TOWARD A MODEL OF PRINCIPLED POLYSEMY

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1. Introduction

What characterizes the polysemous structures of English particles and how can their networks be analyzed? Tyler and Evans (henceforth T&E) attempt to answer these questions in their recent book, which is likely to become a landmark study in the field. The book is an expansion of a 2001 paper published in *Language* (T&E (2001)) in which they discuss Brugman's (1981, 1988) and Lakoff's (1987) analyses of *over*. In this volume, the authors not only describe the polysemous structures of 17 spatial particles—*over*, *above*, *below*, *under*, *up*, *down*, *to*, *for*, *in front of*, *before*, *behind*, *after*, *in*, *into*, *out*, *out of*, and *through*¹—but also propose a model of principled polysemy: they apply

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¹ Besides the 17 listed here, they briefly mention the semantics of *of* in the explanation of the differences between *out* and *out of*. However, the explanation is restricted to two senses of *of* that are relevant for the discussion of *out of*, so, I did not include *of* in the particles that are explained here.

the concept of *on-line contextually determined interpretations* and the idea of extension of the senses through *pragmatic strengthening*.

Section 2 of this paper outlines the authors' arguments. Section 3 points out the strengths and weaknesses of these arguments, proposes a modified approach and applies this modified approach to another preposition. Section 4 summarizes the arguments presented and concludes the review of the book.

2. Review of the Book

2.1. Locating the Book in Semantics

The semantics of prepositions has been studied from two main perspectives—syntactic-semantic and cognitive-semantic (Cuyckens and Radden (2002: ix)). T&E's work can be characterized as cognitive-semantic: it builds on previous research in the field and advances it by incorporating the concepts of *on-line construction of meaning*, *embodiment*, and *pragmatic strengthening*.

Polysemy has received surprisingly little attention in semantics as linguists have often assumed that lexical forms are conventionally paired with meanings. The polysemy of prepositions has received even less attention, probably due to the fact that prepositions were considered as function words, not content ones. As T&E (2003: 1) point out, there are so few studies on the polysemy of prepositions that we can almost say the phenomenon has been ignored.

Studies of prepositions have dealt mostly with their structure of projection (prepositions as the head of Prepositional Phrase, PP). This line of research is still evident in the syntactic-semantic perspective. Linguists in this tradition barely recognize the polysemous nature of prepositions, and when they do, they assume that the relationships between the distinct meanings associated with a single form are arbitrary and argue that these form-meaning pairings are stored in the mental dictionary or lexicon. In other words, they argue that the structure and meaning of prepositions can be explained in terms of the prepositions' different lexical properties (Haumann (2002); Rauh (2002)).

The semantics of what were traditionally considered function words has become a major strand of research in the cognitive-semantic perspective and studies on the polysemy of prepositions and particles, especially the work of Brugman (1981) and Lindner (1981), have greatly influenced the development of this school of thought. As Heine (1997)

observes, demonstrating how the polysemous meanings of words are related to each other has become one of the central issues in cognitive linguistics, and prepositions are some of the most polysemous words. From the cognitive linguistics perspective, the distinct meanings associated with a single form are not arbitrarily related, but form a complex “family resemblance” (Wittgenstein (1953)) network; these meanings are related to the central sense in principled ways.² Some argue they are related through the schemas and properties of each meaning (Brugman (1981)), while others contend that they are related through metaphor and metonymy (Lakoff (1987)).

Accepting the idea that studying the multiple meanings of a single linguistic form is indispensable to linguistic studies as well as the idea that those meanings are related to each other, T&E take a critical step forward by advancing the following three arguments:

- (1) Language radically underdetermines the rich interpretations assigned to utterances; lexical entities serve as mere prompts for meaning construction.
- (2) Meaning representation is fundamentally conceptual and this conceptual structure is a product of how humans experience and interact with the spatio-physical world.
- (3) Polysemous structure must be studied through a model of principled polysemy based on *pragmatic strengthening* (Traugott (1989)).

2.2. T&E’s Model of Principled Polysemy

Chapter 3 of T&E’s book presents a model of principled polysemy and Chapters 4–7 apply the model to case studies. Before examining the model, I will briefly summarize Chapters 1 and 2, as they are essential for understanding the model and its application.

Chapter 1 discusses the *on-line contextually determined interpretations* of an utterance. T&E argue that previous studies on polysemy, such as Brugman (1981, 1988) and Lakoff (1987), adopt what Jackendoff (1997: 48) calls a “simple compositional” approach, wherein “all elements of content in the meaning of a sentence” are provided by the lexical items

² The prototype view is not necessarily shared by all cognitivists. Some argue that they are related through schematic meaning. (For example, Belien (2002).)

and the syntactic configuration in which they occur. T&E, on the other hand, advance the concept of *on-line contextually determined interpretations* and argue that lexical entries serve as mere prompts for meaning construction, which involves elaboration and integration of linguistic and non-linguistic information. For example, they argue that the trajectory of *the cat* in *the cat jumped over the wall* is derived not only from the meaning of the word *over*, but also from the embodied information of *cat*, *jump*, and *wall*. What is usually considered the meaning of words is largely derived from the context; therefore, in studying the polysemy of words, T&E argue, identifying the meaning devoid of context is necessary.

Chapter 2 develops the idea that meaning is fundamentally conceptual in nature and this conceptual structure is a product of how we experience and interact with the spatio-physical world—the *embodied nature of meaning*.

In Chapter 3, the authors discuss the issues related to polysemous structures and suggest a model of principled polysemy. They discuss four issues: (1) how we differentiate a sense of a lexical unit from contextual information and other senses; (2) how we recognize the center of the polysemous network; (3) how we identify the relationships among the elements in the network; and (4) how we model the systematic process through which on-line contextually determined interpretations arise. And through answering those questions, T&E suggest the following model of principled polysemy:

(4) Model for Principled Polysemy

- (a) identify distinct senses through a two-step methodology;
 - [1] abstract away the spatial relation of Trajector (henceforth TR) and Landmark (henceforth LM) of one sense A³
 - [2] combine that resulting schema with the other information, both linguistic and extra-linguistic, in the sentence that contains B. If the meaning of the sentence can be inferred, B is not a distinct sense, and if not, a distinct sense.
- (b) determine the center of the network, which is the abstracted

³ Langacker (1987, 1991), uses the TR (Trajector) and the LM (Landmark) to denote the figure-ground relationship; the TR is the focal element (e.g. the *cat* in *the cat jumped over the wall*) and the LM is the background element (the *wall*).

mental representation of the primary sense;

There are 5 linguistic criteria for narrowing the arbitrariness of attesting the primary sense; earliest attested meaning; predominance in the semantic network; use in composite forms; relations to other particles; and grammatical predictions.

- (c) attest the relations between the elements in the polysemous structure through meaning extension based on pragmatic strengthening on tight correlations in experience, not necessarily metaphor;
- (d) apply 3 major inferencing strategies, which make the on-line interpretation possible: best fit, knowledge of real-world force dynamics, and topological extension.

Regarding the first issue, T&E suggest a two-step process for determining whether a particular instance of a preposition counts as a distinct sense. This process, they argue, minimizes the subjective nature of analysis and adequately identifies senses without reference to contextual information. Without a set of criteria, most previous studies on polysemy have fallen into the *polysemy fallacy* i.e., they have exaggerated the number of distinct senses associated with a particular form.

T&E's two-step process works as follows: to decide whether sense A and sense B are distinct, we first abstract away the spatial relation of TR and LM of sense A. Then, we combine the resulting schema with other information, both linguistic and extra-linguistic, in a sentence that contains B and see if we can infer the sentence meaning. If yes, A and B are the same sense, and if no, distinct ones. (Examples will be provided in 2.3.1.)

The second issue discussed by T&E concerns the center of the polysemous network, which they call *proto-scene*, the abstracted mental representation of *the primary sense*; it consists of a schematic TR, a schematic LM, and a conceptual configurational-functional *relation* which mediates the TR and the LM. In other words, the center of the network is designated by first identifying the primary sense and then constructing a *redescription* from it. (This *redescription* is similar but different from "image schema.")⁴

⁴ T&E avoid using the word "image-schema," for their redescription constitutes an attempt to understand conceptual structure or concepts not in terms of propositional information but as representation of spatio-physical, that is, external experience.

T&E argue that identifying the primary sense requires the five linguistic pieces of evidence listed in (5):

(5) 5 linguistic criteria for narrowing the selection of a primary sense

- (a) earliest attested meaning
- (b) predominance in the semantic network
the unique spatial configuration that is involved in the majority of the distinct senses
- (c) use in composite forms
Participation in composite forms (eg. *overcoat* and *look over* for *over*) cannot directly determine which sense is primary, but failure to participate can be taken as suggestive that the particular sense is probably not primary in the network.
- (d) relations to other particles
The meaning of a particle that participates in a contrast set (e.g. *above*, *over*, *under* and *below*) is partially determined by how it contrasts with other members of the compositional set. The particular sense used in the formulation of such a contrast set would thus seem to be a likely candidate as a primary sense.
- (e) grammatical predictions
For any distinct sense that is represented as directly related to the primary sense, we should be able to find sentences whose context provides the implicature that gives rise to the additional meaning associated with the distinct sense.

They also argue that no one piece of evidence is criterial in determining the primary sense; used together, however, the five produce a substantial body of evidence. Thus, for T&E, the center of the network is the spatial relationship between the TR and the LM of the primary sense determined by the five criteria above. (Examples will be provided in 2.3.2.)

The third issue T&E discuss has to do with determining the relationships between the elements in a polysemous network. They offer a model of pragmatic strengthening based on experiential correlations or construing a spatial scene in a certain way, from a new vantage point. According to T&E, a number of scholars—Bybee et al. (1994), Evans (2000), Hopper and Traugott (1993), Traugott (1989)—have observed that inferences deriving from experience can, through continued use, come to be conventionally associated with a lexical form. Following

Traugott (1989), T&E refer to this process as *pragmatic strengthening* and argue that context provides the implicature, and being reanalyzed, the implicature is conventionalized as a distinct meaning associated with a lexical form. Given the embodied nature of meaning, the recurring implicatures that come to be conventionalized can result either from independently motivated experiential correlations or from construing a spatial scene in a certain way, from a new vantage point. Summarizing, T&E propose a model of meaning extension based on pragmatic strengthening through the embodied nature of meaning. (Examples will be provided in 2.3.3.)

The fourth issue in the principled model of polysemy refers to how we model the systematic process through which on-line contextually determined interpretations arise. T&E do not provide much detail on this issue. They do, however, suggest the following inferencing strategies:

(6) Inferencing Strategies

(a) best fit

Speakers assume that the participants use the spatial particle which offers the best fit between the conceptual relation and the speakers' communicative needs. With this assumption, the speakers fill in information regarding a particular spatial scene. This seems to be a logical extension of the notion of relevance (Grice (1975), Sperber and Wilson (1986)).

(b) knowledge of real-world force dynamics

The speaker and hearer will assume that all elements in a spatial scene are subject to real-world force dynamics.

(c) topological extension

Speakers assume that the principles of Euclidean geometry do not hold at the level of conceptual structure. Conceptual space and spatial relations are not held to be metric notions of fixed distance, amount, size, contour, angle etc., rather the conceptualized space and spatial relations are topological in nature (Talmy (2000)).

