



Humanwissenschaftliche Fakultät

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Proceedings of the Semantics of African, Asian and Austronesian Languages (TripleA) 2

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Universität Potsdam

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The status of degrees in Warlpiri

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I Introduction¹

Recent work in semantics has shown that languages can vary in whether or not they include degrees (that is, elements of type $\langle d \rangle$) in their semantic ontology. Several authors have argued that their languages of study lack degrees, including Bochnak (2013) for Washo (isolate, USA), Pearson (2009) for Fijian (Austronesian, Fiji), and Beck, et al. (2009) for Motu (Austronesian, Papua New Guinea). In this paper, I follow the tests proposed in Beck, et al. (2009) to assess the status of degrees in Warlpiri (Pama-Nyungan, Australia).

I use Warlpiri data collected following the Beck, et al. survey to argue that Warlpiri gradable predicates do not combine with a degree argument. (Like many other Australian languages, adjectival concepts like *big* and *small* are expressed using nouns in Warlpiri (Dixon 1982, Bittner & Hale 1995, among others). I refer to these lexical items as “gradable predicates” in this paper.) This paper represents a first pass at assessing the status of degrees in an Australian language, which have otherwise been unexamined from the point of view of degree semantics.

II Treatments of gradable adjectives with and without degrees

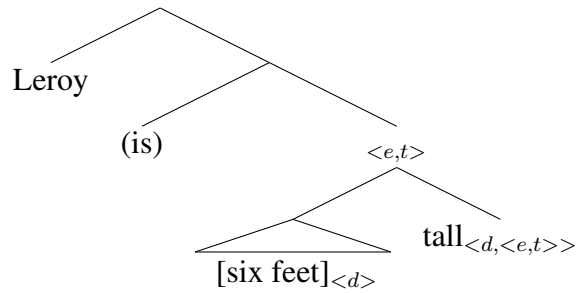
Degree semantics is concerned with data such as measure phrases, comparatives, and gradable predicates more generally. Degree arguments are employed to specify degrees along a lexically supplied scale. In an utterance like *John is taller than Mary*, the scale is one of tallness; in an utterance like *The cat is bigger than the dog*, the scale is one of bigness, and so on (Bartsch & Vennemann 1972, Cresswell 1976, Heim 2001, among others).

Treatments of adjectives under degree semantics propose that gradable adjectives like *big*, *tall*, and so on combine with a degree argument at some point in the derivation, as in the denotation in (1). This degree argument can be overt, as in (2):

$$(1) \quad \llbracket \text{tall} \rrbracket = \lambda d \lambda x. \text{tall}(x,d)$$

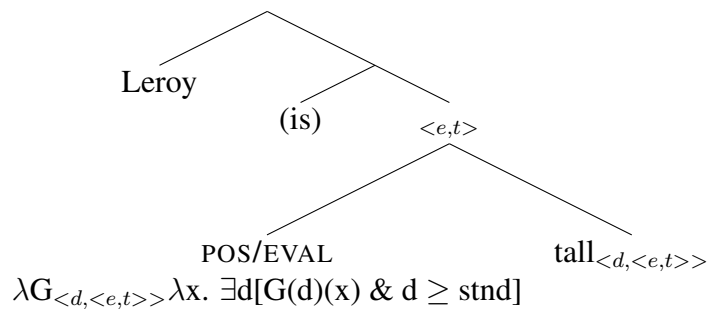
¹ Warlpiri (Pama-Nyungan) is spoken by approximately 3,000 people in the Northern Territory of Australia (Lewis, et al. 2016). The Warlpiri data in this paper comes from my fieldwork in Yuendumu, NT, and from a 2000 draft of the Warlpiri Dictionary Project (compiled by Ken Hale, David Nash, Mary Laughren, and many others). I would like to thank Jessica Rett for her advice and my Warlpiri consultants for teaching me about their language. I would also like to thank the audiences at AAA2, the Stanford Fieldwork Group, and the 2015 Australian Languages Workshop for their comments. This research was supported in part by NSF GRFP grant number DGE-1144087 and a UCLA Ladefoged Scholarship. All mistakes are my own.

(2) Leroy is six feet tall.



Alternately, the degree argument that the adjective combines with can be covert, as in a positive (i.e., unmarked) utterance like *Leroy is tall*. This covert morpheme is motivated by the observation that in such a positive utterance, the individual that the gradable adjective combines with must “stand out” in some way with respect to the relevant property. That is, given an utterance like *Leroy is tall*, Leroy’s height must be such that he “stands out” as tall in the context (Cresswell 1976, Kennedy 1999, among others). This morpheme therefore functions conceptually to ensure that the value of *tall* meets or exceeds some contextually determined standard of tallness. Proposals for this covert morpheme include Kennedy (1999)’s POS and Rett (2008)’s EVAL, among others; however, I would like to remain agnostic as to the precise denotation of this morpheme, since this issue is outside the scope of this paper:

(3) Leroy is tall.

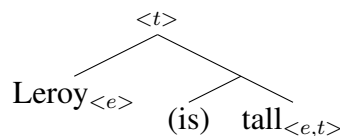


If the semantic ontology of a language lacks degrees, gradable adjectives in that language cannot combine with degree arguments of type $\langle d \rangle$, as in (2). Furthermore, gradable adjectives that occur in positive utterances, as in (3), cannot combine with a covert degree morpheme to ensure that their degree meets or exceeds some contextual standard.

Assuming a semantic ontology without degrees, the interpretations of gradable adjectives in positive utterances like (3) are typically proposed to arise contextually, following e.g. Klein (1980)’s proposal for English positive gradable adjectives (as in Beck, et al. 2009, Bochnak 2013, among others). This occurs without the addition of any covert degree morphology. In (5) below, the meaning of *tall* is interpreted relative to the context c :

(4) $\llbracket \text{tall} \rrbracket^c = \lambda x. \text{tall}(x)$

(5) Leroy is tall.



I follow other authors in proposing a treatment of Warlpiri gradable predicates in the spirit of Klein (1980). Klein proposes that gradable adjectives are of type $\langle e, t \rangle$ and denote partial functions from entities in the universe of discourse to $\{0,1\}$. A central part of Klein’s proposal

involves the concept of an extension gap. That is, a gradable adjective like *tall* partitions its domain into three sets: the set of individuals that are definitely tall (its positive extension), the set of individuals that are definitely not tall (its negative extension), and the set of individuals that can't be categorized into either its positive or its negative extensions. Klein refers to this latter set as constituting the extension gap. More formally, given a gradable adjective G :

- (6) Positive extension of G : $\{x: \llbracket G(x) \rrbracket = 1\}$
- (7) Negative extension of G : $\{x: \llbracket G(x) \rrbracket = 0\}$
- (8) Extension gap of G : $\{x: \llbracket G(x) \rrbracket \text{ is undefined}\}$

Furthermore, this partial function is relativized to the context of utterance. That is, every context determines a comparison class of objects that supplies the domain of the adjective. Given any context c and comparison class $C(c)$:

- (9) $\llbracket \text{tall}(\text{Leroy}) \rrbracket^c = 1$ iff $\text{Leroy} \in \{x: x \text{ is definitely tall in } c\}$
- (10) $\llbracket \text{tall}(\text{Leroy}) \rrbracket^c = 0$ iff $\text{Leroy} \in \{x: x \text{ is definitely not tall in } c\}$
- (11) $\llbracket \text{tall}(\text{Leroy}) \rrbracket^c$ is undefined otherwise

Manipulating the set of individuals within the comparison class can affect whether an individual x does or does not qualify as “definitely tall.” For instance:

- (12) Leroy is tall.
 - a. $C(c_1) = \{x: x \text{ is an elementary school student}\}$
 $\llbracket \text{tall}(\text{Leroy}) \rrbracket^{c_1} = 1$
 - b. $C(c_2) = \{x: x \text{ is a professional basketball player}\}$
 $\llbracket \text{tall}(\text{Leroy}) \rrbracket^{c_2} = 0$

I propose that Warlpiri utterances take the form of (5), with the truth conditions for (5) given in (9). As discussed by Beck, et al. (2009), this lack of a degree argument makes predictions about the availability and unavailability of certain utterances, which I will discuss in the following section. As I will show, Warlpiri speakers manipulate comparison classes, as discussed in (12), to express some utterances that are often expressed using degree modifiers in languages with degrees.

III Warlpiri data

The contact language used in my elicitations was English. However, as I will show, Warlpiri lacks many degree constructions that exist in English. I will therefore provide both the target utterance given in English (‘Nyirrpi is smaller than Yuendumu’) and a literal gloss of the response given in Warlpiri (e.g. ‘Nyirrpi is small, Yuendumu is big’). See section V for a discussion of my fieldwork methodology.

III.I Measure phrases and measure expressions

Warlpiri does not have measure phrases, as in *John is 6 feet tall*. This unavailability of measure phrases is predicted if there is no place for a degree argument in the syntax, as shown in the tree in (5) above.

When prompted with an English sentence containing a measure phrase, Warlpiri speakers often omit the measure phrase and provide an utterance simply containing the unmarked form of the gradable predicate. The choice of predicate is based on context:

- (13) *Context:* We are discussing the height of the speaker’s son, who is in the third grade.

Ngaju-nyangu kaji-nyanu wita.
 1SG-POSS son-POSS small.
 Prompt: ‘My son is 3 feet tall.’
 Literally: ‘My son is short.’²

Alternately, speakers can code-switch to English to express the measure phrase. The same context is maintained as above; note that in (14), the speaker switches to describing their son as *kirrirdimpayi* ‘tall’:

- (14) *Ngaju-nyangu kaji-nyanu kirrirdimpayi, 5 feet tall.*
 1SG-POSS son-POSS tall, 5 feet tall
 Prompt: ‘My son is 5 feet tall.’
 Literally: ‘My son is tall, 5 feet tall.’

These instances of code-switching almost always place the English measure phrase clause-finally, and precede it with a distinct intonational break. This peripheral placement and atypical prosody suggests to me that the English measure phrase is not in fact occupying a degree slot in the Warlpiri semantics, and therefore is not problematic for a degree-free treatment of Warlpiri. However, I will return to this data point later in the paper.³

III.II Comparatives

Warlpiri speakers can express comparatives using implicit comparison constructions (ICs), as described by Kennedy (2009). That is, comparison in Warlpiri is not achieved through specialized comparative morphology used to express ordering relations (e.g. English *-er*). Instead, speakers use the inherent context sensitivity of the positive, unmarked form of gradable predicates to indicate comparison.

Warlpiri ICs can take two different forms. In one form, the speaker asserts that a predicate like *small* holds of one individual, and that an antonymic predicate like *big* holds of another individual:

- (15) *Nyirрпи=ji nguru yukanti. Yurntumu=ju wiri-jarlu.*
 Nyirрпи=TOP country small Yuendumu=TOP big-AUG
 Prompt: ‘Nyirрпи is smaller than Yuendumu.’
 Literally: ‘Nyirрпи is small. Yuendumu is big.’
- (16) *Japanangka-rlu ka marda-rni wirrkardu marlu=ju. Jangala-rlu ngula=ju*
 Japanangka-ERG AUX have-NPST few kangaroo=TOP Jangala-ERG that=TOP
ka marda-rni panu.
 AUX have-NPST many
 Prompt: ‘Japanangka has fewer kangaroos than Jangala.’
 Literally ‘Japanangka has few kangaroos. That Jangala has many.’

²Abbreviations used in this paper include 1 ‘first person,’ 2 ‘second person,’ 3 ‘third person,’ ALL ‘allative,’ AUX ‘auxiliary,’ DAT ‘dative,’ DIM ‘diminutive,’ DIREC ‘directional,’ DU ‘dual,’ ELAT ‘elative,’ ERG ‘ergative,’ EXCL ‘exclusive,’ FUT ‘future,’ INCL ‘inclusive,’ INTENSE ‘intensifier,’ INTERR ‘interrogative,’ LOC ‘locative,’ NEG ‘negation,’ NPST ‘nonpast,’ NSUBJ ‘nonsubject,’ PL ‘plural,’ PST ‘past,’ SG ‘singular,’ and SUBJ ‘subject.’

³I thank Jessica Rett for observing this possible issue.

In another form, the speaker states that a predicate is true of one item, and false of another:

- (17) *Napaljarri=ji kirrirdimpayi, Nakamarra lawa.*
Napaljarri=TOP tall Nakamarra no
Prompt: ‘Napaljarri is taller than Nakamarra.’
Literally: ‘Napaljarri is tall, Nakamarra is not.’
- (18) *Jupurrurla-rlu ka marda-rni yakajirri panu. Jangala lawa.*
Jupurrurla-ERG AUX have-NPST bush.raisin many Jangala no
Prompt: ‘Jupurrurla has more bush raisins than Jangala.’
Literally: ‘Jupurrurla has many bush raisins. Jangala does not.’

ICs are the primary comparative strategy in several other languages that are also argued to lack degrees, including Washo (Bochnak 2013) and Motu (Beck, et al. 2009). Stassen (1985) counts 20 languages in his typological survey that utilize this comparative strategy as their primary means of comparison, including the Australian languages Gumbaynggirr and Mangarayi (Stassen 1985: 183-185).

Finally, Warlpiri speakers can also use the dative case marker to express comparison, a construction that I return to in section IV:⁴

- (19) *Napaljarri=ji ngula=ju kirrirdi=jiki, Nakamarra-ku=ju.*
Napaljarri=TOP that=TOP tall=JUKU Nakamarra-DAT=TOP
Prompt: ‘Napaljarri is taller than Nakamarra.’
Literally: ‘That Napaljarri is tall for/to Nakamarra.’

III.III Differential comparative constructions

In differential comparative constructions, the degree of difference between the compared items is explicitly specified, as in *John is one year older than Mary*. These constructions are unavailable in Warlpiri. Instead, speakers omit the degree phrase and use either an IC or some other periphrastic utterance:

- (20) *Japangardi=ji ka nyina kamparru-warnu Jakamarra-ku=ju.*
Japangardi=TOP AUX be before-LOC Jakamarra-DAT=TOP
Prompt: ‘Japangardi is three years older than Jakamarra.’
Literally: ‘Japangardi is before Jakamarra.’⁵

III.IV Comparison with measure phrases

Warlpiri does not have standardized constructions to express comparison with measure phrases, as in *John is older than five years*. Instead, speakers omit the measure phrase and give the unmarked form of the predicate, as appropriate for the context:

- (21) *Jakamarra=ju ngula=ju kirrirdimpayi.*
Jakamarra=TOP that=TOP tall
Prompt: ‘Jakamarra is taller than one meter.’
Literally: ‘That Jakamarra is tall.’

⁴The data in (19) does not involve morphology that uniquely makes reference to degrees (like the English comparative suffix *-er*). That is, the Warlpiri dative case marker *-ku* is a fully productive, canonical dative case suffix that also occurs in other constructions.

⁵Like English *before*, the Warlpiri lexical item *kamparru* ‘before’ has a spatial usage as well as a temporal usage.

- (22) *Nangala-rlu ka panu marda-rni maliki.*
 Nangala-ERG AUX many have-NPST dog
 Prompt: ‘Nangala has more than five dogs.’
 Literally: ‘Nangala has many dogs.’

III.V Subcomparative constructions

Warlpiri does not have subcomparative constructions like the English utterance *The drawer is wider than it is long*. My consultants reacted very negatively to attempts to elicit these constructions; one consultant commented explicitly that you could only compare two individuals, not the properties of one individual:

- (23) *Kurdiji=ji kirrirdi-karrikarri, manu wantiki.*
 shield=TOP tall-somewhat and wide
 Prompt: ‘The shield is longer than it is wide.’
 Literally: ‘The shield is somewhat long, and wide.’

III.VI Superlatives

Warlpiri has no dedicated superlative morphology or construction used to express superlatives like *John is the tallest child*. Instead, speakers make an assertion that is either unmarked, or combined with an intensifier like the nominal suffix *-nyayirni* (I discuss this intensifier in section IV.IV.I.I):

- (24) *Jangala=ju wirijarlu-nyayirni.*
 Jangala=TOP big-AUG
 Prompt: ‘Jangala is the biggest child.’
 Literally: ‘Jangala is very big.’
- (25) *Nakamarra-rlu ka marda-rni panu jarntu.*
 Nakamarra-ERG AUX have-NPST many dog
 Prompt: ‘Nakamarra has the most dogs.’
 Literally: ‘Nakamarra has many dogs.’

This observation is in accordance with typological work showing that there appear to be no languages with dedicated superlative morphology that lack comparative morphology (Bobaljik 2012, Stassen 1985). Given this typological observation, it would be unexpected if Warlpiri had superlative morphology despite its absence of dedicated comparative morphology.

III.VII Equatives

Warlpiri has no equative construction that targets particular scales of similarity like the English *John is as tall as Mary*. Instead, Warlpiri equatives can be expressed using the nominal suffix *-piya* ‘similar to’ (which I discuss in section IV.IV.I.III):

- (26) *Japaljarri=ji rdangkarlpa, Jakamarra-piya.*
 Japaljarri=TOP short Jakamarra-similar.to
 Prompt: ‘Japaljarri is as short as Jakamarra.’
 Literally: ‘Japaljarri is short, like Jakamarra.’

This suffix does not target the particular scale on which the compared individuals are similar (tallness, shortness, etc.). Instead, the nominal suffix *-piya* ‘similar to’ refers to a general similarity between the two individuals. This suffix frequently occurs in Warlpiri responses to prompts including English similatives, e.g. *The boy barked like a dog*.

Another strategy for expressing equatives in Warlpiri involves stating that the predicate holds of both individuals. This construction does not specify that both individuals instantiate the predicate to (at least) the same degree, as the English equative does. Instead, the speaker simply asserts that both individuals can be described with the same gradable predicate in the same context. The following utterance would be felicitous in a context in which Jungarrayi was running at 8 km/h and Japangardi was running at 10 km/h, as long as both individuals were running at a speed that could be considered *wakurturdu* ‘fast’:

- (27) *Wakurturdu ka=pala nyina-mi, Jungarrayi manu Japangardi.*
 fast AUX=3DU.SUBJ be-NPST Jungarrayi and Japangardi
 Prompt: ‘Jungarrayi is as fast as Japangardi.’
 Literally: ‘They (two) are fast, Jungarrayi and Japangardi.’

Like the lack of superlatives in III.VI, this lack of equatives is also in accordance with the typological observation that there appear to be no languages with dedicated equative morphology that lack comparative morphology (Bobaljik 2012, Stassen 1985).

