

How is Time Spatialized by Metaphor?: The Case of Some Temporal Prepositions in English

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0. