

On expressing measurement and comparison in English and Japanese

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1. Introduction

This chapter applies the analytical tools of Construction Grammar to a delimited area of semantics in two unrelated languages.¹ In contrasting the lexical and grammatical resources of different languages, we first need to define the domain of inquiry. One method is to select lexical or phraseological units, or specific grammatical patterns (e.g., dative and relative clause constructions), and then describe their functions in each language. This method is referred to as a *semasiological*, or *decoding*, approach. One of the difficulties of this approach is the determination of corresponding constructions across languages that do not derive from a common ancestor. For example, it is relatively easy to find structures in Japanese that superficially resemble English dative or relative clause constructions, but closer examination only reveals that they are parts of larger families of constructions which have divergent properties in the two languages, calling into question the original correspondence.

In order to avoid this problem, we have been investigating in recent years a variety of constructions in English and Japanese in an *onomasiological*, or *encoding*, approach. Construction Grammar posits, as its underpinning, the concept of *construction*, i.e., the pairing of form and meaning, which provides us with two possibilities in cross-linguistic investigation. One is to start with a comparable pair of forms, and the other, a comparable pair of meanings. Rather than selecting lexical or phraseological units

1. This work is a development of the ideas discussed in our paper presented at the Fifth International Conference on Construction Grammar in 2008. We are greatly indebted to Kimi Akita, Hans Boas, Albert Kong, Satoru Uchida, and two anonymous reviewers for their comments and suggestions, and to the International Computer Science Institute in Berkeley, CA, for providing us with resources and space for our collaboration. This work was supported in part by Japan Society for the Promotion of Science under the Japan-U.S. Cooperative Science Program.

and then describing their functions in the language, an onomasiological approach proceeds from a concept and asks how it can be expressed in the languages under investigation. It then becomes possible to examine the patterns encountered in such an exercise to find out which of them specifically serve the expressive purposes of the starting concepts, and which of them have more general functions that just happen to include the original purpose.

Adopting the principle of onomasiology in cross-linguistic investigation requires, as the subject matter, a set of precise categories and relationships that can be laid out objectively and that permit replicable elicitation from native speakers. Traditional areas of lexical research that can be described as onomasiological in this sense includes kinship terminology (e.g., Lounsbury 1956), color names (e.g., Berlin & Kay 1969), plant and animal taxonomies (e.g., Berlin 1974, 1992; Grigson 1974), and body part naming (e.g., Zauner 1902, Petruck 1986). In each case, initial inquiries can be limited to easily presented concepts or nameables: show the informant a plant or animal, point to a part of the body and ask for its name, sketch out a real or imaginary family tree and ask how individuals represented in the tree talk to or about the others, or lay out a table of Munsell color chips and find how they are mapped to color names in the culture.

In the history of such research, there have always been surprises: kinship systems sometimes employ birth order as a relevant relationship, providing a different name for a mother's older brother and a mother's younger brother, and the investigator might not have been prepared for this. Biological taxonomies can differ in which words are considered basic and which are considered generic or specific, and can have clear distinctions in naming between useful and harmful plants and animals. Body part names can be imbued with beliefs about the body part's function, or can differ from language to language in terms of the understood "boundaries" of the parts.

In spite of the fact that lexical semantic systems that have been explored in the onomasiological method have required the recognition of language-specific and culture-specific framing or organizational differences, they still contrast strikingly with areas for which initial elicitation is not so easy, such as those of religion, law, or esthetics.

Measurement and comparison expressions seem to be ideal candidates for the onomasiological approach. We can expect the meaning of such expressions to remain relatively constant across languages and objectively describable, at least when we limit ourselves to languages prepared for the needs of modern industrial society, where measurements and comparison are shared needs. In this chapter we are interested in a cross-linguistic study of the three categories we shall informally call *Measurement*, *Comparison*, and *Measured Difference*.

- a. Measurement: the language used in reporting the measurement of objects that have some kind of spatial or temporal linear extent (e.g., the window is a meter wide).
- b. Comparison: the language used in comparing two entities with each other on some scale, both equalities and inequalities (e.g., this window is wider than that one).

- c. Measured Difference: the language used in reporting the measured differences of two entities along some scale (e.g., this window is 3 centimeters wider than that one).

We will find that English offers expressive complexity in Measurement that is not matched in Japanese; we will find different kinds of complexity between the two languages in the area of simple Comparison; and we will find a pattern in Japanese Measured Difference that superficially resembles one of the English Measurement patterns. In so doing, we will aim at establishing a model for cross-linguistic investigation in the framework of Sign-Based Construction Grammar (Sag to appear), with semantic representations compatible with analyses in both English and Japanese FrameNet (cf. Fillmore et al. 2003, Ohara et al. 2004, Ohara 2008), and demonstrate how it can capture the generalizations and differences among the discovered patterns.

Following the guidelines and methods of Frame Semantics (Fillmore 1982, 1985), FrameNet is a computational lexicographic project which describes the lexicon of English as grouped into conceptual *frames* (cf. Ruppenhofer et al. 2006). Frames structure background knowledge needed to understand the participants, props, motivations, etc. of a situation. Each frame has a number of core and non-core *frame elements* (FEs, whose labels will be indicated with small capitals), which can be thought of as semantic roles. For instance, the Attaching frame involves at least three entities, an AGENT, an ITEM, and a GOAL; the AGENT causes the ITEM to be connected to the GOAL (Frame names are in the Courier typeface).

The words (or lexical units) of a language are said to evoke a frame. For instance, the verbs *attach*, *fuse*, and *weld* each evoke the Attaching frame and are associated with a specification for linking their syntactic arguments (external argument, object, etc) with the Attaching frame's FEs.² A detailed discussion of the methodology and tools of FrameNet can be found in Fontenelle (2003).

In the FrameNet project, frame-evokers are limited to lexical units, but it has long been recognized (since at least Fillmore 1985) that non-lexical or partially-filled lexical constructions have semantics of their own, or, in our terms, that constructions, too, evoke frames. The constructional evocation of frames was explored in detail by Goldberg (1995), who demonstrated that the *Ditransitive* construction (V NP NP, *slide her the papers*) had the semantics of the Cause_receive frame (Chapter 6), and that of the *make one's way* construction (*whistled her way down the street*) evokes the Motion frame (Chapter 9). (Construction names are in the Italicized Courier typeface.) Similarly, Kay and Fillmore (1999:20) described the semantics of *what's X doing Y* (*what's this scratch doing on my car?*) in terms of a frame of "incongruity-judgment."

The organization of the present chapter is as follows: Section 2 lays out the Measurement, Comparison, and Measured Difference expressions in English and provides their representations in FrameNet. Section 3 explains the Comparison frame that is the

2. In many cases most or all lexical units that evoke the same frame are associated with the same linking rules, but in others, words that evoke the same frame may use different syntactic means, e.g., within the Giving frame there is both *give X to Y* and *bestow X upon Y*.

underpinning for the semantics of the constructions under investigation. We demonstrate that the integration of the semantic frames of the various scalable concepts (distance, length, age, etc.) with the frames introduced by the *Comparative* construction is expressed by coindexing of FEs. Section 4 presents relevant expressions in Japanese, discusses differences from their English counterparts, and proposes a special construction for Japanese. Section 5 considers two alternative analyses for dealing with the special type of Japanese comparative construction. Section 6 summarizes this chapter.

2. English patterns

2.1 Measurement

English reports numerical measures of properties of entities (i) through nouns that designate particular dimensions, e.g., *depth*, *height*, *thickness*, and *age*, as in (1); (ii) through verbs that incorporate the dimension concept, i.e., *cost*, *weigh*, as in (2); (iii) through adjectives that incorporate the dimension concept, e.g., *tall* and *old*, as in (3).

- (1) a. Entity + *has* + Dimension + *of* + Measurement. (Figure 1)
The pit has a depth of 6 feet.
- b. Entity's + Dimension + *is* + Measurement.
The container's height is 6 feet.
- c. Dimension + *of* + Entity + *is* + Measurement.
The height of the container is 6 feet.
- d. Entity + *is* + Measurement + *of/in* + Dimension. (Figure 2)
The pit is 6 feet in depth.
My sister is 6 years of age.³
- (2) Entity + DimensionVerb + Measurement.
My biology textbook cost 200 dollars.
My biology textbook weighs 4 pounds.
- (3) Entity + *is* + Measurement + DimensionAdjective. (Figure 3)
My youngest son is 6 feet tall.
My youngest son is 14 years old.
My biology textbook is 4 inches thick.

Figure 1 represents in Sign-Based Construction Grammar (SBCG, cf. Sag to appear) the class of dimension-denoting lexical items that participate in the “*has* + Dimension + *of* + Measurement” pattern in (1a), e.g., *The pit has a depth of 6 feet*.

