*.

(23) a. *Nuk/S'* kam ngrënë.
NEG have.1SG eaten
'I haven't eaten.'

b. *Kam {nuk/s'} ngrënë.

(24) a. *Nuk/S'* do vijë.
NEG FUT come.FUT.1SG
'He won't come'

b. *Do *nuk/s'* vijë.

(25) a. *Nuk/S'* do të vinte.
NEG COND SUBJ come.COND.1SG
'He wouldn't come'

b. *Do *nuk/s'* të vinte.

Nuk and *s'* must be immediately adjacent to the verb; no lexical items [26], no adverbs [27] and no parentheticals [28] may appear between *nuk/s'* and the verb; clitics however can, as in [29]:

(26) **Nuk/S'* Maria flet.
NEG Maria talk.3SG
'Maria doesn't talk.'

(27) **Nuk/S'* akoma flet.
NEG still talk.3SG
'She/It doesn't talk.'

(28) **Nuk/S'*, sipas meje, iku.
NEG according.to me left.3SG
'She, according to to me, did not leave.'

(29) *Nuk/S'* i flas.
NEG CLT talk.1SG
'I don't talk to him/her/it.'

Now consider the negative element *mos*. It combines with the subjunctive [30], the imperative [31], the optative [32], the gerund [33] and the infinitive [34].

(30) Merr çadrën që të *mos* lagesh.
take.IMP.2SG umbrella so.that SUBJ NEG wet.SUBJ.2SG
'Take the umbrella, so that that you don't get wet.'

(31) *Mos* lexo këtë libër.
NEG read.IMP.2SG this book
'Don't read this book.'

(32) *Mos* vdeksh kurrë.
NEG die.OPT.2SG never
'May you never die.'

(33) Duke *mos* ditur çfarë të bënte, doli në oborr.
GER NEG knowing what SUBJ do.SUBJ.3SG came.out.3SG in yard
'Not knowing what to do, She came out in the yard.'

(34) Për të *mos* u vonuar, mori një taksi.
INF SUBJ NEG REFL been.late took.3SG one taxi
'For not to be late, he took a taxi.'

Mos cannot be replaced by *nuk* or by *s'*; their distributions are complementary. One of the most notable characteristics of the paradigm is the presence of a mood marker overtly realized by the particle *të* in the subjunctive, by the particle *duke* in the gerund and by the particles *për të* in the infinitive. The negative element *mos* follows the mood marker. So, in [30], *mos* appears between *të* and the verb; in [33] *mos* appears between *duke* and the verb; in [34] *mos* appears between *për të*t and the verb. Like *nuk* and *s'*, *mos* must be immediately adjacent to the verb. Clitics are the only lexical material which may intervene between negation and the verb as seen below:

(35) Të *mos* e harrojnë.
SUBJ NEG CLT forget.SUBJ.3PL
'They don't forget him/her/it.'

(36) *Të *mos* Maria niset herët.
SUBJ NEG Maria leave.SUBJ.3SG early
'Maria doesn't leave early!'

(37) *Të *mos* herët niset.
SUBJ NEG early leave.3SG.SUBJ
'She doesn't leave early!'

This distribution of the Albanian negative elements *nuk/s'* and *mos* is not unique; indeed, Modern Greek exhibits the exact same distributional properties with its negative elements *dhen* and *mi(n)* (Giannakidou (1998)). *Dhe(n)* is identically distributed to *nuk/s'* and *mi(n)* shares an identical distribution with *mos*.

3.2 Emphatic versus non-emphatic items in Albanian

Contrary to the Modern Greek case which marks the difference between the emphatic and non-emphatic items by means of intonation, Albanian marks the difference by means of its morphology[11]. Although Albanian has a number of words for each class of polarity items (see Table [1]), the ones that are more frequently encountered[12]are **asnjë**, **asnjeri** and **askush** for the emphatic case and **ndonjë** and **ndonjeri** for the non-emphatic one. All the

[11]Although Albanian does not differentiate between the two classes of NPIs by means of prosody, I will keep using the terms *emphatic* and *non-emphatic* to refer to the NPIs that match the distribution of the Modern Greek emphatic and non-emphatic NPIs, respectively. This is only for convenience of exposition and to avoid terminological confusion.

[12]The older forms in Table [1] are rarely used, or used only in marginally spoken dialects of the Albanian language. I state them, here, for the benefit of the interested reader.

items of the emphatic case are equivalent to 'nobody' while the ones of the non-emphatic have a meaning which is closer to 'someone' but conveying a more arbitrary indefinite import than *dikush* 'someone' or *kushdo* 'anybody'.

Paradigms	Translation	Emphatic	Determiner	Infrequent
asnjë	nobody	✓	✓	
asnjeri	nobody	✓		
mosnjeri	nobody	✓		✓
askush	nobody	✓		
kurr(ë)kush	nobody	✓		✓
moskush	nobody	✓		✓
kurrnja	nobody	✓		✓
kurrfarë	nobody	✓	✓	✓
ndonjë	anybody		✓	
ndonjeri	anybody			
asgjë	nothing	✓		
mosgjë	nothing	✓		✓
kurrgjë	nothing	✓		✓
(ndonjë) gjë	anything			

Table 1: Emphatic and non-emphatic polarity items

Table [1] requires a clarification. As for the translation of the items of the non-emphatic class, the reader should not be led to consider them free choice items (FCIs). This complication in translation arises only due to the lexical asymmetry between Albanian and English. These are not FCI for FCIs do not surface in negative clauses with episodic predicates (Giannakidou (2001)), even though they surface in most of the other test environments that I use. I will show that, indeed, this is the case for these Albanian polarity items; they do appear in negative contexts (for a preview, consider [38] in Section [3.3]).

A morphological analysis of the above items reveals further information about their nature. Table [2] resulted from data taken from Demiraj (1973):

Items	Morpheme 1	Morpheme 2	Mopheme 3	Morpheme 4
asnjë	as ‘even’	një ‘one’	∅	∅
asnjeri	as ‘even’	njeri ‘human’	∅	∅
mosnjeri	mos (NEG)	njeri ‘human’	∅	∅
askush	as ‘even’	kush ‘who’	∅	∅
kurrkush	kurr ‘never’	kush ‘who’	∅	∅
moskush	mos (NEG)	kush ‘who’	∅	∅
kurrnja	kurr ‘never’	nja ‘one’	∅	∅
kurrfarë	kurr ‘never’	farë ‘sort’	∅	∅
ndonjë	kurr ‘never’	do ‘want’	një ‘one’	∅
ndonjeri	kurr ‘never’	do ‘want’	njeri ‘human’	∅
asgjë	as ‘even’	gjë ‘thing’	∅	∅
mosgjë	mos (NEG)	gjë ‘thing’	∅	∅
kurrgjë	kurr ‘never’	gjë ‘thing’	∅	∅
(ndonjë) gjë	kurr ‘never’	do ‘want’	një ‘one’	gjë ‘thing’

Table 2: Morphological Analysis of the Paradigms

The first observation is that the items of the emphatic class all have a negative marker. Indeed, *as* ‘even’ is treated as a negative element. An explanation of the importance of this observation is provided in Section [3.4], after I have presented the data on the distribution of each item. The morphology of the non-emphatic class is also quite interesting. The analysis in Demiraj (1973) suggests that it comes from the concatenation of three morphemes and the fusion of the first two: *në*, a subordinate conditional conjunction whose meaning is very close to that of ‘if’, *do* (third person singular of *dua* ‘want’) and *një* ‘one’. It seems, therefore, that the first morpheme endows the non-emphatic class of polarity items. Whether this is indeed the case, or whether the particular items exhibit word-internal compositionality is beyond the scope of this paper.

3.3 Distribution of emphatic and non-emphatic items

The following examples demonstrate licensing environments for each paradigm. It is evident right away that the emphatic paradigm can only be present in sentences where an overt negative operator is present. The distribution of the non-emphatic paradigm, however, varies to a much greater extent. Interestingly, the distribution of the non-emphatic class completely matches that of **kanís**, the non-emphatic NPI in Modern Greek[13].

Negative clauses

(38) Kërkova shumë por *(*nuk*) gjeta **asgjë/ndonjë gjë**.
searched.1SG very but NEG found.1SG anything
‘I searched a lot but I didn’t find anything.’ *or* ’I searched a lot but I found nothing.’

It is very important to note that [38] is strong evidence against the potential claim that **asgjë** may be an *n*-word and not a NPI. *N*-words do not require negation to be sanctioned in

[13]In the following examples, I have italicized the relevant environments.

a sentence, on the contrary, they provide the negation for the licensing of other negation dependent elements (e.g. NPIs). **Asgjë**, however, requires overt sentential negation in [38].

Restrictive adverbs and adjectives

(39) *Pak* burra marrin **ndonjë/*asnjë** grua të shëmtuar.
few men take any woman CLT ugly
'Few men take (as their wife) any ugly woman.'

(40) *Vetëm* pak professorë kan shoqëri me **ndonjë/*asnjë** nga studentët e tyre.
only few professors have friendship with any among students CLT their
'Only a few professors make friends with any of their students.'

(41) *Shumica* e professorëve kanë shoqëri me **ndonjë/*asnjë** nga studentët e tyre.
majority of professors have friendship with any among students CLT their
'Most professors make friends with any of their students.'

Adversative predicates

(42) *Dushoj* nëse tha **ndonjëri/*asnjëri** të vërtetën.
doubt.1SG whether said.3SG anybody the truth
'I doubt whether anyone said the truth.'

Yes-no questions

(43) Erdhi **ndonjë/*asnjë** student të puesi për resultatet*?*
came.3SG any student. SUBJ ask.SUBJ.3SG for results
'Did any student come by to ask about the results?'

(44) Supa është gati. Do **ndonjëri/*asnjëri***?*
soup is ready want.3SG anybody
'Soup is ready. Does anybody want some?'

Wh-questions

(45) *Kur* do lexosh **ndonjë/*asnjë** libër*?*
when FUT read.FUT any book
'When are you going to read any book?'

Sentential comparative

(46) E tregoj veten *më të mënçur se sa* do priste
CLT proved.3SG self more CLT clever than CLT FUT expect.PAST.3SG
ndonjëri/*asnjëri.
anybody
'She proved herself to be more intelligent than anyone would expect.'

(47) *Më mirë* të iki *se sa* të shikoj **ndonjë/*asnjë** nga ato
more good SUBJ go.SUBJ.1SG than CLT SUBJ see.SUBJ anyone among them
edhe të nevrikosem.
and SUBJ get.angry.SUBJ.1SG
'It is better for me to leave than to see anyone of them and get angry.'

In the first argument of the universal quantifier

(48) *Kushdo* që ka arritur **ndonjë gjë/*asgjë** të vështirë, e ka arritur me
whoever that has.3SG achieved anything CLT difficult CLT has achieved with
shumë punë.
lot work
'Everyone who has achieved anything difficult, has achieved it with a lot of work.'

Conditional

(49) *Po* të më kërkojë **ndonjëri/*asnjëri**, më lajmëro.
if të.SUBJ me search.SUBJ.3SG anybody me inform.IMP
'If anyone asks for me, inform me.'