III.VIII Degree questions

Warlpiri has no dedicated construction used to ask degree questions, as in *How tall is your son?* Speakers instead use polar questions or non-degree Wh-questions:

- (28) *Tarnnga-mayi=npa nyina-ja?*
 long.time-Q=2SG.SUBJ be-PST
 Prompt: ‘How long were you in Western Australia?’
 Literally: ‘Were you (there) a long time?’
- (29) *Nyiya-piya ka kaja-nyanu nyina-mi?*
 what-similar.to AUX son-POSS be-NPST
 Prompt: ‘How old is your son?’
 Literally: ‘What is your son like?’

III.IX Summary of Warlpiri data evaluated with respect to Beck, et al. (2009)’s criteria

Beck, et al. (2009) survey degree constructions in 14 different languages across a range of language families. This survey provides a set of core data for comparison of the languages. In particular, Beck, et al. are interested in whether the language of study shares properties with the better-understood degree constructions in English. The following table summarizes how Warlpiri is evaluated relative to this questionnaire:

Degree construction	Available in Warlpiri?
Explicit comparatives	no
Differential comparatives	no
Comparison with degrees	no
Degree questions	no
Measure phrases	no
Subcomparatives	no
Explicit equatives	no
Superlatives	no

In order to account for the descriptive coverage of this survey, Beck, et al. (2009) propose a set of degree parameters that can be active or inactive in any given language. The settings of these parameters determine the availability of the degree constructions that they discuss. These parameters are as follows:

- (30) **Degree Semantics Parameter:**
A language {does/does not} have lexical items that introduce degree arguments (e.g. gradable predicates of type $\langle d, \langle e, t \rangle \rangle$)
- (31) **Degree Abstraction Parameter:** (previously discussed in Beck, Oda & Sugisaki 2004)
A language {does/does not} have lambda-binding of degree variables
- (32) **Degree Phrase Parameter:**
The degree argument position of a gradable predicate {may/may not} be overtly filled

Negative settings of these parameters preclude the availability of certain degree constructions. For instance, if a language has a negative setting of the DAP, then any constructions involving binding a degree variable (e.g. English-type comparatives, subcomparatives, measure phrases, and so on) should be unavailable in the language.

Furthermore, Beck, et al. note that there are certain entailment relationships between these parameters. For instance, if a language has a negative setting of the DSP, then it must also have a negative setting for the DAP and DPP. They describe only one language in their sample, Motu, as having negative settings of all three parameters. I propose that Warlpiri, like Motu, also has negative settings for all three of Beck, et al.'s degree parameters. That is, Warlpiri predicates that are glossed with gradable predicates in English in fact have degree-less denotations like in (4). This falls out from a negative setting of the DSP, which in turn leads to negative settings of the DAP and DPP.

IV Potentially problematic data

Warlpiri has several lexical items that appear as if they could be argued to invoke degrees, stemming in part from the fact that their English glosses include degree modifiers like *slightly* and *very*. In section IV.I, I will address each of these lexical items in turn, and show that an

understanding of them does not require degrees.

Warlpiri	English gloss
<i>-nyayirni</i>	‘real,’ ‘very,’ ‘prototypical’
<i>-piya</i>	‘similar to’
<i>-karrikarri</i>	‘a little bit,’ ‘slightly,’ ‘somewhat’
<i>-katu</i>	‘only’(?) ⁶
<i>-ku</i>	‘DAT’

In section IV.II, I address a context in which it seems as if a degree-less analysis might be problematic, and similarly show that it is not.

IV.I Potentially problematic data: lexical items

I group my discussion of these lexical items thematically. First I discuss *-nyayirni* and *-karrikarri*, which each take a single individual argument and manipulate the truth value of the predicate applied to this individual across contexts. Then I discuss *-piya* and *-ku*, which take two individual arguments and manipulate comparison class membership.

IV.IV.II *-nyayirni* ‘real,’ ‘very,’ ‘prototypical’

The nominal suffix *-nyayirni* supplies an intensificational reading of the lexical item it combines with. Its English glosses are lexical items that have been proposed to modify degrees, e.g. *very*. This suffix can combine with Warlpiri gradable predicates, as in (33)-(34), and also with more canonically nominal lexical items like (35)-(36). In the latter case, *-nyayirni* supplies a reading that the noun it combines with is “prototypical” or “canonical”:

- (33) *wiri-nyayirni* ‘very big’
- (34) *wita-nyayirni* ‘very small’
- (35) *ngapa-nyayirni* ‘fresh water’
- (36) *jarntu-nyayirni* ‘real dog’ (i.e, not a dingo)

Interestingly, *-nyayirni* patterns identically in its distribution and interpretation to the Washo suffix *-šemu*, described by Bochnak (2013).⁷ Following Bochnak (2013), I propose that the denotation of *-nyayirni* is as follows:

$$(37) \quad \llbracket -nyayirni \rrbracket^c = \lambda P \lambda x. \forall c [P(x) = 1 \text{ in } c]$$

That is, given a predicate P and an individual x , *-nyayirni* indicates that $P(x)$ is true in all contexts. This works in the following way:

- (38) *Jarntu wiri-nyayirni.*
dog big-INTENSE
‘The dog is very big.’

⁶I set aside a discussion of *-katu* for the moment, since I don’t have enough data on it.

⁷Beltrama & Bochnak (2015), in addition to discussing *-šemu*, also discuss a similar proposal for the Italian suffix *-issimo*. However, this includes an additional expressive component that is not relevant for the Warlpiri data.

For a Warlpiri speaker to felicitously assert (38), the size of the dog must be such that the dog could felicitously be described as ‘big’ in all contexts. This includes contexts in which the size of the dog is evaluated relative to a comparison class that includes extremely large dogs, for instance, mastiffs and great danes (similar to a proposal for English *very* by Wheeler (1972)). This leads to an intensified reading of ‘big.’

Assuming a denotation of *-nyayirni* as in (37), the ability of this suffix to combine with “canonical” referential nominals like *ngapa* ‘water’ suggests that all nominals in Warlpiri, not just gradable predicates, have a denotation similar to (4) and are evaluated relative to a contextually determined comparison class. That is:

$$(39) \quad \llbracket \text{water} \rrbracket^c = \lambda x. \text{water}(x)$$

$$(40) \quad \text{Nyampu} = \text{ju ngapa-nyayirni.}$$

this=TOP water-INTENSE
‘This is real water.’

$$(41) \quad \llbracket \text{water-nyayirni} \rrbracket^c = \lambda x. \forall c[\text{water}(x) = 1 \text{ in } c]$$

Interpreting (41) requires some cultural knowledge about the most important properties of water in Warlpiri country; among other things, this includes that it can be safely drunk. (40) asserts that in all contexts, the item being considered counts as water, i.e., it always instantiates the most important properties of water.

IV.IV.I.II *-karrikarri* ‘a little bit,’ ‘slightly,’ ‘somewhat’

The nominal suffix *-karrikarri* supplies an attenuative reading of the lexical item it combines with. That is, while *-nyayirni* marks something like category centrality, *-karrikarri* marks something like category marginality.⁸ This leads to an attenuative reading that my Warlpiri consultants often gloss with an English degree modifier like *slightly*. Like *-nyayirni*, *-karrikarri* can combine with gradable predicates, as in (42)-(43). This suffix can also combine with more canonically nominal lexical items, as in (44)-(45); however, my consultants noted that you would need to have particular contexts for these utterances to be felicitous:

$$(42) \quad \text{wita-karrikarri} \text{ ‘slightly small’}$$

$$(43) \quad \text{wiri-karrikarri} \text{ ‘slightly big’}$$

$$(44) \quad \text{?tija-karrikarri} \text{ ‘somewhat of a teacher’}$$

$$(45) \quad \text{?yuwarli-karrikarri} \text{ ‘somewhat of a house’}$$

I refer to Klein (1980)’s extension gaps to give a denotation of *-karrikarri*:

$$(46) \quad \llbracket \text{-karrikarri} \rrbracket^c = \lambda P \lambda x. P(x) \text{ is undefined in } c$$

The denotation in (46) states that the value of the predicate *P* applied to an individual falls within the extension gap of *P*. That is, $P(x)$ is neither true nor false in the context. For instance, in (47) below, the context makes stick A the most salient member of the comparison class for evaluating the length of stick B:

$$(47) \quad \text{Context: We are discussing the lengths of two sticks. One stick is slightly shorter than the other (stick A = 12cm long; stick B = 10cm long). The consultant is describing the length of stick B:}$$

⁸-*nyayirni* and *-karrikarri* cannot co-occur on the same lexical item.

Nyampu=ju wita-karrikarri.
 this=TOP small-DIM
 Consultant's gloss: "This one is a little bit small."

Given this comparison class, it would be infelicitous to describe stick B as *kirrirdi* 'long,' since it is markedly shorter than stick A. However, since there is only a relatively small difference in length between stick A and stick B, this consultant felt that it would also be inappropriate to describe stick B as *wita* 'small.' (That is, for this consultant, stick B $\notin \{x: x \text{ is definitely small in } c\}$.)⁹ Since the speaker does not judge stick B as falling into the extension of either things that are definitely small in *c* or things that are definitely not small in *c*, they use *-karrikarri* to assert that stick B is included within the extension gap of *wita* 'small' in this context.

IV.IV.I.III *-piya* 'similar to'

The nominal suffix *-piya* takes two individual arguments and one property argument. By using *-piya*, a Warlpiri speaker asserts that the predicate *P* is true of both individuals, and that both individuals are members of the same comparison class. That is: both individuals are members of the same set of entities against which the meaning of the gradable predicate is evaluated. While Klein (1980)'s comparison classes are picked out by context, I propose that in Warlpiri, functional morphemes, in addition to context, can alter the membership of the comparison class.

Given this assumption, I repeat an example from section III.VII:¹⁰

- (48) *Japaljarri=ji rdangkarlpa, Jakamarra-piya.*
 Japaljarri=TOP short Jakamarra-similar.to
 Prompt: 'Japaljarri is as short as Jakamarra.'
 Literally: 'Japaljarri is short, like Jakamarra.'

I assume the following denotation for *-piya*. I use the notation $C(c)$ to refer to the comparison class picked out in a given context *c*:

- (49) $\llbracket -piya \rrbracket^c = \lambda y \lambda P \lambda x. P(y) \ \& \ P(x) \ \& \ x, y \in C(c) \ \& \ x \neq y$

Given a denotation for *-piya* as in (49), the truth conditions for (48) are as follows:

- (50) $\llbracket Japaljarri \ rdangkarlpa \ Jakamarra-piya \rrbracket^c$
 $= 1 \text{ iff } \text{short}(Japaljarri) \ \& \ \text{short}(Jakamarra) \ \& \ Japaljarri, Jakamarra \in C(c)$
 $\ \& \ Japaljarri \neq Jakamarra$

If Japaljarri and Jakamarra can both be felicitously described as *rdangkarlpa* 'short' in the same context, then it follows that the two individuals have similar heights.¹¹ That is, the heights of each individual are such that they both fall within the extension of "definitely short" in the context. This expresses a similar meaning to the English equative prompt in (48).

⁹Other consultants found it felicitous to simply describe stick B as *wita* 'small' in this context, without any modification by *-karrikarri*. These speakers evaluated the length of stick B to be such that it fell within the extension of $\{x: x \text{ is definitely small in } c\}$. Since this category boundary is somewhat fuzzy, I don't find it problematic that speaker judgments involving this boundary are subject to variation. I discuss crisp judgment contexts like (47) further in section IV.II.

¹⁰I ignore the topicalization clitic *=ji/=ju* in the truth conditions for (50) and (53). I have no reason to believe that its presence or absence affects the truth conditions for either of these utterances. The exact contribution of this clitic is still not well understood.

¹¹Klein (1980: 14) discusses how, given a gradable predicate *G*, $G(x)$ is considered undefined if *x* greatly

IV.IV.I.IV *-ku* ‘DAT’

The nominal suffix *-ku* takes two individual arguments and one property argument. Like *-piya*, *-ku* also manipulates comparison class membership. By using *-ku*, a Warlpiri speaker asserts that the predicate *P* is true of one of the individuals, and that the comparison class contains only the two individuals. This follows the spirit of Pearson’s (2009) proposal for the Fijian directional particle *mai*.¹² I repeat (19) from section III.II:

- (51) *Napaljarri=ji ngula=ju kirrirdi=jiki, Nakamarra-ku=ju.*
 Napaljarri=TOP that=TOP tall=JUKU Nakamarra-DAT=TOP
 Prompt: ‘Napaljarri is taller than Nakamarra.’
 Literally: ‘That Napaljarri is tall for/to Nakamarra.’

As described above, I propose the following denotation for *-ku*:

- (52) $[-ku]^c = \lambda y \lambda P \lambda x. P(x) = 1 \ \& \ C(c) = \{x, y\} \ \& \ x \neq y \ \& \ \neg \exists z: z \in C(c)$

Given the denotation in (52), I give truth conditions in (53) for a simplified version of the utterance in (51) (I omit topicalization morphemes, a demonstrative, and the enclitic *=jiki/=juku*, which I discuss briefly in section VI):

- (53) $[[\textit{Napaljarri kirrirdi Nakamarra-ku}]^c]$
 $= 1$ iff $\text{tall}(\textit{Napaljarri}) = 1 \ \& \ C(c) = \{\textit{Napaljarri}, \textit{Nakamarra}\}$
 $\ \& \ \textit{Napaljarri} \neq \textit{Nakamarra} \ \& \ \neg \exists z: z \in C(c)$

These truth conditions require that *Napaljarri* be considered “definitely tall.” Crucially, the set of entities against which the height of *Napaljarri* is evaluated contains only *Napaljarri* and *Nakamarra*. Assuming Klein’s comparison class proposal, the requirement in (53) that *Napaljarri* count as “definitely tall” similarly requires that the height of *Nakamarra* be such that, when the height of *Napaljarri* is considered with respect to tallness, *Napaljarri* can count as “definitely tall.” Since $C(c)$ contains only these two individuals, and *Nakamarra* is not described as “definitely tall,” this in turns leads to *Nakamarra*’s height being less than *Napaljarri*’s height.

IV.II Potentially problematic data: crisp judgment contexts

Kennedy (2009) observes that ICs, unlike explicit comparatives (ECs), should be infelicitous in what he terms “crisp judgment” contexts. These contexts involve comparison between two items that differ only very slightly on the relevant scale:

- (54) *Context:* Leroy is 6’3”, and Howard is 6’3½”.
- ✓ Howard is taller than Leroy. (IC)
 - # Howard is tall. Leroy is short. (EC)

exceeds the range of values typically associated with the positive or negative extension of *G*. That is, if *Japaljarri* is 5’0” and *Jakamarra* is only 2’0”, the theory predicts that uttering (48) should be infelicitous in this context. This is because the height of *Jakamarra* is so far beyond the typical positive extension of *rdangkarlpa* ‘short’ that *rdangkarlpa*(*Jakamarra*) is considered undefined. Future fieldwork will show if this prediction holds.

¹²Pearson’s (2009) proposal for *mai* differs in that she analyses it as presupposing that the domain of discourse includes only the two relevant individuals as well as any other individuals mentioned in *P*. However, this additional provision is motivated by data which I do not have for Warlpiri. This includes Fijian data on sentences like *Of Peter and Mary, John only likes Peter* (Pearson 2009: 360).

This problem arises since ICs like (54b), by Kennedy’s definition, involve positive (i.e., unmodified) uses of the relevant predicates. Positive uses of gradable predicates typically require that the individual “stand out” in some way with respect to the relevant property. Since the height of Howard (6’3½”) is judged as *tall* in (54), the height of Leroy (6’3”) should therefore be described as *tall* as well. This leads to the infelicity of (54b), which involves the assertion *Leroy is short*.

However, contrary to Kennedy (2009)’s prediction, Warlpiri ICs are felicitous in crisp judgment contexts:

- (55) *Context:* We are comparing the sizes of two bush oranges. The bush oranges are almost the same size.

Watakiyi nyampu=ju yukanti, nyampu=ju wirijarlu.

bush.orange this=TOP small this=TOP big

Prompt: ‘This bush orange is bigger than that one.’

Literally: ‘This bush orange is small, this one is big.’

In general, Warlpiri ICs are felicitous in contexts in which one predicate is true of both compared items:

- (56) *Context:* We are comparing the sizes of Melbourne and Sydney, which are both very big cities.

Melbourne=ju yukanti, Sydney=ji wirijarlu.

Melbourne=TOP small Sydney=TOP big

Prompt: ‘Melbourne is smaller than Sydney.’

Literally: ‘Melbourne is small, Sydney is big.’

- (57) *Context:* We are comparing the sizes of flies and ants, which are both small insects.

Yimangi=ji wirijarlu, nama=ju lawa.

fly=TOP big ant=TOP no

Prompt: ‘Flies are bigger than ants.’

Literally: ‘Flies are big, ants are not.’

I propose that the IC data in (55)-(57) is unproblematic, despite Kennedy’s observation. First, Kennedy’s account for why ICs should be infelicitous in crisp judgment contexts is predicated on the assumption that, in the language being studied, positive forms of adjectives combine with something along the lines of his POS morpheme, which causes the individual to “stand out” with respect to the relevant property (Kennedy 1999). Only if we assume the use of POS (or another covert morpheme with a similar function) does this issue arise. However, I propose that Warlpiri gradable predicates do not combine with a morpheme like POS; instead, manipulation of the comparison class can cause an individual to “stand out.” I note that this account follows Pearson’s (2009: 368-369) proposal for Fijian, which similarly permits ICs in crisp judgment contexts.¹³

In fact, the data in (55)-(57) can be accounted for with a comparison class approach. In (55), we construct the context such that the only two individuals in the comparison classes for *yukanti* ‘small’ and *wirijarlu* ‘big’ are the two bush oranges we are discussing. Given this

¹³Interestingly, ICs are infelicitous in crisp judgment contexts in Washo (Bochnak 2013). This suggests that there is variation in the comparative strategies between degree-less languages.

restricted context, the size of the smaller bush orange can be judged as “definitely small” and the use of the positive utterance is licensed. This parallels the following English example:

- (58) *Context:* Leroy and Howard are professional basketball players. Leroy is 6’3” and Howard is 6’4”. A coach is picking players for their team. The coach can utter:
- a. ✓ Leroy is short.

The utterance in (58a) is felicitous only given the context in (58). If the speaker were discussing the average height of all adult men across the world, (58a) would be infelicitous, since in that context, a height of 6’3” would not be considered *short*. Similarly, although Melbourne is not generally considered *yukanti* ‘small,’ it can be felicitously described as such when compared to Sydney, as in (56).