3. Although not an absolute restriction, we find that *of age* is generally used for people, while *in age* is used for other entities, e.g. *Grand Canyon is 11 million years in age*.

have-attr-lxm ⇒

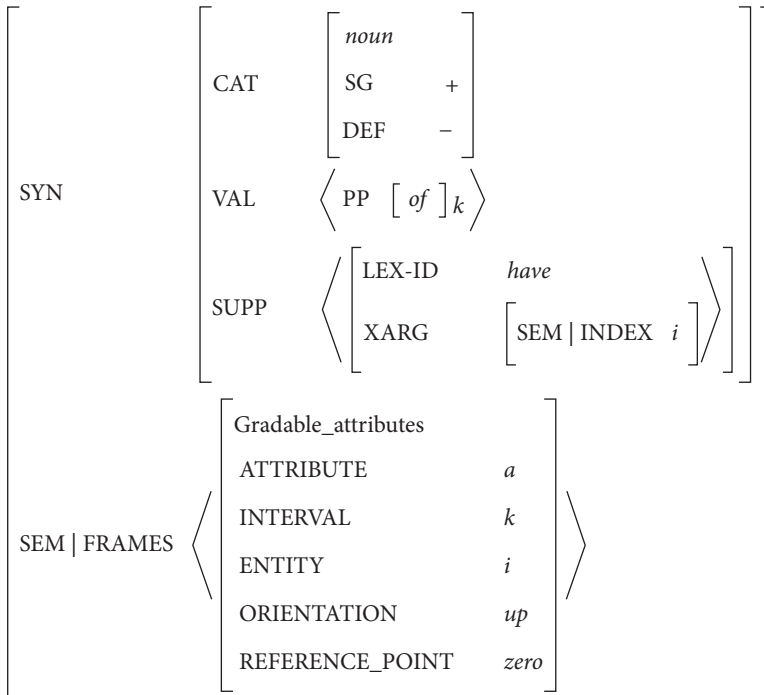


Figure 1. *has* + Dimension + *of* + Measurement

The class of *have-attr-lxm* is construction-specific; i.e., it is stipulated to contain all and only those nouns that can appear in this construction. It includes among many other words *depth*, *density*, *length*, *price*, *width*, and *weight*, but not **charm* or **intelligence*. More precisely, Figure 1 indicates that there is a class of lexemes (*have-attr-lxm*) with a variety of constraints, which is specified by the attribute-value matrix following the double-shafted arrow.

There are two relevant classes of constraints: syntactic (SYN) and frame-semantic (SEM|FRAMES). Among the syntactic constraints are first category (CAT) features: the lexemes described are nouns that occur in indefinite (DEF -) singular (SG +) form. This class of words has a single complement (a valent on the valence (VAL) list), a PP headed by *of*. This PP has an index *k*, to play a role in the semantics below. Finally it appears with a support verb (SUPP) *have* (LEX ID *have*). The index *i* of the external argument (XARG) of the support verb shows that the VP (e.g., *has a height (of *x* inches)*) is a predicate of the NP that is the subject of the support verb *have*.

The semantic constraint is that this class of words evokes a frame of Gradable_attributes, which has six frame elements. Because this is a generalization over all the

members of the class, the frame evoked by a particular lexical item will be more specified, e.g., Depth. The ATTRIBUTE FE will be specified by that frame. The INTERVAL is co-indexed (*k*) with the PP, indicating that *depth of 6 feet* has an INTERVAL of “6 feet” (the *of* contributes no semantic information relevant for current purposes). The INTERVAL is the distance between the REFERENCE_POINT (*zero*) and the value on the scale associated with the ENTITY. That ENTITY is co-indexed (*i*) with the subject of the support verb. Finally, because these are always the ‘up-from-zero’ dimensions (i.e., *height* rather than *shortness*, *depth* rather than *shallowness*, etc.), the ORIENTATION is *up* and the REFERENCE-POINT is *zero*. The *up* here has to be understood as ‘away-from-zero’, rather than ‘vertically up’, because, of course, while *height* is really an upward dimension, *depth* is the opposite, and *length* and *width* are neutral or horizontal.

Regarding the notion of a support verb, a separate *Support* construction (not analyzed here) combines support words with the main frame-evoking unit (e.g., *height*) and supplies, as its external argument (i.e., subject), an NP indexed as the ENTITY.

Figure 2 represents the “(is +) Measurement + in + Dimension” portion of (1d), e.g., *The pit is 6 feet in depth*. Unlike Figure 1, which illustrates a class of lexical items, Figure 2 illustrates a construction. The term *construction* is informally understood as a mechanism that pairs a particular syntactic pattern with the meaning to which it is dedicated. In SBCG, the term *construction* (or *combinatory construction*) is defined as:

“[An] expression [that] defines the distinctive properties of a mode of combination that is part of the grammar of a language – the properties that define a way of putting expressions together to ‘construct’ other, more complex expressions” (Sag, to appear).

In this particular case, the construction licenses the combination of an EXTENT (*6 feet*) with a PP-*in* (*in depth*), resulting in a particular semantics (identification of the EXTENT and INTERVAL FEs) and syntax (usable as a predicate only).

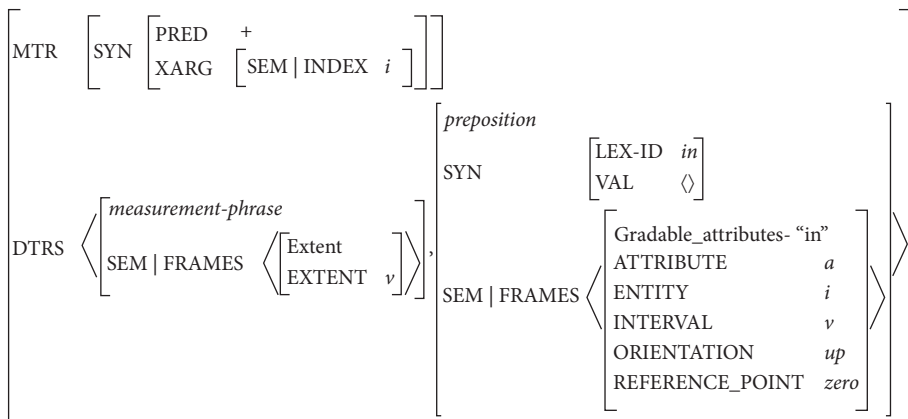


Figure 2. (is +) Measurement + in + Dimension

The Extent frame in the left daughter describes an abstract notion of measurement, and is evoked by such expressions as *6 feet* and *9 years*. It has one FE relevant for the current discussion, namely EXTENT. In this construction, the EXTENT is identified with the INTERVAL FE of the Gradable_attribute-“in” frame. The INTERVAL of this frame is the distance between the REFERENCE_POINT and the value associated with the ENTITY. That is, rather than have a separate VALUE FE, the height (weight, etc.) of an entity can be calculated based on the REFERENCE_POINT and INTERVAL, two FEs which are independently required (see the *Vector* and *Comparative* constructions below). For instance, in *this fence is 6 feet in height*, the INTERVAL is identified as *6 feet* on the scale of height, and thus as the height of the fence. VAL < > in the right daughter indicates that the valence is satisfied (saturated).

The frame specification Gradable_attribute-“in” denotes the fact that only certain gradable attributes can appear in this construction (*height* and *width*, but not **intelligence*). Due to general principles of locality of selection (cf. Sag 2008 for a discussion of locality within an SBCG framework), the head of the noun phrase selected by the preposition *in* is not directly selectable by the measurement phrase; it may select a PP with a particular head, but not a PP with an NP object that itself has a particular head (i.e., niece-selection). What is available is a *frame* evoked by the relevant class of nouns – assuming that in this case the preposition *in* is semantically empty.

Figure 3 illustrates the “Measurement + DimensionAdjective” portion of (3), which licenses such expressions as *2 feet tall*, *9 inches thick*, and *several years old*. The boxed numbers and letters are used for cross-reference; a boxed number in front of a bracketed expression labels that AVM (attribute-value matrix). The interpretation as a Functor-Head construction is shown by the SELECT feature in the left daughter and the coindexation with $[H]$.

measured-adj-cxt ⇒

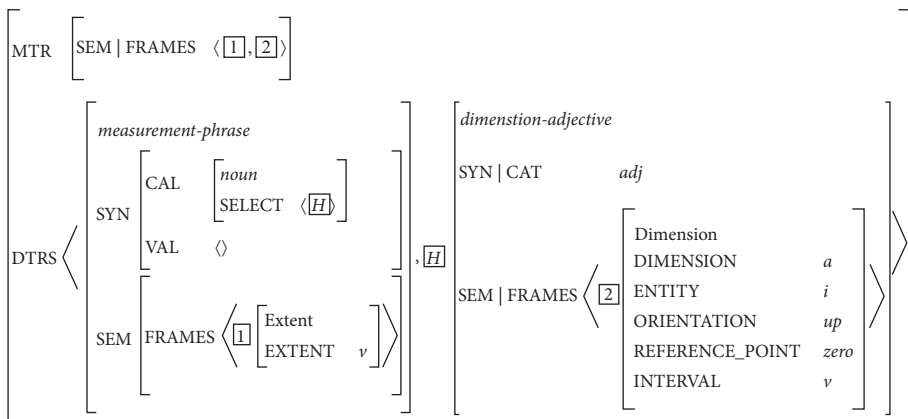


Figure 3. Measured-Adjective construction

The head daughter of the construct is an adjective of type *dimension-adjective*, a class that includes all and only those adjectives which may be modified directly by a measurement phrase (*long, wide, thick, tall, deep, old, high*, but not **heavy, *expensive*, etc.). Each of the dimension-adjectives evokes the Dimension frame with five relevant FEs: the DIMENSION covers height, width, age, etc.; the ENTITY is coindexed with the external argument; the ORIENTATION (*up*) combined with REFERENCE_POINT (*zero*) indicates the adjective to be unmarked, e.g., *tall, thick, deep*, but not **short, *thin, *shallow*; the INTERVAL combined with REFERENCE_POINT (*zero*) provides the value associated with the ENTITY.