(50) *Po* të gjeja **ndonjë/*asnjë** grua të mirë, do martohesha.
if SUBJ find.SUBJ any woman CLT good do.SUBJ get.married.SUBJ
'If I would find a good woman, I would get married.'

(51) *Le* të sjelli **ndonjë/*asnjë** notë të keqe dhe do shikoj çfarë do
let SUBJ bring.3SG any grade CLT bad and FUT see.3SG what FUT
pesoj.
happen.FUT
'If she brings a bad grade, she will see what will happen to her.'

(52) *Po mos* gjejë **ndonjë/asnjë** të njohur, do kthehem herët.
if NEG find.SUBJ.1SG anybody CLT familiar FUT return.FUT.1SG early
'If I don't find anyone that I know, I shall be back early. '

We observe that in [52] the emphatic NPI **asnjë** is sanctioned. This is so because of the intervening negation *mos*. If we omit the negation and have an affirmative protasis instead, then **asnjë** is not be sanctioned.

Modals

(53) {*Mundet të*} / {*ndoshta do*} kaloj **ndonjëri/*asnjëri** të më
maybe SUBJ / possibly SUBJ come.SUBJ.3SG anybody SUBJ me
kërkoj.
search.SUBJ.3SG
'Someone may come and look for me.'

(54) Në këtë lojë shahu *mundet* **ndonjëri/*asnjëri** të fitoi.
in this game chess can.3SG anybody to.SUBJ win.SUBJ.3SG
'In this chess game anyone can win.'

(55) Me kaq dhimbje koke *duhet* të merje **ndonjë/*asnjë** aspirin.
with such pain head must të.SUBJ take.SUBJ.2SG any aspirin
'With such a headache, you should have taken an aspirin.'

(56) *Duhet* sezbën të shikoj **ndonjë/*asnjë** doktorr.
must definitely to see.SUBJ.3SG any doctor
'A doctor must definitely see you.'
[Notice: In English a sentence like *Any doctor must see him is marked as ungramamtical]

(57) *Nuk duhet* të më shikoj **ndonjë/asnjë**.
NEG must to me see.SUBJ.3SG anybody
'No one must see me.'

Similarly to [52], the emphatic NPI in [57] is sanctioned because of the negation *nuk* that precedes the modal. If we remove the negative marker, the sentence becomes ungrammatical.

Simple future

(58) *Do* gjejë **ndonjë/*asnjë** shok të më ndifmoj, mos ki hall.
FUT find.1SG any friend SUBJ me help.3SG NEG have.IMP.2SG worry
'I will find some friend or other to help me, don't worry.'

Imperative

(59) *Shko* gjejë **ndonjë/*asnjë** ndim.
go.IMP.2SG find.IMP.2SG any help
'Go find some help or other.'

(60) Nuk kam ide, *pyet* **ndonjë/*asnjë** specialist.
NEG have.1SG idea ask.IMP.2SG any specialist
'I have no idea, ask some specialist or other.'

(61) *Hajde*, por *mos sill* prap **ndonjërin** nga shokët e tu.
Come.IMP.2SG but NEG bring.IMP.2SG again any among friends of your
'Come, but don't bring again anyone of you friends.'

(62) *Hajde*, por *mos sill* **asnjërin** nga shokët e tu.
Come.IMP.2SG but NEG bring.IMP.2SG nobody among friends of your
'Come, but bring none of your friends.'

Indicative (without negation)

(63) *Kalon* ndonjëherë **ndonjëri/*asnjëri** edhe pyet.
pass.3SG sometime anybody and ask.3SG
'Some person or other passes by and inquires occasionally.'

(64) *Kalonte* ndonjëherë **ndonjëri/*asnjëri** edhe pyeste.
was-passing.3SG sometime anybody and ask.PAST.PROG.3SG
'Some person or other used to pass by and inquire occasionally.'

(65) **Kaloj* **asnjëri** edhe pyeti.
passed.3SG nobody and asked.3SG
'Nobody passed by and asked.'

Superlative

(66) Është gënjeshtra *më e madhe që* ka thënë **ndonjëri/*asnjëri**.
is lie more CLT big that has.3SG told anyone
'It's the biggest lie that anyone has told.'

The following environments are used to test the quantificational nature of the NPIs. They have not been claimed to be licensors of NPIs in the literature.

Co-indexation with clitics

(67) Nuk i_i pëlqen keqtrajtimi i ***ndonjërit**$_i$**/asnjërit**$_i$.
NEG CLT like.3SG maltreatment of nobody
'He does not like anyone's maltreatment.'

Topicalization and fronting

(68) Me këtë sjellje ***ndonjërin/asnjërin** nuk do gjejë ta ndifmoj.
with this attitude nobody NEG FUT find.FUT.3SG her help.FUT.1SG
'With such bad attitude she will find noone to help her.'

Metalinguistic negation

(69) *Nuk* i thash **ndonjërit/*asnjërit** që ike por që ndejte deri në fund.
NEG CLT told.1SG anybody that left.2SG but that stayed.2SG until the end
'I didn't tell anyone that you left but that you stayed till the end.'

Modification by *absolutisht* 'absolutely' and *po thuaj se* 'approximately'

(70) Me kaq errësirrë, nuk shikoj *absolutisht / po thuaj se* ***ndonjë gjë/asnjë gjë**.
with such darkness NEG see.1SG absolutely / approximately nothing
'It is so dark that I can see absolutely nothing.'

(71) *Po thuaj se* ***ndonjë/asnjë** çift nuk është i lumtur.
almost nobody couple NEG is CLT happy
'Almost no couple is happy.'

3.4 Data interpretation

One easily observes the different distribution of the items of the non-emphatic paradigm with respect to those of the emphatic one. In fact, sentential negation is the sole trigger for the licensing of the emphatic class of NPIs while the set of triggers for the licensing of the non-emphatic NPIs is remarkably rich, consisting of modal (subjunctives, imperatives, questions, modal verbs, conditionals, future, superlatives) aspectual (imperfective verbs in indicative) and DM (sentential negation, restrictive adverbs, S-comparatives and conditionals) operators. Clearly, not all of the environments that license NPIs in Albanian are DM (e.g. questions, imperatives). Considering Table [3], the reader can immediately verify that all of the environments that license the two paradigms are nonveridical[14]. Furthermore, the only environment regulating the emphatic element is clausal negation, a prototypical antiveridical operator, which agrees perfectly with the corresponding analysis that Giannakidou has provided for Modern Greek (Giannakidou (2002)). Albanian therefore conforms to the current framework of the nonveridicality theory of polarity.

A cautionary remark is in order at this point. There are examples of sentences which do not contain one of the overt negative markers discussed in Section [3.1] but do, nevertheless, license the presence of the emphatic NPI. Consider the following sentence:

(72) Ishte i sëmurë edhe i paaftë për **asnjë/ndonjë** punë fizike.
was.3SG CLT sick and CLT incapable for any work manual
'He was sick and incapable of any manual work.'

The reader will notice that there is no overt negative operator in this sentence, yet it allows for the presence of the emphatic item **asnjë**. The same will be true even if we change the

[14]Co-indexation by clitics, restriction on metalinguistic negation and modification by **absolutisht/po thuaj se** are not nonveridical but are included in the table to illustrate other properties of the NPIs in question, namely quantificational force, and in particular tracing of universal quantifiers.

Environments	Emphatic	Non-Emphatic
clausal negation	✓	✓
restrictive adjectives/adverbs		✓
adversative predicates		✓
yes - no questions		✓
wh-questions		✓
S - comparatives		✓
conditionals		✓
modals		✓
simple future		✓
imperatives		✓
superlatives		✓
co - indexation with clitics	✓	
topicalization/fronting		✓
restrictions on metalinguistic negation	✓	
modification by *absolutisht/po thuaj se*	✓	

Table 3: Licensing environments for the two paradigms

tense to any other, so there is no relation between the licensing of the non-emphatic item and the imperfective nature of the tense in [72]. A potential solution to this apparent paradox might be in the morphology of the word *paaftë* (incapable).

pa 'without' + aftë 'capable'

At this point I need to introduce the concept of antiadditivity to explain the licensing of the strong[15] NPI in [72].

Definition 3.1. An operator $\mathscr{F}$ is termed antiadditive if and only if $\forall X, Y$

$$\mathscr{F}(X \vee Y) \iff \mathscr{F}(X) \wedge \mathscr{F}(Y)$$

If we replace the operator $\mathscr{F}$ with negation, then we obtain the first De Morgan Law. Indeed, in Albanian the following equivalencies are empirically acceptable[16]:

(73) pa (shtëpi ose familje) $\iff$ (pa shtëpi) dhe (pa familje)
without house or family

(74) pa (shtëpi dhe familje) $\Longleftarrow$ (pa shtëpi) ose (pa familje)
without house and family

(75) pa (u trëmbur ose u friksuar) $\iff$ (pa u trëmbur) dhe (pa u friksuar)
without REFL scared or REFL frightened

[15]The characterization "strong" is from Zwarts (1998) who uses it to classify the NPIs which need to appear in the scope of an antiadditive operator to be sanctioned. I will use the term "strong" as equivalent to "emphatic" in this paper, although in principle strong NPIs are (at best) a superset of emphatic NPIs.

[16]For a proof of the antiadditivity of *without* see Zwarts (1995) and Zwarts (1998).

(76) pa (u trëmbur dhe u friksuar) $\Longleftrightarrow$ (pa u trëmbur) ose (pa u friksuar)
without REFL scared and REFL frightened

We note that the construction *pa* follows **Definition** [3.1] of antiadditive operators hence it forms an environment that licences the emphatic class of NPIs to appear without the companionship of sentential negation. But although Modern Greek and Albanian agree on the antiadditive nature of 'without' (the antiadditivity of Modern Greek 'without' has been established in Giannakidou (1998) and other work by the same author; it can also be observed in [7]), this still does not account for the discrepancy of [72] as, in this case, the negative marker *pa* has become the prefix of an adjective. My current research on this topic, which is still ongoing, revolves around one possible explanation namely that the prefix *pa* 'without' in the adjective *i paaftë* 'incapable' is a semantically active morpheme that allows the licensing of the NPI *asnjë*. Therefore, a covert antiveridical operator exists in the above clause and it may be the case that, although a prefix, it has licensing potential for the emphatic NPIs.

An important distinction between the two paradigms comes from their truth-conditions. This agrees with the analysis in Giannakidou (1993b) and is clearly illustrated by observing the behavior of the two classes of NPIs in imperative sentences such as those in [77] and [78].

(77) *Hajde*, por mos sill prap **ndonjërin** nga shokët e tu.
Come.IMP.2SG but NEG bring.IMP.2SG again any among friends of yours
'Come, but don't bring again anyone of you friends.'

(78) *Hajde*, por mos sill **asnjërin** nga shokët e tu.
Come.IMP.2SG but NEG bring.IMP.2SG nobody among friends of yours
'Come, but bring none of your friends.'