V A note on data collection

Linguists often face problems when trying to elicit constructions that do not exist in their field-work language. It can be challenging to assess whether the construction does not exist in the language, if it is available but uncommonly used, if the consultant is unfamiliar with the construction, or if the consultant simply does not understand the prompt and is therefore failing to produce the target utterance.

Fortunately, the target sentences proposed in Beck, et al. (2009), and degree constructions more generally, lend themselves well to using visual stimuli to elicit responses. The use of multiple modalities in elicitations (i.e., visual stimuli as well as verbal prompts given in the contact language) decreases the chance of misunderstandings between linguist and consultant. This technique also provides consultants with more cues to help them arrive at the target sentence. I elicited the data in this paper in part by using visual stimuli created using Pixton for Fun (pixton.com). Visual stimuli took the form of images like the following:



Napaljarri is taller than Nakamarra.
Nakamarra is shorter than Napaljarri.

Data was also elicited using objects collected in the field and brought to the elicitation session (e.g. bush oranges, sticks, leaves, and so on). This use of multiple modalities in elicitation, and “hands on” discussion of tangible objects, gives me a high degree of confidence in the data I have presented.

VI Conclusion

In this paper, I evaluated the status of degrees in Warlpiri using the questionnaire presented in Beck, et al. (2009). I concluded that it is possible to account for all of the Warlpiri data given in

section III, as well as the challenging data given in section IV, using a degree-free comparison class analysis in the spirit of Klein (1980). I therefore concluded that (according to the Beck, et al. diagnostics) Warlpiri gradable predicates do not combine with any degree morphology, and the language has negative settings for all three degree parameters given in Beck, et al. (2009).

I view the next step in a study of degree semantics in Warlpiri as investigating the behavior of degree achievement verbs like *walyka-jarrimi* ‘to cool’ (lit. ‘cool-become’), *munga-jarrimi* ‘to darken’ (lit. ‘night-become’), and so on. Several authors have proposed that degree achievement verbs, like gradable adjectives, also include degrees in their denotations. For instance, Kennedy & Levin (2008) treat degree achievement verbs as encoding measure of change functions derived from the measure functions of the corresponding gradable adjectives. That is, a verb like *cool* measures the difference in the degree of coolness of an individual *x* between the beginning and the end of an event. Given this theoretical proposal, it’s unclear what the semantics of degree achievement verbs should look like in a language like Warlpiri.

The inclusion of the inchoative *jarrimi* ‘to become’ in the morphologically complex degree achievement verbs *walyka-jarrimi* ‘to cool’ and *munga-jarrimi* ‘to darken’ suggests that an appropriate approach may be along the lines of Bochnak’s (2015) analysis of these verbs in Washo. Bochnak gives a semantics for (similarly morphologically complex) Washo degree achievement verbs using a degree-free BECOME operator adapted from Dowty (1979) and Abusch (1986). However, future fieldwork is necessary to see if Warlpiri patterns like Washo with respect to the degree achievement data.

Other Warlpiri data suggests that a comprehensive treatment of gradability may still present challenges. For instance, the (typically temporal) modifier =*jiki/juku* ‘still’ optionally surfaces in Warlpiri translations of degree construction prompts, as in (19). This suggests that Warlpiri speakers may optionally borrow some sort of scale from the verbal, into the nominal domain.¹⁴ Furthermore, Warlpiri permits temporal modifiers like English *in a day/for a day*, which seem analogous to measure phrases in the nominal modifier domain:

- (59) *Ya-nu=rnalu Darwin-kurra jinta-ku, ngula-jangka nguna-ja=rnalu.*
 go-PST=1PL.EXCL Darwin-ALL one-DAT that-from sleep-PST=1PL.EXCL
 ‘We drove towards Darwin for a day, and then we slept.’
- (60) *Yujuku=rnalu ngarnturnu wanta jinta-ngka.*
 humpy=1PL.EXCL build.PST sun one-LOC
 ‘We built the shelter in one day.’¹⁵

Today, Warlpiri speakers in Yuendumu learn English alongside Warlpiri. While Warlpiri is the main language spoken at home, lessons at school are taught largely in English and there are many native English speakers providing services in the community. It is possible that, as contact with English (a +DSP language) has increased, the semantics of Warlpiri is changing. This could account for the ability of some speakers to use code-switched English measure phrases, as in (14). Determining the availability of this construction relative to speaker age could shed light on whether this is a recent innovation that has arisen through increased contact with English.

¹⁴I note that a similar expression is possible in English, in which a non-temporal modifier use of *still* occurs in a comparative construction:

- (1) Mary is tall, but Susan is still taller.

My consultants sometimes use expressions like (1) to gloss their Warlpiri utterances.

¹⁵My Warlpiri consultants report that the only unit of time that can be used in these constructions is *parra* or *wanta* ‘day,’ since Warlpiri historically did not use any other unit to measure time. I have not yet done tests to check the telicity of the sentences in (59)-(60).

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The ‘Associative Reading’ of DPs and the Quantity *vs.* Quality Distinction

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This paper investigates an unnoticed difference in Mandarin between the Q-adjectives and the gradable adjectives of quality and shows that this observation follows straightforwardly from a theory that differentiates gradable predication of quantity and that of quality (e.g., Rett 2008; Lin 2014; Solt 2015; a.o.).

I. Mandarin Q-adjectives and the ‘Association’ Effect

I.I. The unnoticed reading and the *quantity vs. quality* distinction

The Mandarin Q-adjectives *dūo* ‘many/much’ and *shǎo* ‘few/little’ may appear in predicate position in various degree constructions (see (1))^{1, 2}; in all these examples, the Q-adjectives are predicates of the nominal phrases (indicated by the underlining) that refer to the students that Zhangsan taught and those that Lisi taught respectively.

- (1) a. Zhāngsān jiāo-gùo dè xúeshēng hěn dūo/shǎo (positive)
Zhangsan teach-EXP REL student very many/few
‘The students Zhangsan taught are many/few.’
- b. Zhāngsān jiāo-gùo dè xúeshēng bǐ Lìsì jiāo-gùo dè xúeshēng
Zhangsan teach-EXP REL student COMP Lisi teach-EXP REL student
dūo/shǎo (comparative)
many/few
‘The students Zhangsan taught are more/fewer than the students Lisi taught.’
- c. Zhāngsān jiāo-gùo dè xúeshēng hàn Lìsì jiāo-gùo dè xúeshēng
Zhangsan teach-EXP REL student and Lisi teach-EXP REL student
yīyàng dūo/shǎo (equative)
the-same many/few
‘The students Zhangsan taught are as many/few as the students that Lisi taught.’
- d. Zhāngsān jiāo-gùo dè xúeshēng zài dūo/shǎo (superlative)
Zhangsan taught-EXP REL student SUPL many/few
‘The students that Zhangsan taught are the most/fewest.’

Something that has gone unnoticed in the literature, however, is the fact that the predicative Q-adjectives may give rise to an ‘association effect’ on the nominal phrases they are predicates of: in the various degree constructions in (2), while on the surface it looks as if the Q-adjectives are predicates of the proper names *Zhāngsān* and *Lìsì*, these

¹ There is no morphological *many/few vs. much/little* distinction in Mandarin, and there is no obligatory plural marking (like English *-s*) in Mandarin, either.

² The abbreviations used in glosses are listed below:

COP: copular	CL: classifier	EXP: experiential marker
GEN: genitive case	MOD: modification marker	NOM: nominative case
PERF: perfective marker	POSS: possessive marker	REL: relativizer
SUPL: superlative	TOP: topic marker	

Q-adjectives, with the sentential adverbial *speaking of the students that one taught*, are in fact predicates of the students that Zhangsan taught and those that Lisi taught, as indicated by the bold-facing in the translation.

- (2) shuōdào jiāo-gùo dé xúeshēng,
speaking-of teach-EXP REL student
'speaking of the students that one taught'
- a. Zhāngsān hěn duō/shǎo (positive)
Zhangsan very many/few
'**The students that Zhangsan taught** are many/few.'
- b. Zhāngsān bǐ Lǐsì duō/shǎo (comparative)
Zhangsan COMP Lisi many/few
'**The students Zhangsan taught** are more/fewer than **the students Lisi taught**.'
- c. Zhāngsān hàn Lǐsì yīyàng duō/shǎo (equative)
Zhangsan and Lisi the-same many/few
'**The students Zhangsan taught** are as many/few as **the students Lisi taught**.'
- d. Zhāngsān zuì duō/shǎo (superlative)
Zhangsan SUPL many/few
'**The students that Zhangsan taught** are the most/fewest.'

Examples (3) and (4) show that it is possible in a comparative sentence for the association effect to target only the nominal after the comparative morpheme *bǐ* (i.e., the post-*bǐ* nominal)³; in these two examples, while the post-*bǐ* nominal appears to be simply the proper name *Lǐsì*, semantically the standards of comparison in (3) and (4) are the students that Lisi taught and the students of Lisi, respectively.

- (3) Zhāngsān jiāo-gùo dé xúeshēng bǐ Lǐsì duō/shǎo
Zhangsan teach-EXP REL student COMP Lisi many/few
'The students that Zhangsan taught are more/fewer than the students that Lisi taught.'
- (4) Zhāngsān-de xúeshēng bǐ Lǐsì duō/shǎo
Zhangsan-POSS student COMP Lisi many/few
'Zhangsan's students are more/fewer than Lisi's students.'

Examples (5)-(6) further show that it is possible for the association effect to target only the subject of the comparative; while the subject in these two examples appears to be

³ A Mandarin *bǐ*-comparative has the schema in (i), where GP is the gradable predicate and DIFF the differential phrase.

- (i) TARGET *bǐ* STANDARD GP (DIFF)

For simplicity we will treat *bǐ* as carrying the function of expressing the meaning of comparison, though this choice has no effect on the discussion below. For more discussion on this matter, see Lin (2009), Liu (2011) and the references cited therein.

the proper name *Zhāngsān*, semantically the targets of comparison are the students that Zhangsan taught and the students of Zhangsan, respectively.

- (5) *Zhāngsān* bǐ Lǐsì jiāo-gùo dé xúeshēng dūo/shǎo
 Zhangsan COMP Lisi teach-EXP REL student many/few
 ‘The students that Zhangsan taught are more/fewer than the students that Lisi taught.’
- (6) *Zhāngsān* bǐ Lǐsì-dè xúeshēng dūo/shǎo
 Zhangsan COMP Lisi-POSS student many/few
 ‘Zhangsan’s students are more than Lisi’s students.’

The data in (2)-(6) are particularly interesting for the following two reasons. First, this way of mapping from form to meaning is far from common in Mandarin. As shown in (7a)-(7b), while it is possible to omit the head noun in a possessive or a complex nominal phrase, a proper name by itself is never interpreted the way it is in (2)-(6), even with a proper antecedent.

- (7) a. Wángwǔ jiàoxùn-lè Zhāngsān-dè xuéshēng, yěi
 Wangwu teach.a.lesson-PERF Zhangsan-POSS student also
 jiàoxùn-lè Lǐsì-dè/ *Lǐsì
 teach.a.lesson-PERF Lisi-POSS/ Lǐsì
 Intended: ‘Wangwu taught Zhangsan’s students a lesson, and he also taught Lisi’s students a lesson.’
- b. Wángwǔ jiàoxùn-lè Zhāngsān jiāo-gùo dé xúeshēng, yěi
 Wangwu teach.a.lesson-PERF Zhangsan teach-EXP REL student also
 jiàoxùn-lè Lǐsì jiāo-gùo dé/ *Lǐsì
 teach.a.lesson-PERF Lisi teach-EXP REL/ Lisi
 Intended: ‘Wangwu taught a lesson to the students that Zhangsan taught, and he also taught a lesson to the students that Lisi taught.’

Second, the ‘association’ effect observed above is only seen with the Q-adjectives; no such effect on the nominal phrase is observed with a gradable adjective of quality. The various degree constructions in (8), if they are well-formed at all with the sentential adverbial *speaking of the students that one taught*, only have a reading in which the intelligence of the individual the proper name *Zhāngsān* refers to and that of the individual that the proper name *Lǐsì* refers to are in comparison. In none of these examples is the reading available in which the intelligence of the student(s) Zhangsan taught and/or that of the student(s) Lisi taught are being discussed.

- (8) shūodào jiāo-gùo dé xúeshēng,
 speaking.of teach-EXP REL students
 lit. ‘Speaking of students that one taught,’
- a. ^{*/ok}Zhāngsān hěn cōngmíng (positive)
 Zhangsan very smart
 ✓‘Zhangsan is smart.’
 ✗‘The student(s) that Zhangsan taught is/are smart.’

- b. [?]/_{ok}Zhāngsān bǐ Lǐsì cōngmíng (comparative)
 Zhangsan COMP Lisi smart
 ✓‘Zhangsan is smarter than Lisi.’
 ✗‘The student/s that Zhangsan taught is/are smarter than that/those that Lisi taught.’
- c. [?]/_{ok}Zhāngsān hàn Lǐsì yīyàng cōngmíng (equative)
 Zhangsan and Lisi the.same smart
 ✓‘Zhangsan is as smart as Lisi.’
 ✗‘The student/s that Zhangsan taught is/are as smart as that/those Lisi taught.’
- d. [?]/_{ok}Zhāngsān zài cōngmíng (superlative)
 Zhangsan SUPL smart
 ✓‘Zhangsan is the smartest.’
 ✗‘The student/s that Zhangsan taught is/are the smartest.’

The lack of the association effect with the gradable adjectives of quality is further evidenced by (9) and (10); the fact that the comparative in (9) can only be judged false in the scenario (10) indicates that unlike (3), (9) only has a reading in which the intelligence of Lisi himself, rather than that of the student(s) that he taught, is being compared.

- (9) Zhāngsān jiāo-gùo de xúeshēng bǐ Lǐsì cōngmíng
 Zhangsan teach-EXP REL student COMP Lisi smart
 ✓‘the student(s) taught by Zhangsan is/are smarter than Lisi.’
 ✗‘the student(s) that Zhangsan taught is/are smarter than the student/s that Lisi taught.’
- (10) Scenario: the IQ of the students that Zhangsan taught is 115-119; the IQ of the students that Lisi taught is 106-109; Lisi’s IQ is 125.

The contrast between (11a)-(11b) provides another piece of evidence for the lack of an association effect with gradable adjectives of quality: while continuing (2a) with the Mandarin counterpart of *just pick one to be your assistant* is fine (see (11a)), continuing (8a) with the same sentence results in oddity (see (11b)). The cause of this oddity seems intuitively straightforward: given that in (11b) *Zhāngsān* can only be interpreted as a unique individual, rather than a plurality associated with someone named Zhangsan, there is no appropriate antecedent for the indefinite cardinal determinative *one*. On the other hand in (11a), the first sentence may carry a meaning in which it is the students that Zhangsan taught, rather than Zhangsan himself, who are under discussion, even though the subject nominal appears to be simply the proper name *Zhāngsān*. The indefinite cardinal *one* thus has an appropriate antecedent.

- (11) shuōdào jiāo-gùo de xúeshēng,
 speaking.of teach-EXP REL students
 lit. ‘speaking of students that one taught,’
- a. Zhāngsān hěn duō/shǎo, nǐ jǐngguān zhǎo yī-gè dāng nǐ-de zhùlǐ
 Zhangsan very many/few you just find 1-CL to.be you-POSS assistant
 ‘Zhangsan’s students are many; you just pick one to be your assistant.’

- b. #Zhāngsān hěn cōngmíng, nǐ jǐngǔan zhǎo yī-gè dāng nǐ-dé
 Zhangsan very smart you just/simply find 1-CL to.be you-POSS
 zhùlǐ
 assistant
 ‘Zhangsan is smart; just pick one to be your assistant.’

It is worth noting that the association effect observed above and the contrast between the Q-adjectives and the gradable adjectives of quality are not unique to Mandarin; they are observed in Japanese as well.⁴ Japanese *ooi* ‘many’ may occur in predicate position.⁵ In the various degree constructions in (12), *ooi* appears to be predicated of the proper names *Taro* and *Hanako*; nevertheless, with the sentential adverbial *speaking of the students that one taught*, it is predicated of the students that Taro taught and those that Hanako taught respectively.

- (12) Osieta gakusee nituite iu to
 taught student about talk when
 ‘Speaking of students one taught,
- a. Taro-ga ooi (positive)
 Taro-NOM many
 ‘The students that Taro taught are many.’
- b. Taro-ga Hanako yori-mo ooi (comparative)
 Taro-NOM Hanako than-more many
 ‘The students that Taro taught are more than the students that Hanako taught.’
- c. Taro to Hanako-ga onaji yooni ooi (equative)
 Taro and Hanako-NOM same way many
 ‘The students that Taro taught are as many as the students that Hanako taught.’

Example (13) shows that the association effect observed in (12) is not available with adjectives of quality; with the gradable adjective *kasikoi* ‘smart’, all the degree constructions in (13) only permit the reading in which the intelligence of Taro and that of Hanako are under discussion.

- (13) Osieta gakusee nituite iu to
 taught student about talk when
 ‘Speaking of students (people) taught,’

⁴ We thank Toshiko Oda for sharing with us the Japanese data. All errors, of course, are ours.

⁵ There are two lexical items in Japanese, *ooi* and *takusan*, that translate as ‘many’. Unlike *ooi*, the predicate position is a less hospitable environment for *takusan*.

- (i) ?/*John-no tomodati-ga takusan-da
 John-GEN friend-NOM many-COP
 ‘John’s friends are many.’

- a. Taro-ga kasikoi (positive)
 Taro-NOM smart
 ✓‘Taro is smart.’
 ✗‘The student/s that Taro taught is/are smart.’
- b. Taro-ga Hanako-yori-mo kasikoi (comparative)
 Taro-NOM Hanako-than-more smart
 ✓‘Taro is smarter than Hanako.’
 ✗‘Taro’s student/s is/are smarter than Hanako’s.’
- c. Taro to Hanako-ga onaji yooni kasikoi (equative)
 Taro and Hanako-NOM same way smart
 ✓ ‘Taro and Hanako are equally smart.’
 ✗‘The students taught by Taro and by Hanako are equally smart.’

Example (14) shows that it is possible for the association effect to target the complement of *-yori* alone; in this example, it is the students that John taught and Mary taught who are being compared, despite the fact that the complement of *-yori* appears to be simply the proper name *Mary*. This association effect, again, disappears with the gradable adjective of quality *smart*, as shown in (15).

- (14) John-ga osieta gakusee-wa Mary-yori-mo ookatta
 John-NOM taught student-TOP Mary-than-more many
 ‘The students that John taught were more than the students that Mary taught.’
- (15) John-ga osieta gakusee-wa Mary-yori-mo atamagaii
 John-NOM taught student-TOP Mary-than-more smart
 ✓‘The student(s) John taught is(are) smarter than Mary.’
 ✗‘The students John taught are smarter than the students Mary taught.’

I.II. Some alternatives that do not seem to work

One quick response to the association effect observed in Mandarin (as well as Japanese) is to say that in the relevant examples, the Q-adjectives are predicated not of the proper names *Zhāngsān* and *Lǐsì* but rather of a nominal phrase that contains a phonetically null head, which may result from PF-deletion or a base-generated empty category *e*. Along these lines, (2a) may be assigned the structure (16a) or (16b).

- (16) a. [*Zhāngsān teach-EXP-de-student*] *very dūo/shǎo*
 b. [*Zhāngsān e*] *very dūo/shǎo*

Nevertheless, analyses along with these lines not only lack empirical support, as already shown in (7), but also leave unexplained the contrast between the Q-adjectives and the gradable adjectives of quality.

Another possible response is that the association effect results from coercion. It is assumed that the Q-adjectives carry a plurality requirement and hence do not combine with nominal phrases that are interpreted as atomic individuals (see, e.g., Hackl (2000)). The proper names *Zhāngsān* and *Lǐsì* denote atomic individuals and hence cannot be combined directly with the Q-adjectives. In order to guarantee interpretability, a coercion operation along the lines of de Swart (1998) and Sawada and Grano (2011) might have applied in the examples above, when the association effect is observed.

If coercion is a ‘last resort’ operation (de Swart 1998; Sawada and Grano 2011; a.o.), an analysis along these lines predicts that the association effect should not arise once the plurality requirement of the Q-adjectives has been satisfied. This prediction is not borne out, however. With the sentential adverbial *speaking of one’s books*, (17) does carry the meaning in which the cardinality of the books possessed by the group of students that the nominal phrase *these students* refers to, rather than the cardinality of this group of students itself, is being compared, even though on the surface the Q-adjective appears to combine with the nominal phrase *those students*.

- (17) shūodào shū, zhè-xiē xúeshēng hěn dūo
speaking.of book these-CL_{PL} student very many
‘speaking of books, the books of these students are many.’

A coercion-based analysis also leads us to expect that the same effect should be seen with a gradable adjective of quality that also poses a plurality requirement (e.g., *diverse*). Contrary to our expectation, this prediction is not borne out, as evidenced by the ungrammaticality of (18a) (in contrast to (18b)).⁶

- (18) a. *shūodào xúeshēng-dè bèijǐng, Zhāngsān hěn dūoyuán
speaking.of student-POSS background Zhangsan very diverse
intended: ‘speaking of the backgrounds of the students, the backgrounds of Zhangsan’s students are diverse.’
- b. Zhāngsān-dè xúeshēng(-dè) bèijǐng hěn dūoyuán
Zhangsan-POSS student-POSS background very diverse
‘The backgrounds of Zhangsan’s students are diverse.’

As we suggest below, an adequate account of the association effect should lie in the combination of the syntax of comparison of quantity and the semantics of the Q-adjectives.

II. The Association Effect and the Syntax and Semantics of Q-adjectives

II.I. The semantics of Q-adjectives and MEASUREMENT

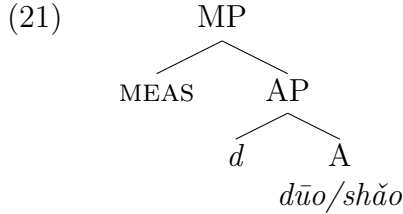
Constructions involving Q-adjectives have been treated on a par with those involving gradable adjectives of quality and analyzed using degree semantics (Bresnan 1973; Hackl 2000, 2009; Nakanishi 2004; Wellwood et al. 2012; a.o.). While some treat the Q-adjectives as comparable to the gradable adjectives of quality (Nakanishi 2004; Wellwood et al. 2012; a.o.), others suggest that there is a fundamental difference between the two in their syntax and semantics (Rett 2008; Solt 2015; Lin 2014; a.o.). In the latter approach, a gradable adjective of quality like *smart* is taken to encode in its lexical meaning a measure function μ that maps individuals to (sets of) degrees (see (19); Creswell 1976; von Stechow 1984; a.o.), whereas the semantic contribution of the Q-adjectives is considered to be rather trivial. Solt (2015) suggests the semantics in (20a)-(20b), according to which the Q-adjectives are semantically bleached.

$$(19) \quad \llbracket \textit{smart} \rrbracket = \lambda d_d. \lambda x_e. \mu_{\textit{intelligence}}(x) \geq d$$

$$(20) \quad \begin{array}{l} \text{a.} \quad \llbracket \textit{many/dūo} \rrbracket = \lambda d_d. \lambda I_{\langle d, t \rangle}. I(d) \\ \text{b.} \quad \llbracket \textit{few/shǎo} \rrbracket = \lambda d_d. \lambda I_{\langle d, t \rangle}. \neg I(d) \end{array}$$

⁶ We thank Stefan Kaufmann and Jon Gajewski for pointing this out.

In the following we will work with this approach, given that it provides a straightforward way to locate the source of the association effect and to account for the contrast between the Q-adjectives and the gradable adjectives of quality. We assume the semantics in (20a)-(20b) for the Mandarin Q-adjectives *dūo* ‘many/much’ and *shǎo* ‘few/little’, and the measurement of cardinality is introduced by the functional head MEAS.⁷ Syntactically, MEAS heads the projection MP and takes as its complement an AP headed by the Q-adjective; the specifier of AP may be occupied by a degree variable, which may be bound by a degree operator in a higher position.



As we suggest below, the source of the association effect is located in MEAS. The lexical entry of this functional head is given in (22); it encodes a variable R, whose value is largely determined by the linguistic context.

(22) $\llbracket \text{MEAS} \rrbracket = \lambda D_{\langle \langle d, t \rangle, t \rangle}. \lambda x_e. D([\lambda d. \mu_{\text{card}}(\mathbf{R}(x)) \leq d])$,
 where R is a function from individuals to individuals

This flexibility in the lexical meaning of MEAS enables us to derive the association effect observed above. Provided that the plurality requirement of the measure function μ_{card} is not violated, R may be an identity function and map some individual x to x itself.

II.II. Accounting for the association effect

First consider the positives (1a) and (2a) (with the Q-adjective *dūo* ‘many’). In (1a), the Q-adjective appears to be predicated of the nominal phrase *the students that Zhangsan taught*. Uttered out of the blue, this example carries a meaning in which the cardinality of the students that Zhangsan taught is what is being discussed. With the lexical meanings of *dūo* in (20a), MEAS in (22), and the positive morpheme in (23) (von Stechow 2005; Heim 2006; and others), this meaning of (1a) (see the LF (24a)) may be modeled through the truth conditions in (24b); the value of the variable R, in this case, is an identity function, and hence μ_{card} applies to the unique group itself of students that Zhangsan taught.

- (1) a. Zhāngsān jiāo-gùo de xúeshēng hěn dūo/shǎo
 Zhangsan teach-EXP REL student very many/few
 ‘The students Zhangsan taught are many/few.’

(23) $\llbracket \text{POS} \rrbracket = \lambda P_{\langle d, \langle e, t \rangle \rangle}. \lambda x_e. \forall d[d \in \text{MIDDLE-GROUND}_C \rightarrow P(d)(x)]$

(24) a. $\llbracket \textit{the-students-that-Zhangsan-taught} \rrbracket_{[\text{MP POS} [1 [\text{MP MEAS} [\text{AP } d_1 \textit{dūo}]]]]}$

⁷ The syntax and semantics we assume for MEAS differs from Solt’s 2015 proposal in several aspects. As far as we can see, nothing hinges on this. Nevertheless, see section IV.I for the empirical support for this move.

- b. $\llbracket (1a) \rrbracket = 1$ iff $\forall d[d \in \text{MIDDLE-GROUND}_C \rightarrow \mu_{\text{card}}(\text{R}(\text{the students that Zhangsan taught})) \geq d]$,
 where $\text{R} = [\lambda x_e. x]$

In (2a) on the other hand, while the subject appears to be the proper name *Zhāngsān*, it is actually the cardinality of the students that Zhangsan taught that is being compared. With the LF (25a), the truth conditions of (2a) are presented as in (25b). The content of the variable R is made explicit by the sentential adverbial *speaking of the students that one taught*, just as would be the conversational background of a modal statement such as *John must pay a fine*, which can be made explicit by a sentential modifier like *in view of the law* (Kratzer 2012; a.o.). In this case, the value of R is a function that maps an individual x to the unique group of students that x taught.

- (2) a. shūodào jiāo-gùo dé xúeshēng, Zhāngsān hěn dūo
 speaking-of teach-EXP REL student Zhangsan very many
 ‘Speaking of the students that one taught, the students that Zhangsan taught are many.’
- (25) a. [*Zhangsan* $[_{\text{MP}} \text{POS} [1 [_{\text{MP}} \text{MEAS} [_{\text{AP}} d_1 \textit{dūo}]]]]$]
 b. $\llbracket (2a) \rrbracket = 1$ iff $\forall d[d \in \text{MIDDLE-GROUND}_C \rightarrow \mu_{\text{card}}(\text{R}(\text{Zhangsan})) \leq d]$,
 where $\text{R} = [\lambda x. \iota y[y \text{ are students that } x \text{ taught}]]$

Note that the variable R in (2a)/(25a) cannot be an identity relation; otherwise the non-atomicity requirement of MEAS would be violated.

In a comparative, the association effect can target the post-*bǐ* nominal (see (3)-(4)) or the subject of the comparative (see (5)-(6)), or both (see (2b)). At this point we simply assume the Reduction Analysis of the Mandarin comparative (Liu 1996; Hsieh 2015; a.o.) and make the following assumptions, although as far as we can see nothing crucial is hinging on them⁸: we assume that there is an occurrence of the gradable predicate in the *bǐ*-constituent that is elided at the surface, and the *bǐ*-constituent adjoins to *vP* (see (27a)). For convenience, we also assume that both the subject of the comparative and the post-*bǐ* nominal are interpreted MP-internally. In (2b), both proper names *Zhāngsān* and *Lǐsì*, with the sentential adverbial *speaking of the students one taught*, are associated with a contextually bound variable whose value is a function that maps an individual x to the unique group of students that x taught. With the lexical meaning of the comparative morpheme *bǐ* in (26) and the LF in (27a), the truth conditions of (2b) are as presented in (27c).⁹

- (2) b. shūodào jiāo-gùo dé xúeshēng, Zhāngsān bǐ Lǐsì dūo
 speaking.of teach-EXP REL student Zhangsan COMP Lǐsì many
 ‘speaking of the students one taught, the students that Zhangsan taught are more/fewer than the students that Lisi taught.’
- (26) $\llbracket bǐ \rrbracket = \lambda D_{\langle d, t \rangle}. \lambda D'_{\langle d, t \rangle}. \text{MAX}(D') > \text{MAX}(D)$
 (for any $D_{\langle d, t \rangle}$, $\text{MAX}(D) = \iota d[D(d)]$ and $\forall d'[D(d') \rightarrow d \geq d']$)

⁸ The implications of the association effect for the structure of the Mandarin comparative are discussed in detail in Section III.

⁹ This lexical meaning of *bǐ* needs to be revised in order to derive the correct truth conditions for comparatives of negative gradable adjectives, including *shǎo* ‘few’. The required revision, however, does not affect the point made here. Due to space limitations, we simply refer the reader to Beck (2012) and Solt (2015) for possible solutions.

- (27) a. Surface syntax of (2b):

$$[{}_{\text{TP}} \text{Zhangsan}_2 \dots [{}_{\text{vP}} [\text{bǐ} [\text{Lisi}_3 [{}_{\text{MP}} \text{t}_3 \text{ MEAS } [{}_{\text{AP}} \text{d}_1 \text{ dūo}]]]]] v [{}_{\text{MP}} \text{t}_2 \text{ MEAS } [{}_{\text{AP}} \text{d}_2 \text{ dūo}]]]$$
- b. LF of (2b):

$$[[\text{bǐ} [1 [{}_{\text{MP}} \text{Lisi MEAS } [{}_{\text{AP}} \text{d}_1 \text{ dūo}]]]] [2 [{}_{\text{MP}} \text{Zhangsan MEAS } [{}_{\text{AP}} \text{d}_2 \text{ dūo}]]]]]$$
- c. $\llbracket (2b) \rrbracket = 1$ iff

$$\text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}(\text{Zhangsan})) \geq \text{d}]) > \text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}(\text{Lisi})) \geq \text{d}]),$$
 where $\text{R} = [\lambda \text{x}_e. \iota \text{y}[y \text{ are students that } x \text{ taught}]]$

In (3) (with *dūo* ‘many’), where the association effect targets only the post-*bǐ* nominal, the R' associated with the nominal phrase *the students that Zhangsan taught* is an identity function, whereas the R associated with the proper name *Lǐsì* is a function that maps an individual x to the unique group of students that that x taught (see (28a)-(28b)).

- (3) Zhāngsān jiāo-gùo dé xúeshēng bǐ Lǐsì dūo
 Zhangsan teach-EXP REL student COMP Lisi many
 ‘The students that Zhangsan taught are more/fewer than the students that Lisi taught.’
- (28) a. $\llbracket [\text{bǐ} [1 [{}_{\text{MP}} \text{Lisi MEAS } [{}_{\text{AP}} \text{d}_1 \text{ dūo}]]]] [2 [{}_{\text{MP}} \text{the-students-Zhangsan-taught MEAS } [{}_{\text{AP}} \text{d}_2 \text{ dūo}]]]] \rrbracket$
- b. $\llbracket (3) \rrbracket = 1$ iff

$$\text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}'(\text{The students that Zhangsan taught})) \geq \text{d}]) > \text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}(\text{Lisi})) \geq \text{d}]),$$
 where $\text{R}' = [\lambda \text{x}_e. x]$ and $\text{R} = [\lambda \text{x}_e. \iota \text{y}[y \text{ are students that } x \text{ taught}]]$

Example (5) can be analyzed in the same fashion (see (29)); the variable R' associated with the subject *Zhāngsān* maps Zhangsan to the unique group of students that Zhangsan taught; the variable R associated with the post-*bǐ* nominal *the students that Lisi taught*, on the other hand, is an identity function.

- (29) a. $\llbracket [\text{bǐ} [1 [{}_{\text{MP}} \text{the-student-that-Lisi-taught MEAS } [{}_{\text{AP}} \text{d}_1 \text{ dūo}]]]] [2 [{}_{\text{MP}} \text{Zhangsan MEAS } [{}_{\text{AP}} \text{d}_2 \text{ dūo}]]]] \rrbracket$
- b. $\llbracket (5) \rrbracket = 1$ iff

$$\text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}'(\text{Zhangsan})) \geq \text{d}]) > \text{MAX}([\lambda \text{d}_d. \mu_{\text{card}}(\text{R}(\text{the students that Lisi taught})) \geq \text{d}]),$$
 where $\text{R} = [\lambda \text{x}_e. x]$, and $\text{R}' = [\lambda \text{x}_e. \iota \text{y}[y \text{ are students that } x \text{ taught}]]$

Note that the suggested analysis predicts that a comparative like (3) is ambiguous; in addition to the meaning expressed by the translation, (3) can have a meaning in which the quantity of something related to the students that Zhangsan taught and the quantity of the same type of object associated with Lisi are being compared. This reading can be made more salient by adding the sentential adverbial *speaking of ...*, as shown in (30).

- (30) shūodào jiāo-gùo dé nǚpéngyǒu, Zhāngsān jiāo-gùo dé xúeshēng
 speaking.of make-EXP REL girl-friend Zhangsan teach-EXP REL student
 bǐ Lǐsì dūo
 COMP Lisi many
 ‘speaking of the girlfriends that one had, the girlfriends that the student(s) that Zhangsan taught had are more than the girlfriends that Lisi did.’

Likewise, the positive in (1), with the adverbial *speaking of . . .*, can have a meaning that exhibits the association effect, as shown in (31). This is also expected under our analysis.

- (31) shūodào shū, Zhāngsān-dè xúeshēng hěn dūo
speaking.of book Zhangsan-POSS student very many
‘speaking of books, the books of Zhangsan’s student(s) are many.’

The contrast between the Q-adjectives and the gradable adjectives of quality, as indicated above, simply follows from the fundamental difference between these two types of gradable predication in the syntactic structure. In the gradable predication of quantity, the functional head MEAS, whose interpretation is contextually dependent, gives rise to the observed association effect. In contrast, the structure of gradable predication of quality lacks such a functional head; therefore, the association effect is not available in gradable predication of quality.

II.III. Remarks on the relation analysis of *many*

In another approach (Nakanishi 2004, 2007; Wellwood et al. 2012; a.o.), the Q-adjectives are treated on a par with gradable adjectives of quality; the lexical meaning of these words is taken to be a relation between degrees and individuals (i.e. a function of type $\langle d, \langle e, t \rangle \rangle$) and is taken to encode the measure function μ_{card} . Along these lines, the lexical meanings in (32a) are proposed for the Mandarin Q-adjectives *dūo* and *shǎo*; the source of the association effect, just as in the analysis suggested above, is located in the variable R that is incorporated in these lexical meanings. Its value is a contextually determined function that maps an individual x to the unique group of objects associated with x in some way.

- (32) a. $\llbracket dūo \rrbracket = \lambda d_d. \lambda x_e. \mu_{\text{card}}(R(x)) \geq d$
 $\llbracket shǎo \rrbracket = \lambda d_d. \lambda x_e. \mu_{\text{card}}(R(x)) < d$
b. LF of (2a): $\llbracket Zhangsan \llbracket_{AP} POS dūo/shǎo \rrbracket \rrbracket$

It seems to us that this line of analysis leads to much the same predictions for the data under discussion. For conceptual reasons however, we consider this approach less desirable. Given that within this approach gradable predication of quantity and of quality are executed through the same structure, the only way we can see to cash out the distinction in the availability of the association effect is to stipulate that in Mandarin and other languages where this contrast is observed, the lexical meaning of a gradable adjective of quality like *smart* does not incorporate a contextually bound variable; in other words, it does not have a lexical meaning like (33).

- (33) $\llbracket smart \rrbracket = \lambda d_d. \lambda x_e. \mu_{\text{intelligence}}(R(x)) \geq d$

This may lead one to wonder whether there are languages in which a gradable adjective of quality can give rise to the association effect and hence might have a lexical meaning of the same sort. In our limited survey however, we have not encountered any language of this kind. If indeed there exists no such language, it is unclear how to capture the fact under this approach.

III. More on the Association effect and the Mandarin Comparative

In this section, we will discuss further the association effect in a comparative and its implications for the syntax and semantics of this construction.

III.I. Isomorphism and the association effect

III.I.I. The confinement of the association effect

In the analysis above, we suggest that the association effect arises from the contextually bound variable R incorporated in the lexical meaning of the functional head MEAS. Nevertheless, the following examples show that the rise of the association effect in a comparative seems to be subject to some other constraints.

The association effect, as shown above, may target the subject of the comparative, the post-*bǐ* nominal, or both. Hence, we expect to see (34)/(35) carry both readings (34a)/(35a) and (34b)/(35b). In fact, only the readings (34b) and (35b) are available.

- (34) shuōdào jiāo-guò de nǚpúnyǒu, Zhāngsān jiāo-guò de xúeshēng
speaking.of make-EXP REL girlfriend Zhangsan teach-EXP REL student
bǐ Lǐsì duō
COMP Lisi many
- a. ✗‘Speaking of the girlfriends one had, the student(s) that Zhangsan taught are more than the girlfriends that Lisi had.’
- b. ✓‘Speaking of the girlfriends one had, the girlfriends that the student(s) taught by Zhangsan had are more than the girlfriends that Lisi had.’
- (35) shuōdào jiāo-guò de nǚpúnyǒu, Zhāngsān bǐ Lǐsì jiāo-guò de
speaking-of make-EXP REL girlfriend Zhangsan COMP Lisi teach-EXP REL
xúeshēng duō
student many
- a. ✗‘Speaking of the girlfriends one had, the girlfriends that Zhangsan had are more than the students that Lisi taught.’
- b. ✓‘Speaking of the girlfriends one had, the girlfriends that Zhangsan had are more than the girlfriends that the students that Lisi taught had.’

Note that the meanings (34a) and (35a) are sensible, as evidenced by the well-formedness of the comparatives in (36). This suggests that whatever factor causes the lack of these readings (34a)-(35a) should be structural.

- (36) a. Zhāngsān jiāo-guò de xúeshēng bǐ Lǐsì jiāo-guò de nǚpúnyǒu
Zhangsan teach-EXP REL student COMP Lisi make-EXP REL girlfriend
duō
many
‘The students that Zhangsan taught are more than the girlfriends that Lisi had.’
- b. Zhāngsān jiāo-guò de nǚpúnyǒu bǐ Lǐsì jiāo-guò de xúeshēng
Zhangsan make-EXP REL girlfriend COMP Lisi teach-EXP REL student
duō
many

‘The girlfriends that Zhangsan had are more than the students that Lisi taught.’

(34)-(35), together with (3)-(6), suggest that some form of isomorphism between the target and the standard of comparison is required when the association effect arises: in (3), the proper names *Lisi* and *Zhangsan* are in contrast, and what is under comparison is the students that Zhangsan taught and the students that Lisi taught; on the other hand, in (34) (with the reading (34b)), the things under comparison are the students that Zhangsan taught and the girlfriends that Lisi had. Below we show that this follows straightforwardly from the Reduction Analysis of the *bǐ*-comparative and the constraint of semantic isomorphism on ellipsis (e.g., Rooth 1992; Schwarzschild 1999; Merchant 2001; a.o.) .

III.I.II. *e*-GIVENNESS and the association effect

It is widely accepted that there is semantic isomorphism (of some form) between an elided VP and its antecedent, and several proposals have been made to capture this. In the following, we work with Merchant’s (2001) *e*-GIVENNESS condition on ellipsis (37), according to which an expression α may be deleted at the surface only if α is *e*-given.

- (37) a. *e*-GIVENNESS:
 An expression E counts as *e*-GIVEN iff E has a salient antecedent A and modulo \exists -type shifting,
 (i) A entails F-clo(E), and
 (ii) E entails F-clo(A)
 b. F-clo(α), the F-closure of α , is the result of replacing the F-marked parts of α with \exists -bound variables.
 c. an expression α can be deleted only if α is *e*-given.

Along with the Reduction Analysis, we assume that there is an AP/MP inside the *bǐ*-constituent that is elided at the surface. With the *e*-GIVENNESS condition (37), it then follows that the elided constituent is *e*-given, and hence the conditions (37a-i)-(37a-ii) are met. To see how this works, consider the comparative (3) and its LF (28b) with some slight modification (see (38)): we assume that the nominals that are in contrast, in this case *Zhāngsān* and *Lǐsì* (as well as their MP-internal copies), are F-marked (cf. Liu 2011).¹⁰

- (38) [[*bǐ* [1 [MP_E *Lǐsì*_F MEAS [AP *d*₁ *dūo*]]]] [2 [MP_A *the-students-that-Zhangsan*_F-*taught* MEAS [AP *d*₂ *dūo*]]]]

In (38), the antecedent MP (i.e. MP_A) contains an open degree variable; modulo \exists -type shifting, MP_A is assigned the truth conditions (39a). The focus-closure of the elided MP (i.e. F-clo(MP_E)) inside the *bǐ*-constituent, modulo \exists -type shifting operation on the open degree variable, is assigned the truth conditions (39b). With the given specification of the variables R and R’, (39a) entails (39b) and hence (37a-i) is met.

¹⁰ As Merchant (2001, p. 26, footnote 9) points out, in general and perhaps on principled grounds, a deleted constituent will not contain any F-marked material. Here we just follow Merchant (2001) and assume that traces of constituents moved out of the ellipsis site will be \exists -bound for purposes of satisfaction of the various Focus conditions.

- (39) a. $\exists d[\mu_{\text{card}}(\text{R}(\text{the students that Zhangsan taught})) \geq d]$
 b. $\exists x \exists d[\mu_{\text{card}}(\text{R}'(x)) \geq d]$
 (where $\text{R} = [\lambda x_e. \iota y[y \text{ are students that } x \text{ taught}]]$, and $\text{R}' = [\lambda x_e. x]$)

In the same fashion, MP_E and the $\text{F-clo}(\text{MP}_A)$, modulo \exists -type shifting on the open degree variable, are assigned the truth conditions (40a)-(40b) respectively. Given that (40a) entails (40b), (37a-ii) is met. Therefore, the e -GIVENNESS condition on MP_E is satisfied.

- (40) a. $\exists d[\mu_{\text{card}}(\text{R}(\text{Lisi})) \geq d]$
 b. $\exists x \exists d[\mu_{\text{card}}(\text{R}'(\text{the students that } x \text{ taught})) \geq d]$
 (where $\text{R} = [\lambda x_e. \iota y[y \text{ are students that } x \text{ taught}]]$, and $\text{R}' = [\lambda x_e. x]$)

The e -GIVENNESS condition is satisfied in the same fashion in the cases where the association effect targets both the subject and the post- $b\check{i}$ nominal (e.g., (2b)) and where it targets only the subject (e.g., (5)-(6)). In (2b) (see the modified LF (41)) the subject and the post- $b\check{i}$ nominal are in contrast. In order to satisfy the e -GIVENNESS condition, the value for the variables introduced by MEAS is required to be the same.

- (41) $[[[b\check{i} [1 [\text{MP}_E \text{ Lisi}_F \text{ MEAS } [\text{AP} d_1 d\bar{u}o]]]]] [2 [\text{MP}_A \text{ Zhangsan}_F \text{ MEAS } [\text{AP} d_2 d\bar{u}o]]]]]$

In (5), the subject is in contrast with part of the post- $b\check{i}$ nominal (see the modified LF (42)). With the values in (29b) for the function variables R and R' , the e -GIVENNESS condition is satisfied. Due to space limitations, we leave the details for the reader.

- (42) $[[[b\check{i} [1 [\text{MP}_E \text{ the-students-that-Lisi}_F\text{-taught MEAS } [\text{AP} d_1 d\bar{u}o]]]]] [2 [\text{MP}_A \text{ Zhangsan}_F \text{ MEAS } [\text{AP} d_2 d\bar{u}o]]]]]$

It is then obvious why (34) and (35) lack the reading (34a) and (35a). Take (34) for instance. The comparative in (34) has the very same LF in (42). With the given specification of the function variables for the intended reading and modulo \exists -type shifting, MP_A (see (43a)) does not entail $\text{F-clo}(\text{MP}_E)$ (see (43b)).

- (43) a. $\exists d[\mu_{\text{card}}(\text{R}'(\text{the students that Zhangsan taught})) \geq d]$, where $\text{R}' = [\lambda x_e. x]$
 b. $\exists x \exists d[\mu_{\text{card}}(\text{R}(x)) \geq d]$, where $\text{R} = [\lambda x_e. \iota y[y \text{ are girlfriends that } x \text{ had}]]$

Likewise, the truth conditions of MP_E (see (44a)) do not entail those of $\text{F-clo}(\text{MP}_A)$ (see (44b)), either. Hence, the reading (34a) is not available.

- (44) a. $\exists d[\mu_{\text{card}}(\text{R}(\text{Lisi})) \geq d]$, where $\text{R} = [\lambda x_e. \iota y[y \text{ are girlfriends that } x \text{ had}]]$
 b. $\exists x \exists d[\mu_{\text{card}}(\text{R}'(x)) \geq d]$, where $\text{R}' = [\lambda x_e. x]$

In sum, in our analysis of the association effect, while the value assignment of the function variable incorporated in the lexical meaning of MEAS, as suggested above, is largely contextually determined, it has to comply with other structural constraints at the syntax and syntax-semantics interface.

III.II. The Direct Analysis and the association effect

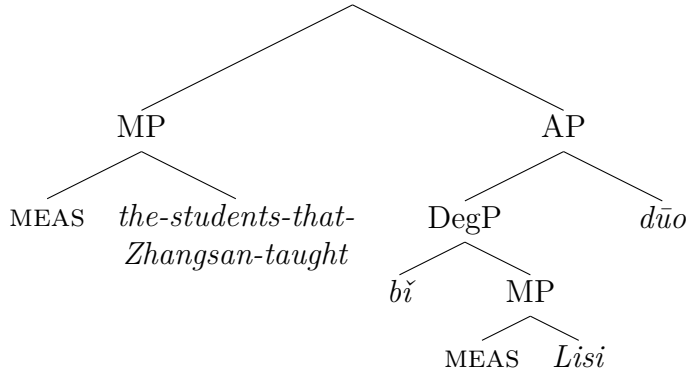
To the extent that our proposal is on the right track, the association effect from the Q-adjective provides an additional piece of evidence in favor of the Reduction Analysis and against the Direct Analysis. While details vary, all the variants of the Direct Analysis

suggested for the Mandarin comparative (Xiang 2003, 2005; Erlewine 2007; Lin 2009; a.o.) assume that the size of the post-*bǐ* constituent is exactly what it looks like at the surface, and no elliptical operation is involved in the derivation. Given that the subject and the post-*bǐ* nominals share one gradable predicate, the syntactic location and the lexical entry of MEAS need to be reconsidered in order to locate the source of the association effect and at the same time keep the flexibility for this effect to target either of the subject or the post-*bǐ* nominal. One possibility is that the subject of the comparative and the post-*bǐ* nominal form a constituent respectively with MEAS, the according lexical entry of which is given in (45).¹¹

$$(45) \quad \llbracket \text{MEAS} \rrbracket = \lambda x_e. \lambda d_d. \mu_{\text{card}}(\text{R}(x)) \geq d \quad (\text{to be coupled with the Direct Analysis})$$

These assumptions, together with Lin's (2009) syntax and his lexical entry for *bǐ* (46b), give us the LF in (46a) for (3) and the truth conditions (46c).¹² With the given specification for the values of the function variables R and R', the intended reading of (3) is derived.

(46) a.



$$b. \quad \llbracket bǐ \rrbracket = \lambda \vec{a}_i. \lambda \mathcal{P}_{\langle d, \langle \vec{a}, t \rangle \rangle}. \lambda \vec{a}'_i. \iota_{\max} d [P(d)(\vec{a}') > \iota_{\max} d [P(d)(\vec{a})]],$$

where $|\vec{a}'| \geq 1$

$$c. \quad \llbracket (3)/(46a) \rrbracket =$$

$$\llbracket bǐ \rrbracket (\llbracket \text{MEAS} \rrbracket (\text{Lisi})) (\llbracket dūo \rrbracket) (\llbracket \text{MEAS} \rrbracket (\text{the students that Zhangsan taught})) =$$

$$\llbracket bǐ \rrbracket ([\lambda d_d. \mu_{\text{card}}(\text{R}(\text{Lisi}))]([\lambda d_d. \lambda I_{\langle d, t \rangle}. I(d)]$$

$$([\lambda d_d. \mu_{\text{card}}(\text{R}'(\text{the students that ZS taught}))]) = 1$$

$$\text{iff } \iota_{\max} d [\mu_{\text{card}}(\text{R}'(\text{the students that Zhangsan taught})) \geq d] >$$

$$\iota_{\max} d [\mu_{\text{card}}(\text{R}(\text{Lisi})) \geq d],$$

where $\text{R} = [\lambda x_e. \iota y [y \text{ are students that } x \text{ taught}]]$, and $\text{R}' = [\lambda x_e. x]$

It is unclear to us however in what way other than stipulation such an analysis may predict the lack of, for instance, the reading (34a). With the structure and semantics in (46), it is possible that the value for the variable R' is an identity function and that for R is the function $[\lambda x_e. \iota y [y \text{ is a girlfriend that } x \text{ had}]]$; hence the intended reading (34a) is expected to be available. As we have already seen however, this prediction is not borne out.

As already pointed out in various research (Xiang 2003, 2005; a.o), the lack of sub-comparatives follows straightforwardly from the Direct Analysis but poses a challenge for the Reduction Analysis. Given that the Reduction Analysis has greater advantage

¹¹ This is the lexical meaning of MEAS suggested by Solt (2015).

¹² We do not see a simple way to extend other variants of the Direct Analysis to the data in question; therefore, we will not discuss them.

than the Direct Analysis in accounting for the association effect in a *bǐ*-comparative, an attempt to implement the Reduction Analysis to account for the lack of the subcomparatives in Mandarin is then desirable.¹³ This is however beyond the scope of this paper and should be left for another occasion.

IV. Concluding Remarks and Further Issues

In the discussion above, we investigated the association effect observed with the Q-adjectives in Mandarin and suggested that the solution lies in the syntax of the gradable predication of quantity and the lexical meaning of the functional head involved. Our observation suggests that a theory that differentiates gradable predication of quantity and that of quality is preferable. In the end of the discussion we have two remarks; one concerns the pre-nominal occurrence of the Q-adjectives, and the other the cross-linguistic variation regarding the availability of the association effect.

IV.I. The pre-nominal Q-adjectives

Just like English *many* and *few*, the Mandarin Q-adjectives *dūo* and *shǎo* may occur in a prenominal position. Nevertheless, unlike those in predicate position, the prenominal Q-adjectives do not give rise to the association effect; the object nominal in (47) merely refers to a group of students the quantity of which is large/small; it cannot refer to a group of students that are associated with some entities or objects the quantity of which is large/small.

- (47) Zhāngsān zuótiān jiàn-lè hěn dūo/shǎo-dè xúshēng
 Zhangsan yesterday meet-PERF very many/few-MOD student
 ‘Zhangsan yesterday met many/few students.’

In keep with a unified semantics of the Q-adjectives, what is to blame for the lack of the association effect in this case then is the functional head involved in the prenominal modification of quantity; crucially, this functional head, unlike the one in predicate position (see (22)), does not carry a contextually bound variable that is responsible for the rise of the association effect. This also suggests that an adequate theory of degree syntax and semantics, in addition to the quality *vs.* quantity contrast in predication, should differentiate the case of predication and that of prenominal modification in comparison of quantity. It is also worth noting that the lack of the association effect in the case of prenominal modification suggests that prenominal modification with Q-adjectives should not involve relativization (Sproat and Shih 1988; Cinque 2010, a.o.), though this conclusion then leads to the question why relativization is not allowed with the predicative use of Q-adjectives, which has to be left for future investigation.

IV.II. A note on cross-linguistic variation

To our knowledge so far, Mandarin and Japanese are the only languages that show the association effect. For instance, (48a), the English counterpart of (2a), is simply ungrammatical.

¹³ See Hsieh (2015) for discussion that the lack of subcomparatives is not necessarily decisive evidence against the Reduction Analysis in a given language.

- (48) a. *Speaking of the students that one/he₁ taught, John₁ is/are many.
b. The students that John taught are many.

Our analysis can be easily extended to English and other languages that do not show the association effect. One possibility is that in those languages, the functional head in gradable predication of quantity MEAS does not involve a contextually bound functional variable, and the measure function μ_{card} applies to the individual argument of MEAS directly. Alternatively, we could give MEAS in English and other languages without the association effect the same lexical meaning as it has in those with this effect (see (22)), but with an additional lexical restriction that the functional variable involved must always be an identity function. Under either of these possibilities, this difference can be reduced to one simple lexical variation.

It is desirable to see how this lexical property may be linked to other components of the grammar so that we may form a hypothesis that predicts in which language we may expect to see the association effect. Given that only limited cross-linguistic data of sufficient depth are available for consideration, this will have to be left for future investigation.

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Singular Quantified Terms^{*†}

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I Introduction

Singular quantified terms are terms (or DPs; linguistic objects that can appear in argument position) with quantifying force whose head noun is singular. Formally, these are terms which contain terms which are in the scope of a quantifier, like *all boys*, *most of the apple*, and *some of the committee*. In English, singular quantified terms must contain a mediating preposition *of* between the quantifier and the singular term, as is demonstrated in (1a).

- (1) a. Most *(of) the menu costs \$20.
b. kol ha-tafrit be esrim jekel
all the-menu in 20 NIS
'Every item on the menu sells for 20 NIS.'

In this paper, I discuss the behavior of singular partitives, focusing on Hebrew. I show that group noun-headed singular quantified terms behave essentially different from other singular quantified terms. Specifically, the domain of quantification in the former is a discrete set (the members of the group), while in the latter the domain of quantification is a set of mass entities. I propose a preliminary analysis of singular quantified terms in Hebrew, respecting the properties peculiar to this language as well as the observations about group vs. non-group singular quantified terms. This analysis is based on a novel class of quantifiers I name 'Measure Quantifiers', which instantiate relations between algebraic sums. Using shifts between algebraic sums, we can represent the different readings of singular and plural individual or group terms.

For simplicity, in this paper I only deal with definite partitives since the analysis of definite partitives is more straightforward and can be generalized to non-definite partitives. Section II is an overview of key observations about singular partitives in English. The major observation is that the domain of quantification within partitives depends on the head noun. With individual nouns (e.g.

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†Hebrew sentences are transcribed using simplified IPA. Glosses are provided word by word and below is a translation of the intended meaning in English. I use '*' to designate sentences which speakers do not accept. '?' designates sentences whose acceptability status is debatable among speakers. For the English data, I consulted native speakers of English, and for the Hebrew data I provided the judgments myself.

book, apple, pen) and mass nouns, the domain of quantification is material stuff. With group nouns (e.g. team, army, committee), the domain of quantification is the set of members of the group.

In Section III, I describe the Hebrew data. I exemplify the uses of several Hebrew quantifiers and how they affect the morphosyntax of partitives. Most prominently, some quantifiers, such as *kol* ‘all’ exemplified in (1b), do not allow the use of an intermediary preposition, while others, such as *harbe* ‘many/much’, require it in all partitives. Numerals greater than 1 are allowed only in plural partitives but not in singular partitives, while fractions between 1 and 0 may also be used in singular partitives.

In Section V, I propose a semantic scheme which captures the behavior of the Hebrew quantifiers, situated in a Boolean semantics framework following Link (1983). Semantically, these quantifiers (‘Measure Quantifiers’) apply relations between degrees of Boolean sums. This is essentially different from relations between sets as in Barwise and Cooper (1981). Crucially, these quantifiers have the same semantics in both singular and plural partitives, which allows a uniform treatment of partitives. The uniformity is made possible by a novel operator, a variant of Landman (1989a)’s \downarrow , which formally discriminates between group, individual, mass and plural nouns. In Section VI, I conclude and suggest directions for further research.

II Definite Partitives in English

In this section I compare group-headed definite partitives with individual-headed and mass-headed quantified terms in English. This shows an essential contrast within singular quantified terms, namely, that the domain of quantification is determined by the head noun. In group-headed definite partitives, the domain of quantification is a discrete set of individuals (group members), while in individual- and mass-headed ones, the domain of quantification is a continuous set of mass entities (material). This shows a crucial distinction which is also shared with Hebrew (and any other language I know) and is therefore directly relevant to the discussion in Sections III-V.

The purpose of this section is to bring out the differences between group and non-group singular quantified terms, which emerge as a result of conceptual distinctions between group entities and individual/mass entities. In the analysis proposed in Section V, I attempt to capture these distinctions formally within the Hebrew data.

Singular quantified terms prove to behave in an essentially different way from their plural counterparts. In a plural quantified term, the domain of quantification is the set of atoms of the plurality. Thus, for instance, in (2), *some* measures atomic boys. In singular quantified terms, on the other hand, the domain of quantification is not fixed. In (3a), the domain of quantification is a sum of material parts (the parts of the schnitzel). In (3b), the domain of quantification is a set of crew members. In (3c), the domain of quantification is again a sum of material parts.

- (2) Some of the boys are smart.
- (3) a. Dan ate all of the schnitzel.
b. ... he was taking most of the crew off [...] ¹
c. Some of the water is poisoned.

¹Found in: Robin Hobb. 2001. *Ship of Destiny*. p. 558. Spectra: New York

The contrast in (3) is mediated by lexical properties of the nouns involved. When quantifying over individual nouns like *schnitzel* the domain of quantification is usually the sum of material parts of an individual. With group nouns like *crew*, *team* and *committee*, the domain of quantification is almost invariably a set of group members. With mass nouns like *water*, *gold* and *coffee*, quantification occurs over a sum of material parts.

The key observation is that singular quantified terms (quantified terms whose syntactic head is singular) can quantify over different domains for individual and group nouns. Individual singular quantified expressions (singular quantified expressions whose head is an individual noun) quantify over material (mass) parts, and group singular quantified expressions (singular quantified expressions whose head is a group noun) quantify over atomic parts. This is demonstrated in (3a) and (3b). I use the term 'singular quantified expressions' rather than 'singular partitives' since in Hebrew, unlike English, not all quantified terms with singular head are partitive.

II.I Group Quantified Terms

Pearson (2011) gives various tests which demonstrate that in British English (BE), group nouns are much more similar to pluralities than in American English (AE). For instance, in BE, they are compatible with reciprocal expressions in the same way that pluralities are, as is demonstrated in (4), adapted from a similar example in Pearson (2011, p. 161). However, such cases are largely restricted to pluralized predicates; the singular version of the reciprocal predicate is still unacceptable, as in AE. Another noticeable observation is that in AE singular quantified expressions cannot be combined with numerals, while in BE, it is possible (according to Pearson (2011)). Thus, (5) is acceptable in BE but not in AE.

- (4) The family like(*-s) each other. (BE)
- (5) He was taking three of the crew off. (✓BE, *AE)

Despite the fact that group nouns exhibit certain behaviors which characterize plural terms, they often behave like individual nouns. For example, pluralities of group nouns distribute exactly like pluralities of individual nouns. The domain of quantification for plural group term is a set of group-atoms - not a set of individual-atoms. This yields particularly interesting distributive subentailment.

Distributive subentailments (following Dowty (1987)) are entailments about the atoms of certain plural expressions, which appear in certain environments but not others. For instance, Dowty gives examples such as the ones below. Both *gather* and *be numerous* are perceived as collective, because they only accept collections as arguments. However, (6b) is peculiar, unlike (6a). Moreover, (6b) seems to be peculiar in the same way as (7b) - a fact which led Dowty to the conclusion that *be numerous* exhibits entailment patterns similar to *meet*. Thus, (7b) means that every student is numerous, which is grammatical but nonsensical.

- (6) a. All the students gathered in the hallway.
- b. * All the students are numerous.
- (7) a. * Every student gathered in the hallway.
- b. * Every student is numerous.

The entailment in (6b) about each the students, which doesn't exist in (6a), is called by Dowty 'distributive subentailment'. These are entailments about the atoms of *all*-marked plurals expressions, which appear in certain environments but not others. In (6a) there is no distributive subentailment that every student gathered, but in (6b) there is a distributive subentailment that every student is numerous, and hence the infelicity in (6b).

Going back to plural group partitives, predicates such as *numerous*, which cannot apply to plural individuals (as in (6b)), can apply to plural groups (as in (8)), since the distributive subentailment in these cases is felicitous. Since being numerous is a possible property of armies, the distributive entailment in (8) that the armies are numerous does not lead to infelicity as in (6b).

(8) All of the armies are numerous.

In (9), on the other hand, the domain of quantification is a set of individual-atoms (soldiers); individual soldiers cannot be numerous, and therefore the distributive subentailment in (9) leads to nonsensicality.

(9) * All of the army is numerous.

In (8) the group noun behaves like a plural individual noun, but (9) is another case where a group noun behaves like a plurality - the unacceptability of (9) is akin to the unacceptability of (6b). In both cases, the source of unacceptability is a distributive subentailment which applies the property *be numerous* to an individual atom, which is infelicitous.

Another point of similarity between group terms and plurals is their interaction with stubbornly distributive predicates (following Schwarzschild (2011)). As was observed by Schwarzschild, some predicates have only a distributive interpretation regardless of their conceptual content. He gives examples such as the ones below. (10a) can only mean that each of the phone calls took up a lot of time, while (10b) can also mean that the phone calls collectively took up a lot of time. In other words, (10a) is only distributive with respect to the phone calls, while (10b) is ambiguous between collective and distributive interpretation.

- (10) a. The phone calls were long.
b. The phone calls took up a lot of time.

Schwarzschild calls such predicates 'Stubbornly Distributive'. There are numerous examples of such predicates, such as *big*, *large* and *round*.

A committee can be old, and the members of a committee can be old, but only (11a), unlike (11b), is ambiguous (see the discussion in Pearson (2011, p. 161)). The former can say something either about the committee or its members, and the latter says something only about the committee members. Thus, in (11a), *committee* is ambiguous between atomic interpretation and sum interpretation. In (11b), in contrast, *committee* behaves like a plurality: it **forces** distribution to the committee members. This demonstrates that quantified singular expressions behave essentially different from non-quantified ones (plain definites). The quantifier *all*, even though it is a universal quantifier, makes the plural interpretation of *the committee* much more salient compared to (11a), in which there is no quantifier.

- (11) a. The committee is old.
b. All of the committee is old

The collective readings of group quantified expressions are not identical to the readings available for non-quantified definite group nouns. Properties which apply exclusively to groups cannot apply to collections, and thus the collective interpretation of a group quantified expressions is not a possible argument for certain predicates. For example, (12a) is far better than (12b), since only committees (which are groups) can win the Best Committee Prize. (12a) allows the subject to refer to a group, but (12b) does not. In (12b), the presence of *all* blocks the group interpretation, and allows only the distributive and collective interpretations, analogously to the two readings of (1b). As evidence that *all of the committee* indeed can be interpreted as a collection, note the acceptability of (12c). Additionally, (12b) can in fact be acceptable if it is taken to mean that the members of the health committee won the prize as a collection, i.e., through collaborative effort. In such a case, this sentence doesn't say something about the health committee itself, but about its members.

- (12) a. The health committee won the Best Committee Prize for 2015.
 b. ? All of the health committee won the Best Committee Prize for 2015.
 c. All of the health committee met.

The distributive interpretation of group terms, the one demonstrated in (4), is not as easily accessible without overt marking. In the case of (4), the marking comes in the form of a pluralization of the predicate. In other cases, such as (1b), it comes in the form of a quantifier. Without overt marking, in the vast majority of the cases, the distributive reading is not available to group terms.

To conclude, we have seen that group nouns can sometimes have a distributive interpretation. Groups are composed of individual members, and in certain cases, the members of a group can be made salient and thus distributive predicates can apply to the group members. When group terms are quantified, the group members are often more salient, meaning that distributive interpretation is more easy to achieve. Additionally, predicates which are only defined for groups/collections (such as *be numerous*) can sometimes have a distributive interpretation with quantified group plurals (e.g. *all of the army*) but not with quantified plural individuals (e.g. *all of the boys*), since the atoms of a plural group term can have collective properties such as being numerous.

In Section V, I will attempt to model this property of group nouns using shifting operators which can shift them between their group and plural interpretations.

II.II Individual and Mass Quantified Expressions

In this section I point out that individual and mass quantified expressions denote collections of mass entities. In the same way that group entities are composed of individuals, individual and mass entities are composed of mass entities. I also argue that quantified individual terms are essentially different from definite ones, similarly to group terms. That is, *all of the N* is not codenotational with *the N*. As for groups, this stems from the fact that quantifiers over singular definites trigger a distribution effect. The difference is, however, that quantified group definites distribute into a set of individual members, while quantified individual definites distribute into a set of mass entities.

Individual and mass quantified expressions behave rather similarly. In both, the domain of quantification is a sum of mass entities. This was demonstrated in (3a) and (3c) above, repeated here as (13a) and (13b), respectively.

- (13) a. Dan ate all of the schnitzel.

- b. Some of the water is poisoned.

Individual and mass quantified terms exhibit the distributive subentailment effect that is observed for group quantified expressions. The domain of quantification being a mass entity, distributive subentailments apply to mass entities. Therefore distributive subentailment-triggering predicates must be applicable to mass entities in order to be felicitous. To exemplify, *smart* is a property of individuals. It is not defined for mass entities. In (14a), due to the presence of *all*, *smart* triggers distributive subentailments which apply to all the parts of the boy. Since the parts of the boy are mass sums, these distributive subentailments cause unacceptability. Hebrew (14b) is acceptable since the predicate doesn't trigger distributive subentailments despite the presence of *all*. This sentence can be interpreted as saying something about the sum of material parts of the schnitzel - that its price is 20 NIS.

- (14) a. * All of the boy is smart
b. kol ha- $\widehat{\text{fnit}}\text{sel}$ be esrim jekel
all the-schnitzel in 20 NIS
'It is possible to get all of the schnitzel for 20 NIS'

It was pointed out by Seth Cable (p.c.) that the same effect is observable with mass quantified expressions. For example, note the contrast in 15. The source of the contrast is the difference between the predicates applied to the mass quantified expressions. It seems that *fill the glass*, but not *be drunk*, generates distributive subentailments in the presence of *all*. It can't be the case that every part of the water fills the glass, and therefore the distributive subentailments triggered are inherently false, since they apply to all the parts of the water. In the same way that a plurality is composed of atoms, a mass entity is composed of mass entities. The parts of *the water* are a set of material parts of the water. *All*-triggered distributive subentailments apply to all the material parts of the argument, and since there must be water parts that do not fill the glass, there's bound to be a false distributive subentailment. Thus, (15a) is inherently false, and hence its oddness.

- (15) a. * All of the water fills the glass.
b. All of the water was drunk.

This pattern can help us uncover more of the nature of individual and mass quantified expressions. As it turns out, the domain of quantification in these expressions is not actually the set of parts of the quantified expression (e.g. *the water* in (15a)). The domain of quantification is more limited than the set of material parts of the quantified expression. One piece of evidence for this is that *all* does not apply distributive subentailments to all the material parts of the quantified expression - only to a subset of them.

For instance, notice that (16a) is not truth conditionally identical to (16b). Imagine a situation where someone poured poison into the river. The poison did not yet spread into all the waters in the river; only one section of the river is actually poisoned. In such a situation, (16b) is much more acceptable than (16a). (16a) is misleading and verges on an outright lie, since it strongly suggests that the water everywhere in the river is dangerous to drink.

- (16) a. Someone poisoned all of the river.
b. Someone poisoned the river.

Since (16a) and (16b) are not truth conditionally identical, it means *all* contributes something to the meaning. Presumably, it contributes distributive subentailments that apply to everything in its domain of quantification. Relating this to the above statement that the domain of quantification is more limited than the set of material parts of the quantified expression, note that the distributive subentailments do not apply to all quantities of water inside the river. This shows that the domain of quantification is not the set of material parts of the river. If that were the case, (16a) would assert that every quantity of water is dangerous to drink. But (16a) is consistent with a situation where the water is poisonous only in quantities greater than, say, 1 water molecule. Quite possibly, the poison binds to aggregates of water molecules, and every single molecule does not contain poison. However, (16a) does assert that every *large enough* quantity of water is poisonous. Or in other words, every material part of the river is part of a *small enough* quantity of poisoned water.

My conclusion is that expressions like *all of the river* do not quantify over the entire set of material parts of the river. It quantifies over some cover of this set, in the sense of Schwarzschild (1996). That is, it quantifies over a set S of parts of the river such that every part of the river is part of some $s \in S$. In (16a), the predicate *was poisoned* applies to every element in that cover. This cover divides the river into quantities of water which are big enough to contain poison. Probably, (16a) entails that every quantity of water which is big enough to see with the naked eye contains poison. In such a case, the cover imposed on the material parts of the river would be the set of quantities of water big enough to see.

This is the source of the difference between individual and mass quantified expressions on the one hand and group quantified expressions on the other. The former distribute into mass portions, while the latter distribute into individuals. This leads to another difference - mass portions are formed from mass entities, and mass entities are cumulative. As a result, sums of mass portions can overlap each other, which is not the case for sums of individuals.

The robustness of this distinction can be demonstrated by the fact that when individual nouns are distributed into a sum of individuals rather than chunks, they behave like group quantified expressions. For instance, a pizza is naturally individuated into a set of slices. When a pizza is thought of as a sum of slices, rather than a sum of pizza-chunks, it distributes into individuals, not into chunks, since slices are individuals.

This is the reason why an individual quantified expressions like *most of the pizza* can count slices rather than measure pizza-stuff. Imagine a group of friends orders one pizza, and they want to divide the pizza between the boys and the girls. Since there are more girls than boys, the girls get most of the slices. (17) can be felicitously used to describe this situation. The friends measure pizza in slices, and therefore (17) asserts something about the number of slices the girls will eat, not about the weight of the pizza-stuff they will eat.

(17) The girls will eat most of the pizza.

III Hebrew Singular Partitives

As was shown in (1b), repeated below as (18a), Hebrew singular partitives do not always require an intermediate preposition such as English *of*. (18b) is another example of such a use. As can be seen, there is no syntactic difference between the plural and the singular partitive.

- (18) a. kol ha-tafrit be esrim jekel
all the-menu in 20 NIS
'Every item on the menu sells for 20 NIS.'
- b. rov ha-fulxan mexuse
most the-table covered.3SG
'Most of the table is covered.'
- c. dan mexabev et kol (*me-)ha-jeladim
Dan like.3SG ACC all (of-)the-child.PL
'Dan likes all of the children.'

In this section I provide some more data about the behavior of quantified terms in Hebrew, comparing plural, singular group and singular non-group terms. I present morphosyntactic restrictions and restrictions on counting, and finally counting and measuring. This collection of data will form the basis for the analysis in Section V.

III.I Intermediate Preposition

Hebrew does have a preposition which can be used similarly to English *of* - the prefix *me-*. Certain Hebrew quantifiers necessitate the presence of *me-* within partitives in the same manner that English partitives necessitate *of*, as exemplified in (19).

- (19) a. dan mexabev kama *(me-)ha-jeladim
Dan like.3SG some *(of-)the-child.PL
'Dan likes some of the children.'
- b. dan axial ktsat *(me-)ha-fnitsel
Dan ate.3SG little *(of-)the-schnitzel
'Dan ate little of the schnitzel.'
- c. dan axial reva *(me-)ha-fnitsel
Dan ate.3SG quarter *(of-)the-schnitzel
'Dan ate a quarter of the schnitzel.'

The fact that *me-* is not obligatory to form a partitive construction suggests that it has no contribution to meaning. This idea is supported by the apparent semantic vacuity of English *of* in partitives, a point which will be touched again in the analysis.

Interestingly, group quantified expressions can exhibit collectivity/distributivity ambiguity. For instance, (18a) can either mean that every item on the menu by itself costs 20 NIS, or it can mean that one can buy all the items on the menu put together for 20 NIS. This ambiguity is another point of similarity between group nouns and plurals, which is not (always) shared with individual nouns, as is evident in (20) - this sentence can only mean that the entire schnitzel costs 20 NIS, not that every part of the schnitzel costs 20 NIS (analogously to the distributive reading of (18a)).

- (20) kol ha-fnitsel ole 20 jekel
all the-schnitzel cost.3SG 20 NIS
'All of the schnitzel costs 20 NIS.'

Note that in certain contexts, the distributive-collective distinction does not exist. For instance, eating events are indifferent to which distribution takes place. For example, consider (21a). There is no sense in which this sentence is collective or distributive, since it is both collective and distributive, in a way. The predicate *be eaten* applies to all the dishes, and it also applies to each dish separately, and therefore the prerequisites for both distributivity and collectivity hold. Similarly, in (21b), the predicate applies to the entire schnitzel, so the sentence can be said to be collective, but it also applies to the elements of every partition of the schnitzel into proper parts, so the sentence is also distributive.

- (21) a. kol ha-manot neexlu
 all the-dishes were.eaten.3PL
 ‘All of the dishes was eaten.3PL’
- b. kol ha- $\widehat{\text{fnit}}\text{sel}$ neexal
 all the-schnitzel was.eaten.3SG
 ‘All of the schnitzel was eaten.’

III.II Numerical Quantifiers

In Hebrew, despite the striking similarity between group and pluralities when it comes to partitive constructions, group members cannot be counted as part of a partitive construction. Thus, (22a) is infelicitous, even though (22b) is acceptable. This shows that the availability of counting depends not only on conceptual criteria, but also on purely morphological features.

- (22) a. *dan hizmin et arba ha-tafrit
 Dan ordered.3SG ACC four the-menu
 Intended: ‘Dan ordered four dishes from the menu.’
- b. *dan hizmin et arba ha-manot
 Dan ordered.3SG ACC four the-dishes
 ‘Dan ordered the four dishes.’

Despite the above restriction, there is a class of numerical quantifiers which can participate in singular quantified expressions in Hebrew: fractions. This kind of quantification is unique in that it does not require the definite marker, even though it allows it, as is shown below. Moreover, regardless of whether the definite marker is present or not, the singular quantified expressions can be either definite or indefinite. That is, (23) below can be definite, or it can be indefinite, regardless of whether the definite marker is present or not.

- (23) dan axal reva (me-ha-) $\widehat{\text{fnit}}\text{sel}$ /tafrit
 Dan ate.3SG quarter (of-the-)schnitzel/menu
 ‘Dan ate a quarter of a/the schnitzel/menu.’

III.III Counting vs. Measuring

There is a class of quantifiers in Hebrew which are compatible both with counting and measuring interpretations, similarly to English *some* and *most*. The two uses are exemplified in (24) and (25) below. It is shown that they both can either count items (in a menu) or measure stuff. In (26)

the behavior of both quantifiers is demonstrated with plural partitives. The data in (26) show two important facts. First, it is shown that both *harbe* and *most* behave the same syntactically in plural and singular partitives. Second, it shows that both can count items. That is, like English *most*, they can either measure cardinality or mass degrees (volume, weight, etc.). Hebrew does not have a semantic distinction analogous to the distinction between *many* and *much*. Instead, there is only one quantifier, *harbe*, which can be assume the use of both *many* and *much*.

- (24) a. * dan hizmin harbe me-ha-tafrit
 Dan ordered.3SG much of-the-menu
 ‘Dan ordered much of the menu.’
 b. * dan axal harbe me-ha-šnitšel
 Dan ate.3SG much of-the-schnitzel
 ‘Dan ate much of the schnitzel.’
- (25) a. dan hizmin et rov ha-tafrit
 Dan ordered.3SG ACC most the-menu
 ‘Dan ate most of the menu.’
 b. dan axal et rov ha-šnitšel
 Dan ate.3SG ACC most the-schnitzel
 ‘Dan ate most of the schnitzel.’
- (26) a. dan hizmin harbe me-ha-manot
 Dan ordered.3SG many of-the-dishes
 ‘Dan ordered many of the dishes.’
 b. dan hizmin et rov ha-tafrit
 Dan ordered.3SG ACC most of-the-dishes
 ‘Dan ordered most of the dishes.’

IV Theoretical Background

In this section I provide the theoretical basis for the formal analysis of the data presented in the previous section, to be provided in Section V. In this paper I do not provide a comprehensive overview of relevant literature. However, I do present theoretical highlights which will be crucial for the analysis.

IV.I Boolean Semantics

I am working in a standard Boolean Semantics framework, based on Link (1983). The major distinction in this framework is between atomic and non-atomic individuals, both of type e , where sums are generated from atoms by the Boolean sum operator \sqcup . $a \sqcup b$ is the sum of two (atomic or non-atomic) individuals. The singular/plural distinction results from application of \sqcup : a singular predicate P denotes a set of atoms, and the plural predicate of Q is the closure under sum of some singular predicate P . By definition, for every two a, b of type D_e , $a, b \sqsubseteq a \sqcup b$. The partial order \sqsubseteq thus defines a Boolean algebra over every predicate. Link also makes use of \sqcap , the meet operator. $a \sqcap b$ is the \sqsubseteq -maximal c such that $c \sqsubseteq a$ and $c \sqsubseteq b$.

To exemplify, assume $[[the\ boys]] = a \sqcup b \sqcup c$. The corresponding structure is depicted in Figure 1, where a line from node x to node y represents $x \sqsubseteq y$. The predicate *boy* denotes the set $\{a, b, c\}$ (atomic boys), and the predicate *boys* denotes the set $\{a, b, c, a \sqcup b, b \sqcup c, a \sqcup c, a \sqcup b \sqcup c\}$.

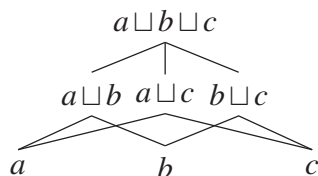


Figure 1: Boolean Structure

IV.II Sums and Groups

According to Landman (1989a,b), pluralized noun phrases are ambiguous between group and sum readings. Landman assumes type shifting principles in the manner developed in Partee and Rooth (1983), Partee (1986). Groups are atomic individuals which represent a sum. Sums are Boolean \sqcup -products of atomic individuals. He defines operators which shift between these two nominal interpretations. Plural definites, in their basic meaning, denote sums of atoms. For a plural definite $X = x_1 \sqcup \dots \sqcup x_n$, $\uparrow X$ is the group which corresponds to $\{x_1, \dots, x_n\}$. \downarrow is the inverse of \uparrow . Simply put, an unshifted plurality (a sum) represents the distributive reading, and the atoms created \uparrow represent the collective reading.

IV.III Group Nouns

The status of group nouns is debatable in this framework. On the one hand, such nouns are morphologically singular (both in Hebrew and English). On the other hand, they denote non-atomic individuals (i.e. groups). There have been several attempts to formalize the meaning of group nouns. According to Landman (1989a,b), group nouns behave like pluralities in that they are ambiguous between atomic and sum interpretations, and the two interpretations can be accessed through application of the shifting operators.

In the analysis of Barker (1992), group nouns are not different semantically from individual nouns, but he defines a function which maps every group to the set of its members. Using this function, he accounts for several phenomena which distinguish group nouns from individual nouns. Schwarzschild (1996) too, among others, offers an account in which group nouns, like individual nouns, denote atoms and are not translated into pluralities.

More recently, scholars such as Pearson (2011) and de Vries (2015) offer accounts of group nouns in which group nouns denote pluralities, and they can be ‘packaged’ into atoms by semantic shifts. Specifically, de Vries (2015) adopts Landman’s \uparrow operator, and uses it as a shifting operator which turns pluralities into atoms.

V Towards an Analysis

In this section, I propose what might be the first steps towards a formal analysis of the semantics of singular quantified expressions. Based on these ideas, I attempt to account for unique characteristics of Hebrew singular quantified expressions, and possibly explain why they behave differently from the English ones.

V.I The Nominal Domain

As described above, *kol* ‘all/every’ and *rov* ‘most’ do not allow the prefix *me-* (which functions like *of*), unlike their English counterparts, which require *of* in partitive constructions. Therefore, I opt for a semantics in which *me-* has no contribution to truth conditions in partitives.

As a first step, it is necessary to define sub-domains within the nominal domain D_e , such that each sub-domain corresponds to a particular kind of entities. For any domain D_X of atoms of sort X , $*D_X$, is the respective closure under sum, and it represents the set of plural individuals whose atoms are elements in D_X .

First, we have the mass domain D_M . This domain is the set of all stuff. To represent the way we conceptualize stuff, D_M is a non-atomic Boolean algebra. Thus, every $m \in D_M$ is a sum of an infinite set of other elements in D_M . The reason is of course that every chunk of stuff is built up from other chunks of stuff, ad infinitum.

We also have the domain of individuals D_I . The elements of D_I are entities which are associated with some sum of material parts, but are not themselves identical to this sum. The relation which associates an individual with its sum of parts is the ‘bulk of’ relation: the bulk of x is exactly the mass entity which forms the sum of mass entities associated with x . The function which maps individuals to the sum of their constituting parts has been defined for example in Link (1983) and Landman (2011).

Groups relate to individuals in the same way that individuals relate to stuff - they are entities which are associated with a sum of individual atoms. The difference of course is that atomic predicates that apply to groups not always apply to individuals and vice versa. A simple example is a predicate like *meet*, which can apply to groups but not to individuals. Therefore, D_G , the domain of groups, is the set of all groups, where every group is associated with a sum of individuals in the same way that every individual is associated with a mass sum.

It follows that for our purposes, $D_e = D_M \cup D_I \cup D_G$. At this point we can redefine Landman’s \downarrow operator so that it is sensitive to this partition of the domain of entities:

- If $x \in *D_e$ (if x is a sum), then $\downarrow(x) = x$
- (\Rightarrow) If x is mass, then $\downarrow(x) = x$
- If $x \in D_I$, then $\downarrow(x) = m_x$, the mass entity which corresponds to the sum of the parts of x
- If $x \in D_G$, then $\downarrow(x) = s_x$, the sum of the members of x

We will also need the σ operator. σ is the formal representation of the definite marker, as in Sharvy (1980): $\sigma(P) = \sqcup P$ iff $\sqcup P \in P$, \perp otherwise. Thus, if P is a plurality, $\sigma(P)$ is always defined. Else, $\sigma(P)$ is defined iff $|P| = 1$. This represents the intuition that *the P* is defined iff P is a set which contains only one element in the context.

V.II Measure Quantifiers

Kol ‘all’ and *rov* ‘most’ are two interesting quantifiers because they both share the property that they do not allow any preposition when they form partitive constructions. It was exemplified in (18a) and (18b), respectively, repeated below. *Kol* also has a Generalized Quantifier (Barwise and Cooper (1981)) interpretation which is seemingly identical to that of *every*, but this interpretation is of no relevance to the current work.

- (27) a. kol ha-tafrit be esrim fekel
all the-menu in 20 NIS
‘Every item on the menu sells for 20 NIS.’
b. rov ha-fulxan mexuse
most the-table covered.3SG
‘Most of the table is covered.’

There are also quantifiers which require the preposition *me-* ‘of’ in singular but not in plural partitives, as is demonstrated below, one of which is *harbe* ‘many/much’, discussed in (24)–(26) above, and its counterpart *meat* ‘few/little’. This provides further motivation for an analysis of partitives in which *me-* plays no semantic role.

- (28) a. *dan hizmin harbe/meat me-ha-tafrit
Dan ordered.3SG much/little of-the-menu
‘Dan ordered much/little of the menu.’
b. *harbe/meat me-ha-manot nimkeru
many/few of-the-dishes were.sold.3pl
‘Many/few of the dishes were sold.’

To analyze these quantifiers’ use in partitive constructions, I define a novel class of quantifiers which I name Measure Quantifiers (MQs). Formally, these quantifiers are of the form:

$$\lambda x. \lambda P. \theta(\downarrow x, \sqcup P)$$

where θ is a binary relation between sums. θ functions similarly to the relations between sets established by Generalized Quantifiers, except it operates over sums. In order to compare sums, θ may make use of measure functions, marked μ , which can measure cardinality (in other words, do counting), or it can measure stuff in terms of volume, weight, etc’, as in Schwarzschild (2002) and Solt (2014), among many others. Measure functions apply to a sum S and return the degree of S on its measure scale.

I provide lexical entries for *kol* ‘all’, *rov* ‘most’, *harbe* ‘much/many’ and *meat* ‘little/few’ to this schema. d_h is a contextually dependent degree which represents the contextual standard for *harbe*. d_m represents the contextual standard for *meat*.

$$(29) \quad \llbracket \text{kol} \rrbracket = \lambda x. \lambda P. \downarrow x \sqcap (\sqcup P) = \downarrow x$$

$$(30) \quad \llbracket \text{rov} \rrbracket = \lambda x. \lambda Q. \mu(\downarrow x \sqcap (\sqcup P)) = \frac{\mu(\downarrow x)}{2}$$

$$(31) \quad \llbracket \text{harbe} \rrbracket = \lambda x. \lambda Q. \mu(\downarrow x \sqcap (\sqcup P)) \geq d_h$$

$$(32) \quad \llbracket \text{meat} \rrbracket = \lambda x. \lambda Q. \mu(\downarrow x \sqcap (\sqcup P)) \leq d_m$$

Note that in the case of *kol*, there is no need to make use of a measure function, since if two sums are equal, then their measures are also equal on any measure scale.

These entries do not depend on an intermediate preposition. That is, they are indifferent to whether or not the preposition *me-* 'of' is present. Therefore, partitive *me-* in Hebrew should be semantically vacuous, similarly to English *is* in sentences like *John is a fireman*. The motivation for this is the fact, discussed above, that *me-* does not seem to have any contribution to meaning. This is a point of difference from Ladusaw (1982)'s influential approach to English partitives (developed also by Barker (1998)), in which partitive *of* plays a crucial role in the semantics.

I now exemplify these lexical entries by deriving the truth conditions of (27a), (27b) and (a version of) (28b). These three sentences were chosen because they show the three most crucial cases: group quantified expressions, individual quantified expressions and plural partitive, respectively. This shows how the lexical entries defined above can be used to represent all kinds of partitive constructions uniformly, which is a desirable result.

$$\begin{aligned}
 (33) \quad & \llbracket \text{kol ha-tafrit be-esrim fekel} \rrbracket = \\
 & \llbracket \text{kol} \rrbracket (\llbracket \text{ha-tafrit} \rrbracket) (\llbracket \text{be-esrim fekel} \rrbracket) = \\
 & [\lambda x. \lambda P. \downarrow x \sqcap \sqcup P = \downarrow x] (\sigma(\text{Menu})(\text{Cost}.20.\text{NIS})) = \\
 & \downarrow \sigma \text{Menu} \sqcap \sqcup \text{Cost}.20.\text{NIS} = \downarrow \sigma \text{Menu} = \\
 & s_{\sigma \text{Menu}} \sqcap \sqcup \text{Cost}.20.\text{NIS} = s_{\sigma \text{Menu}}
 \end{aligned}$$

$s_{\sigma \text{Menu}}$ is the sum of members of the menu-group, that is, the sum of the items which are on the menu. This formula says that the meet of the sum of items on the menu and the sum of things which cost 20 NIS equals the sum of items on the menu. Mathematically this means that the sum of items on the menu is a sub-sum of the sum of things which cost 20 NIS, and in prose it means that every item on the menu costs 20 NIS, which is the desired truth conditions of (18a).

$$\begin{aligned}
 (34) \quad & \llbracket \text{rov ha-fulxan mexuse} \rrbracket = \\
 & \llbracket \text{rov} \rrbracket (\llbracket \text{ha-fulxan} \rrbracket) (\llbracket \text{mexuse} \rrbracket) = \\
 & [\lambda x. \lambda Q. \mu(\downarrow x \sqcap (\sqcup P)) = \frac{\mu(x)}{2}] (\sigma(\text{Table})) (\text{Covered}) = \\
 & \mu(\downarrow \sigma(\text{Table}) \sqcap (\sqcup \text{Covered})) = \frac{\mu(\sigma(\text{Table}))}{2} = \\
 & \mu(m_{\sigma(\text{Table})} \sqcap (\sqcup \text{Covered})) = \frac{\mu(m_{\sigma(\text{Table})})}{2}
 \end{aligned}$$

$m_{\sigma \text{Table}}$ is the sum of stuff which comprises the table. μ is some conceptually plausible mass measure function. In this case, the measure scale which makes the most sense is surface area (two-dimensional volume), since the quantified term measures unoccupied space on top of the table.

This formula says that the meet of the sum table-stuff and the sum of covered things equals the sum of items on the menu. Mathematically this means that the the mass entity which represents the covered portion of the table comprises more than half of the mass entity which represents the surface area of the table. In prose it means that most of the surface area of the table is covered, which is the desired truth conditions of (18b).

Recall that *me-* is semantically vacuous, and therefore *me-ha-manot* means *ha-manot* in partitives. Since $\sigma(*\text{Dish})$ is a plurality, it is unaffected by the application of \downarrow by definition. The measure function μ in this case is the counting function since when combined with plurals, *harbe* is translated as *many*, and therefore it must apply a count measure function.

$$\begin{aligned}
 (35) \quad & \llbracket \text{harbe me-ha-manot nimkeru} \rrbracket = \\
 & \llbracket \text{harbe} \rrbracket (\llbracket \text{me-ha-manot} \rrbracket) (\llbracket \text{nimkeru} \rrbracket) =
 \end{aligned}$$

$$\begin{aligned}
& [\lambda x. \lambda Q. \mu(\downarrow x \sqcap (\sqcup P)) \geq d_h](\sigma(*Dish))(Were.Sold) = \\
& \mu(\downarrow \sigma(*Dish) \sqcap (\sqcup Were.Sold)) \geq d_h = \\
& \mu(\sqcup(*Dish) \sqcap (\sqcup Were.Sold)) \geq d_h
\end{aligned}$$

This formula means that the measure of the meet of the sum of dishes and the sum of things that were sold is greater or equal to d_h , the degree that represents the threshold for *harbe*. Since the relevant measure function is the counting function, due to the plurality of the noun, the formula means in prose that the number of dishes that were sold is large enough to be considered many.

VI Conclusions

In this paper I presented some novel observations about the behaviour of singular quantified terms. I started with facts about English and later focused on Hebrew. The situation in Hebrew is remarkable since in some cases there is no overt syntactic difference between singular and plural quantified terms.

Singular group nouns behave differently from individual nouns in singular quantified terms: when quantifying over a group noun, the domain of quantification is the set of group members; when quantifying over an individual noun, the domain of quantification is the stuff comprising an individual. Despite this difference, it is usually not acceptable to combine singular group nouns with numerical quantifiers. That is, even though the domain of quantification is a discrete set, counting is not acceptable.

I proposed a semantic scheme for Hebrew quantifiers which respects the syntactic and truth-conditional observations. I provided formal derivations which show that these schemes provide us with a uniform treatment of individual, group, and plural quantified terms.

There is still much work to be done in this area. One direction for further research is extending the analysis to more quantifiers and generalizing it so that the semantics is language-independent. Additionally, one big issue that remains is the difference between group nouns and plurals when it comes to counting. As was demonstrated in (22a), group quantified expressions cannot be counted in Hebrew (and in most dialects of English), but if their denotation can be identical to a plurality, then one should expect them to be countable. Therefore, one important desiderata from a theory of group nouns would be a formal account which distinguishes between groups and pluralities while maintaining the similarities between them.

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Lone Contrastive Topic Constructions: A Puzzle from Vietnamese

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I. Introduction

It has been long agreed by formal and functional researchers (primarily based on English data) that contrastive topic marking, namely marking a constituent as a contrastive topic via the B-accent/the rising intonation contour) requires the co-occurrence of focus marking via the A-accent/the falling intonation contour (see Sturgeon 2006, and references therein). However, this consensus has recently been disputed by new findings indicating the occurrence of utterances with only B-accent, dubbed as lone contrastive topic (Büring 2003, Constant 2014). In this paper, I argue, based on the data in Vietnamese, that the presence of lone contrastive topic is just apparent, and that the focus that co-occurs with the seemingly lone contrastive topic is a verum focus. The paper is structured as follows. Section 2 is a brief description of how information structural categories are canonically realized in Vietnamese. The non-canonical construction in question is discussed in section 3. An analysis of this non-canonical construction is given in section 4. Section 5 is a concluding remark.

II. Information structure in Vietnamese

II.I Topic

Vietnamese displays a SVO word order in a pragmatically neutral context, and is a topic prominent language in the spirit of Li and Thompson (1976) in that the subject tends to be the topic, and is preferably referentially given. The following examples are illustrative.

- (1) a. *Một nhóm người làm giàu rất nhanh.
one group person make rich very fast
'A group of people become rich very fast.'
- a'. Nam nói chuyện với một nhóm người.
Nam say story with one group person
'Nam talked to a group of people.'

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The ill-formedness of (1a) results from the occurrence of the indefinite NP ‘a group of people’ in the subject position, as opposed to the well-formedness of (1a’) where the indefinite NP ‘a group of people’ is in the object position. The contrast in grammaticality of these two sentences indicates that indefinite NPs are not qualified as topics. To express the proposition intended by (1a) an existential sentence is used.

- (1) b. Có một nhóm người làm giàu rất nhanh.
 exist one group person make rich very fast
 ‘(There is) A group of people (who) become rich very fast.’

A non-subject topic generally undergoes topicalization, that is, to be dislocated to the left periphery. As expected, topicalization of indefinite NPs is not allowed as evidenced by the contrast between (2a) and (2c).

- (2) a. *Một cái ghế, Nam mới mua.
 one CL chair Nam just buy
 ‘Nam just bought a chair.’
- b. Nam mới mua một cái ghế.
 Nam just buy one CL chair
 ‘Nam just bought a chair.’
- c. Cái ghế này, Nam mới mua.
 CL chair this Nam just buy
 ‘This chair, Nam just bought.’

To account for the fact that a topical constituent is generally located in the left periphery, researchers working within the Cartography approach (Duffield 2007, Tran 2009) assume that a full-fledged sentence in Vietnamese is a Topic Phrase (TopP), and the topic is located in the Spec, TopP.

II.II Is *thì* a topic head?

It is common in Vietnamese that a topic phrase is linearly followed by a particle, characterized in the literature as a topic marker, hence the gloss TOP. For instance, the subject-topic ‘he’ is followed by the topic marker *thì* in (3a). Another particle interchangeable with *thì* is *là*, as shown in (3c). In the absence of the overt particle, a null particle realized by a pause is used (3b).

- (3) a. Nó **thì** thích kẹo chanh nhất.
 he TOP like candy lemon best
 ‘He likes lemon candy best.’ (Cao 1991)
- b. Mãng cụt, ai cũng thích.
 mangosteen, TOP_{Null} who also like
 ‘Everybody likes mangosteens.’ (Michaud & Brunelle 2015)

- c. Mãng cụt **thì/ là** ai cũng thích.
 mangosteen TOP who also like
 ‘Everybody likes mangosteens.’ (Michaud & Brunelle 2015)

Since the non-canonical construction under investigation exclusively involves the particle *thì*, and allows for neither particle *là* nor the covert particle, a deeper look at this particle is necessary. As mentioned earlier, researchers working within the framework of the Cartography approach analyze a full-fledged sentence in Vietnamese as a Topic Phrase. The topic marker *thì* on this analysis is the topic head of the Topic Phrase (Duffield 2007, Tran 2009).² This analysis leads to the assumption that the element located in the Spec of the Topic Phrase must be topical. There is however evidence indicating that the so-assumed topic head *thì* is not always associated with the topic. Consider the examples below.

- (4) a. Ai **thì** anh giúp?
 who PRT you help
 ‘Who will you help?’
 b. Nam **thì** tôi giúp.
 Nam PRT I help
 ‘I will help Nam.’

Note that Vietnamese is a wh-in-situ language: the word order of a canonical wh-question remains the same as that of its non-interrogative counterpart. As such, (4a) represents a non-canonical wh-question in that the argument object wh-phrase ‘who’ is dislocated from the base position, namely the post-verbal position. It is not plausible to assume that the particle in question is a topic head given that the wh-phrase is not qualified as a topic. Additionally, the fronted object ‘Nam’ in (4b) is construed as being focused either as a reply to the question in (4a) or as a continuation of a mini-discourse such as ‘it is not my nature to help anyone, yet ...’ I therefore reject the assumption that the particle in question is a topic head, and assume, following Neeleman and van de Koot (2008), that the particle in question is at best a marker that partitions the utterance into topic-comment or background-focus, and does not mark the moved elements as topics or foci, but instead marks the constituents formed by their movements as comments and backgrounds. For ease of presentation, the gloss for the particle *thì* is simply PRT ‘particle’.

II.III Givenness

Vietnamese realizes givenness by ellipsis (deletion). Ellipsis applies not only to nominal, but to non-nominal constituents as well. The size of the elided material varies, depending on the focus structure of the utterance.

²Trinh (2005) provides an alternative analysis, according to which a full-fledged sentence in Vietnamese is a CP, and analyzes the particle in question as the head C of the CP.

- | | | |
|-----|---|---|
| (5) | a. Anh gặp ai?
you meet who
'Who did you meet?' | b. Nam.
Nam
'Nam.' |
| | c. Gặp Nam.
meet Nam
'(I) met Nam.' | d. Tôi gặp Nam.
I meet Nam
'I met Nam.' |

Of the three felicitous answers (5b, c, d), (5b) is the most frequent utterance in informal conversations where all but the focused constituent is deleted. In polarity focus contexts, it is common that the given propositional content is left unpronounced. For instance, all but the aspectual particles is deleted in (6b).

- | | | |
|-----|---|---|
| (6) | a. Anh gặp Nam chưa?
you meet Nam not.yet
'Have you met Nam?' | b. Rồi / Chưa.
already not.yet
'Already./ Not yet.' |
|-----|---|---|

It is possible to provide a tense-aspect marker or a 'yes-particle' as the answer to a polarity question even though such an answer is considered to be impolite.³

- | | | |
|-----|---|--|
| (7) | a. Anh có đi không?
you Q go Q
'Did you go?' / 'Will you go?' | b. Sẽ/Có.
FUT/do
'I will/I did.' |
|-----|---|--|

II.IV Focus

Focus in Vietnamese is generally realized in situ and is prosodically marked, namely by placing the stress on the focus element (Jannedy 2007, and references therein). Vietnamese also marks focus by adjoining a particle, homophonic to the existential/possessive verb and the yes-no particle, to the focused element (Tran 2012). The relevant role of this particle to the issue under investigation will be discussed in section 4.

III. The non-canonical structure

III.I The structure and the licensing context

We have seen above that a canonical sentence in Vietnamese displays a SVO word order, and that the topic is linearly followed by the assumed topic particle *thì*. In what follows we will look at a non-canonical construction. Briefly, the non-canonical construction involves a clause followed by the particle *thì* (the particle *là* and the covert one are ungrammatical in this construction), and what looks like a verb, or the existential/possessive verb to be precise. This construction cannot be used out of the blue, but requires contextual licensing: The context given in (8A, B) facilitates the non-canonical construction (8a), not the canonical one (8b).

³It is controversial with respect to the category of the preverbal particle *sẽ* that somehow encodes temporal reference. I gloss it as FUT just for ease of exposition.

- (12) Nam là giám đốc.
 Nam be director
 ‘Nam is a director.’

We have seen that *có* in the examples above is not an instance of the lexical verb ‘exist/have’. If it is a functional element, what is its role in the sentence structure? Consider the examples in (13) and (14) where it occurs in the pre-verbal position. The gloss in these examples is mine, but the translation is by the authors.

- (13) Hôm qua tôi có đi săn.
 yesterday I CO go hunting
 ‘Yesterday I did go hunting. (Thompson 1965:216)

Thompson (1965:216) assumes that *có* “[...] is in many ways similar to the English auxiliary verb *do*“, and “[...] denotes a kind of emphasis of the verb it precedes.” Other authors hold a somewhat similar view. For instance, Nguyen (1997:152) proposes that ‘[*có*] is used to emphasize a confirmation’.

- (14) X có ăn hối lộ.
 X CO eat bribe
 ‘X did take bribe.’ Nguyen (1997:152)

The only formal analysis of this element to date is Duffield (2007) who analyzes the pre-verbal *có* as the lexical realization of the head of the Assertion Phrase (AsrP), selected by the head T (Tense) of the Tense Phrase (TP). In the following I show that the pre-verbal *có* is a verum focus marker.

First, the functional *có* needs contextual licensing. As shown by the examples given below, the functional *có* is felicitously used in uncertainty contexts (15), and denial contexts (16).

- (15) I wonder whether Nam goes to church or not.
 Nam #(có) đi nhà thờ.
 Nam VR go to church
 ‘Nam does go to church.’

- (16) Tan didn't help Mai.
 Không. Tân #(có) giúp Mai.
 not Tan VR help Mai.
 ‘No, (that's not true). Tan did help Mai.’

The contexts that license the functional *có*, namely the indirect yes-no question in (15) and the denial context in (16), are known in the literature as the verum focus contexts. It is therefore reasonable to assume that *có* is a verum focus marker; henceforth, it is glossed as VR. In these contexts, the propositions are given, and the focus is on the polarity, that is, on whether the proposition is true or not.

We have observed previously that the non-canonical construction in question cannot be used out of the blue, and needs contextual licensing. It is interesting that its

licensing context is parallel to one of those of the preverbal *có* as verum focus marker in canonical constructions, that is, the denial context.

- (17) Tan helped Mai.
 Không. Lan giúp Mai **thì có**.
 not Lan help Mai PRT VR
 ‘No, (that’s not true). (The truth is) Lan did help Mai.’

The obvious difference between (16) and (17) is the obligatory occurrence of *có* (17): Its absence renders (16) as infelicitous, but (17) as ungrammatical. At a first approximation it seems safe to assume that the functional *có* in (17), the non-canonical construction, is a verum focus marker. Syntactically, it adjoins to the TP (18a). Its semantic contribution to the propositional content of the TP is null: It is an identity function with the lexical entry given in (18c), the ordinary value semantics, and the focus value semantics is as in (18b).

- (18) a. $[_{TP} [_{TP} \text{ có } [_{TP}]]]$
 b. $[[\text{có} (p)]]^f = \{\lambda p[\lambda w[p(w)]], \lambda p[\lambda w[\neg p(w)]]\}$
 c. $[[\text{có}]]^o = \lambda p. \lambda w p(w)$

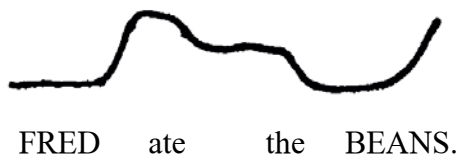
The focus value indicates that the proposition is given, and only the polarity is focused. We have observed that givenness material generally undergoes ellipsis as evidenced by the yes-no questions in (6) and (7). It is unclear why the non-canonical construction does not apply it. What prevents it? To answer this question, let us first examine the information structural status of the TP.

IV. Contrastive topic and lone contrastive topic

IV.I Contrastive topic (CT) realization

Before discussing the information structural status of the TP that the verum focus adjoins to, it is necessary to have a brief review of the current analyses of an information structural category that we have not discussed: contrastive topic (CT). Formal semantics, based mainly on European languages, provides an intonation based analysis of CT: a constituent marked by the A-accent (rise-fall intonation) is referred to as the focus of the sentence, and a constituent marked by B-accent (fall-rise intonation) the contrastive topic (Jackendoff 1972, Roberts 1996, Krifka 1999, Büring 2003, among others), as illustrated below.

- (19) a. What about FRED? What did HE eat?



[FRED]_{B-accent} [the BEANS]_{A-accent} Büring (2003:511-512)

In (19a), the B-accent on the subject NP ‘Fred’ indicates that it is a contrastive topic, as opposed to the object NP ‘the beans’ that bears an A-accent, and is construed as a focus. By contrast, in (19b), the subject NP ‘Fred’ as an instance of focus receives an A-accent, while the object NP ‘the beans’ is an instance of contrastive topic bearing a B-accent.

b. Well, and what about the BEANS? Who ate THEM?



FRED ate the BEANS.

[FRED]_{A-accent} [the BEANS]_{B-accent} Büring (2003:511-512)

As far as I am informed, Vietnamese does not exhibit the use of B-accent for contrastive topic. It is more likely that the language makes use of other means, for instance, syntactic means. If a contrastive topic is as Krifka (2006) explicates, that is, as an aboutness topic that contains a focus, then a contrastive topic is expected to undergo topicalization in Vietnamese. In fact, English also employs syntactic means to mark CT: Functional researchers regard preposing constructions as a means of contrastive topic marking (Chafe 1976, Prince, 1981, Lambrecht 1994, among others). For instance, contrastive topics appear at the left edge of the clause.

(20) What about the apples? Who ate them?

[Apples]_{CT} [Mary]_F ate.

Now let us turn to the question whether lone CT is possible across languages. Büring (2003) seems to indicate that lone CT is language specific: “In Büring (1997b) I pointed out that a contrastive topic in German must be followed by at least one focus. Accordingly, CT+CT doesn’t exist, just as little as F+CT or sole CT. In English the situation is different in that we do find sole B-accent, which should be indicative of a sole contrastive topic” (Büring 2003: 532). Recently, Constant (2014) specifies cases where an utterance surfaces with only the B-accent, and refers to this type of utterances as a lone-CT construction. The example in (21) from Constant (2014), where only *Persephone* bears the rising contour/the B-accent, is illustrative.

(21) **Lone CT**

A: Did Persephone and Antonio bring vegetarian dishes?
 B: [Persephone]_{CT} brought one...
 L+H* L-H% (Constant 2014:23)

Furthermore, there are cases where the contrastive topic is the entire clause; namely, it is the clause that bears the rising intonation or the B-accent. Constant (2014) refers to

element is replaced with alternatives to it: {{Nam helped Mai, Nam did not help Mai}, {Lan helped Mai, Lan did not help Mai}...}.

IV.II Particle *thì* as a discourse template marker

We have observed that the particle *thì* partitions the sentence into either topic-comment or background-focus, and therefore should not be analyzed as a topic head or topic marker. Following Neeleman and van de Koot (2007), I assume that the movement of the topic is to mark the comment, and that of the focus is to mark the background. Simply put, as a result of the movement of the topic (contrastive topic), the constituent resulted from the movement is construed as comment, and similarly, the movement of the focus gives rise to the construal of the remaining constituent as background. The movement of the CT witnessed in Vietnamese is to obey the mapping rules proposed by Neeleman, and van de Koot (2007) in (25), where the information structure in (25b) is ruled out. The topic is followed by a Kleene star in (25a) to indicate that there may be more topics.

- (25) a. topic* [COMMENT FOCUS [BACKGROUND]]
 b. *FOCUS [BACKGROUND topic [COMMENT]]

For illustration, consider the non-canonical examples in (23). I assume that (23a) is base generated as in (26a): The information structure formed by the verum focus *có* and the TP is ruled out by the mapping rule given in (25b), where the background following the focus consists of the topic, *Hoa*, and the comment, *bring the cookies arrive*. To comply with the mapping rule (25a), left dislocation of the contrastive topic is required, yielding (26b), where the comment following the topic includes only the focus (the verum focus), and the optional background: The deletion of ‘bring the cookies arrive’ is not obligatory.

- (26) a. [**thì** [TP **có** [TP [Hoa] CT mang bánh đến]]]
 PRT VR Hoa bring cookies arrive
 b. [[Hoa] **thì** [TP **có** [TP [Hoa] CT mang bánh đến]]]
 Hoa PRT VR Hoa bring cookies arrive

The example in (23) is parallel to the following English example in Constant (2014), where on Constant’s analysis, the first utterance of (27B) ‘Our first kid does’ is a case of Lone CT.

- (27) A: Do your kids have Swiss citizenship?
 B: [Our first] CT kid does...
 L+H* L-H%
 ?? [our second kid] CT does...
 L+H* L-H%

But [our third kid]_{CT} [doesn't]_{Exh.}
 L+H* L-H% H*L-L% (Constant 2014:143)

However, if this is the case, it would be difficult to explain why the third utterance 'But our third kid doesn't' is not a Lone CT given that they both contribute to the resolution of the same question.⁴ It is more plausible that the auxiliary 'do' in the first sentence functions as a verum focus, the same as the verum focus *có* in Vietnamese, but for unknown reason, the expected accent is not realized.

Continuing with the verum focus analysis, I argue that the example in (28), which according to Büring (2003) is an instance of Lone CT, also displays a CT+VF pattern, and the verum focus of (28) is realized by the strong form [kæn], not the weak form [kən] of the modal verb 'can'.

(28) Can Jack and Bill come to tea? – BILL_{CT} can. (Büring 2003:532)

The non-canonical construction in Vietnamese uses a modal verb instead of a verum focus to express the short answer in (28), as illustrated in (29). This is not unexpected given that the use of a modal verb as a short answer to a yes-no question in Vietnamese is quite common.

(29) Can Nam and Trung come to tea?
 Nam thì được.
 Nam PRT can
 'Nam can.'

The non-canonical construction can also realize sentential CT constructions, namely constructions where the entire clause functions as a contrastive topic. As shown in (30), the first clause 'the workers work' (30a) contrasts with the second clause 'the boss does not pay them their salary' (30b).

(30) What caused the strike yesterday?
 a. Vì [công nhân làm]_{CT} thì [có]_F
 because worker work PRT VR
 'Because the workers work...'
 b. mà [chủ trả lương]_{CT} thì [không]_F.
 but boss pay salary PRT not
 'but the boss does not pay them their salary.'

V. Conclusion

The findings in Vietnamese indicate that contrastive topic marking requires the co-occurrence of focus marking. Constructions that can be specified as Lone CT in Vietnamese in fact involve verum focus marking. It is likely that Lone CT across

⁴ The subscripted *Exh* phrase according to Constant (2014) is an exhaustive focus that provides the complete answer to the question.

languages is accompanied by verum focus marking, and languages differ as to how this verum focus is realized: syntax, phonology, or both.

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