The frame information introduced by the daughters is assembled in the mother as indicated by 1 and 2. The left daughter is a *measurement-phrase*, which for the purposes of the present construction is limited to units quantified by a number or *several/a couple/a few* and perhaps a few other expressions. Expressions like *a lot/bunch* and *many* are prohibited: **It was a lot of feet tall, *It was many feet tall*.⁴

The *Measured-Adjective* construction is a subtype of the *Functor-Head* construction which combines heads and a wide variety of functional and modificational elements (cf. Van Eynde 2006). In particular, the *Measured-Adjective* construction is a subtype of the general *Vector* construction, shown in Figure 4, that adds measurement and measurement-like phrases to a variety of scale-denoting predicators (cf. Fillmore 2002: 45–46).

vector-cxt ⇒

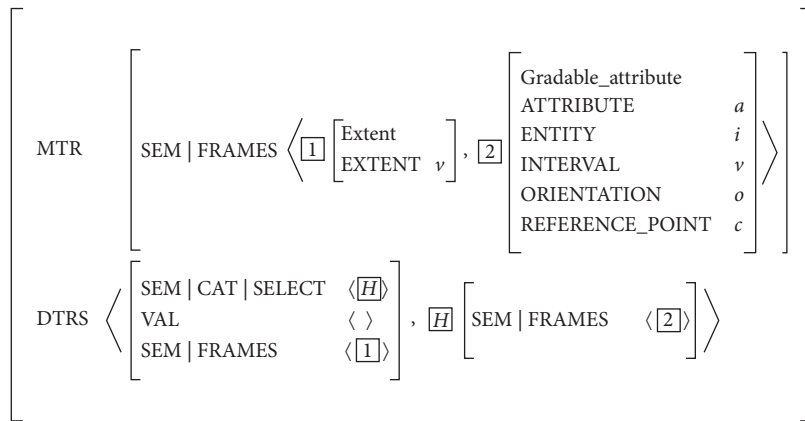


Figure 4. Vector construction

4. Other expressions that can occur as a degree marker in such a pattern, e.g., *how tall, that tall, so tall*, etc., are treated separately; they are not limited to the list of adjectives accounted for by this construction. Consider *how intelligent, how probable, that short*, and *so young*.

The *Vector* construction is a generalization over a wide variety of phrases (samples are presented in Figure 5) that indicate the extent to which some gradable attribute applies: *4 feet deep*, *6 inches taller*, *9 years ago*, *several inches above the water*, *10 miles north of here*, *how much bigger than this*, and so on.

The left daughter in Figure 4 evokes the frame of Extent, i.e., some measured distance. The value of that distance (v) is identified with the value of the INTERVAL FE of the right daughter (*deep*, *above the water*, etc.). The REFERENCE_POINT FE has a value denoted by the particular inherited construction. For bare adjectives such as *high*, the REFERENCE_POINT is the bottom of the scale. For *ago*, it is the deictic temporal center (often “now”). For *above the water* or *bigger than this*, the REFERENCE_POINT is provided by a complement of the head word: (*above*) *the water*, (*bigger*) *than this*. Fillmore (2002) presents an extended discussion of the general regularities of this construction as applied to, e.g., time, spatial dimensions, etc. In this highly generalized *Vector* construction in Figure 4, the ORIENTATION and REFERENCE_POINTS are unspecified.

In each of the daughter constructions in Figure 5, there are specific correspondences to the frames and FEs. For instance, in the *Measured-Adjective* construction (Figure 3), the left daughter must be a particular kind of measurement expression (e.g., *3 feet tall* and *that deep* but not **a lot deep*, cf. *a lot deeper* and **that deeper*), and the right daughter must be one of a small set of adjectives. Additionally, the right daughter can evoke not Gradable_attribute, but a more specific frame, e.g. *Linear_dimension* (or perhaps even a frame as specific as *Depth*), and the REFERENCE_POINT is set to the bottom end of the evoked scale.

We note in passing that the types of measure phrases usable in this construction must be kept distinct from those in the *Magnitude-Comparative* construction (to be

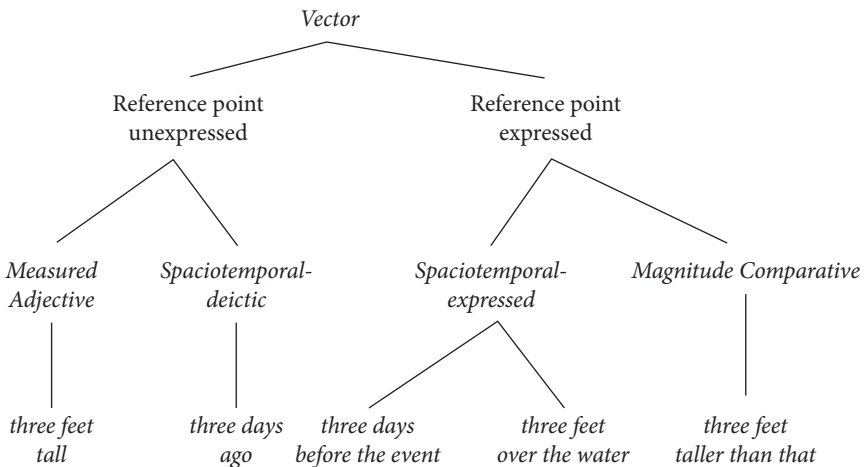


Figure 5. The *Vector* family of constructions

discussed in Section 2.4): **it was many feet tall, but it was many feet taller than needed; how tall was it?*, but **how taller was it?* (cf. *how much taller was it?*).

2.2 Schwarzschild's work on measurement

A detailed examination of the semantics of measurement phrases was conducted by Schwarzschild (2004). He argues that such phrases should not be considered arguments of the adjective, but, rather, equivalent to a particular kind of adjuncts. He provides a few syntactic arguments to support his analysis, including (i) the general tendency is for arguments to follow their heads (*fond of my cat*), but measurement phrases precede their adjectives (*5 feet tall* vs. **my cat fond*); (ii) the impossibility of most noun phrases to appear in the pre-adjectival slot as in (4a), despite the equivalence between normal noun phrases and measure phrases as in (4b); and (iii) the fact that in these expressions the adjective receives stress, despite the general trend for complements to be stressed over predicates (4c) (2004: 2).

- (4) a. **my father's height tall* vs. *5 feet tall*
 **his age old* vs. *35 years old*
 b. *my father's height is 5 feet*
 his age is 35 years
 c. *5 feet TALL* vs. **5 FEET tall*

Schwarzschild (2004: 5–6, 8–9) goes on to provide a semantic framework in which measurement phrases in comparatives (*5 inches taller*, *3 degrees warmer*) are analyzed as expressions denoting gaps between two values on a scale (e.g., height, temperature). However, because most bare adjectives cannot semantically combine with gap-denoting expressions (e.g., **3 degrees warm*, **2 dollars expensive*), Schwarzschild proposes a lexical rule that licenses such a combination. In English, this rule is applicable only to a few adjectives – namely the neutral or unmarked members of certain oppositions: *old* but not *young*, *tall* but not *short*, etc. – i.e., a small number of adjectives that identify scales of linear extent. A similar lexical rule will apply with some modification to different adjectives in German, Dutch, and Italian (2004: 4).

Schwarzschild's account raises several issues, which we cannot address but will mention only briefly. First, these derived adjectives must appear with a measurement phrase, but this is treated as a purely semantic, rather than syntactic, requirement. However, to the extent that the syntax and semantics of *3 feet tall* is similar to that of *3 days ago* (by virtue of being licensed by subtypes of the *Vector* construction), these should both be treated as a head plus a functor. Second, some adjectives have an ability to take a leftward complement: *there were [prizes galore]*, *we were [50 feet clear of the blast]*. In the case of *galore*, the only available pattern is a pre-adjectival complement (which cannot be omitted). *Clear* optionally omits the preceding measurement phrase, but as its denotation remains the same with or without such a phrase, no lexical

rule is needed. This calls into question Schwarzschild's claim that adjectives do not take leftward complements. In other words, although his semantic account seems to work well for the meanings of phrases like *2 feet tall*, it falls short of integrating description of this construction into the much wider range of similar constructions in the language. By contrast, our SBCG/FrameNet account succinctly captures the details of this construction and how it syntactically and semantically relates to other constructions.

2.3 Comparison

English reports scalar equalities and inequalities between two entities (i) as arguments of a compared adjective, where the dimension is incorporated into the meaning of the adjective, as in (5); (ii) as arguments of a comparison verb or adjective, where the dimension is introduced in a prepositional phrase, as in (6).

- (5) a. Entity1 + *is* + ComparedDimensionAdjective (monomorphemic) + *than* + Entity2.
Your proposal is better/worse than mine.
- b. Entity1 + *is* + ComparedDimensionAdjective (derived) + *than* + Entity2.
Your proposal is longer than mine.
- c. Entity1 + *is* + ComparisonMarker + DimensionAdjective + *than/as* + Entity2.
Your proposal is more/less interesting than mine.
Your proposal is as interesting as mine.
- (6) a. Entity1 + ComparisonVerb + Entity2 + *in* + Dimension.
Your proposal exceeds mine in length.
- b. Entity1 + *is* + IdentityAdjective + *to* + Entity2 + *in* + Dimension.
Your proposal is identical to mine in length.

A description and analysis of comparison expressions involves specification of both of their morpho-syntax and semantics, i.e., the *Comparative* construction. We define the *Comparative* construction as follows:

A general construction that licenses the creation of a complex comparative predicator and the realization of the arguments of that predicator. A comparative expression indicates the equality or non-equality of two values on a scale.

Figure 6a represents the construction for those lexical items which can accept the *-er* suffix. Notice that this construction has only one daughter; thus it is a derivational construction, creating one kind of word from another. The form of the adjective is 1, and the function *F* (in the *FORM* attribute of the mother) adds the *-er* suffix (and is defined only for those lexical items that have *-er*-form comparatives).

comparative-er-cxt \Rightarrow

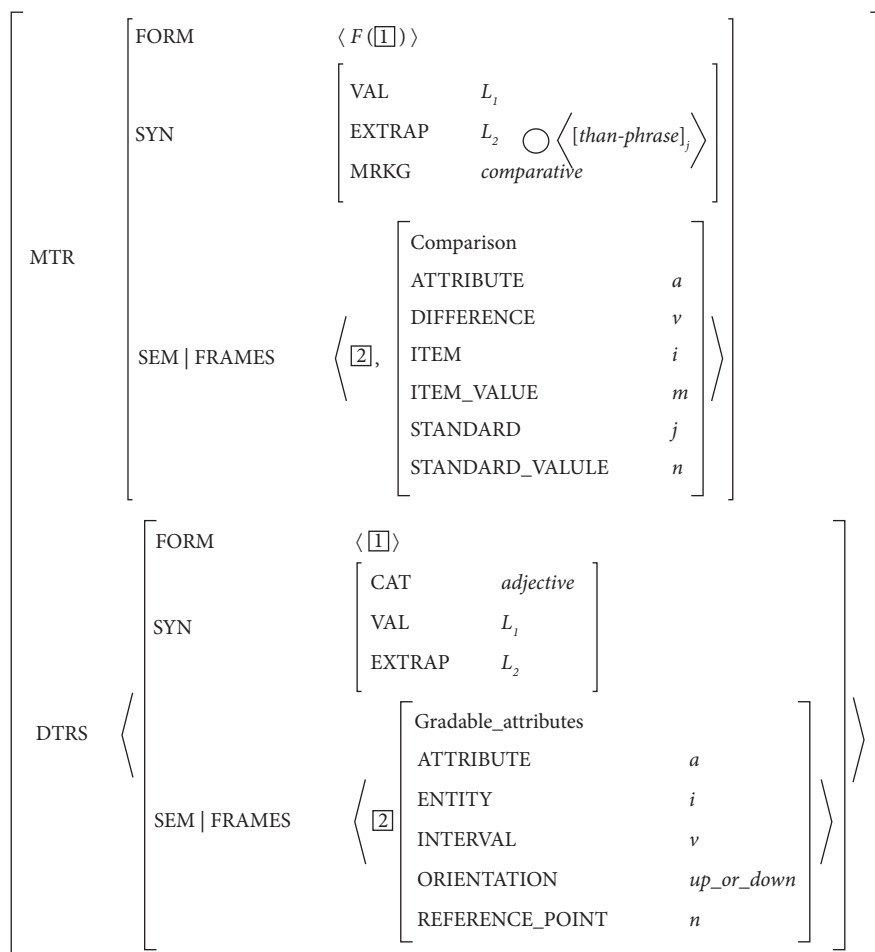


Figure 6a. *Comparative-er* construction

Here we make use of the EXTRAP (extraposition) feature, which allows for the *than*-phrase to be extraposed. That is, the *Comparative* construction adds the *than*-phrase to the EXTRAP list of the comparative adjective by means of a shuffle operator (the circle in the mother's valence), which allows it to be interleaved with other valence elements, rather than appearing just at the end, e.g., *better than her father at chess* and *better at chess than her father* (cf. Kay 2008, Kay & Sag in preparation).⁵

5. The comparative patterns discussed in this paper are those for which the compared adjective is a predicate of a simple entity, and the function of the *than*-phrase is to introduce the comparison entity, as suggested in (i):

The main semantic component of the *Comparative* construction is indexing FEs of the frame introduced by the basic adjective to FEs of the Comparison frame. The details of the frame and its FEs are laid out in the following section. Some might question the legitimacy of considering Comparison as a frame. It is a frame because frames are not limited to substantive empirical knowledge, but represent all conceptual structures that can be expressed linguistically. The Comparison frame represents the notion of “more,” which is operational in understanding verbs like *exceed*, *surpass*, and *prefer*. It can be understood as a *metaframe*, or *second-order framing*.

The DIFFERENCE FE in the Comparison frame indicates the difference in value between the STANDARD and ITEM. It is coindexed with the INTERVAL FE in the Gradable_attribute frame of the daughter, and the STANDARD_VALUE itself is coindexed with the REFERENCE_POINT of the daughter’s frame. This captures the intuition that what a comparative construction does is to reset the reference point of a bare adjective like *tall* from zero to some explicit standard (given in English by a *than*-phrase). The DIFFERENCE is not specified by the *Comparative* construction per se, but, rather, by a separate subtype of the *Vector* construction (see Figure 7 below).

Figures 6b and 6c represent the lexical entries for *more* and *worse*, respectively.

The lexical entry for *more* specifies it as a “functor,” by virtue of it having a non-empty SEL (select) list. As a functor, *more* selects a gradable adjective as a head, and marks the larger phrase built as *Comparative*. It further introduces a *than*-phrase to the valence of the phrase, in a manner similar to the construction illustrated in Figure 6a. Semantic integration is represented by coindexation between several of the FEs within the frames evoked by *more* (Comparison) and the adjectival it selects (some subtype of Gradable_attribute).

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- (i) Entity1 is bigger/less attentive/more interesting than Entity2.

In a broader study, it may be necessary to distinguish two constructions: (a) one that creates the basic comparative phrase (with *-er*, *more*, or *less*, in the case of adjectives or adverbs), introducing the *than*-phrase requirement with that constituent, and (b) one that, in the case of compared adjectives serving as noun modifiers, is capable of assigning a “comparative” feature to a higher constituent (e.g., a full VP or a full S), and extraposing the *than*-phrase after that constituent. Thus, in a sentence like (ii)

- (ii) I like stronger coffee than you do.

two individuals’ preferences are being compared; [*stronger coffee than you do*] cannot be taken as a self-standing NP. The comparative marker in (ii) shows the aspect of the preferences by which these individuals differ, and the *than*-connective separates the two coffee-liking states of affairs. A postnominal comparative structure does not permit this possibility: (iii) and (iv) are grammatical but (v) is not.

- (iii) I like stronger coffee than this stuff.
 (iv) I like coffee stronger than this stuff.
 (v) *I like coffee stronger than you do.

For a similar proposal for Japanese, see Hirose (2006).

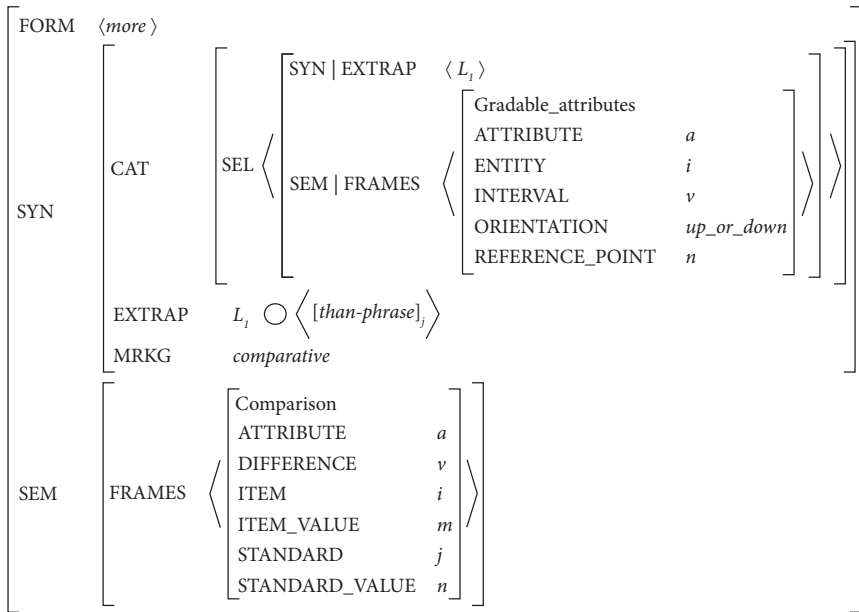


Figure 6b. Lexical entry for *more*

The difference between *more* and *less* may be indicated either by adding another frame element to Comparison (VALUE_RELATION), which may be either *greater-than*, *less-than*, or *equal-to* (as in *as*-comparatives), or it may be indicated by creating subtypes of the Comparison frame, e.g., *Comparison_greater_than*, *Comparison_less_than*, and so on. We leave for future exploration the evaluation of the advantages and disadvantages of these and other possible approaches.

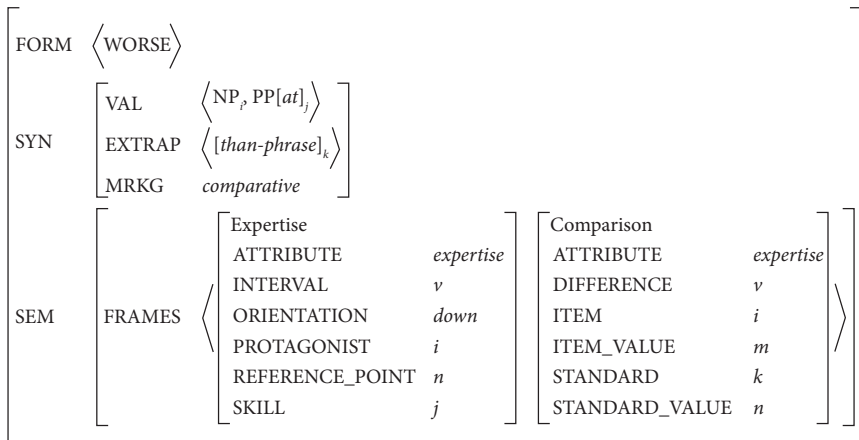


Figure 6c. Lexical entry for *worse*

Figure 6c illustrates the lexical entry for one sense of the word *worse*, namely the one that evokes the frame of Expertise. This frame is evoked in expressions like (*she is good at chess, bad at tennis, worse at golf, skilled at poker, expert in martial arts, etc.*) *Worse* is a case in which a single lexical entry contains information that elsewhere in the language has to be expressed as a constructed form, i.e., as licensed by a particular phrasal or derivational construction, e.g., Figure 6a.

2.4 Measured difference

English reports differences between two entities measured against the same scale (i) as arguments of a comparison construct, with the measurement modifying the adjective, as in (7); (ii) as arguments of a compared comparison construct, with the measurement introduced by *by*, as in (8).

- (7) Entity1 + *is* + Measurement + ComparisonDimensionAdjectival + *than* + Entity2. (Figure 7)
 Harry is 2 years older than Emily.
 My fridge is 20 degrees colder than yours.
- (8) Entity1 + *is* + ComparisonHead + *than* + Entity2 + *by* + Measurement.
 Harry is older than Emily by 2 years.
 My fridge is colder than yours by 20 degrees.

The *Magnitude-Comparative* construction licenses the “Measurement + Comparison-DimensionAdjectival” portion of (7), e.g., *2 feet taller*. Like the *Measured-Adjective* construction (Figure 3), this is a type of *Vector* construction (Figure 5). The left daughter is of type *magnitude-phrase*, which includes such quantified expressions as *6 feet* as well as adverbials (*much, a lot*) that may modify comparative expressions (*much/a lot taller*), but not plain adjectives (**much tall*). It indicates an interval on a scale (as is the case for all *Vector* constructions), and the extent of this interval (*v*) is identified with the DIFFERENCE FE of the Comparison frame and the INTERVAL FE of the Gradable_ attributes frame evoked by the comparative adjective.

magnitude-comparative-cxt ⇒

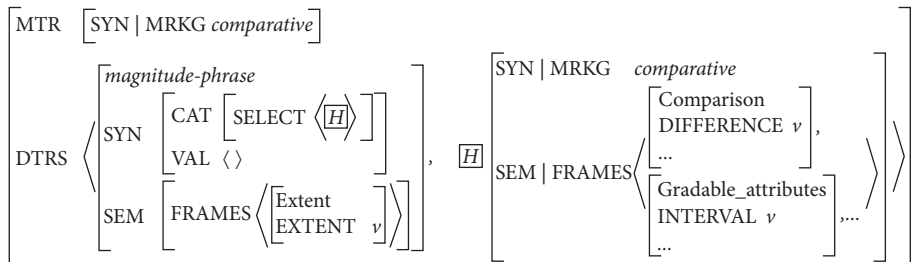


Figure 7. *Magnitude-Comparative* construction

Unlike the *Measured-Adjective* construction, the *Magnitude-Comparative* construction allows not only both members of polar adjective pairs, but also a wider set of attributes, as in (9).

- (9) a. *Measured-Adjective*
 2 feet tall, *2 feet short, 2 inches thick, *2 inches thin, 2 years old, *2 years young, *2 pounds heavy, *2 degrees cold, *2 dollars expensive, *20% likely, *20 IQ points intelligent
- b. *Magnitude-Comparative*
 2 inches taller, 2 inches shorter, 2 years older, 2 years younger, 2 pounds heavier, 2 degrees colder, 2 dollars more expensive, 20% more likely, 20 IQ points more intelligent

The *Measured-Adjective* construction represents measurements from a scalar zero; the *Magnitude-Comparative* construction represents measurements from some implicit (anaphoric or exophoric) or explicit (by means of a *than*-phrase) reference point.

Some measurement expressions are “hidden” comparisons: *10 minutes late* means ten minutes later than some appointed time, and *10 minutes early* means ten minutes earlier than some appointed time. Therefore, these sentences can be paraphrased as *X was late/early by 10 minutes*, like those in (8). Similarly, *5 miles ahead* and *5 miles behind* mean, respectively, five miles ahead of, or behind, some moving reference object. Such appointed time and reference object must be recoverable from discourse (i.e., *definite null instantiation*, in FrameNet terms, cf. Ruppenhofer et al. 2006).⁶

In fact, all evaluative adjectival expressions involve hidden comparisons. For example, in *That building is tall*, the standard of comparison is implicit but generally understood, e.g., tall for buildings with its function, tall for buildings in the neighborhood, etc. The standard in this case, however, is an instance of *indefinite null instantiation*, i.e. one that is not supplied anaphorically or exophorically.⁷ We will discuss this issue in more detail below.

3. The comparison frame

As shown in Figures 6a–c, the *Comparative* construction evokes the Comparison frame. An initial version of the Comparison frame is as follows:

6. *Definite null instantiation* is a type of *null instantiation*, in which FEs that are conceptually salient do not show up as lexical or phrasal material in the sentence. When the missing element is something that is already understood in the linguistic or discourse context, it is called *definite null instantiation*.

7. In contrast to definite (or *anaphoric*) omissions, with indefinite (or *existential*) omissions, the nature (or at least the semantic type) of the missing argument can be understood given conventions of interpretation, but there is no need to retrieve or construct a specific discourse referent.

One value on a scale is compared to another. Each degree represents the value of some attribute of an entity, placed along a potentially quantifiable scale. For instance, the heights of two doors are comparable, as are the height and width of the same door. In general, one degree is foregrounded – the *trajector*, in Langacker’s (1999) terms – and the other is regarded as the standard – the *landmark* – against which the former is measured.

The Comparison frame has as its FEs ATTRIBUTE, DIFFERENCE, ITEM, ITEM_VALUE, STANDARD, and STANDARD_VALUE. The STANDARD in the Comparison frame is licensed by a special construction, and may be syntactically realized in numerous ways: (*than her, than she is, than expected*). The exception is where the ITEM is compared to a STANDARD_VALUE (*taller than 2 meters*). This distinction between STANDARD and STANDARD_VALUE is significant in English: while the STANDARD permits a clausal complement, the STANDARD_VALUE does not.

- (10) a. John is taller than Bill is.
 b. *John is taller than 6 feet is.

The Comparison frame has a maximally-general description, as it is meant to cover lexically comparative items such as *exceed, surpass, and prefer* as well as the various comparison-related constructions discussed in this paper. As noted in the previous section, although the semantic background of these lexical items and constructions is more general than that of *work* or *sell*, there is a conceptual framework – a semantic frame – behind each of them. One quality of the more general frames (Purpose, Likelihood, Risk, and Comparison) is that often their arguments are themselves complex frames. But this does not diminish their status as frames in their own right.

English has several families of constructions that evoke the Comparison frame.

The *Comparative* construction specifies mappings between syntactic arguments of the comparative predicator and the various FEs of the Comparison frame. The FE ITEM is often, but not always, the external argument, (*that is more interesting than this, I like you more than him*). The STANDARD is normally a complement (i.e. an obligatory argument) of the *Comparative* construction, (*taller than you*). DIFFERENCE (*three inches taller than you*), APPROXIMATION (*almost taller than you*) and MULTIPLICATIVE (*4 times taller than that one*) are all specified as pre-adjectival modifiers. DIFFERENCE, which indicates the difference in values between the ITEM and STANDARD, may be a measurement phrase (*3 inches*) or a more vague specification (*much*).

The combined semantics of the comparative-containing sentence (11) is represented in Figure 8, following the principles of Minimal Recursion Semantics (Copestake, Flickinger, Pollard, & Sag 2006).

- (11) [She_{ITEM}] is [6 inches_{DIFFERENCE}] [taller] [than you_{STANDARD}]

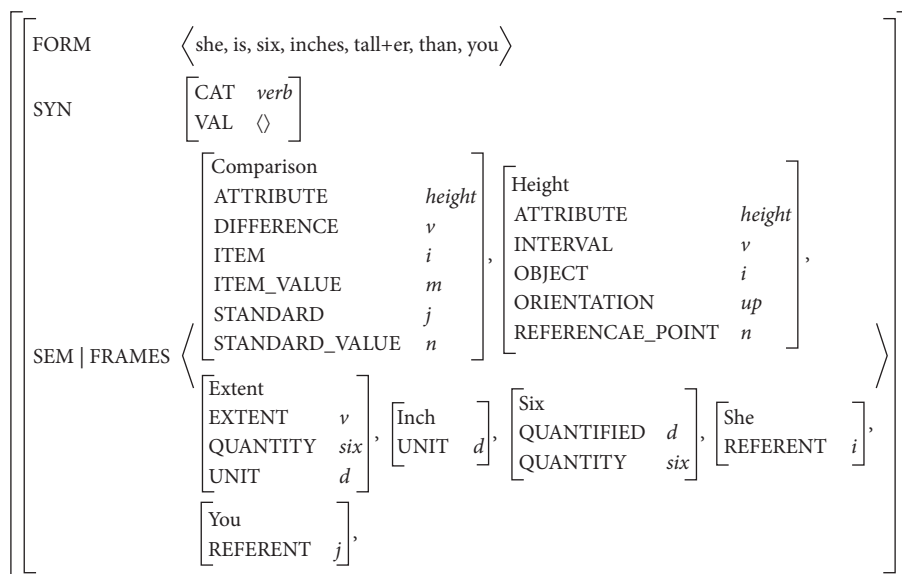


Figure 8. She is 6 inches taller than you

The fact that this construct is a sentence is indicated by the syntactic features: it is a verb-headed structure with a satisfied (saturated) valence. Note that the more specific frame of *Height* is evoked, rather than the general *Gradable_attributes* frame from which it inherits. The *ORIENTATION* FE (*up*) in the *Height* frame differentiates *tall* from *short*.

We assume that the construction that licenses measurement phrases (*6 inches*) additionally evokes the *Extent* frame, as discussed with respect to Figure 3. The order of frames is not significant; rather, connections between the frames are indicated by coindexation of FEs across the frames.

4. Japanese patterns

4.1 Measurement

Japanese reports numerical measures of scalar properties through nouns that designate particular dimensions, e.g., *fukasa* ‘depth’, *takasa* ‘height’, *atsusa* ‘thickness’, as in (12).

- (12) a. Entity + *wa* + Dimension + *ga* + Measurement + Copula/Existential.
*kono tsukue wa okuyuki ga 60cm da/aru.*⁸

8. Abbreviations: ACC, accusative; COP, copula; EXIST, existential; GEN, genitive; NOM, nominative; TOP, topic.

this desk TOP depth NOM COP/EXIST
 ‘This desk has the depth of 60 centimeters.’

- b. Entity + *no* + Dimension + *wa* + Measurement + Copula/Existential.

kono tsukue no okuyuki wa 60cm da/aru.
 this desk GEN depth TOP COP/EXIST
 ‘The depth of this desk is 60 centimeters.’

- c. Entity + *wa* + Dimension + Measurement + Copula. (Figure 9)

kono kuruma wa nagasa 5m da.
 this car TOP length COP
 ‘This car has the length of 5 meters.’

When the measurement expression implies what the dimension is, the latter can be omitted:

- d. Entity + *wa* + Measurement + Copula/Existential.

kono hon wa 100 peeji da/aru.
 this book TOP page COP/EXIST
 ‘This book is/has 100 pages.’

(12a) and (12c) may seem only variations of the same construction, one with *ga*, and the other without it. We consider them to be distinct because (12a) allows both the copular (*da*) and existential (*aru*) constructions, but (12c) permits only the former. Furthermore, while (12a) allows scrambling, (12c) prohibits it.

a.' *kono tsukue wa 60cm da/aru, okuyuki ga.*
 this desk TOP COP/EXIST depth NOM
 ‘This desk has the depth of 60 centimeters.’

a." *okuyuki ga, kono tsukue wa 60cm da/aru.*

c.' **kono kuruma wa 5m da, nagasa.*

this car TOP COP length
 ‘This car has the length of 5 meters.’

c." **nagasa, kono kuruma wa 5m da.*

Figure 9 illustrates the “Dimension + Measurement” portion of (12c). The left daughter is a Dimension-evoking noun. Such nouns may be taken directly from the lexicon (e.g., *haba* ‘width’, *okuyuki* ‘front-to-back-depth’), or may be derived (e.g., *naga-sa* long-NOMINAL ‘length’). The right daughter is a measurement phrase (e.g., *5 meetoru* ‘5 meters’). The resulting phrase (*nagasa 5 meetoru*) may be used as a nominal predicator, as in (12c).

When the noun for a dimension is derived from an adjective, Japanese also exhibits the markedness constraint (*4 feet tall* vs. **2 feet short*), as illustrated in (13), although not as strictly as English does.

dimension-measurement-cxt ⇒

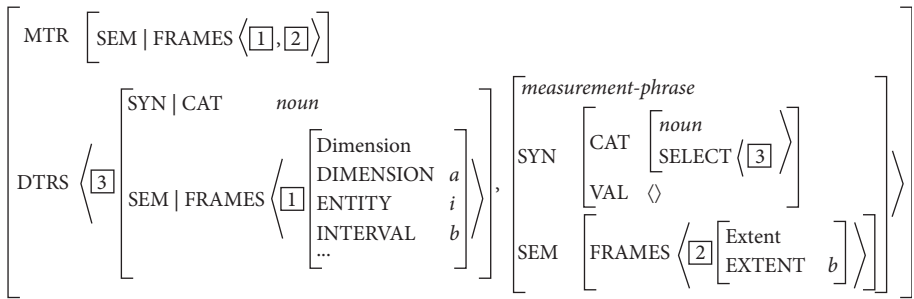


Figure 9. Dimension + Measurement in Japanese

- (13) a. *kono hon wa atsusa ga 3cm da/aru.*
 this book TOP thickness NOM COP/EXIST
 ‘This book has the thickness of 3 centimeters.’
- b. *kono dejikame wa ususa ga 18mm da/*aru.*
 this digital.camera TOP thinness NOM COP/EXIST
 ‘*This digital camera has the thinness of 18mm.’
- c. *kono kabin wa omosa ga 2kg da/aru.*
 this vase TOP heaviness NOM COP/EXIST
 ‘*This vase has the heaviness of 2kg.’
- d. *kono nooto-pasokon wa karusa ga 500g da/*aru.*
 this laptop TOP lightness NOM COP/EXIST
 ‘*This laptop has the lightness of 500g.’

The use of marked adjectives in measurement expressions, e.g. (13b, d), is possible only when such attributes are significant, normally in a positive way. Note that in (13b, d) nouns derived from marked adjectives occur naturally in the copular construction, but not in the existential one.

By contrast, the use of the marked members of the following pairs are still illegitimate, as (13e–h) illustrate.

- e. *kono hon wa nagasa ga 100 peeji da/aru.*
 this book TOP length NOM page COP/EXIST
 ‘This book is 100 pages long.’
- f. **kono ronbun wa mijikasa ga 30 peeji da/aru.*
 this article TOP shortness NOM page COP/EXIST
 ‘*This article is 30 pages short.’
- g. *kono isu wa takasa ga 1m da/aru.*
 this chair TOP height NOM COP/EXIST
 ‘This chair is 1 meter high.’

- h. **kono isu wa hikusa ga 1m da/aru.*
 this chair TOP lowness NOM COP/EXIST
 ‘*This chair is 1 meter low.’

This constraint is more prominent in compound nouns: *shakoo* (car + high = the height of a car), **shatei* (car + low); *taijuu* (body + heavy = body weight), **taikei* (body + light); *shinchoo* (body + long = body height), **shintan* (body + short).

4.2 Comparison

Japanese reports scalar equalities and inequalities between two entities as arguments of a plain adjective, where the dimension is incorporated into the meaning of the adjective.

- (14) a. Entity1 + (*no hoo*) *ga* + DimensionAdjective.
kore (no hoo) ga nagai.
 this GEN side NOM long
 ‘This is longer.’
- b. Entity2 + *yor*i + DimensionAdjective.
are yori nagai.
 that than long
 ‘It’s longer than that.’

The construction in Figure 10 licenses (14a) and (14b). The VALENCE of the mother indicates two crucial aspects of our analysis of Japanese comparative expressions. First, Japanese has a class of expressions, the *comparative-item-phrase*, which covers the NP *no hoo* (Lit. ‘the NP’s side’), an unambiguous indicator of comparison semantics, and also, under the right circumstances *ga*-marked subjects, as in (15), especially when only two items are under discussion.

- (15) A: *dotchi ga takai?*
 which NOM expensive
 ‘Which one is more expensive?’
- B: *kotchi/kore ga takai.*
 this.side/this NOM expensive
 ‘This one is more expensive.’

The other valent of the mother in Figure 10 is a *yor*i-phrase, which is a postposition phrase headed by *yor*i, another unambiguous indicator of comparison.

The second important fact is that, in a comparison construction licensed by Figure 10, at least one (or both) of these valents must be present – it is not allowed to omit both, unless the additional construction outlined below is employed. We represent this constraint with the inclusive-*or* operator.⁹

9. An alternative analysis of this variety of comparative expressions might involve *no hoo* and *yor*i independently evoking the Comparison frame, and when multiple of these phrases are in

Japanese *comparative-cxt* ⇒

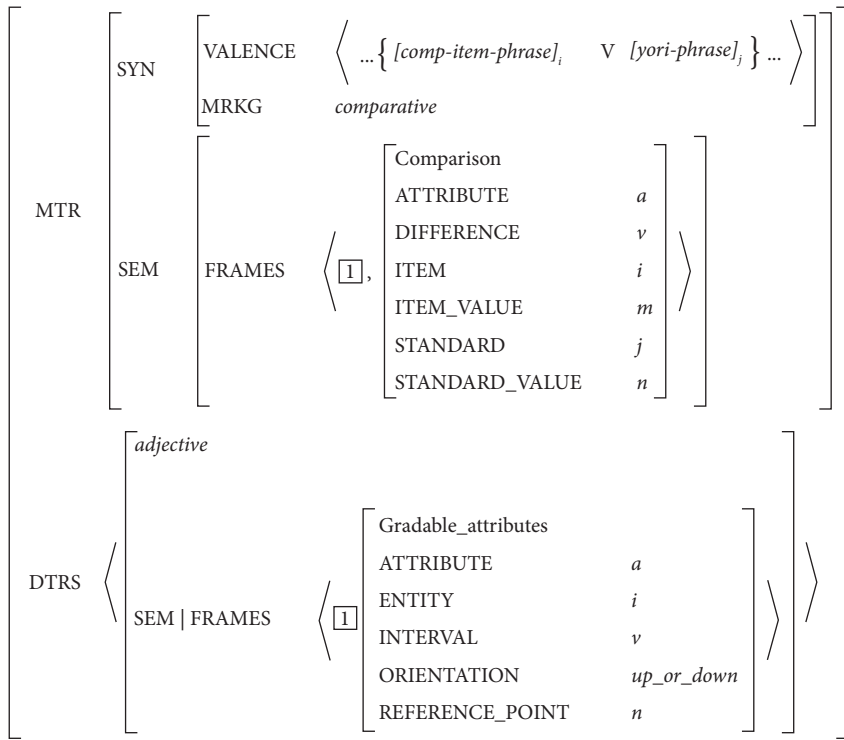


Figure 10. Japanese *Comparative* construction

In Japanese, STANDARD, e.g. (16a), and STANDARD_VALUE, e.g. (16c), require totally different constructions. With a STANDARD_VALUE, the existential construction with an NP [measurement-value + *ijoo* ‘X or more’] must be used.

- (16) a. *kono kuruma wa watashi-no yori takai.*
 this car TOP mine than expensive
 ‘This car is more expensive than mine.’
- b. *??kono kuruma wa 30,000 doru yori takai.*¹⁰
 this car TOP dollar than expensive
 ‘This car is more expensive than \$30,000.’

the same clause, the multiply-evoked Comparison frames (or the indices within them) are unified. In the absence of a clear formulation of how (and when) to accomplish such unification, we present here a non-unification analysis.

10. This type of expression can occur freely in a noun modification construction, e.g. *30,000 doru yori takai kuruma* ‘a car that is more expensive than \$30,000’, and this fact appears to

- c. *kono kuruma wa 30,000 doru ijoo suru.*
 this car TOP dollar than do
 ‘This car is more expensive than \$30,000.’

4.3 Measured difference

Japanese reports differences between two entities measured against the same scale as arguments of a comparative construct, with the measurement modifying the adjective, as in (17).

- (17) Entity1 + *no hoo ga* + Entity2 + *ori* + Measurement + DimensionAdjective.
kore no hoo ga are yori 100 peeji nagai.
 this GEN side NOM that than page long
 ‘This is 100 pages longer than that.’

Measured difference can also be expressed by juxtaposition of a measurement expression and an adjective. Compare the following:

- (18) a. *kono hon wa nagai.*
 this book TOP long
 ‘This book is long.’
 b. *kono hon wa 100 peeji nagai.*
 this book TOP page long
 ‘This book is 100 pages **longer**.’
 NOT ‘This book is 100 pages long.’

While (18a) translates as ‘this book is long’, (18b) does not mean ‘this book is 100 pages long’. Rather, it renders only ‘this book is 100 pages *longer*’ than some topical reference object. That is, Japanese scalar adjectives do not permit measurement-value expressions. Additional examples:

- (19) a. *kono hako wa 5kg omoi.*
 this book TOP heavy
 ‘This box is 5kg **heavier**.’
 b. *kono pen wa 2,000-en takai.*
 this pen TOP 2,000-yen expensive
 ‘This pen is 2,000 yen **more expensive**.’

This obligatory comparison interpretation in (18b) is neither a property of the measurement expression itself, nor of the scalar adjective itself. Therefore, the comparison reading should be considered a property of the construction, not compositionally

motivate constructional diffusion. Therefore, some native speakers of Japanese consider it well-formed and natural. We still maintain that, as a basic rule, this pattern is anomalous.

derived from the meaning of its component(s). We propose the following construction named Japanese *Magnitude-comparative* construction.

The Japanese *Magnitude-Comparative* construction is similar to that of English (Figure 7): it licenses combination of measurement phrases like *6 fiito* ‘6 feet’, or adverbs like *motto* ‘more’ with a gradable adjective, as in (20).

- (20) a. *kono hon wa motto nagai.*
 this book TOP more long
 ‘This book is longer. (Lit. more long)’
- b. *kono hon wa harukani nagai.*
 this book TOP by_far long
 ‘This book is longer by far.’
- c. *kono hon wa wazukani nagai.*
 this book TOP a_little long
 ‘This book is a little longer.’

Japanese *magnitude-comparative-cxt* ⇒

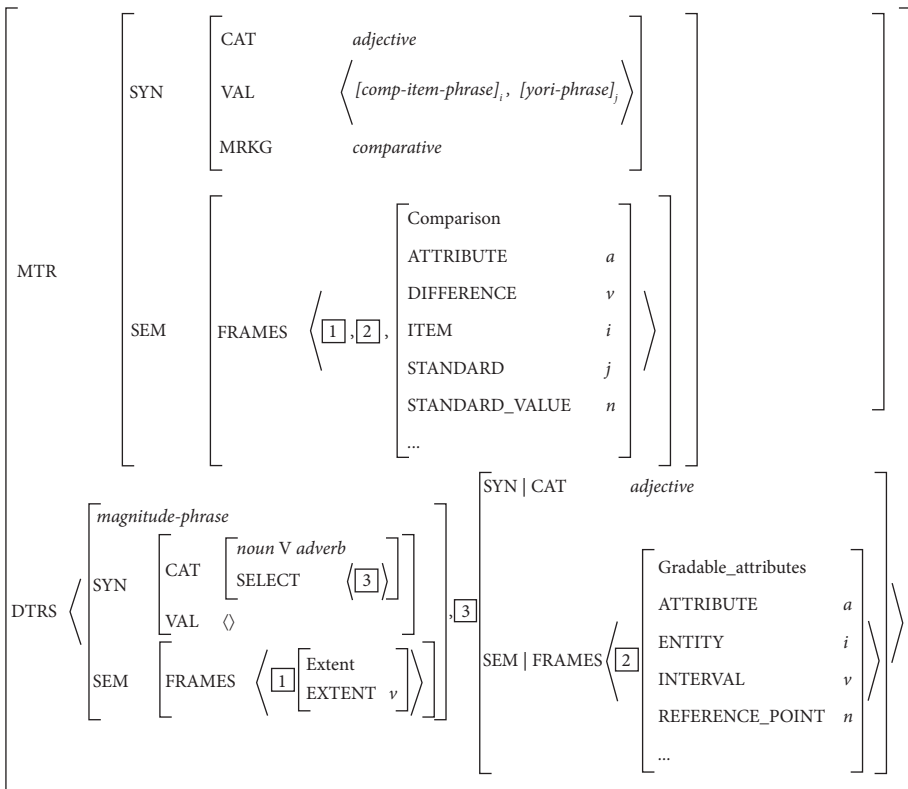


Figure 11. Japanese *Magnitude-comparative* construction

The resulting phrase has comparative meaning, which is contributed not necessarily by the daughter constituents, but by the construction that combines them.

5. Alternative accounts for the Japanese magnitude-comparative construction

5.1 Lexical polysemy account

An alternative account for the Japanese *Magnitude-Comparative* construction, particularly when a measurement expression and a scalar adjective are juxtaposed without an overt comparative marker, would attribute the difference between English and Japanese, shown in (18b), to the idea that adjectives are inherently polysemous: those that render an implicit comparison (α -reading) and those without such a comparison (β -reading), e.g.:¹¹

- (21) a. A dissertation that is 100 pages long $_{\beta}$ is not long $_{\alpha}$ at all.
 b. How long $_{\beta}$ is her dissertation?¹²

“Implicit comparison” refers to the concept we discussed in Section 2.3: i.e., all evaluative adjectival expressions involve hidden comparison. In *That building is tall*, for example, the standard of comparison is implicit but generally understood, i.e., an instance of *indefinite null instantiation*. Such an implicit STANDARD can be made explicit:

- (22) a. He is short for a Swede.
 b. He is even tall for a Swede.

From this perspective, the differences between English and Japanese would be summarized as follows:

(23)		English	Japanese
	α . Implicit comparison	<i>long</i>	<i>naga-i</i> (adjective)
	β . No comparison	<i>long</i>	<i>naga-sa</i> (noun)
	γ . Explicit comparison	<i>long-er</i>	<i>naga-i</i> (adjective)

Under this analysis, in English, the base form (i.e. morphologically more basic form), e.g. *long*, is polysemous. By contrast, the base form in Japanese always implies comparison; the non-comparison β -reading must be expressed by a morphologically more complex form, e.g. *naga-sa* (the stem of the adjective *naga-i* ‘long’ plus a nominalizer suffix *-sa*).

11. We are indebted to Seizi Iwata for bringing this perspective to our attention.

12. Bierwisch’s (1988) contends that interpretation of relational adjectives may involve a contextually determined norm; if such a norm is involved, he considers the interpretation to be *norm-related* (NR). His distinction corresponds to that between the α -reading (+NR) and β -reading (-NR).

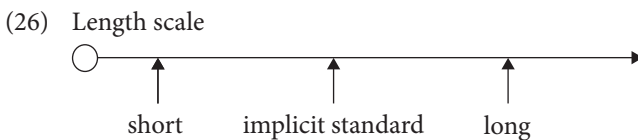
The problem of this alternative analysis is that, as discussed earlier regarding the English *Measured-Adjective* construction in Figure 3 as well as the Japanese examples in (13), only limited, neutral adjectives permit β -readings, thus making the generalization rather restricted:

- (24) a. *A dissertation that is 100 pages short _{β} is not short _{α} at all.
 b. *A car that is 50 miles per hour fast _{β} is not fast _{α} at all.

Furthermore, the marked polar adjectives in (25) necessarily imply that the corresponding α -readings are *context propositions*, i.e. previously posed, as discussed in Fillmore et al. (1988: 513–14) regarding the expression *let alone*.

- (25) a. How short is her dissertation?
 (context proposition: Her dissertation is short.)
 b. How light is your laptop?
 (context proposition: Your laptop is light.)

We consider the comparison interpretation of a juxtaposed numerical measure and adjective in Japanese to be derived constructionally, rather than lexically. That is, these distinct readings of the adjectives shown in (21) are not due to lexical polysemy, but to the properties of the constructions in which a given adjective appears. When licensed by the *Measured-Adjective* construction (Figure 3), English adjectives identify a relevant scale. For example, *long* in *Her dissertation is 100 pages long* is not evaluative, but only evokes the length scale and a location on that scale, without communicating whether 100 pages is considered “long” or “short.” By contrast, *her dissertation is long/short* evaluates the length of the dissertation as compared against an implicit standard, informally represented in (26). In this view, Japanese adjectives are necessarily evaluative and unable to serve a mere scale-identifying function.



The identified scale might be associated with an implicit standard for a given type of entity. When the measurement value of the entity is above such a standard, the entity is judged as long; when its value is below the standard, it is judged as short.

Notice that the scale in (26) has one end closed and the other end open. This asymmetrical configuration of the scale explains the commonly observable neutral vs. marked distinction between adjectives with polar opposition. Because there is no limit on the larger end, wherever the implicit standard is, *long* by nature has a greater coverage. The applicability of *short*, on the other hand, is rather limited.

Moreover, when a marked, rather than neutral, adjective is used to identify a relevant scale, e.g. (25), our psychological focus is on the difference between the values of

the entity and the standard, rather than the value of the entity itself, which is measured from the zero point, although responses to such questions normally supply the latter value. This discrepancy between the focus of interest and the value identified by a response is more salient in MULTIPLICATIVES, e.g. *twice as long*, **twice as short*, *3 times as old*, **3 times as young*. Although all of these expressions are certainly possible as linguistic objects, those with marked adjectives cannot be easily interpreted. This is a second reason why the marked member of a pair of adjectives has a more restricted utility.

In Japanese, just as in English, marked derived nouns cannot normally be used for MULTIPLICATIVES: *2-bai no hirosa* 'double space', **2-bai no semasa* 'double the smallness', *3-bai no nagasa* 'three times the length', **3-bai no mijikasa* 'three times the shortness'.

When searching the Internet, however, one finds numerous examples of *2-bai no ususa* 'double the thinness' (vis-à-vis *2-bai no atsusa* 'double the thickness') and *3-bai no karusa* 'three times the lightness' (vis-à-vis *3-bai no omosa* 'three times the weight (heaviness)'). However, they are mostly in commercial catch copies, a genre that frequently contains innovative expressions. Even in English, one can find *twice as light*; however, this does not assume an upper boundary on the scale like (26). Therefore, in order to interpret it, one needs to identify the heaviness of the STANDARD and then divide it by two (i.e. half as heavy).

A separate but related issue we recognize is whether the scale itself has an endpoint: e.g., height has a zero point but no maximum; temperature as a natural language concept – ignoring absolute zero – does not. Here we confront a difference between intuitions of grammaticality/acceptability on the one hand and reasoning on the other hand. Ordinarily an expression like *twice as X* suggests that two values are being contrasted in terms of their distance from scalar zero: something that is *twice as tall* as something else extends twice the distance from zero as what it is being compared with. An expression like *twice as short* or *twice as young* cannot literally make sense, since there is no point on the scale from which it makes sense to measure the two values. Yet there are usages in which *twice as short* and *twice as young* are interpreted as meaning 'half as long' and 'half as old'. It is also common to hear a remark like *Today's weather was twice as warm as yesterday's*, but as soon as the speaker is asked to identify the scale – Celsius or Fahrenheit – the absurdity of the expression becomes clear.¹³

5.2 Sawada and Grano's account

Sawada and Grano (2009) compare the juxtaposition comparative construction, as exemplified in (27), with a resultative construction, as exemplified in (28):

13. By contrast, both *twice as fast* and *twice as slow* (e.g. *The iPhone keyboard is twice as slow as regular phones*) sound normal. The compared values with the former are the speed, whereas those with the latter are the time by which a certain task is accomplished.

- (27) a. *kono tana wa 2m takai.*
 this shelf TOP is.high
 ‘This shelf is 2 meters higher.’
 NOT ‘This shelf is 2 meters high.’
- b. *kinoo wa 5-do atatakakatta.*
 yesterday TOP 5-degree was.hot
 ‘It was 5 degrees warmer yesterday.’
 NOT ‘It was 5 degrees warm yesterday.’
- (28) a. *kono sao wa 5-do magatteiru.*
 this rod TOP 5-degree is.bent
 ‘This rod is 5 degrees bent.’
 NOT ‘This rod is 5 degrees more bent.’
- b. *kono fusuma wa 3cm aiteiru.*
 this sliding_door TOP is.open
 ‘This sliding door is 3 centimeters open.’
 NOT ‘This sliding door is 3 centimeters more open.’

Considering the predicators in (27) to be gradable adjectives, they claim that numerical measures with such an adjective are sometimes interpreted as a DIFFERENCE, as in (27), and sometimes as an INTERVAL, as in (28). Following Svenonius and Kennedy (2006), they posit a special degree-phrase head, *Meas*, which combines with a subset of degree adjectives and introduces a measurement phrase.

- (29) John is [_{DegP} [_{NumP} 4 feet [_{Deg} [_{Deg} *Meas*] [_{AP} tall]]]]
 [[*Meas*]]([[tall]]) ([[four feet]]) ([[John]])
 = λgλdλx.g(x) ≥ d ([[tall]]) ([[four feet]]) ([[John]])
 = TALL(John) ≥ 4 ft.

Unlike English, Sawada and Grano continue, Japanese has two *Meas*: *Meas*_{*JP* differential} and *Meas*_{*JP* direct}. The former can combine with measurable adjectives and introduce a contextually determined standard from which a comparison is made, whereas the latter can combine only with measurable adjectives that have a well-defined zero point, e.g. *bent* and *open*. Hence, the measurement expressions in (27) are interpreted as DIFFERENCES, but those in (28) are as absolute INTERVALS.

The fundamental problem of this analysis is that the sentences in (28) involve no adjectives, although their English translations do; they are in a *Resultative* construction with a verbal predicator. Resultatives are statives and, therefore, resemble adjectival phrases, but they are nevertheless syntactically and semantically distinct. Compare the sentences in (30) and (31), where no different interpretation rules for the measurement phrases are needed between the simple past tense and resultative counterparts.

- (30) a. *kono sao wa 5-do magatta.* (Simple past tense)
 this rod TOP 5-degree bent
 ‘This rod bent 5 degrees.’
- b. *kono sao wa 5-do magatteiru.* (Resultative)
 this rod TOP 5-degree has/is.bent
 ‘This rod has bent 5 degrees/This rod is 5 degrees bent.’
- (31) a. *fusuma ga 3cm aita.* (Simple past tense)
 sliding.door NOM opened
 ‘The sliding door opened 3 centimeters.’
- b. *fusuma ga 3cm aiteiru.* (Resultative)
 sliding.door NOM has.opened/is.open
 ‘The sliding door has opened 3 centimeters/The sliding door is 3 centime-
 ters open.’

In fact, the past tense and the resultative are interchangeable when used attributively:

- (32) a. *5-do magatta sao* (Simple past tense)
 5-degree bent rod
 ‘The rod that is 5 degrees bent.’
- b. *5-do magatteiru sao* (Resultative)
 5-degree has/is.bent rod
 ‘The rod that is 5 degrees bent.’
- (33) a. *3cm aita fusuma* (Simple past tense)
 opened sliding.door
 ‘The sliding door that is 3 centimeters open’
- b. *3cm aiteiru fusuma* (Resultative)
 has.opened/is.open sliding.door
 ‘The sliding door that is 3 centimeters open’

Therefore, however the interpretation of measurement phrases with a verbal predicator is derived, the same rule can account for those in the resultative counterparts.

One might argue that *magatteiru* in (28a) should nevertheless be considered an adjective because the rod had never been straight; therefore, the statement does not refer to a resultant state of any change. However, resultatives are commonly used in world’s languages to depict genuine states (cf. Matsumoto 1996). Consider:

- (34) a. *kono tsukue wa kado ga maruku-natteiru.* (Resultative)
 this desk TOP corner NOM has.become.rounded
 ‘This desk has rounded corners.’
 Lit. ‘The corners of this desk have been rounded.’

- b. *watashi no namae ga nuketeiru.* (Resultative)
 I GEN name NOM has.dropped
 ‘My name is missing (from the list).’
 Lit. ‘My name has been dropped (from the list).’

In (34a), the depicted state of affairs (the desk has rounded corners) is compared with the norm (desks have angled corners), and it is described as similar to the resultant state of the act of rounding. Whether or not the event has taken place is irrelevant. In (34b), the speaker’s name might have never been included in the list, but the described state is identical with the resultant state of deletion.

In consequence, what needs special attention is the case in (27); (28) requires no supplementary rule. Therefore, an attempt to derive the different interpretations of numerical measures in (27) and (28) by the same rule is deemed inappropriate. We propose a special construction represented in Figure 11 for (27).

6. Conclusions

This chapter has reported on our ongoing onomasiological investigation of English and Japanese measurement and comparison expressions as part of the Joint Research Project under the Japan-U.S. Cooperative Science Program. It confronted Construction Grammar with Frame Semantics through (a) the mechanisms of semantic valence associated with the lexicon of gradable concepts, and (b) the semantic import of the constructions that deal with compared or evaluated positions in scalar domains. This confrontation requires meaning composition of a kind that involves more than simple modification, coordination, or complementation: as dictated by the relevant constructions, the elements of a frame of comparison or measurement are coindexed with particular elements of the frames that introduce entities, orientations, and dimensions.

Both in English and in Japanese, a limited number of scalar adjectives can be preceded by a measurement expression. In English, the adjective in such a combined expression (e.g. *3 inches long*) does not function as an evaluative predicate (i.e., longer than a certain standard), but, rather, it merely evokes a relevant scale on which the measured value is located. In Japanese, by contrast, scalar adjectives are always evaluative and cannot be used as a scale-evoker. The Japanese *Measured-Comparative* construction licenses a juxtaposition of a measurement and a scalar adjective, and the resultant complex expression is interpreted as comparison.

The onomasiological approach was supported by the tools of Construction Grammar and Frame Semantics. We selected a restricted semantic domain and mapped out its meaning in terms of FrameNet frames, which has the benefit of equal applicability to lexical and constructional units, and the ability to compare meanings both within and across languages (cf. Boas 2009). For each language it was asked which constructions are available for or dedicated to measurement and comparison. This revealed

several similarities but also unexpected differences. It is clear that even in a limited semantic domain with relatively straightforward equivalences across languages there are many significant lexical and constructional differences to be found. Further research along the lines presented in this chapter will no doubt reveal other semantic domains ready for contrastive onomasiological analysis, showing the utility of Construction Grammar in understanding how languages differ.

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