[77] implicates that the hearer did bring some colleagues the last time he visited the utterer, contrary to [78] which states clearly that last time the hearer came alone. As a consequence, [77] expresses the desire of the utterer that the hearer does not repeat what he did last time whereas by uttering [78] the speaker expects that the hearer will repeat exactly what he did the previous time. We therefore have two distinct scopal orders:

NOT AGAIN SOMEONE [77]
AGAIN NOT SOMEONE[17] [78]

The aspectual marker *prap* (again) is non-trivially affecting the sentence as it reinforces the modal effect already activated by the imperative mood. We observe, also, that no specific reading of **ndonjë** is permissible in such constructions, contrary to what is the case for the negation of indicatives, as modality seems to dictate indefinite non-specific interpretations of the non-emphatic items.

When considering the items of the emphatic class, the reader should be particularly careful with the concatenative morphology that generates them. Indeed, all of the items of the emphatic paradigm have as their first morpheme the word *as* 'even'. Note that translation equivalents of the English *even* have polarity sensitive meanings crosslinguistically

[17] With the concordant reading because Albanian is a negative concord language.

(see Giannakidou (2007) for a detailed account). The Albanian *as* corresponds to the high-scalar negative polarity *even* meaning. This explains its restrictions of use to negative and antiveridical environments. The following examples illustrate this phenomenon:

(79) Oresti *(nuk) lexhoj as pak.
Orest (NEG) read.3SG.PAST even a.little
'Orest did not read even a little.'

(80) Oresti iku pa takuar as professorin.
Orest left.3SG without greet.INF even professor.DEF
'Orest left without greeting even the professor.'

(81) Oresti as hëngri as piu.
Orest neither ate.3SG neither drank.3SG
'Orest neither ate nor drank.'

Typically *as* occurs in post-verbal position but it may also occur in pre-verbally, leading to cases where *as* requires no overt negation for its licensing as in the following:

(82) As e vras mëndjen.
Even CLT bother.1SG mind
'I don't even bother (my mind).'

This admits a syntactic account which proposes the existence of a covert counterpart of negation, but which is beyond the scope of this paper. I refer the reader to (Giannakidou (2007)) for completeness. What one notices, then, is that the distribution of the items of the emphatic class perfectly matches (with the exception of the unresolved case mentioned previously) the distribution of *as*. Indeed, the emphatic paradigm inherits the properties of its first morpheme *as*, and this accounts perfectly for the strictness of the particular items with respect to their nature as NPIs requiring antiveridical environments for their licensing.

4 Conclusion

In this paper, the first treatment of negative polarity items in Albanian, I presented the typology, semantic distribution and interpretation of the emphatic and non-emphatic class of NPIS like **asnjë** 'nobody' and **ndonjë**, whose meaning is close to 'anybody' (albeit with a more indefinite import and having always an existential content), in Albanian and compare it to that of Modern Greek, both languages of the *Balkan Sprachbund*.

I showed that Albanian differs from Modern Greek in that it differentiates between the two classes lexically (it has a distinct lexical entry for each class), whereas Modern Greek uses the same entry for both (**kanénas**) but distinguishes the cases intonationally, by means of emphatic stress. As in the case of Modern Greek, the distribution of the Albanian emphatic and non-emphatic NPIs is regulated by nonveridicality; the emphatic class only appears in the scope of antiveridical operators, while the non-emphatic class appears in a large repertoire of environments which are all, however, nonveridical. Albanian conforms to the predictions of the nonveridicality theory of polarity and enriches the existing theory by adding a set of previously unexplored data to the class of languages in which NPI distribution is modeled successfully by the nonveridicality theory.

Morphology, in particular, plays an important role in the distribution of the emphatic items since their first morpheme *as* 'even' has always the strict NPI reading which forces *as* to be licensed only in the scope of antiveridical operators, a property that is inherited by the items of the emphatic class. Indeed, the licensing environments of *as* in Albanian are in a one-to-one correspondence with the licensing environments of the emphatic items.

Finally, I provided examples that seem to exhibit properties not predicted by the nonveridicality theory of NPI licensing by raising the question of whether negative import prefixes of nouns or adjectives and word-internal compositionality in general can serve as licensing environments of NPIs. To my knowledge, there has been no evidence of languages in which licensing of strong NPIs is possible from word-internal negative markers which makes the Albanian examples interesting. The licensing of strong NPIs is only possible if an antiadditive operator scopes above the strong NPI. There have been no arguments so far, that I am aware of, claiming that word-internal negative markers can be antiadditive operators. This is the line of research that I would like to pursue in future work, summarized by Hypothesis [4.1]:

Hypothesis 4.1. *A word-internal negative marker $\mathscr{M}$ licenses strong NPIs in the scope of its host if the following conditions are satisfied:*

1. *$\mathscr{M}$ can appear as a free morpheme (i.e. in non-word-internal position).*
2. *$\mathscr{M}$ is an antiadditive operator when not word-internal.*

In essence, this Hypothesis [4.1] proposes an extension of the class of licensors of NPis, which, according to the Albanian examples, is necessary. Note, crucially, that I do not an equivalence between sentential negation and lexical negation. The conjecture that I am proposing is that lexical negation satisfying the conditions in Hypthesis [4.1] is able to license strong NPIs. To my knowledge, this is the first semantic attempt to relate the licensing of strong NPIs to lexical negation.

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Two cases of incremental parsing in Korean: conditionals and relative clauses

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Abstract

The strong head-finality of Korean raises many potential challenges to *incremental parsing*. In languages like Korean, there is normally no indication of clause structure before the parser encounters the verb or the relative head at the end of the clause. This *uncertainty* of clause structure can potentially give rise to the processing difficulty of verbs in head-final languages. Developing our earlier studies in Japanese (Yoshida 2006), we present four series of experiments in Korean (offline and online) to show that there are, however, cases where the processing of clause-final verbs can be indeed *predicted* and *facilitated*.

1 Introduction

The strong head-finality of Korean raises many potential challenges to the notion of incremental parsing. In languages like Korean, there is normally no indication of clause structure before the parser encounters the verbs, complementizers attached to verbs, or relative heads at the end of the clause. One of the long-standing problems in the studies of sentence processing in head-final languages is how the parser maintains the incremental structure building without the help from a rich information bearing units like verbs, which come at the end of each clause. It has been known that the parser utilizes case information to determine the type of the clause before the verb is processed (Altman and Kamide 1999, Miyamoto 2002). Even though the case information can potentially tell the argument structure of the verb (e.g., the combination of dative NP and accusative NP can tell that the upcoming verb is most likely a ditransitive verb), the case information alone cannot signal whether the clause is an embedded clause or a matrix clause, or what type of embedded clause the parser is dealing with.

This study presents four series of experiments (offline and online) in Korean to show that in the processing of head-final clauses in Korean, the parser utilizes sophisticated grammatical information to recognize the type of upcoming verbal morphology and the clause type before the end of the clause. We report two of such cases. One is when the presence of a conditional clause and a conditional-marked embedded verb is signaled by the conditional adverb (CA) which is licensed only by conditional clause head. The other is when the upcoming head of a relative clause (RC) is signaled by a numeral classifier. Once the presence of the relative clause is signaled, its verbal morphology can be predicted because verb in RCs must bear adnominal form (noun-modifying inflection).

2 Processing of conditionals

Korean conditional *if*-clauses cannot normally be detected until the clause-final conditional verb is reached.

(1) *Swuni-nun* [*Toli-ka* *ku-haksayng-ekey* *senmwul-ul*
S.-Top T.-Nom that-student-Dat present-Acc
*cwunta-**myen***] *wulki-sicakha-lkeya.*
give-Cond cry-start will
'Swuni will cry if Toli gives a present to that student.'

Conditional meaning in Korean is always expressed by verbal morphology and these morphemes roughly correspond to *if* in English. Based on the optionality of some of the morphemes, conditional verbs can have seven possible surface forms in Korean as shown in (2). (2) shows all seven possibilities with the verb *mek* 'eat'. These examples show how the omission of conditional morphemes can take place.

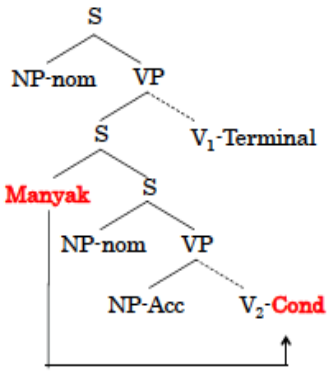
(2) a. *mek-un-kes-i-la-koha-myen*
b. *mek-un-kes-i-la-myen*
c. *mek-un-ke-la-myen*
d. *mek-ess-takoha-myen*
e. *mek-ess-u-myen*
f. *mek-ess-ta-myen*
g. *mek-u-myen*

Notice that, in all conditional clauses, the embedded verb bears unique conditional morphology *myen* (e.g., *mek-**u-myen*** 'eat-Cond'), which is equivalent to the conditional complementizer *if* in English. Importantly, the conditional mophology is attached to a verb and thus it comes at the end of the conditional clause.

In Korean, however, an optional adverb, *manyak,* can appear at the beginning of conditional clauses as in (3-4), which may signal the presence of the upcoming conditional-marked verb. This is so because *manyak* is licensed only in conditional clauses and thus, if *manyak* is present, there must be a conditional clause, and a conditional verb.

(3) *Swuni-nun* *[**manyak*** *Toli-ka* *ku-haksayng-ekey*
S.-Top manyak T.-Nom that-student-Dat
senmwul-ul *cwunta-**myen**]* *wulki-sicakha-lkeya.*
present-Acc give-Cond cry-start will
'Swuni will cry if Toli gives a present to that student.'

(4)



In sum, *manyak*, when present, must be licensed by conditional clauses (with conditional morphology), as schematized below:

(5) a. [ok][manyak … V-myen]
b. *[manyak … V] (e.g., complement clause)

2.1 Sentence fragment completion task

The conditional adverb can potentially signal the upcoming conditional clause and the conditional verb. Thus, if the parser may use such information, it is possible that the parser can recognize the upcoming conditional verb just by recognizing the conditional adverb. We tested this possibility through an offline and an online experiment.

The first experiment, an off-line sentence fragment completion task, is designed to show whether the presence of CA *manyak* can provide an effective cue to the upcoming conditional clauses and the type of the embedded verbal form, i.e. with conditional morphology.

40 Korean speakers participated in the experiment, who were students at the University of Seoul, Korea. All were given informed consent and paid the equivalent of $5.00 as a compensation for their participation in the experiment, which lasted about 30 minutes. An offline sentence fragment completion experiment in 1x2 design has been conducted in which the adverb type has been manipulated as an independent factor (conditional adverb vs. non-conditional adverb). This experiment examined whether the semantic relation between *manyak* and the conditional verb affords a reliable signal to the presence of conditional morphology in the embedded clause. Sentence fragments containing the conditional adverb *manyak* vs. non-conditional regular adverbs like *always* as in (6) were compared.