2.3. Case Studies Utilizing the Model of Principled Polysemy

In Chapters 4 through 7, T&E apply the model proposed in Chapter 3 to a number of prepositions. Chapter 4 examines the preposition *over* in detail; in Chapter 5, T&E consider three additional spatial particles—*above*, *under* and *below*—that involve verticality and are a con-

trast set with *over*; Chapter 6 deals with eight particles, four involving an oriented TR—*up*, *down*, *to* and *for*—and four related to an oriented LM—*in front of*, *before*, *behind* and *after*. In Chapter 7, T&E explore five particles that are sensitive to certain dimensions of the LM—*in*, *into*, *out*, *out of*, and *through*. Due to space limitations, I will briefly review their arguments on *over*; interested readers should refer to the book for a discussion of the other particles.

2.3.1. Identifying Distinct Senses

Using the two-step process discussed above, T&E identify 15 senses for *over*. We will review only two of these senses: *over* has one sense in (7) and (8) and another in (9).

- (7) The picture is over the mantel.
- (8) The rabbit hopped over the fence.
- (9) Arlington is over the Potomac River from Georgetown.

Following the two-step methodology for determining whether a sense is distinct or not, first we must depict the spatial relation of the TR and the LM in (7)—the TR is higher than the LM. Then, we apply that image to the rest of the sentences to see if we can infer the meaning of each sentence.

- (8') The rabbit hopped <TR being higher than LM> the fence
- (9') Arlington is <TR being higher than LM> the Potomac River from Georgetown

If we look at (8') and (9'), we can infer the meaning of (8), but not of (9). Hence, the *over* in (7) and (8) can be identified as one sense, while that in (9) is distinct, what T&E term *on-the-other-side-of* sense.

Over in (8) is supplemented by contextual information, so that the above-across movement of the rabbit is not indicated by *over* alone.

FIGURE 1: Schematization of *The rabbit hopped over the fence*

The meaning of sentence (8) is represented in Figure 1. T&E argue that the lexical form *over* in (8) mentions only point B—TR being higher than LM—the spatial relation abstracted away from (7). Points A and C are inferred from what we know about *hopping*, *rabbit*, and

fence; the rabbit can hop at point A or point C, but with the help of *over*, which hints at the spatial position of B, listeners are able to interpret the utterance as meaning that a rabbit has moved from A to C through B. In other words, the above-across reading in (8) is not prompted by *over*, but rather arises from the integration of linguistic prompts at the conceptual level. Most of the information required to integrate the linguistic prompts and construct a mental concept is provided by inference and real-world or encyclopedic knowledge. In interpreting (8), the encyclopedic knowledge includes at least the following: our understanding of the action of hopping; our knowledge of rabbits (they cannot hover in the air the way birds can); and our knowledge of force dynamics such as gravity (a rabbit cannot remain in midair indefinitely). With these pieces of information, we can say that (7) and (8) are representations of the same sense.

Sentence (9), on the other hand, is usually interpreted to mean that Arlington is located on the other side of the Potomac River from Georgetown. However, there is no principled way of deriving this *on-the-other-side-of* sense from the sentential context, as can be seen in (9'). Hence, (9) involves a different sense of *over*, the *on-the-other-side-of* sense.

2.3.2. Identifying the Primary Sense and Constructing Proto-Scene

The second step in the model of principled polysemy is to identify the primary sense among the 15 identified senses and abstract the proto-scene from it. Applying (4b) to the 15 senses identified through (4a), T&E conclude that the primary sense of *over* is the one in (7); if we abstract the proto-scene from that sense, it would be a spatial configuration in which the TR is higher than the LM.

According to the Oxford English Dictionary (OED), the earliest meaning of *over* is "higher than" or "above" (criterion 1). In terms of the criterion of predominance (criterion 2), the analysis provides substantial evidence that the majority of distinct senses associated with *over* involve a spatial configuration in which the TR is higher than the LM. In addition, the use in composite forms (criterion 3) is helpful in designating this sense as the primary one. Criterion 4, the relationship to other spatial particles, also points to this sense as the primary; *over* is a contrast pair with *above*, *below*, and *under*, and among these four, the contrasted meaning of *over* is the TR being located higher than the LM. Lastly, criterion 5 confirms this sense as the primary since many

sentences involving *over* are derived from this sense with the help of the context.

Once the primary sense is designated, T&E abstract the proto-scene from it (Figure 2).

FIGURE 2: Proto-Scene for *Over*

This figure depicts two major points: the TR is higher than the LM and the TR and LM are within each other's sphere of influence, represented by the dotted line. The first point needs no explanation, but the second one does. Let us consider the following sentences:

- (10) The picture is above/over the mantel.
- (11) The birds are somewhere above/?over us.
- (12) The maid hung the jacket above/over the back of the chair.

The interpretations of the sentence in (10) are virtually synonymous. Because of this, many studies—including Lakoff (1987)—argue that *over* and *above* are roughly equivalent. However, when we examine sentences like (11) and (12), we become aware that *over* indicates there is a potential for contact between the TR and the LM. In (12), the sentence with *over* implies that there is contact between the *chair* and the *jacket*, but the one with *above* does not. The distance here is a topological one: the metric measurement between the TR and the LM is quite subjective. Consequently, in certain instances *over* and *above* can be used interchangeably, but in others they cannot.

2.3.3. Attesting the Semantic Network for *Over*

The third step in explaining polysemy is attesting the network of the word. Carefully examining the 15 senses of *over*, T&E conclude that they are related as Figure 3 shows. A cluster of senses is denoted by an open circle as in nodes 2 and 5. A shaded sphere represents a single distinct sense. The larger circle stands for the proto-scene.

