[Review]

Formal Properties of Measurement Constructions


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Keywords: measure construction, non-split/split quantifier, monotonicity, comparative

1. Introduction

This book is a revised version of the author’s doctoral dissertation submitted to University of Pennsylvania (Nakanishi (2004)). The dissertation already had many strengths with respect to theoretical depth and empirical coverage. With the elaborations Nakanishi has added, this book is truly worth reading, and contains many stimulating discussions.

The fundamental issue this book addresses is compositionality, i.e. formal representation of the syntax-semantics correspondence. The specific area of investigation is measurement constructions, and the two main topics Nakanishi takes up in particular are non-split/split MP (Measure Phrase) constructions (Chapters 2 and 3) and comparatives with MPs involving -sugiru (Chapter 4). The author’s main idea is that there is a mapping relation (homomorphism) between events and other domains, which leads to the mechanisms whereby the MP in split MP constructions indirectly measures events by measuring individuals mapped from events, and the MP in the verbal domain in the V-sugiru construction measures the excessiveness of events by measuring times, paths, and individuals mapped from events.

In the next section, I will present the core data Nakanishi commits herself to account for in this book and briefly summarize the approach she takes. In section 3 I will discuss some issues concerning the non-split/split MP constructions and comparatives with MPs. In section 4 I will make some comments on the relation of this book to other works in the literature.

* I thank two anonymous reviewers for critical comments and constructive suggestions.
2. Some Empirical Facts and Nakanishi’s Approach

For the non-split/split MP constructions, consider the following minimal pair in Japanese.

(1) a. Gakusei san-nin-ga kinoo odotta.
    student 3-Cl-Nom yesterday danced
    ‘Three students danced yesterday.’

   b. Gakusei-ga kinoo san-nin odotta.
    student-Nom yesterday 3-Cl danced
    ‘Three students danced yesterday.’

In (1a), the numeral (in association with a classifier) is adjacent to the noun gakusei ‘student,’ within the nominal domain of the subject DP. On the other hand, in the split MP construction in (1b), a.k.a the floating quantifier construction, the numeral is separated from the noun, even though the numeral is construed with this noun as much as in (1a). Nakanishi shows a similar minimal pair of sentences in German (a sentence with a numeral in the DP and its corresponding sentence in the so-called ‘split NP topicalization’ construction). Given this syntactic contrast, an obvious question is exactly how such a pair of sentences are semantically computed in accordance with syntax, maintaining compositionality. In particular, there are several significant semantic differences between the non-split and the split MP constructions which Nakanishi draws our attention to. First, the latter, but not the former construction, is incompatible with single-occurrence events, as exemplified in (2a). Second, the split MP construction is incompatible with individual-level predicates, as exemplified in (2b). Finally, the split MP construction does not allow collective readings, as exemplified in (2c).

(2) a. ??Gakusei-ga kinoo san-nin Peter-o koroshi-ta.
    student-Nom yesterday 3-Cl Peter-Acc kill-Past
    ‘Three students killed Peter yesterday.’

   b. ??Gakusei-ga kono kurasu-de san-nin kashikoi.
    student-Nom this class-in 3-Cl smart
    ‘In this class, three students are smart.’

   c. Otokonoko-ga kinoo san-nin booto-o tsukut-ta.
    boy-Nom yesterday 3-Cl boat-Acc make-Past
    ‘Three boys each built a boat yesterday.’

   ??‘Three boys together built a boat yesterday.’
An adequate semantic analysis which accounts for this unacceptability in a principled fashion is called for.

As for the second topic, i.e. comparatives with MPs, consider the following minimal pair.

   (p. 173, (3a))
   John-Nom book 3-Cl-Acc yesterday read-exceed-Past
   ‘John read (the) three books too much yesterday.’

   (p. 173, (3b))
   John-Nom book-Acc yesterday 3-Cl read-exceed-Past
   ‘John read three books too many yesterday.’

In (3a), the numeral (with a classifier) is contained in the nominal domain of the object DP, adjacent to the noun hon ‘book,’ while in (3b), it is separated from the noun. Note that these sentences have the comparison-denoting element -sugi ‘exceed’ as part of the compound verb. Nakanishi claims that the syntactic difference between these two sentences with -sugi yields a striking interpretation difference. While (3a) means that John overdid the reading of three particular books, i.e., John read them too many times or for too long, (3b) means that John read three more books than he was supposed to, e.g., he was supposed to read five, but ended up reading eight.

The syntactic difference at issue in these data is the occurrence of the MP in a nominal domain versus its occurrence in a verbal domain. Regarding syntax, critically assessing the transformational analysis of the FQ (e.g. Sportiche (1988)), Nakanishi adopts the hypothesis that the split MP (the FQ/the floating numeral quantifier) is a VP-adjunct (e.g. Fukushima (1991), Fujita (1994), Gunji and Hasida (1998), Ishii (1999), Kobuchi-Philip (2003)), and proposes a Generative Grammatical syntactic structure, which incorporates Kratzer’s (1996, forthcoming) Voice Phrase (p. 140).

Semantically, first, Nakanishi adopts the assumption that there is a parallelism between the two domains, and shows in particular that the parallelism between the count/mass distinction in the nominal domain and the telic/atelic distinction in the verbal domain can be represented with respect to the algebraic lattice formation in a unified fashion, as follows.
(4) a. Lattice Structure of Individuals (e.g. Link (1983))

\[
\begin{array}{c}
x \\
\cup IY \\
x \cup IZ \\
y \cup IZ
\end{array}
\]

\[
\begin{array}{c}
x \\
y \\
z
\end{array}
\]

\[
\begin{array}{c}
x \cup Y \cup Z
\end{array}
\]

b. Lattice Structure of Events (e.g. Krifka (1989))

\[
\begin{array}{c}
e_1 \cup E_2 \cup E_3
\end{array}
\]

\[
\begin{array}{c}
e_1 \cup E_2 \\
e_1 \cup E_3 \\
e_2 \cup E_3
\end{array}
\]

\[
\begin{array}{c}
e_1 \\
e_2 \\
e_3
\end{array}
\]

Next, Nakanishi takes Schwarzschild’s (2002, 2006) notion of ‘monotonicity’ as the basic principle at work in the two domains. To see this semantic constraint at work, consider the following sets of data with the English pseudopartitive construction.

(5) a. three liters of water (volume-water) (p. 42, (13))

b. *three degrees of water (*temperature-water)

(6) a. seven pounds of meat/marbles (pound-mass/plural count) (p. 42, (15))

b. ? seven pounds of baby (??pound-singular count)

Schwarzschild accounts for these data in terms of monotonicity: The measure function (e.g. that of liter, degree, pound) must keep track of the part-whole structures of the entity referred to by the noun in the pseudopartitive. Nakanishi formalizes this as in (7) (p. 43, (16)).

(7) A measure function \( \mu \) is monotonic relative to domain I iff:

(i) \there exists at least two individuals \( x, y \) in I such that \( x \) is a proper subpart of \( y \) (i.e., \( x < y \)), and

(ii) for all \( x, y \) in I such that \( x < y \), \( \mu(x) < \mu(y) \).

To be concrete, the measure function \( \mu \) is what we measure the given entity by, as in (8).
Thus, the well/ill-formedness in (5) results from the circumstance that, while volume keeps track of the part-whole structure of water, temperature does not do so. Likewise, in (6), weight keeps track of the part-whole structure of mass and plural-count objects, while it does not do so with respect to a single body of baby, which we do not perceive as a collection of parts.

Although Schwarzschild discusses the monotonicity mainly in terms of the nominal domain, Nakanishi applies this to the verbal domain as well. That is, what she claims is that in the non-split MP construction monotonicity must be respected in the nominal domain, while in the split MP construction it must be respected in the verbal domain.

The algebraic structural parallelism between the nominal and verbal domains and the monotonicity constraint in the two domains do not, however, completely explain the tie between the two domains. In a split MP construction such as (1b) above, the classifier phrase occurs in the verbal domain, yet it is apparently construed with the noun in the nominal domain. A mechanism which directly relates the two domains is necessary. This is what leads Nakanishi to propose a homomorphism, a mapping relation between the two domains, which is a main proposal of the book. In order to correctly derive the interpretation of sentences containing a temporal adverbial, e.g. a durative adverbial for two hours in the sentence John slept for two hours, Krifka (1989) proposes a homomorphism h which connects events and the run time of events. This is because a durative adverbial cannot directly apply to an event, since the event of sleeping and the duration of this event are different sorts of semantic entities. Nakanishi makes use of this idea and proposes that there is a homomorphism h from events (the lattice structure schematized in (4b) above) to individuals (the lattice structure schematized in (4a)), as illustrated in (9), and that, with the help of this homomorphism, the split MP construction measures events by measuring individuals.
(9) A Measure Function Associated with a Split MP

\[ h(e_1 \cup h(e_2)) = h(e_1) \cup h(e_2). \]

The homomorphism \( h \) from events to individuals is a function which preserves the part-whole structure, specifically, the property of cumulativity and monotonicity, satisfying \( h(e_1 \cup e_2) = h(e_1) \cup h(e_2) \).

Equipped mainly with these semantic devices, Nakanishi explains the data in (2) in a principled fashion (pp. 73–77). First, the split MP construction is incompatible with single-occurrence events. In the split MP construction, the measure function applies to individuals mapped from events by the homomorphism \( h \), and the monotonicity constraint must be satisfied in the event lattice. However, while the lattice of individuals is structured with the part-whole relation, the lattice of a single-occurrence event has only one atomic element. Thus, the monotonicity constraint cannot be satisfied. Second, the split MP construction is incompatible with individual-level predicates. Taking Kratzer’s (1995) view, an individual-level predicate does not have an event argument, and thus, there can be no homomorphism \( h \) from events to individuals. Consequently, the measure function does not have an appropriate domain of application. Third, the split MP construction does not allow collective readings. A collective reading is generally assumed to be the result of a predicate applying to a collection of individuals as a group. Technically, a group is formed by applying a group-forming operator ‘↑’ to a sum of individuals, as in ↑(x ∪ y ∪ z) (Landman (1989a, 1989b, 1996, 2000)). However, the group is an atomic entity; it is no longer a sum of its members (x, y, and z). Thus, it has no part-whole structure and as a result, the monotonicity constraint in the verbal domain cannot be satisfied. In this way, Nakanishi shows that the data with non-split/split MP constructions can be explained in a principled way with a precise compositional semantic analysis based on monotonicity.

Turning to the -sugiru comparative construction with an MP, when the MP is in the nominal domain, as in (3a), the excessiveness is not specified (e.g. too many times, too much of the three books). On the other hand, when the MP is in the verbal domain, the excessiveness is specified with respect to what the classifier refers to; the volumes of books (san-satsu ‘3-Cl’) in the case of (3b). Thus, the MP in (3b) functions as a differential
After carefully examining the function of -er, more (as many/much plus -er), and too of the semantics of comparatives (e.g. Heim (2000), von Stechow (1994), Hackl (2000)), Nakanishi analyzes -sugi as equivalent to English too, in association with an implicit function MANY/MUCH. The MP in the verbal domain in a -sugiru sentence necessitates that the MP be interpreted as a differential MP due to its direct combination with -sugiru (p. 205). In the case of (3b), the MP san-satsu ‘3-CL’ expresses the measure function µ: cardinality-of-individuals. In order to apply this to events, the denotation of the verb yomu ‘read’ is used for the homomorphism, from events to individuals (book-volumes), the same homomorphism we saw in the interpretation of the split-MP construction above. In turn, the excessiveness of reading events is aligned with the three book volumes. This is not the case for the non-split MP in (3a); -sugiru combines with the nonfinite non-split MP construction as a whole, i.e. ‘John read (the) three books.’ (p. 206) Thus, the excessiveness denoted by -sugiru may be associated with any degree compatible with the event of John’s reading three books (e.g. event cardinality ‘too many times,’ or temporal length ‘too long’).

3. On the V-Sugiru Construction

Here I would like to make a brief comment on Nakanishi’s analysis of the V-sugiru construction. Nakanishi claims that an MP in a V-sugiru construction, such as in (3b), repeated here, can only be interpreted as a differential MP.

(3) b. John-ga hon-o kinoo san-satsu yomi-sugi-ta.
   John-Nom book-Acc yesterday 3-CL read-exceed-Past
   ‘John read three books too many yesterday.’

Indeed, the most preferred interpretation of (3b) may be that of a differential MP, as in the English gloss. However, although Nakanishi claims that a distributive interpretation is not available here (pp. 207–208), for some native speakers, such a sentence can in fact allow a distributive interpretation, since (3b) can be considered to be associated with an elliptical adverb ooku ‘many/much’ right after the MP. Compare (3b) with (11); both sentences have exactly the same meaning when the MP forms a constituent with ooku ‘many.’
Nakanishi claims that, although the co-occurrence of a differential MP and a gradable adverb with -sugi leads to a redundancy (Chapter 4, sections 3.2 and 3.4.2), this does not hold when the negative implication evoked by -sugi is meaningful (p. 193, fn. 15). If so, the well-formedness of (11) suggests that it does have some negative implication. Putting aside the precise justification for the redundancy mechanism, note that (11) is in fact structurally two-ways ambiguous. In one reading, ooku ‘many/much’ forms a constituent with the MP san-satsu ‘3-Cl,’ while in the other, it forms a constituent with the predicate yomi-sugi-ta ‘read-exceed-Past,’ as in (12).

(12) a. John-ga hon-o kinoo [san-satsu ooku]
    John-Nom book-Acc yesterday 3-Cl many
    yomi-sugi-ta.
    read-exceed-Past
    ‘John read three books too many yesterday.’ (differential MP reading)

b. John-ga hon-o kinoo san-satsu [ooku
    John-Nom book-Acc yesterday 3-Cl much
    yomi-sugi-ta].
    read-exceed-Past
    ‘John read three books each too much yesterday.’ (distributive reading)

The structure (12a) only allows a differential MP interpretation, but in the case of (12b), the distributive interpretation of Nakanishi’s split MP construction is possible. It is important to point out also that in (12a) the choices of the adverb are limited to those which yield the differential reading, such as ooku ‘many/much’ and yokeini ‘extra.’ On the other hand, in (12b) a variety of adverbs can occupy the preverbal position, in so far as they adequately combine with the meaning of the predicate, to yield a distributive reading.
b. John-ga hon-o kinoo san-satsu [hayaku
John-Nom book-Acc yesterday 3-Cl fast
yomi-sugi-ta].
read-exceed-Past
‘John read three books each too fast yesterday.’ (distributive)
c. John-ga hon-o kinoo san-satsu [majimeni
John-Nom book-Acc yesterday 3-Cl seriously
yomi-sugi-ta].
read-exceed-Past
‘John read three books each too seriously yesterday.’ (distributive)

Thus, it seems that the differential MP reading of (3b) arises from the circumstance that the MP is underlyingly associated with an elided instance of a quantity-denoting adverb such as ooku ‘many/much’ and yokeini ‘extra’ in the structure configuration in (12a). As a reviewer points out, this may be an overt realization of Nakanishi’s implicit function MANY/MUCH, which is supposed to be associated with -sugiru. If so, a closer structural relation between the MP and MANY/MUCH may be desired than suggested in Nakanishi’s structure (p. 205, (79)), given that the precise syntactic position of the adverb significantly affects the interpretation. (Regarding this, it is worth noting that Tanaka (2006) analyzes ooi ‘many/much’ as what can be equivalent to English comparative more (also assuming it to be many/much plus -er), when combined with an MP.) In any event, the well-formedness of sentences (12a, b) shows that the absence of the overt adverb in (3b) creates a structural ambiguity with respect to a possible elliptical adverb. It seems that this should be assumed to account for the existence of the distributive reading as a possible reading for (3b).

4. Overview of the Literature on the FQ

In this section I will briefly overview Nakanishi’s work in comparison with some other works in the literature, focusing on the split MP construction.

Syntactically, as mentioned above, Nakanishi assumes that the split MP is a VP-adjunct, while non-split MP is an NP-adjunct. Although this is not a new analysis—indeed, it could be considered the standard view in the semantics literature on the FQ (e.g. Dowty and Brodie (1984), Link (1987), Junker (1990), Fukushima (1991), Gunji and Hasida (1998), Kobuchi-Philip (2003))—the new observation Nakanishi makes is the significant interpretive
differences between the split and non-split MP sentences, and the split MP sentence’s direct relation to the predicate. Moreover, Nakanishi presents a formal semantic analysis of these observations. Even though Nakanishi does not particularly emphasize the syntactic implications, as further support of Nakanishi’s approach, it can be noted that there are some classifiers which are only construed with events, such as follows (Fukushima (1991), Kobuchi-Philip (2003, 2007)).

(14) a. Taro-ga pisutoru-o ip-patsu kinoo ut-ta. (Fukushima (1991))
   Taro-Nom pistol-Acc 1-Cl yesterday shot-Past
   ‘Taro shot a pistol once yesterday.’

   b. John-wa soko-de ni-kai ton-da. (Kobuchi-Philip (2007))
   John-Top there-at 2-CL jump-Past
   ‘John jumped twice there.’

   Yoko-Top the hotel-at 3-CL stay-Past/do-Past
   ‘Yoko stayed three nights at the hotel.’

These MPs are obviously construed with events referred to by the predicate, not with objects. In the syntax literature, the adverbial approach to the Japanese FQ, which would directly relate the FQ to the predicate (e.g. Inoue (1978), Fujita (1994)), has always been a topic of controversy opposed by a transformational approach, which currently continues to be influential (Watanabe (2006), Miyagawa and Arikawa (2007), also see Fitzpatrick (2006)). Nakanishi’s work once again reminds us that, no matter what approach is taken, the proper syntactic analysis must explicate the FQ’s direct relation to the predicate.

Semantically, one of the advantages of Nakanishi’s analysis is that it does not use the D(istributivity)-operator, which is used to explain the characteristic distributive reading of the FQ (Link (1987, 1998)). Clarifying the semantic status of sums and groups and distinguishing them, Landman (1989a, 1989b, 1996, 2000) reduces distributivity to semantic plurality, eliminating D-operator; unless a sum is reanalyzed as a group (associated with a group operator), it by default yields a distributive interpretation. This is a significant simplification of the theory, and using Landman’s plurality theory, Nakanishi’s analysis accomplishes a simpler account of the distributive reading of the split MP sentence.

Another significant merit of the analysis is that it is framed in event semantics. Although Fukushima (1991) provides a formal semantic analysis of the Japanese FQ and suggests the importance of event considerations...
in relation to the event classifier such as -hatsu ‘shot’ mentioned above, Fukushima himself does not pursue the topic further, since his analysis is based on a traditional object-quantificational semantics. In contrast, since Nakanishi’s whole analysis is set up in event semantics to begin with, her analysis straightforwardly captures the facts for event classifier sentences.

Nakanishi’s theory also has the empirical advantage that it covers all MPs within the same framework. In comparison, although Kobuchi-Philip (2003, 2007) also offers a formal semantic analysis of the Japanese FQ, which covers event classifiers as well as distributivity effects, her analysis is limited to the individual-denoting classifiers and does not cover MPs used to measure substance, time, etc. Thus, Nakanishi’s analysis has a larger empirical domain. This is made possible by the approach that takes all measure units as measure functions in a unified fashion.

Finally, a brief discussion of the analysis of Gunji and Hasida (1998) is in order. The basic idea Nakanishi proposes about the split MP is that it counts events by counting individuals expressed in the MP. In fact this was earlier suggested by Gunji and Hasida (1998: 64). Gunji and Hasida’s analysis uses a homomorphic relation between events and another domain which the MP expresses, on the basis of Krifka’s (1988) pm (primary measure) and Dowty’s (1991) incth (incremental theme). These ideas are similar to what Nakanishi uses in her analysis as well. Thus, aside from the difference in the framework (Gunji and Hasida (1998) use GPSG, while Nakanishi uses the Generative Grammatical framework), the two have essentially the same idea. However, Gunji and Hasida’s (1998) main focus is subject-object asymmetry and they argue that the prima facie syntactic subject-object asymmetry, much discussed in the Japanese FQ syntax literature (e.g. Miyagawa (1989)), should be accounted for by semantic mechanisms. Thus, although Gunji and Hasida use some mechanisms that are the same as what Nakanishi uses, their research develops in a different direction from Nakanishi’s, involving the discussion of subtle acceptability differences of sentences with different word order and the factors that have to do with the processing cost, among other things.

In sum, the contribution of this book is significant. It accomplishes a semantic formalization of the intricate system of measurement reflected in language in an extensive scale. The book certainly inspires its readers, making them aware of the rich complexity of linguistic meaning.
REFERENCES


[received July 20 2009, revised and accepted November 16 2009]