(6) Materials:

a. *Manyak Condition*

NP-nun	manyak	Adj	NP-ka	_____
NP-Top	**manyak**	Adj	NP-Nom	_____

b. *Adverb Condition*

NP-nun	always	Adj	NP-ka	_____
NP-Top	**Adv**	Adj	NP-Nom	_____

12 items with two conditions have been tested. Each participant saw exactly one of the lists of 24 target items intermixed with seventy-two filler items in a random order. The filler items included a variety of non-conditional adverbs, and were thus intended to prevent participants from noticing the regularity in the form of the target items. The length of the fragments was matched across target and filler items.

Results

An offline sentence fragment completion experiment (n=40) strongly supports this tight relation between *manyak* and the conditional verb. The presence of *manyak* modulated expectations for conditional verbal morphology. Fragments containing *manyak* as in (6a) yielded conditional clause completions on 97.1% of trials, whereas conditional clause completions were extremely rare (0.6%) when *manyak* was replaced with a non-conditional adverb like *always* as in (6b).

2.2 Self-paced reading task

The second experiment, an online phrase-by-phrase self-paced moving window experiment (Just et al. 1982), aims to test the same question, i.e., whether *manyak* can provide an effective cue to the upcoming conditional clauses and the type of the embedded verbal form, i.e. with conditional morphology. The rationale for the self-paced reading task is this: If the parser can make use of this syntactic-o-semantic information, the parser can recognize the type of upcoming verbs even before seeing the conditional verb itself. As a result, the processing of the conditional verb is facilitated when the presence of conditional verb at later stage is foreseen by the early occurrence of *manyak*. Thus the experiment was in 1x2 design in which the factor of adverb (the conditional adverb vs. the non-conditional adverb) has been manipulated as shown in (8).

40 Korean speakers participated in the experiment, who were students at the University of Seoul, Korea. All were given informed consent and paid the equivalent of $5.00 as a compensation for their participation in the experiment, which lasted about 30 minutes. The moving window experiment has been conducted on laptop computers running the *Linger* software developed at MIT (Rohde 2001-2003). Participants were timed in a phrase-by-phrase self-paced non-cumulative moving window reading task. Sentences were presented using Korean characters, with target items segmented according to the scheme in (7). All sentences, including the filler items, were presented on a single line.

(7) Materials:

a. *Concordant Adverb Condition*

NP-nun [$_{\text{Adjunct}}$ **manyak** NP-nom NP-dat NP-acc V-**myen**] NP-acc V.

b. *Standard Adverb Condition*

NP-nun [$_{\text{Adjunct}}$ **adv** NP-nom NP-dat NP-acc V-**myen**] NP-acc V.

Stimulus regions initially appeared as a row of dashes, and participants pressed the space bar of the keyboard to reveal each subsequent region of the sentence.

(8) a. *Concordant Adverb Condition*

1	2	3	4	5	6	7	8	9	10
NP-nun	**manyak**	Adj	NP-nom	NP-dat	NP-acc	V-**myen**	Adv	NP-acc	V.

b. *Standard Adverb Condition*

1	2	3	4	5	6	7	8	9	10
NP-nun	**Adv**	Adj	NP-nom	NP-dat	NP-acc	V-**myen**	Adv	NP-acc	V.

In order to ensure that participants attended to the stimuli, an argument-verb matching task was presented after each trial. It was not practical to ask yes/no comprehension questions, since many of the experimental sentences could themselves be understood as questions. Following each trial, a verb was displayed on the computer screen followed by two NPs, corresponding to NPs from the experimental sentence, and participants had to indicate which of the NPs was the subject of the verb in the sentence just read by pressing one of two keys on the keyboard. In the comprehension task, the two NPs were displayed without case markers, in order to exclude the possibility of answering the question based on the case markers on the NPs. This task was adopted from Nagata (1993) and Aoshima et al. (2004) with a slight modification. In the previous studies only subject NPs were used in this task, but in our experiment both subject NPs and non-subject NPs were presented. This modification was adopted both in order to encourage participants to attend to all words in a sentence, and also because some of the filler sentences had quantificational wh-phrase subject NPs, which were not suitable for the comprehension task.

Results

Comprehension accuracy and reading times at each region were analyzed using a repeated-measures ANOVA, with semantic compatibility between numeral classifiers and the adjacent subject NP (match vs. mismatch) as a within-subjects factor. All data from participants whose comprehension task accuracy was below 70% in total were discarded (9, 16 %). Reading times longer than 3000ms were discarded, affecting 1% of trials. The means and analyses presented below are based on the remaining trials.

The average comprehension accuracy among the forty participants who were included in the analysis was 82.5%. Mean accuracy scores did not differ significantly between the two conditions. (Fs < 1).

Average reading times for each region are calculated. There were significant differences in reading times between the two conditions at Region 4 (embedded subject NP), Region 5 (adjective), and Region 8 (embedded verb), with a reversal in the pattern

of difficulty between Regions 4-5 and Region 8. There were no significant differences at any other regions (all *F*s < 1).

The result of a self-paced moving window experiment showed that information from *manyak* considerably facilitated the processing of conditional verbs online. Reading times at 'V-cond' were significantly faster in the *manyak* condition (9a) than in the non-conditional adverb condition (9b) (ps<.05).

(9) a. NP-top [$_{\text{if-clause}}$ ***manyak*** Adj NP-nom NP-dat NP-acc **V-cond**]
Adv NP-acc V.

b. NP-top [$_{\text{if-clause}}$ ***Adv*** Adj NP-nom NP-dat NP-acc **V-cond**]
Adv NP-acc V.

These results indicate that the conditional adverb provides a reliable cue to the upcoming conditional verb.

Korean conditional *if*-clauses normally cannot be detected until the clause-final conditional verb is reached, but the optional conditional adverbial *manyak* may provide a cue for the upcoming verb form. Experiment part I (sentence completion, n=40) showed that the presence of *manyak* modulated expectations for conditional verbal morphology: fragments containing *manyak* yielded *if*-clause completions on 97.1% of trials, whereas *if*-clause completions were extremely rare (0.5%) when *manyak* was replaced with a non-conditional adverb. Experiment part II (self-paced reading, n=40) showed that information from *manyak* considerably facilitated the processing of conditional verbs online. Reading times at 'V-cond' were faster in the *manyak* condition than in the adverb condition (ps<.05). These results indicate that the conditional adverb provides a reliable cue to the upcoming verb form in Korean (and Japanese, see Yoshida 2006).

3 Processing of relative clauses

Like conditional clauses, Korean RCs tend not to be detected early due to the head-finality. In head-final languages like Korean and Japanese, the head of each phrase follows all other elements in the phrase, both modifiers and arguments. The sentence parser is thus normally deficient of reliable cues about the upcoming sentence structures until it encounters the head at the end of each phrase (Hirose 1999, Inoue 1991, Mazuka and Lust 1988, 1990, Mazuka and Itoh 1995, Miyamoto 2002, 2003 for Japanese; Kiaer 2006, Kwon et al. 2006 for Korean). Among such head-final constructions, relative clauses have received considerable attention since they are known to have strong garden path effects (Hirose 1999; Inoue 1991; Mazuka and Lust 1988, 1990; Mazuka and Itoh 1995; Miyamoto 2002, 2003; Nakamura 1999/2000, 2003; Yamashita et al. 1993; Yamashita 1995; Kwon et al. 2006).

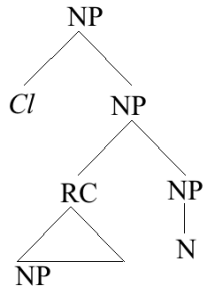
It is widely assumed that garden path effects are created because in Japanese and Korean an upcoming relative clause structure is extremely difficult to predict. Mostly in Japanese literature, researchers observed that the parser shows a bias to strongly prefer to posit a simple clause or a complement clause structure whenever possible over a complex structure (Inoue 1991; Mazuka and Lust 1988, 1990; Mazuka and Itoh 1995; Miyamoto 2002, 2003; Yamashita et al. 1993; Yamashita 1995). This means that a relative clause

structure is unlikely to be the originally preferable structure. Given this initial preference for a complement clause analysis, we can assume that when a disambiguating cue from the relative head or the verbal morphology is available, a garden path effect may arise because the parser needs to reanalyze the initially-posited complement clause structure to a relative clause structure. This garden path effect arises due to the lack of syntactic or morphological cues for an upcoming relative clause structure at an earlier stage of processing in head-final languages, unlike relative clauses in English where the beginning of a relative clause is marked by a relative pronoun.

Starting from the assumption that this garden path effect may be resolved if an upcoming relative clause structure can be forecast at an earlier stage, we provide a case study of one such construction in Korean. We furthermore discuss theoretical implications of the current results in comparison with prior Japanese, Chinese, and Korean studies on the subject (Yoshida et al. 2004, Yoshida 2006 in Japanese; Wu, Kaiser, and Anderson 2009, Hsu 2006 in Chinese; Kiaer 2006, Kwon et al. 2006 in Korean).

In Korean, a certain class of modifiers of NPs, i.e., numeral classifiers, may provide an indirect cue for an upcoming relative clause structure. The structure in (10) illustrates this schematically. As we shall see in more detail below, in certain contexts where a classifier cannot modify its linearly adjacent NP due to the semantic mismatch, a possible solution is for the classifier to modify another NP. Since the only plausible candidate for the second NP is the head of a relative clause in this context, a relative clause must intervene between the classifier and the host NP.

(10)



We take this close connection between the numeral classifier and the relative head NP in terms of semantic class to assume that, if the parser has access to this information in the course of sentence structure processing, it must have the predictability for the upcoming relative clause structure. If true, this will crucially implicates that there are certain environments where the semantic information like a type of classifier provide a sufficiently unambiguous cue for an upcoming syntactic structure like a relative clause during online sentence processing.

Building on Yoshida's (2006) original idea of unambiguously marking the left-edge of embedded clauses in Japanese (cf. Wu, Kaiser, and Anderson 2009, Hsu 2006 for in Chinese), we examine whether classifiers in Korean also have the potential to provide an unambiguous cue for an upcoming relative clause.

Observe that both of the following examples are acceptable. In (11a), the numeral

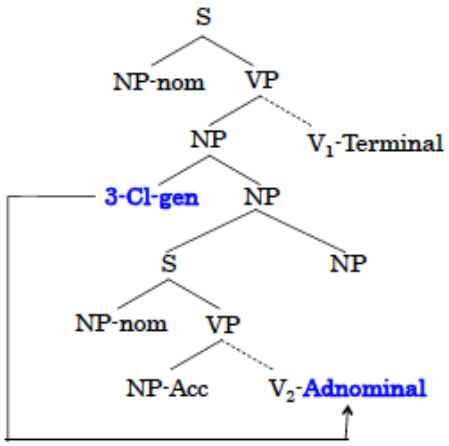
classifier *myeng* for human is associated with the human subject NP of the relative clause. In (11b), however, the classifier *kwen* for books cannot modify the immediately following subject of the relative clause due to semantic incompatibility, book-human. It thus must continue to seek a possible host NP, and find the NP head of the relative clause with the matching semantic type, book-book.

(11) a. **3-myeng-uy** [$_{RC}$ **haksayng**-i ilk-un] chayk
3-Cl$_{human}$-Gen student-Nom read-Rel book
'The book that the three students read'

b. **3-kwen-uy** [$_{RC}$ haksayng-i ilk-un] **chayk**
3-Cl$_{book}$-Gen student-Nom read-Rel book
'The three books that the students read'

In (12), the semantic incompatibility between the classifier (e.g., for book) and the immediately following subject NP (e.g., student), forces the classifier to be associated with the relative head noun (e.g., book).

(12)



From the online sentence processing perspective, if such mismatch happens, the presence of the upcoming relative head noun can be detected. Thus, the semantic mismatch between the classifier and the subject NP may provide a reliable cue to the upcoming relative head NP. Additionally, in Korean RCs, the embedded verb must be in adnominal (noun-modifying) form. Therefore, if the upcoming relative head is anticipated, the adnominal verbal form can also be expected. When there is a semantic mismatch between a classifier and an immediately following nominative NP, the only plausible scenario is that the structure contains an intervening relative clause. This means that, if the parser instantly notices the semantic anomaly at that point of processing, active remedial prediction of syntactic structure (i.e., positing an intervening relative clause) is undertaken to fulfill semantic requirements during sentence processing.

With this background, we report the results from two experiments in Korean. These experiments are designed to show how the parser behaves upon encountering a temporary

glitch (i.e., the mismatching numeral classifier and the following noun). We show that the parser seems to make effort to build a grammatical structure, even using the seeming anomaly as an indirect cue for reanalysis in order to project a potentially rescuing structure.

3.1 Sentence fragment completion task

The third experiment, an off-line sentence fragment completion task, is designed to show whether the classifier mismatch can provide a valid cue to the upcoming relative head NP and the type of the embedded verb, the adnominal verb.

40 Korean speakers participated in the experiment, who were students at the University of Seoul, Korea. All were given informed consent and paid the equivalent of $5.00 as a compensation for their participation in the experiment, which lasted about 30 minutes. An offline sentence fragment completion task where the classifier-type has been manipulated as an independent factor in 1x2 design (classifier-match vs. classifier mismatch). This experiment examined whether the semantic mismatch between the classifier and the subject NP (e.g., *3-myeng-uy sensayngnim-i*) provides a reliable cue to the presence of the relative head NP and the adnominal verb. Sentence fragments containing locally matching vs. mismatching numeral classifiers as in (13) were compared.

(13) *Classifier Match*

NP-nun	3-myeng-uy	Adj	sensayngnim-i _____
NP-top	3-Cl_{human}-gen		teacher-nom

b. *Classifier Mismatch*

NP-nun	3-kwen-uy	Adj	sensayngnim-i _____
NP-top	3-$Cl_{book\text{-}like}$-gen		teacher-nom

Each participant saw exactly one of the lists of 26 target items intermixed with seventy-eight filler items in a random order. The filler items included a variety of forms of numeral classifiers and wh-phrases, and were thus intended to prevent participants from noticing the regularity in the form of the target items. The length of the fragments was matched across target and filler items.

Results

In classifier-mismatch conditions (book-student) (13a) 81.4% of completions involved RCs with Adnominal verbs, contrary to classifier-match conditions (human-student) (13b) (0.7%). The study showed that locally matching vs. mismatching numeral classifiers strongly biased the type completion. In classifier-mismatch conditions 81.4% of completions involved RCs, contrary to classifier-match conditions (0.7%).

This result strongly indicates that the classifier mismatch can indeed provide a valid cue to the upcoming relative head NP and the type of the embedded verb, the adnominal verb.

3.2 Self-paced reading task

A phrase-by-phrase self-paced moving window experiment has been conducted, in which the classifier-type has been manipulated as an independent factor in 1x2 design (classifier match vs. classifier mismatch) to test whether the parser can make use of the information from the mismatching classifier to detect the upcoming RC head NP and the adnominal verb.

40 Korean speakers participated in the experiment, who were students at the University of Seoul, Korea. All were given informed consent and paid the equivalent of $5.00 as a compensation for their participation in the experiment, which lasted about 30 minutes. The moving window experiment has been conducted on laptop computers running the *Linger* software developed at MIT (Rohde 2001-2003). Sentences were presented using Korean characters, with target items segmented according to the scheme in (14). All sentences, including the filler items, were presented on a single line.

(14) a. NP-top 3-**class(human)-gen** [$_{RC}$ student-nom Adv V-adnominal] book-acc V.
b. NP-top 3-**class(book)-gen** [$_{RC}$ student-nom Adv V-adnominal] book-acc V.

(15) a. *Classifier Match*

1	2	3	4	5	6	7	8	9
NP-top	GNC_{match}	Adj	NP-nom	Adj	NP-dat	Adv	Verb	NP-acc
	2-Cl_{human}-gen		**teacher**					**book-acc**

10	11	12
NP-dat	Adv	Verb

b. *Classifier Mismatch*

1	2	3	4	5	6	7	8	9
NP-top	$GNC_{mismatch}$	Adj	NP-nom	Adj	NP-dat	Adv	Verb	NP-acc
	2-$Cl_{book\text{-}like}$-gen		**teacher**					**book-acc**

10	11	12
NP-dat	Adv	Verb

As in the case with the self-paced reading task on conditional clauses, in order to ensure that participants attended to the stimuli, an argument-verb matching task was presented after each trial. It was not practical to ask yes/no comprehension questions, since many of the experimental sentences could themselves be understood as questions. Following each trial, a verb was displayed on the computer screen followed by two NPs, corresponding to NPs from the experimental sentence, and participants had to indicate which of the NPs was the subject of the verb in the sentence just read by pressing one of two keys on the keyboard. In the comprehension task, the two NPs were displayed without case markers, in order to exclude the possibility of answering the question based on the case markers on the NPs. As noted above, this task was adopted from Nagata (1993) and Aoshima et al. (2004) with a slight modification. In the previous studies only subject NPs were used in this task, but in our experiment both subject NPs and non-subject NPs were presented. This modification was adopted both in order to encourage participants to attend to all

words in a sentence, and also because some of the filler sentences had quantificational wh-phrase subject NPs, which were not suitable for the comprehension task.

Results

Comprehension accuracy and reading times at each region were analyzed using a repeated-measures ANOVA, with semantic compatibility between numeral classifiers and the adjacent subject NP (match vs. mismatch) as a within-subjects factor. All data from participants whose comprehension task accuracy was below 70% in total were discarded (9.16 %). Reading times longer than 3000ms were discarded, affecting 1% of trials. The means and analyses presented below are based on the remaining trials.

The average comprehension accuracy among the fifty-four participants who were included in the analysis was 82.5%. Mean accuracy scores did not differ significantly between the two conditions. (Fs < 1). Average reading times for each region are measured. There were significant differences in reading times between the two conditions at Region 4 (embedded subject NP), Region 5 (adjective), and Region 8 (embedded verb), with a reversal in the pattern of difficulty between Regions 4-5 and Region 8. There were no significant differences at any other regions (all Fs < 1).

The result showed that information from mismatching numeral classifiers led to the facilitation for the embedded verb processing. The embedded adnominal verb was read significantly faster in the classifier-mismatch condition (book-student) (15a) than the classifier-match condition (human-student) (15b) (ps<.05).

4 Discussion

Both experiments, sentential completion task and self-paced reading task showed that information from mismatching numeral classifiers led to the facilitation for the embedded verb processing. Reading times at the embedded adnominal verb showed a significant facilitation in the classifier-mismatch condition, in sharp contrast to the classifier-match condition (human-student) (ps<.05).

This result has an important implication to the incremental structure building. The processing of the embedded adnominal verb can be facilitated only if the structure of the relative clause is detected before the relative head is encountered. The verb bears adnominal form only when it is embedded in a complex NP context (either a relative clause or a complement clause to a noun). Thus, the facilitation of the adnominal verb is possible if the parser can recognize that the verb is embedded in a complex NP context. Given that the classifier does not have any direct relation to the embedded verb, the classifier cannot provide a cue to the type of the embedded clause. Rather the classifier provides a cue to the upcoming RC head and the upcoming RC structure. The recognition of the upcoming RC structure leads to the recognition of the inflectional morphology of the embedded verb. Thus, when the adnominal verb was processed, the parser must have built the structure of the relative clause without bottom up cues.

5 Conclusion

Important implication here is that both *manyak* and classifier mismatch are reliable cue to predict V-morphology in Korean (and Japanese, see Yoshida 2006). The results of four experiments uniformly suggest that the parser utilizes the information in the left context to anticipate the form of the upcoming verbs, not only when there is a direct dependency between the verb and an element in the left context, such as a conditional adverb like *manyak*, but also when the verb has an indirect relation with an element in the left context, such as a mismatching classifier. Thus, this study provides crucial evidence supporting the previous arguments in the literature that the parser does not wait until the clause final verbs to build the sentence structure even in head-final languages (Miyamoto 2002, Aoshima et al. 2009).

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Mandarin Gapless Relative Clauses as Reduced Relative Clauses

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Abstract

In this paper, I propose a new analysis for Mandarin gapless relative clauses as reduced relative clauses with a nominalized *v*P structure. I present three pieces of evidence to support this new analysis: the subject of a gapless relative clause can be marked with the genitive marker *de*, a gapless relative clause only needs to select for a VP, not necessarily a full gapless relative clause, and that the gapless relative clause can be specific even without aspectual markers. I also point out the semantics of *v*P is a set of events, and this may be the motivation for a reduced structure *v*P for true gapless relative clauses, because the head noun of a gapless relative clause is related to events, not times semantically.

1 Introduction

Unlike English relative clauses, Mandarin relative clauses are prenominal, marked with *de* at the end. As observed in the literature, some of these relative clauses seem to be gapless (Aoun & Li 2003, Cheng & Sybesma 2005, Huang et al. 2009, Zhang 2008). For example, compare a regular relative clause in (1) and two gapless relative clauses in (2) and (3) below. In (1), the sentence inside the relative clause is missing the object; whereas in (2) and (3), both sentences are complete without any gaps.

(1) [[wo xuexi _____]$_S$ de]$_{RC}$ [zhuanye]$_{NP}$
[[I study _____]$_S$ REL]$_{RC}$ [major]$_{NP}$
'The major I am studying.'

Regular RC

(2) [[wo qie-cai]$_S$ de]$_{RC}$ [dao]$_{NP}$
[[I cut-vegetable]$_S$ REL]$_{RC}$ [knife]$_{NP}$
'The knife which I cut vegetables with.'

Relativization of an Adjunct

(3) [[Langlang tan-gangqin]$_S$ de]$_{RC}$ [shengyin]$_{NP}$
[[Langlang play-piano]$_S$ REL]$_{RC}$ [sound]$_{NP}$
'The sound of Langlang's piano playing.'