FIGURE 3: The Semantic Network for *By*

T&R argue that the senses are related through pragmatic strengthening based on the embodied nature of meaning. Discussing all relationships among the 15 senses is beyond the scope of this paper. Instead, I will show only one extension of meaning:

- (13) The picture is over the mantel. (= (7))
- (14) The big tablecloth is spread over the table.
- (14') The big tablecloth is spread <TR being higher than LM> the table
- (15) They put a transparent plastic sheet over the painted ceiling of the chapel during repairs.
- (15') They put a transparent plastic sheet <TR being higher than LM> the painted ceilings of the chapel during repairs

By examining (14') and (15'), we see that (13) and (14) belong to the same sense, but (15) does not. This leads us to examine how (15) is related in the semantic network of *over*. T&E argue that in everyday life, we encounter instances in which the object in focus (the TR) is

larger or perceived as larger than the locating object (the LM). In addition, given our normal interactions with tables and tablecloths, it follows that our typical vantage point is such that when a tablecloth is over the table, we perceive it as covering the table. Because of the ubiquitous nature of this situation, the covering implicature is reanalyzed as distinct from the spatial configuration of the proto-scene; accordingly, the covering component becomes instantiated in the semantic network as a distinct sense. It is through the embodiment of meaning, through experience with the world, that a sense is recognized as distinct.

Applying (4c) to the other 13 senses identified through (4a), T&E argue for explaining meaning extension through pragmatic strengthening, not metaphor, as shown in Figure 3.

3. A Revised Model of Principled Polysemy

Having outlined T&E's arguments, in this section I will critically evaluate their assertions, propose a modified model of principled polysemy, and apply it to another preposition, *by*.

3.1. Strengths and Weaknesses of T&E's Model

T&E's model has three strengths—the on-line contextually determined interpretation, the embodied nature of meaning, and the network based on pragmatic strengthening—and four weaknesses—artificiality of data, lack of consideration of obsolete senses, inclusion of non-meaning nodes in the network, and the criteria for identifying the primary sense.

T&E can be credited with introducing the concept of *on-line contextually determined interpretations* of an utterance. Discarding the "simple compositional approach" (Jackendoff (1997: 48)) adopted by Brugman (1981, 1988) and Lakoff (1987), T&E have managed to avoid the polysemy fallacy. Brugman and Lakoff discuss the polysemous network of *over*, subsuming 24 distinct schemata interconnected through six central schemata via various links and transformations.^{5,6} Due to

⁵ The notion of figure-ground relationship was originally developed in Gestalt psychology and introduced to linguistics by Talmy (1978).

⁶ The proposed links and transformations are, to list a few, schema transformation and metaphor such as CONTROL IS UP, CHOOSING IS TOUCHING.

space limitations, we will only consider the following sentences:

- (16) The plane flew over. (Lakoff (1987: 416))
 (17) Hang the painting over the fireplace. (ibid.: 424)

(ibid.: 419)

FIGURE 4: *The plane flew over.*

(ibid.: 425)

FIGURE 5: *Hang the painting over the fireplace.*

Figure 4 is the schema for (16); the LM is what the plane is flying over (ibid.: 419) and the TR *the plane*. The dotted line and the arrow represent the PATH that the TR is moving along. Figure 5, the schema for (17), shows that the TR (*painting*) is above the LM (*fireplace*).

This analysis is problematic since the schemata do not represent the meaning of *over* itself. Figures 4 and 5 differ in that the former meaning is dynamic, the latter static. It is more reasonable, as T&E do, to attribute the difference between the two to contextual information, not to a difference in the meaning of *over* itself; it is *fly* and *plane* that create PATH, and *hang*, *painting* and *fireplace* that yield the static meaning, not simply the meaning of *over*. This analysis shows that the simple compositional approach is unsuccessful in distinguishing appropriately between information coded by the lexical item and information derived from context, background knowledge, and cognitive processing.

T&E can also be credited with advancing the claim that meaning is a product of how we experience and interact with the spatio-physical world—the embodied nature of meaning. This point is closely related to the third strength of their approach—a semantic network based on pragmatic strengthening.

Most earlier studies on polysemy assumed that the senses in the radial category are related through metaphor and metonymy (Lakoff (1987)).⁷ Taylor (1993), who lists eight possible processes of polysemization, also follows this line of thought: all of his processes are triggered by the change in the domain, hence metaphor. In practice, there are two major problems with this approach: it provides such an unconstrained semantic network that the model allows any other preposition or any other sense to be related to the polysemous network of the word in question, and it offers no explanation for why some possible extensions have not occurred.

These points are illustrated in (18) through (20). *Under* depicts the TR being located below the LM, as (18) shows:

- (18) A dog is under the table.
- (19) a field under grass
- (20) *a transparent plastic sheet under the painted ceiling of the chapel (* in the "covering" reading)

An explanation based on metaphorical extension, or change in domain, authorizes the LM to be in the landscape domain, which makes (19) available. Similarly, if *under* metaphorically extends to the construction domain, we should be able to have (20), which cannot be understood in the sense of (15): not only the explanation based on metaphorical extension, but, moreover, the information of world knowledge, such as the knowledge of what a *ceiling* is, and the information based on the experience of interaction with ceilings are inevitable in explaining (20).

Examples (18) through (20) show that an analysis based on metaphor alone allows any sense to be related to the network and provides no explanation for why the covering reading of (20) is unacceptable. On the other hand, as we saw in (15), using pragmatic strengthening based on embodiment, we can explain the meaning extension without facing those two problems—it allows only certain extensions that are recurrently used in daily experience. The model based on the embodiment nature of meaning also prevents studies on polysemy from going into a deep morass of mentalism; unless we ground an explanation in daily experiences, all the semantic information must be stored in the mental lexicon. In addition, the idea of embodiment can incorporate the

⁷ Brugman (1981, 1988) argues that schemas are related through the properties possessed by each.

results of numerous recent cognitive linguistic analyses, developmental psychological experiments (Lloyd, Sinha and Freeman (1981); Mandler (1992)), phenomenological studies (Ingarden (1973)), and anthropological linguistics (Hanks (1996)).

T&E's arguments, however, are not without weaknesses. First of all, relying on artificial instead of authentic data, or adopting a top-down instead of a bottom-to-top approach, has two consequences:⁸ (1) we cannot say with confidence that T&E have accounted for all the senses of the particles; and (2) research with artificial data does not fully capture the nature of pragmatic strengthening. Coriston-Oliver (2001) shares this view and even T&E themselves are fully aware of this weakness: they state that "it would not be surprising if a corpus-based investigation also revealed additional uses and even seemingly anomalous uses which would challenge our model in various ways" (T&E (2003: 236)). Moreover, if we examine meaning extension through pragmatic strengthening, the information about whether a particular sense is recurrently used is vital. Only through a bottom-to-top approach can we get this information. Thus, it becomes clear that a bottom-to-top approach is critical for a model of principled polysemy.

The second weakness of the model is the failure to consider obsolete senses. A synchronic analysis alone often leaves some senses isolated and, when we take the obsolete senses into account, we see that they can serve as missing links, as shown in the meanings of *by* in (21) through (23).

- (21) <Till> finish by 5 o'clock
- (22) <Near/Out-of-the-domain> sit by him
- (23) <In-the-domain> Swear by God.⁹

⁸ Langacker (1991) describes the model of "bottom-to-top." He says "Another fundamental concern is ... the problem of specifying which elements are allowed to occur in particular constructions, especially when the precise inventory is evidently subject to neither semantic nor phonological prediction. A natural solution is available in cognitive grammar owing to its usage-based (or "bottom-to-top") character, i.e., its emphasis on specific expressions and the extraction therefrom of low-level schemas as well as those representing higher levels of abstraction" (Langacker (1991: 6-7)).

⁹ OED asserts that this phrase originally meant "in the presence of God." This sense is scarcely used nowadays except these clichés. We will come back to this in 3.2.5. A more obvious example of this sense is (i):

(21) seems to be a distinct sense, not related to the <Near/Out-of-the-domain> sense of (22), the <In-the domain> sense of (23), or any other senses of *by*. It does not correlate with the <Near/Out-of-the-domain> sense, for TR can be anywhere around the LM in (22); in (21), however, TR (*the due time*) is only before the LM (*5 o'clock*), not after. Nor is (21) related to (23) in that TR cannot be anywhere in the LM domain and it needs a directional sense.

When we take into account the obsolete <Directional> sense, (21) is no longer isolated; the <Directional> sense is the missing link between (21) and (23). (A more detailed account is provided in 3.2.) In other words, only by taking into account the obsolete senses can we attest the semantic network of *by*. It follows, then, that T&E's analysis falls short in that it lacks a consideration of obsolete senses.

Thirdly, we need to consider the open circles in Figure 3. T&E provide only the following account for those nodes in the figure: "a cluster of senses is denoted in our representation of a semantic network by an open circle" (T&E (2003: 80)). If we are to demonstrate semantic extensions through pragmatic strengthening, it is erroneous to include a point in the picture that is not a sense itself.

The last weakness of T&E's argument is the method for determining the primary meaning; the model fails to identify the primary sense for some prepositions. The five criteria of (5) identify different senses of *by* as the primary sense. Criterion 1, the earliest attested date, suggests that the <Near/Out-of-the-domain> sense is primary; OED says *by* was an adverbial particle indicating the place being near, while criterion 4, relationship to other prepositions, creates confusion: since *by* participates in a contrast set with *near* (*I stand by/near him*), the primary sense seems to be the <Near/Out-of-the-domain> sense; yet, *by* being in the composite set with *through* (*I explain by/through examples*), the <Through> sense can be regarded as primary, too. As can be seen,

- (i) *Pa hydras soðlice oncneowon þe þam worde þe him gesæde wæs [be] ðam cilde, and ealle wundrodon þe þæt gehyrdon, and eac [be] ðam ðe þa hydras him sædon. (ÆCHom i 30: 32)*
 'But the shepherds understood by the word that had been said to them [concerning] the child, and all wondered that heard it, and also at that which the shepherds said unto them.'

T&E's criteria for determining the primary sense do not work well in the case of *by*. Therefore, some refinement of the criteria for determining the center of the network is necessary.

3.2. Revised Model of Principled Polysemy and the Semantics of *By*

This section will offer an alternative model of principled polysemy, and apply it to the preposition *by*. T&E do not discuss *by* even though, according to Narita et al. (1984: 12), it is one of the ten most frequently used prepositions. The discussion in this section is based on Kato and Hanazaki (2003a) and Hanazaki and Kato (2004a, 2004b), henceforth K&H and H&K respectively.

The revised model of principled polysemy consists of six steps:

(24) A Revised Model for Principled Polysemy

Step 1: collect authentic data using a bottom-to-top approach;

Step 2: identify distinct senses through the two-step process:

[1] abstract away the spatial relation of the TR and LM of sense A

[2] combine the resulting schema with other information, both linguistic and extra-linguistic, in a sentence that contains B. If the meaning of the sentence can be inferred, B is not a distinct sense; if not, it is a distinct sense.

Step 3: attest the polysemous network through meaning extension based on pragmatic strengthening, not metaphor;

Step 4: examine the network from a diachronic perspective;

Step 5: determine the center of the network in the different periods in the history of this preposition through the predominance of the central meaning in the semantic network;

Step 6: apply the three inferencing strategies: best fit, knowledge of real-world force dynamics, and topological extension.

The revised model includes parts of T&E's model (Steps 2, 3, and 6) while modifying it in important ways. First of all, the revised model advocates the use of a bottom-to-top approach; secondly, adopts a diachronic viewpoint in attesting the semantic network; thirdly, it also revises the concept of the network by arguing that only senses become nodes in the network; fourthly, that the primary sense should be identified on the basis of its predominance in the network; and lastly, it accepts changes in primary sense according to time. It is important to

note that the revised model attests the primary sense *after* identifying the network, while in T&E's model the primary sense is identified *before* the network is attested.

If the above six-step model is applied to *by*, its semantic network can be represented in Figure 6: the open circles indicate extinct senses and the larger circles show the center of the network.

FIGURE 6: The Semantic Network for *By*

3.2.1. A Review of Previous Studies on *By*

Before applying the revised model to *by*, this section will briefly review earlier studies on the polysemy of *by* and argue that none of them presents a satisfactory analysis.

Studies on *by* are difficult to locate. As Zelinsky-Wibbelt (1993: 1) notes, prepositions are a “category which had long been neglected in linguistic inquiry” and the amount of research on *by* certainly supports this claim (Lindkvist (1976, 1978), Dirven (1993), Sakamoto (1993), Ueno (1995), O’Dowd (1998), Lindstromberg (1997), Ueno & Kanasugi (1997a, b), and Masamura (1989, 2002)). The few existing studies vary as to what they claim to be the primary meaning. H&K (2004b) offer a more detailed review of previous studies, but let me show the unsatisfactory nature of some studies.

Some previous studies consider *proximal distance* as the primary meaning of the polysemous network of *by*. This model explains *by* in (25) well; however, it should be difficult for such a model to show how *by* in (26) relates to the “nearby” sense. *Shoulder* is not near *her*, it is a part of *her*. Also, it cannot accommodate the sense in (27). The *deadline* cannot be “near” but must be “before.”

(25) I want to go *by* the window. (Lindstromberg (1997: 142))

- (26) He caught her by the shoulder. (COBUILD)¹⁰
 (27) Guaranteed acceptance if you apply by the following date. (BNC)¹¹

3.2.2. The Revised Model

Step 1: Collecting Authentic Data through a Bottom-to-top Approach

The revised model of principled polysemy requires that data be collected from daily conversations through a bottom-to-top approach as this approach best captures the actual uses of a specific language structure.¹² Of course, by its nature, research utilizing a bottom-to-top approach can never be complete: there will always be data that cannot be accounted for in a single study. However, gathering data from daily conversation is more reliable than any other approach as it reflects the actual uses of language. Moreover, as mentioned in 3.1, only through a bottom-to-top approach can we identify senses frequently used in daily conversation, which is critical for pragmatic strengthening. Using a bottom-to-top approach, we obtained 719 examples of *by*. The data were gathered from a wide variety of sources to overcome the limitations of this approach.

Step 2: Identifying the Different Senses

The revised model identifies the distinct senses of a preposition *by* using T&E's approach.

The few existing analyses of *by* identify different numbers of senses. Some fall prey to the polysemy fallacy and identify as many as 24 senses, while others limit their investigation to a certain sense, not providing an explanation of the polysemous structure of *by*. The second step of (24) proposes a strict method that eliminates contextual information; this yields a list of senses differentiated from contextual information and other senses.

Applying the second step of (24) to the 719 examples of *by* analyzed

¹⁰ COBUILD = Cobuild English Dictionary

¹¹ BNC = British National Corpus

¹² K&H (2003a, b) and H&K (2004a, b) have found it valid to adopt the methodology suggested by T&E because, from a different path, we also have come to the conclusion that much of the meaning is dynamically organized on-line at the time of interpretation. The main trigger for such an observation was that some prepositions have seemingly opposite meanings (e.g. cause and concession), and it is difficult to saddle such a broad meaning to a single word.

in this study, we establish 10 senses for *by*: (1) <Agent> (*The feast was served by his mother*); (2) <Through> (*I explained by a certain example*); (3) <Means> (*Travel by car*); (4) <Near/Out-of-the-domain> (*I want to go by the window*); (5) <Till> (*By 8 o'clock, he had arrived at my hotel*); (6) <Part/Whole> (*Catch her by the shoulder*); (7) <Bit-by-bit> (*I live for the moment day by day*); (8) <Margin> (*Violent crime has increased by 10%*); (9) <In-the-domain> (*By the way I dropped my wallet*); and (10) <Throughout> (*by day*).

Applying the second step of (24) to (28)–(30), we can see that (28) and (29) are representations of the same sense, but (30) is not; we can infer the meaning of (29) from (29'), but we cannot infer the meaning of (30) from (30'). (For the other senses, please refer to K&H (2003a) and H&K (2004a, b).) Notice that although (28) seems to have a dynamic sense, it is *went* that adds the meaning of motion, not *by*.

- (28) <Near/Out-of-the-domain> I want to go by the window.
(Lindstromberg (1997: 142))
- (29) <Near/Out-of-the-domain> The bomb went off as the police went by. (BNC)
- (30) <Till> Guaranteed acceptance if you apply by the following date. (BNC)
- (29') The bomb went off as the police went <TR being Near/Out of the domain of the LM>
- (30') Guaranteed acceptance if you apply <TR being Near/Out of the domain of the LM> the following date

Thus, the second step of (24) successfully identifies 10 senses for *by*, demonstrating the usefulness of this step of the revised model.

Step 3: Attesting the Semantic Network of *By*

The third step in the revised model is attesting the semantic network of the word in question by adopting T&E's approach: meanings expand through *pragmatic strengthening* based on the embodiment of meaning. As noted earlier, explaining meaning extension in this way adequately accounts for how the meaning has expanded. The alternative explanation based on metaphor is so unconstrained that the model allows any development of meaning and offers no explanation for why some senses do not occur. The method adopted here, on the other hand, is able to fully explain the constraints under which meaning can be reanalyzed as a new distinct sense. It also prevents research from going into extreme mentalism and can accommodate recent research results from a variety

of areas.

When applied to the data, the third step of (24) shows that the 10 senses of *by* are related as nine being grouped into two clusters and one being isolated. The <Near/Out-of-the-domain> and the <Bit-by-bit> senses are related and form the *Near* cluster; the <In-the-domain>, <Throughout>, <Through>, <Means>, <Agent>, <Part/Whole>, and <Margin> senses are also related; and the <Till> Sense is isolated. Because of space limitations, only the relationship between two senses in the *Near* cluster is investigated here. See K&H (2003a) and H&K (2004a, b) for a more detailed discussion.

The senses of the *Near* cluster, <Near/Out-of-the-domain> and <Bit-by-bit>, differ in that the latter has the meaning of gradualness, as (31) and (32) show:

(31) <Near/Out-of-the-domain> But as time goes by it just gets harder. (BNC)

(32) <Bit-by-bit> I live for the moment day by day. (COBUILD)

(32') I live for the moment day <Near/Out of the domain> day

Applying the second step of (24) to (32), we can see that (32') lacks the meaning of "happen gradually, not at all once," (COBUILD "by") which is present in (32). Notice that it is not the contextual information that gives rise to the gradual meaning; *live for the moment* does not have such meaning.

The <Near/Out-of-the-domain> sense has extended to the <Bit-by-bit> sense. In everyday life, we experience situations in which the LM and TR are near each other and there is another TR close to the former TR, which now acts as the LM. In the case of days, *Sunday* is near *Monday*, *Monday* is close to *Tuesday* and so on. The relationship is represented in Figure 8a. The ubiquitous nature of this situation leads to a reanalysis of the implicature of continuousness into a distinct sense, as in Figure 8.¹³

¹³ Having the PATH in the picture may seem to violate the principle of eliminating all the contextual information. The notion of PATH is "evoked" through having a beginning and end point. (See T&E for more detail.)

FIGURE 7:
<Near/Out-of-the
Domain>

FIGURE 8-a:
<Bit-by-bit>

FIGURE 8:
<Bit-by-bit>

It is important to note the similarities and differences between Figure 7, the abstract picture of the <Near/Out-of-the-domain> sense of *by*, and Figure 8: the PATH in Figure 8 adds the meaning of gradualness.

Step 4: Examining the Network from a Diachronic Perspective

Introducing a diachronic point of view will enable us to overcome the second weakness of T&E's model: without a diachronic perspective, some semantic networks, such as that for *by*, remain unexplained.

As shown in Step 2, *by* has 10 senses; nine of them are grouped into two clusters and one is isolated. All 10 senses will be related when we examine not only the existing senses but also the obsolete senses of *by*: the extinct <Directional> sense connects the isolated sense of <Till> with the <In-the-domain> sense, and another obsolete <Vague-area> sense connects the two clusters.

As noted earlier, the <Till> sense of *by* is not related to the <Near/Out-of-the-domain>, the <In-the-domain>, or any other senses of *by*.

- (33) <Till> finish by 5 o'clock (=21))
- (34) <Near/Out-of-the-domain> sit by him (=22))
- (35) <In-the-domain> Swear by God (=23))

If we examine obsolete data, however, we see that the *by* in (36) provides the connection between (33) and (35);

- (36) <Directional> Caucas se beorg is be norþan and Indus seo ea be westan, and seo Reade Sæ be suþan. (OED)
- 'Mt. Caucasus is to the north and the Indian Ocean is to the west, and the Red Sea to the south.'

The <Directional> sense has extended from the <In-the-domain> sense; TR is in the domain of *north* and with recurrent pointing in a direction, the directional reading of *by* became a distinct sense. In

turn, the <Directional> sense has extended to the <Till> sense: with the contextual information of time and deadline, it developed into a new sense referring to the end point.

The <Vague-area> sense supplies the missing link between the <Near/Out-of-the-domain> and the <In-the-domain> senses.

- (37) <Vague-area> *Pa vt-lazes beoð swa stronge [bi] watere & [bi] londe* (OED)

‘The outlaws are so strong [on] water and [on] land.’

In (37), the *outlaws* can be strong *on* the surface of *water*, as well as *in* the *water*, hence the naming. The change in vantage point motivates this sense to extend not only to the <Near/Out-of-the-domain> sense (when the vantage point is in the water, the outlaws seem to be out of the domain), but also to the <In-the-domain> sense (when the vantage point is out of the water, the outlaws seem to be in the domain).

With the help of these two obsolete senses, the semantic network of *by* becomes complete. Figure 6 illustrates the links among the 12 senses of *by*, 10 from existing senses and two obsolete ones.

Step 5: Determining the Center of the Network

The fifth step of the revised model is determining the center of the network. The arguments for Step 5 are two-fold: (1) the primary sense should be identified by its predominance in the network, not through T&E’s five criteria; and (2) the primary sense can change over time. To support these arguments, we will apply the fifth step of (24) to *by* and prove that determining the primary sense through its predominance works well and that the center of the network of *by* has changed from the <Vague-area> to the <Through> sense.

T&E’s five criteria for determining the center of the network have been shown to be untenable: they sometimes produce confusing results as to which sense is the primary. In the case of *by*, one criterion indicates the <Vague-area>, others the <Near/Out-of-the-domain>, and still others the <Through> sense as the primary sense.

The earliest attested meaning, the criterion T&E seem to rely on the most, does not identify the center for some words, including *by*.¹⁴ The OED suggests that the <Near/Out-of-the-domain> sense is the earliest

¹⁴ We can say T&E rely on this the most because this is the very first criterion they discuss and their arguments start with the application of this criterion.

attested meaning of *by* by a slight difference between it and <Vague-area>, yet it is problematic to consider this sense as the central one. It does not hold a central position in Figure 6 nor is it the base for meaning extensions: it is impossible to think of the <Vague-area> sense as being derived from the <Near/Out-of-the-domain> one; it should be the other way around.

Moreover, relying primarily on the earliest attested meaning when determining the primary sense, as T&E do, raises questions about the level of confidence in the OED data on the first attested date. Also, what happens if the first attested dates of two senses are almost the same? What happens if the earliest attested meaning and the sense predominant in the semantic network are different?

To avoid confusion, I argue that when determining the primary sense, we need to privilege predominance in the semantic network. Given the nature of meaning extension based on pragmatic strengthening, it makes sense to identify the primary meaning through its predominance in the network. Pragmatic strengthening presupposes that meanings expand from one sense to another with the help of contextual inference. If this is the case, there must be a sense that all the meanings are related to and this should be identified as the primary sense.

Determining the primary sense through its predominance in the network subsumes all of T&E's criteria. Criterion 1, the earliest attested meaning, should bear the same consequence as the method proposed here if the data fully capture old usage; the oldest sense ought to be the source of the meaning expansion. The revised method does not deny criterion 1; it simply emphasizes other aspects of it. The revised method covers criterion 3, composite forms, as well: if a sense is the source of expansion, it is more likely to be involved in composite forms. T&E's criterion 4 is also incorporated in the revised method: the sense involved in producing the new meaning should also be the one involved in composite sets with other particles. Lastly, the method proposed here subsumes criterion 5, i.e., grammatical prediction: a sense that can be predicted grammatically should be the one that is predominant in the network.

Dewell (1994) lends support to the approach proposed here: rather than relying on the first attested date in determining the center of the semantic network, he gives priority to the semantic network structure.

In the case of *by*, we can regard <Vague-area> as the predominant sense in the network; as we have seen in the arguments in Step 4, <In-

the-domain> and <Near/Out-of-the-domain> senses derive from <Vague-area>, and Figure 6 shows that all the senses derive from that sense. If we abstract the proto-scene from this sense, it would be as in Figure 9:

FIGURE 9: <Vague-area>

The TR is in the *vague area* of the LM, and the dotted line indicates that the TR is always within reach of the LM. (Recall T&E's argument about *over*: the TR is within reach of the LM.)

This argument is similar to that of Ueno (1995) and Ueno & Kanasugi (1997a, b). Discussing the primary meaning of *by*, Ueno (1995: 93) says, "By has ... a central sense which indicates a spatial position of 'in the domain' but 'a little away from'."

An important feature of the predominant sense in the network is that it changes with the passage of time.

The case of *by* supports this point: the primary sense has changed from <Vague-area> to <In-the-domain> to <Through>. Figure 6 indicates that we must acknowledge changes in the primary sense. The <Vague-area> sense no longer holds the central position in the network; the sense itself is extinct. It *used to be* the center of the radial category of *by*. Since some new senses are likely to have emerged around the <Through> cluster, especially the most frequently used sense of <Agent>,^{15, 16} we can say that the predominant sense of *by* in modern-

¹⁵ The fact that *by* as a marker of Agent is a fairly new sense (from the 15th century), in spite of the fact that the notion of agent being so basic in our cognition, is an interesting phenomenon. K&H (2003a) and H&K (2004a) have hypothesized that *by* expelled other prepositions as the marker of Agent under the influence of French Agentive marker *par*. (See K&H (2003a), H&K (2004a), Pinker (1983), Mustanoja (1985), and Koike (1991) for more detail.)

¹⁶ More than half of my data is, in fact, the representation of the <Agent> sense.

day usage is <Through>. In other words, we can hypothesize that the central schema has changed over time.

Support for this argument can be found in the data from *Catholic Homilies*, which was written around 1000: by a considerable margin, the sense of *by* most frequently used in *Catholic Homilies* is <In-the-domain>. To quote one example:

- (38) <In-the-domain> Ða hydras soðlice oncneowon be þam worde þe him gesæde wæs be ðam cilde, and ealle wundrodon þe þæt gehyrdon, and eac *be* ðam ðe þa hydras him sædon. (ÆCHom i 30: 32)

‘But the shepherds understood by the word that had been said to them concerning the child, and all wondered that heard it, and also at that which the shepherds said unto them.’

However, this sense is rare in modern-day use. Thus, we can safely assume that through pragmatic strengthening, the central schema has changed away from the <Vague-area> sense toward the <Through> sense, as shown in Figure 6.

If we assume that language is a continually evolving system, a necessary assumption for a polysemous approach to meaning, the changes in the primary sense are to be expected. Therefore, determining the primary sense according to the earliest attested meaning seems to be inconsistent with the assumptions of a polysemy theory.

The above observations lead to the conclusion that predominance in the network is *the* criterion for determining the primary sense which changes with time.

4. Conclusion

This paper has reviewed T&E’s (2003) book, a cornerstone in the field of polysemy. T&E’s approach has three strengths: (1) they argue that language radically underdetermines the rich interpretations assigned to utterances and that lexical entities act merely as prompts for meaning construction; (2) they contend that the representation of meaning is fundamentally conceptual in nature and this conceptual structure is a product of how humans experience and interact with the spatio-physical world; and (3) they suggest a model of principled polysemy based on conceptual structure and pragmatic strengthening.

However, their approach also has weaknesses: the use of artificial

data; the lack of a diachronic viewpoint; the open circles in the network; and the issues with attesting the center of the network.

By building on the strengths of T&E's (2003) model and overcoming its weaknesses, this paper suggests a revised model of principled polysemy consisting of six steps and summarized in (25). The revised model uses a bottom-to-top approach; adopts a diachronic viewpoint in attesting the semantic network; allows only senses to become nodes in the network; identifies the primary sense through its predominance in the network; and accepts changes in the primary sense over time. By adopting the concept of *on-line contextually determined interpretation*, this model avoids the polysemy fallacy seen in many studies on polysemy including Lakoff (1987) and Brugman (1981, 1988). Also, by placing more emphasis on the network structure than on the earliest attested meaning in determining the center for a polysemous network, the revised model is a more rigid paradigm of principled polysemy. Lastly, by adopting a diachronic viewpoint and acknowledging the possibility for change in the center of the network, the model enables a more dynamic approach than the models of Dewell (1994), Kreitzer (1997), and T&E (2003).

This model of polysemy will continue to evolve and I hope that it will serve as a stepping-stone for a range of research in the field; this would benefit language education and shed light on the human cognitive system.

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