Gapless RC modifying External Noun

Although structurally the same on the surface, (2) and (3) actually represent two different types of gapless relative clauses: the former is modifying a head noun that can be interpreted as an adjunct in the relative clause, and the latter is modifying a noun external to the relative clause. Semantically speaking, the head noun *dao* 'knife' of (2) is the tool

used in the event of my cutting the vegetables, while the head noun *shengyin* 'sound' in (3) is not a participant in the event, but rather a product generated by the event. While for sentences like (2), it is possible to reconstruct a gap in the original sentence for the adjunct with a missing preposition (Larson 1987, Grosu 1996, Van Riemsdijk 2006); for sentences like (3), it is impossible to do so because a product of an event, such as a sound, is not assigned a theta role in the original sentence. Therefore, I consider the latter to be true gapless relative clauses and will focus on sentences like (3) only in this paper.

In some recent studies, Mandarin gapless relative clauses have been shown to behave syntactically different from regular relative clauses (Zhang 2008, Tsai 2008).Zhang (2008), for example, shows that while regular relative clauses can be stacked, gapless relative clauses cannot.

(4) Regular RC can be stacked but gapless RC cannot.

a. [Baoyu xie _____] de [[Daiyu langsong _____] de shi]
Baoyu write DE Daiyu read.aloud DE poem
'the poem that Baoyu wrote and Daiyu read aloud'

b. * [Baoyu tan gangqin] de [[Daiyu chang ge] de shengyin]
'Baoyu play piano DE Daiyu sing song DE sound'

(Tsai 2008: 112)

According to these studies, gapless relative constructions are not regular relative clauses, but rather adnominal CP clauses. For example, in Zhang (2008), a gapless relative clause is analyzed as a clausal licensor of a relational noun, such as smell or sound, and in Tsai (2008), it is analyzed as a clausal modifier of a noun.

These new accounts successfully explain the syntactic differences between a regular relative clause and a gapless relative clause by analyzing the two with different syntactic structures. And yet they cannot account for a peculiar behavior of aspectual markers observed by Cheng & Sybesma (2005). In their squib, Cheng & Sybesma (2005) observe that aspectual markers are infelicitous in gapless relative clauses, and consequently they propose that gapless relative clauses must be generic semantically. Neither of the two syntactic accounts above can account for this additional fact from the syntax alone without invoking any further semantic constraints.

(5) a. * ta chang-guo (nei-shou ge) de shengyin.
he sing-EXP that-CL song DE sound.
Intended: 'the voice that he had when he sang (the) song before.'

b. ta chang (nei-shou ge) de shengyin.
he sing that-CL song DE sound.
'the voice of his singing that song.' (Cheng & Sybesma 2005: 75)

In this paper, following Krause (2001) and Miyagawa (2008), I will argue that Mandarin gapless relative clauses are best analyzed as reduced relative clauses with a nominalized *v*P structure . My new proposal can not only account for the difference between a regular relative clause and a gapless relative clause, but also account for the lack of aspectual markers in gapless relative clauses directly from the syntax. Furthermore, contra Cheng & Sybesma

(2005), I argue that aspectual markers are absent from the gapless relative clause not because the gapless relative clause must be generic semantically, as the gapless relative clause can be made specific with a time adverbial for a specific time.

2 Previous Work on Gapless Relative Clauses in Chinese

2.1 Background

In the literature, the term 'gapless relative clause' has been used to refer to different types of noun modifying clauses. As shown in (6), one type is relative clauses that modify head nouns such as 'reason', 'manner' and 'time'. As shown in (7), another type is the ones that modify head nouns such as 'news' or 'rumor's and actually this type should be better characterized as noun complement clauses instead. I will dismiss this latter type as irrelevant in the following discussion.

(6) a. wo zhidao ta (weishenme) meiyou lai de yuanyin.
I know he (why) no-have come DE reason.
'I know the reason why he has not come.'

b. Xiaoming gai jie-hun de shijian dao-le
Xiaoming should marry DE time come-PERF.
'The time when Xiaoming should get married has come.'

c. Xiaohong jiejue wenti de fangfa hen zhijie.
Xiaohong solve problem DE manner very direct.
'The manner that Xiaohong solves problems is very direct..'

(7) wo shoudao-le Xiaoming hui lai de xiaoxi.
I receive-PERF Xiaoming will come DE news.
'I recieved the message that Xiaoming will come.'

For the type of gapless relative clauses in (6), the head noun may be interpreted as a missing adjunct within the relative clause, because semantically the head noun bears some thematic relation to the event described by the relative clause.Therefore, these sentences can actually be analyzed as regular relative clauses with an adjunct gap with some kind of missing preposition. 'According to Ning (1993), the domain of the adjunct gap should be within four types <LOCATION>,<TIME>, <MANNER>, <INSTRUMENT> and <REASON>(Tsai 2008).' Since this type of gapless relative clauses can be analyzed as underlyingly gapped, I do not consider this type of gapless relative clauses as true gapless relative clauses.

What I truly consider to be gapless relative clauses is a third type of relative clauses that modify head nouns that do not seem to bear any thematic relation to the relative clause. As shown in (8), some examples from Zhang (2008)'s paper, the head nouns, 'sound', 'smell' or 'consequence', do not bear a thematic role in the relative clause. It is not possible reconstruct a gap in the same fashion as the adjunct gapless relative clauses above. Zhang (2008) calls the head nouns 'sound', 'smell' and 'consequence' 'relational nouns', because she believes that these nouns must be licensed by a gapless relative clause in order to be

present. In other words, such nouns must be related to a gapless relative clause. Semantically speaking, all these 'relational nouns' seem to denote more or less the product or the result of the relative clause (Ning 1993).

(8) a. [LuLu tan gangqin] de shengyin.
Lulu play piano DE sound.
'the sound which (is produced by) Lulu's playing piano.'

b. Wo wendao-le [[mama chao cai] de weidao].
I smell-PERF Mom fry vegetable DE smell
'I smelled the smell from Mom's vegetable frying.'

c. [Lulu zuobi] de xiachang
Lulu cheat DE consequence.
'the consequence which (results from) Lulu's cheating.'

(Zhang 2008: 1004)

There are some debates about whether this type of gapless relative clauses for relational nouns can be also analyzed as underlyingly gapped. Ning (1993) assumes that the gap can be reconstructed as a VP adjunct gap of the meaning 'producing/obtaining ...'. As (9) shows, (9a) can be re-interpreted as (9b). However, Tsai (2008) points out that this analysis runs into some empirical problems, as such reinterpretation is not always possible for some sentences. For example, (10) cannot be re-interpreted in a similar way, as the budget is not produced by the event of Zhangsan's buying books.

(9) a. ta chang ge de shengyin.
He sing song DE sound.
'the sound of his singing'

b. [ta [[$_{VP}$ [$_{V'}$ chang ge] [$_{VP}$[$_{V}$ fachu le shengyin]]]]]
[He [[$_{VP}$ [$_{V'}$ sing song] [$_{VP}$[$_{V}$ produce Asp sound]]]]]
'the voice is obtained from his singing.'

(Tsai 2008: 117)

(10) Zhangsan mai shu de yusuan.
Zhangsan buy book DE budget.
'the budget of Zhangsan's buying books.'

(Tsai 2008: 118)

I have a further objection to reconstructing a gap in Ning (1993)'s fashion. As can be seen from (9b), the so called 'gapped VP' is not really an adjunct, but rather the main VP of the sentence, as the elided VP *fa chu shengyin* 'produce sound' actually bears the aspectual marker. This analysis would imply that the main verb in the relative clause *changge* 'sing song' is not the main VP in the original sentence, and that the main verb can be elided or dropped in a relative clause, which seems to be a rather difficult claim to make and needs much more evidence to support.

Having established that gapless relative clauses for relational nouns are truly gapless, I will move on to discuss some differences between a gapless relative clause and a regular relative clause observed in three recent studies by Zhang (2008), Tsai (2008) and Cheng & Sybesma (2005).

2.2 Some Properties of Gapless Relative Clauses

Zhang (2008) observes some very interesting differences between regular relative clauses and gapless relative clauses. Tsai (2008)'s paper gives a nice summary of these in Zhang (2008)'s paper, as shown in (11)[1].

(11) I. Gapless relative clauses indeed have no gaps.
II. The heads of gapless relative clauses must be relational.
III. The adnominal clauses of gapless relative clauses are not optional.
IV. Gapless relative clauses may not be conjoined with the regular relative clauses.
V. Gapless relative clauses may not be stacked, but the regular relative clauses may.

The following are some examples from Zhang (2008)'s paper to support each of these five claims.

(12) The gapless relative clause is indeed gapless.
a. [qiche xingshi] de sudu
car run DE speed
'the speed of the car's running.'
b. * [qiche sudu xingshi]
car speed run
c. * [qiche ta_i xingshi] de $sudu_i$
car it run DE speed

(13) The head noun must be relational.
a. chao cai de na ge ren
fry vegetable DE that CL person
'The person who fried vegetables.'
b. * Mama chao cai de na ge ren
Mom fry vegetable DE that CL person
Intended:'the person who was with Mom when the latter fried vegetables.'
Or:'the person for whom Mom fried vegetables.'

(14) The gapless relative clause is not optional.
a. Ta bu xihuan wo chao cai de weidao.
he not like I fry vegetable DE smell.
'He does not like the smell of my frying vegetables.
b. * Ta bu xihuan weidao.
he not like smell.

[1] Actually, Tsai's paper responds to an earlier version of Zhang's paper in 2007. The newer published version of the paper does not mention the coordination evidence. I will include this piece of evidence because it will be relevant to my later discussion.

(15) Regular RC and gapless RC cannot be coordinated.

a. * Wo ganjuedao-le [[Lulu mai de cai] he [ta chao cai de]
I fell-ASP [[Lulu buy DE vegetable] and [he fry vegetable DE]
weidao
smell

(Tsai 2008: 112)[2]

(16) Regular RC can be stacked but gapless RC cannot.

a. [Baoyu xie _____] de [[Daiyu langsong _____] de shi]
Baoyu write DE Daiyu read.aloud DE poem
'the poem that Baoyu wrote and Daiyu read aloud'

b. * [Baoyu tan gangqin] de [[Daiyu chang ge] de shengyin]
Baoyu play piano DE Daiyu sing song DE sound

Based on these observations, Zhang (2008) argues that the head nouns for gapless relative clauses are relational nouns, the gapless relative clause is in a reverse predication relation with the head noun, and that the head noun is an external argument to the relative clause.

Tsai (2008), however, argues that some of the differences, namely III, IV and V in (11) that Zhang (2008) observes in her paper are not valid. Against III and IV, Tsai (2008) offers some counterexamples.

First, against III, she offers the following example to show that the gapless relative clause can be omitted.

(17) Zhangsan mei tingdao (Lisi tan gangqin de) shengyin
Zhangsan not hear Lisi play piano DE sound
'Zhangsan does not hear the sound of Lisi's playing piano.

(Tsai 2008: 111)

Secondly, against IV, she argues that gapless relative clause and regular relative clause can be conjoined by offering the following example in (18). I think this example alone cannot prove conclusively that a regular relative clause and a gapless relative clause can indeed be conjoined. Because there are actually many different connective words in Chinese, for example *he*, *gen*, *erqie*, *yiji* and so on and critically *erqie* is the connective for conjoining clauses (Aoun & Li 2003: 142-143) rather than *gen*. However, I find that replacing *gen* with *erqie* in the following example unacceptable. This may suggest that what are being conjoined probably are not two clauses.

(18) Zhangsan tongshi wendao [mama chao cai de] gen [ta zui
Zhangsan simultaneously smell [Mom fry vegetable DE] and [he most
huainian de] weidao
miss DE] weidao
'Zhangsan simultaneously smells the smell of Mom's frying vegetables and what he misses.'

[2] I think that this example is actually not showing the coordination of regular RC and gapless RC. But rather the regular RC is modifying *cai* 'vegetable', in this sentence.

(Tsai 2008: 112)

(19) * Zhangsan tongshi wendao [mama chao cai de] erqie [ta zui
Zhangsan simultaneously smell [Mom fry vegetable DE] and [he most
huainian de] weidao
miss DE] weidao
Intended 'Zhangsan simultaneously smells the smell of Mom's frying vegetables and what he misses.'

(modified from Tsai 2008: 112)

Tsai (2008)'s new proposal is that 'gapless relative clauses are not true relative clauses' but 'complex noun phrases with adnominal clauses.' Yet, she does not show how her analysis work for the conjunction case in (18). I agree with most grammatical judgments with both Zhang (2008) and Tsai (2008), and in fact their examples may not necessarily be irreconcilable. However, I do share Tsai (2008)'s conclusion that 'gapless relative clauses are not true relative clauses', and I argue that gapless relative clauses are reduced relative clauses.

Furthermore, in a scrib, Cheng & Sybesma (2005) observe two peculiar properties of gapless relative clauses. They observe that only activity predicates can occur in a gapless relative clause, and that the activity in the relative clause must receive a generic reading and cannot be temporally restricted. As shown in(20), a regular relative clause can have the aspectual marker 'guo' in (20b), and yet a gapless relative clause may not in (20c). They argue that the requirement for activity predicate suggests there is an event variable *e* and that the event variable cannot be bound by an aspectual operator. So they propose that '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 (Cheng & Sybesma 2005: 75).'

(20) a. ta chang-guo de nei-shou ge.
he sing-EXP DE that-CL song
'the song that he sang before.'

b. chang-guo nei-shou ge de geshou.
sing-EXP that-CL song DE singer
'the singer who sang that song before.'

c. * ta chang-guo (nei-shou ge) de shengyin.
he sing-EXP that-CL song DE sound.
Intended: 'the voice that he had when he sang (the song) before.'

If Cheng & Sybesma (2005) are right in claiming that a gapless relative clause cannot be temporally restricted, i.e. no aspectual marker may occur in the gapless relative clause, another interpretation for this fact is that the verbal predicate in the gapless relative clause is non-finite. Because Mandarin does not have a very rich verbal morphology, the bare form of a verbal predicate can have the function of an infinitive, a gerund or a verbal noun in a sentence. I will argue that this verbal predicate in the gapless relative clause is actually a verbal noun in most cases in §3.

3 Evidence for a Reduced Relative Clause

From the previous section, it is clear that a gapless relative clause is significantly different from a regular relative clause and that a gapless relative clause does not allow for aspectual markers. These facts suggest that a gapless relative clause is structurally different from a regular relative clause and that a gapless relative clause is reduced in structure. In this section, I will provide several pieces of evidence for a reduced relative clause structure for Mandarin gapless relative clauses.

To begin with, I argue that the subject of a gapless relative clause can be optionally marked with a genitive marker *de*. This *de* marker is actually multifunctional. Besides its function as the relative clause marker as introduced in the very beginning of this paper, *de* can be used after a noun phrase, an adjective stem, or a preposition phrase to turn the phrase into a modifier phrase (Paul 2007). When it is used after an NP, one of its functions is to mark the NP as the possessor, i.e. a genitive marker. Sometimes, when *de* is used for the genitive marker, this *de* is optional, especially when it is at the beginning of a DP with some modifiers or determiners in between as shown in the following examples.

(21) a. wo zhe-ben shu
I this-CL book
'this book of mine'

b. wo de zhe-ben shu
I DE this-CL book
'this book of mine'

(22) a. wo meili-de jiaxiang
I beautiful-DE hometown
'my beautiful hometown'

b. wo de meili-de jiaxiang
I DE beautiful-DE hometown
'my beautiful hometown'

This genitive marker *de* can indeed intervene between the subject and the predicate of the gapless relative clause, but not of the regular relative clause[3]. Consider the constrast between (23) and (24). Genitive case marking of the subject of an relative clause suggests that the relative clause is a reduced relative clause (Krause 2001, Miyagawa 2008).

(23) Langlang de tan gangqin de shengyin.
Langlang DE play piano DE sound.
'The sound of Langlang's playing the piano.' Gapless RC

(24) * Langlang de tan guo de quzi.
Langlang DE play EXP DE song.
Intended: 'The song that Langlang has played.' Regular RC

[3]I find gapless relative clauses with genitive subjects to be OK, or a bit more awkward in comparison with the not marked counterpart, although some other native speakers may disagree. A simple google search did render some examples with the genitive marked subject.

Second, I argue that the predicate in a gapless relative clause is a nominalized *v*P. Because Mandarin verbs do not have a separate form for the infinitive or the gerund, on the surface, a nominalized *vP* would look exactly the same as a verb without any aspectual markers. As shown in (25), *tan gangqin* 'play piano' has the same form whether it functions as the main verb, a verbal complement or a nominalized subject of a sentence.

(25) a. wo jingchang tan gangqin
I often play piano.
'I often play piano.'

b. wo xiang tan gangqin
I want play piano.
'I want to play piano.'

c. tan gangqin shi hen meimiao de shi.
play piano be very fabulous DE thing.
'Playing piano is a fabulous thing.'

Therefore, given that verbs in a gapless relative clause cannot have aspectual markers, it is possible that syntactically the predicate is actually a nominalized *v*P instead, without an AspP layer for hosting the aspectual markers. In other words, a gapless relative clause is not a full relative clause, but a reduced one with only *v*P-level material. One piece of evidence is that, contra Zhang (2008), a relation noun such as 'sound' only requires a verb phrase, not necessarily a full gapless relative clause.

(26) Wo tingdao tan gangqin de shengyin.
I hear play piano DE sound.
'I heard the sound of piano playing.'

Notice that I explain the lack of aspectual markers as a result of a reduced syntactic structure, not as a semantic constraint as proposed by Cheng & Sybesma (2005). Recall from §2, according to Cheng & Sybesma (2005), aspectual markers cannot show up in a gapless relative clause because a gapless relative clause must be semantically generic. In fact, as shown in (27), a gapless relative clause can be specific with a temporal adverbial such as *na tian* 'that day', i.e the gapless relative clause is modifying a specific sound from a piano-playing event on a specific day. This example shows that the lack of aspectual markers in a gapless relative clause is not so much due to semantic restrictions of genericity, but more to syntactic restrictions of not allowing aspectual markers.

(27) Langlang na tian tan gangqin de shengyin hen bang.
Langlang that day play piano DE sound very good.
'The sound of Langlang's playing the piano that day was very good.'

To summarize, I have shown that the subject of a gapless relative clause can be additionally marked by the genitive marker *de* and that the predicate of a reduced relative clause may be better analyzed as a nominalized *v*P. Based on these two properties, I suggest that a Mandarin gapless relative clause can be analyzed similarly to gapless relative clauses in Japanese and other Altaic languages (Krause 2001, Miyagawa 2008).

4 Analysis

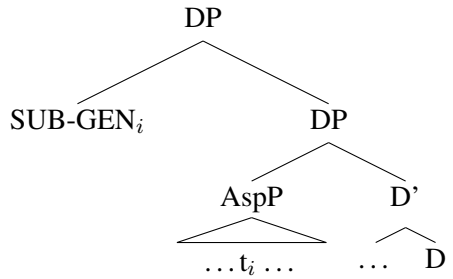
4.1 Previous Analysis of Reduced Relative Clauses

In previous studies, relative clauses with genitive subjects have been shown to be reduced in structure (Krause 2001, Miyagawa 2008). In other words, a relative clause which is reduced in structure does not have a full CP, but has smaller structures such as AspP or *v*P. For example, according to Miyagawa (2008), when a Japanese relative clause has a subject with the genitive marker *no*, there is some evidence to show that the relative clause is reduced in structure with only an aspectual phrase layer, but not a full CP.

According to Krause (2001), reduced relatives are typically nominalized, i.e. the predicate verb usually exhibits nominal properties. This nominalization is achieved by a null D (or N) head (Krause 2001: 87).

Because a reduced relative clause lacks a TP or CP structure, the subject cannot be assigned a nominative case. It can only get a structural genitive case by raising to Spec,DP (Miyagawa 2008). This explains why a genitive subject in a relative clause can indicate a reduced structure.

(28)



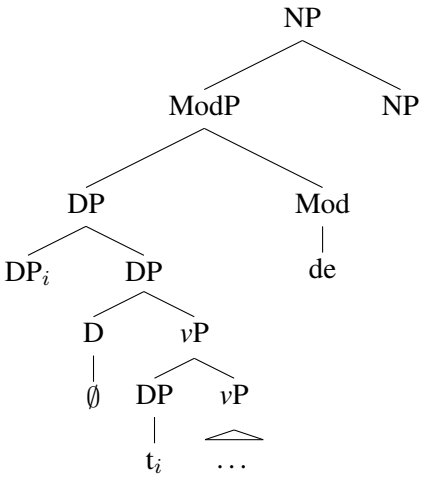
(modified from Miyagawa 2008: 9)

Crosslinguistically, a reduced relative clause may have different levels of structures, at least a *v*P and usually up to an AspP (Krause 2001: 83). Since Mandarin gapless relative clauses lack aspectual markers, an AspP layer is not present in a Mandarin gapless relative clause and so only a *v*P layer is present.

4.2 Proposal

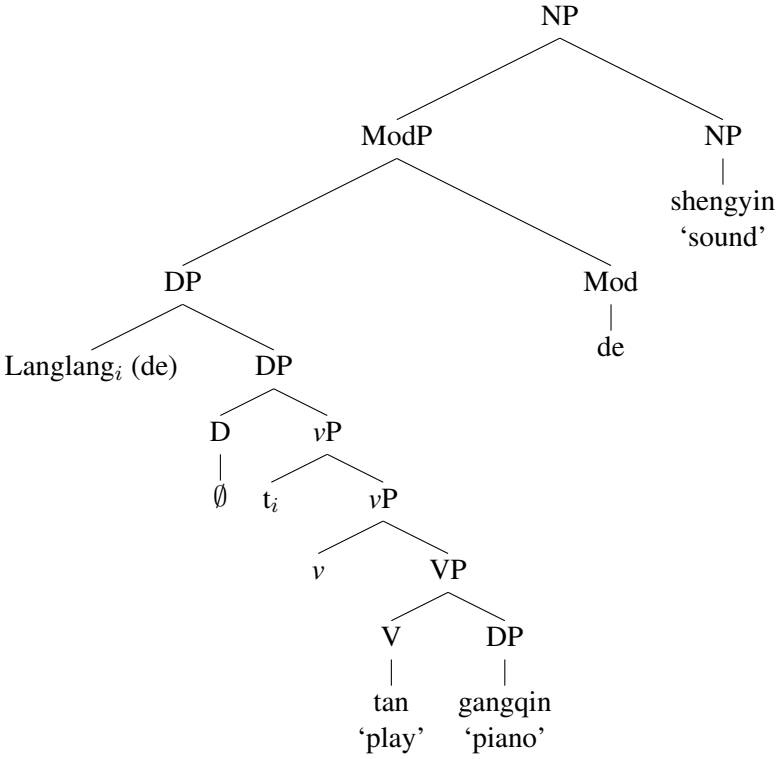
Adopting Miyagawa (2008)'s analysis, I propose that Mandarin gapless relative clauses have a reduced structure of a *v*P. The *v*P is nominalized by a null D head, and the subject receives a genitive case by moving to Spec,DP. While there are some ongoing debates about how to analyze the *de* marker for the relative clause (Simpson 2002, Del Gobbo 2003, Den Dikken & Singhapreecha 2004, Ou 2007), I choose to analyze the *de* marker between the relative clause and the head noun as a modifier phrase head, since the reduced relative clause is nominalized as a DP and a modifier head merges with a DP. The relational noun can select for a gapless relative clause, a nominalized VP, or a DP modifier phrase.

(29) General Structure for Mandarin Reduced Relative Clause



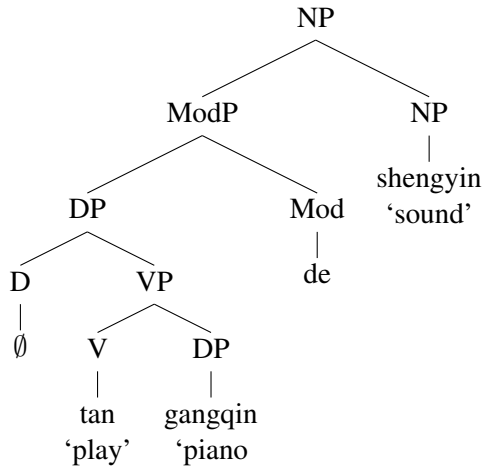
First, I argue that the subject of a gapless relative clause receives a genitive case, whether the subject is overtly marked with *de* or not. As discussed in §3, the *de* marker for possessor can sometimes be omitted in a nominal possession construction. Consequently, even if the subject DP is not marked with *de* overtly always, as long as it is marked with the genitive case sometimes, it can be argued to have a genitive case. Consider the following example 'the sound of Langlang's playing the piano'. The subject 'Langlang' moves out from the *v*P into the Spec,DP position and receives a genitive case. This is why sometimes *de* can appear after subject in a gapless relative clause construction.

(30) The sound of Langlang's playing the piano

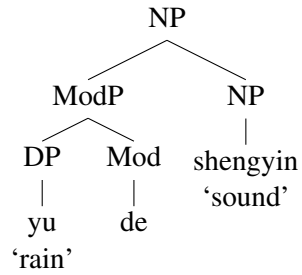


Second, I analyze the *de* marker of the relative clause as a modifier head. Such an analysis has the advantage of having a unified account for VP and DP modification of a relation noun 'sound'. For example, as shown in (31), when the relational noun 'sound' selects for a VP modification, the VP is nominalized by the D head and then merges with the modifier head *de* to form a modifier phrase. In the case of DP modification, as shown in (32), the modifier head merges directly with a DP to form a modifier phrase. In all of the three cases, a gapless relative clause, a VP modification, a DP modification, the modifier head merges with a DP, whether it is a nominalized DP or an inherent DP.

(31) The sound of piano playing

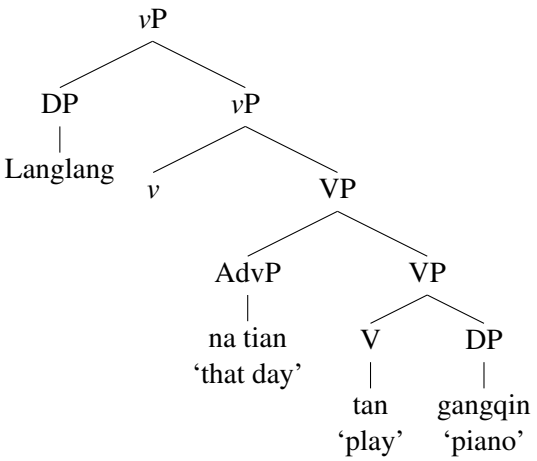


(32) The sound of the rain



Furthermore, I have analyzed a Mandarin gapless relative clause as only having a *v*P structure. This immediately predicts that aspectual markers are infelicitous in a gapless relative clause because there is no AspP structure to host the aspectual markers, without wrongly predicting that gapless relative clauses must be generic. Because a gapless relative clause in Mandarin does allow a temporal adverb such as *na tian* 'that day', which makes the gapless relative clause specific. As shown in the following example, an AdvP in Mandarin can attach to a VP (Ernst 1994).

(33) Langlang playing the piano that day



Now I will explain how my new analysis may reconcile some conflicting cases from Zhang (2008)'s and Tsai (2008)'s papers.

First, recall the following two examples from §2. Zhang (2008) claims that the gapless relative clause is not optional, but Tsai (2008) offers a counterexample showing that the gapless relative clause can be omitted at times. I share the judgments in both cases, but I think Tsai (2008)'s example is a special case, because the sound is semantically not referential, and so probably what sort of sound it is can be left unspecified in this case. Of course, to really explain why there is such a difference, one needs to examine the syntax and semantics of relational nouns in Chinese, which is beyond the scope of this paper.

(34) * Ta bu xihuan weidao.
he not like smell.

(Zhang 2008)

(35) Zhangsan mei tingdao (Lisi tan gangqin de) shengyin
Zhangsan not hear (Lisi play piano DE) sound
'Zhangsan does not hear the sound of Lisi's playing piano.

(Tsai 2008: 111)

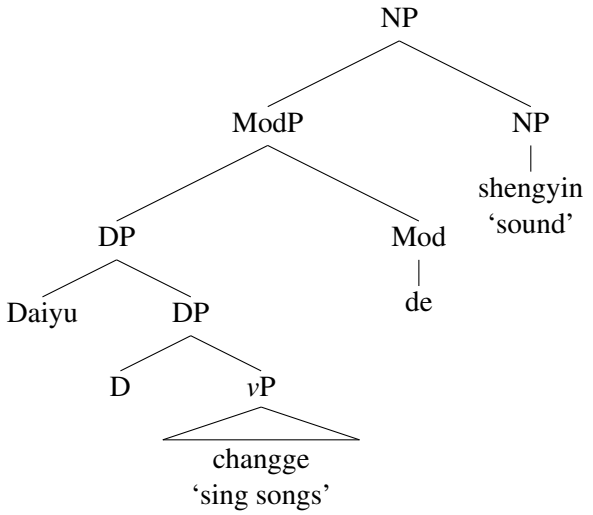
Crucially, I observe that what is not optional is only the nominalized VP part, not the gapless relative clause. (17) differs minimally from (14) by having VP+*de* modifying *weidao* 'taste'. This follows nicely from my new analysis that a relational noun can either select for a gapless relative clause with a nominalized *v*P or a nominalized VP.

(36) Ta bu xihuan chao cai de weidao.
he not like fry vegetable DE smell.
'He doesn't like the smell of frying vegetable.'

Second, Zhang (2008) argues that stacking is not possible for a gapless relative clause. Tsai (2008) does not offer any solid counterexample against this argument. My new analysis predicts that Zhang (2008)'s observation is correct, as shown in (38). *Shengyin* 'sound' has already selected for a nominalized *v*P and it cannot select for another nominalized *v*P.

(37) * Baoyu tan gangqin de Daiyu chang ge de shengyin
Baoyu play piano DE Daiyu sing song DE sound

(38)



Thirdly, my new analysis would predict that a gapless relative clause and a regular relative clause cannot be coordinated, given their different syntactic structures. The following example repeated from §2 is predicted to be ungrammatical, but is actually judged to be grammatical. I do not have a very good explanation for this sentence, but I think the use of the word 'simultaneous' suggests that there is an NP ellipsis in the first conjunct, because semantically speaking one can smell two things simultaneously, but not smell one thing simultaneously. Furthermore, the connective 'gen' is a connective for DP, but not for NP or CP.

(39) Zhangsan tongshi wendao [mama chao cai de] gen [ta zui huainian de] weidao
Zhangsan simultaneously smell [Mom fry vegetable DE] and [he most miss DE] weidao
'Zhangsan simultaneously smells the smell of Mom's frying vegetables and what he misses.'

(Tsai 2008: 112)

4.3 Semantic Motivation

Analyzing a gapless relative clause as a reduced relative with nominalized *v*P is semantically well motivated as well. Because a relational noun 'sound' is associated with events, not times. Since the semantics of *v*P is $\lambda e.P(e)$, a set of events, whereas the semantics of AspP is $\lambda i.P(i)$, a set of times, it is not surprising that only the *v*P layer but not the AspP layer is present for the gapless relative clauses of relational nouns.

The relational noun either selects for a set of events, which gives rise to the generic reading, or selects for a specific event, which gives rise to the specific reading.

(40) a. [[sound]]=$\lambda P_{<v,t>}\lambda x.sound(x) \wedge R(x,P)$

b. [[sound]]=$\lambda e \lambda x.sound(x) \wedge R(x, e)$

My semantic analysis is different from Cheng & Sybesma (2005)'s in that *de* does not function as a λ-abstraction operator, so that an aspectual operator is infelicitous not because the event variable cannot be bound by this aspectual operator. In my analysis, an aspectual marker is not allowed simply because it is not the right semantic type that the relational nouns look for, because aspectual phrases denote sets of times. Therefore, my analysis also offers a more straight forward semantic explanation for the lack of aspectual markers in Mandarin gapless relative clauses.

5 Conclusion

In this paper, I have proposed a new analysis for Mandarin gapless relative clauses as reduced relative clauses. In support of this new analysis, I have introduced three pieces of new data: that the subject can be marked by the genitive marker *de*, that a relational noun does not necessarily need to select for a gapless relative clause, but a nominalized VP is enough, and that the gapless relative clause can be specific without aspectual markers.

By analyzing Mandarin gapless relative clauses as reduced relative clauses, I have situated my analysis along the line of works of reduced relatives in Japanese and other Altaic languages by Krause (2001) and Miyagawa (2008). Thus my paper offers some interesting crosslinguistic perspectives on reduced relatives from Mandarin gapless relative clauses. Moreover, I also offer tentatively the semantic motivation for the *v*P level layer structure for gapless relative clauses of relational nouns. This may predict that gapless relatives clauses for relational nouns in other languages may also only consist of *v*P layer material.

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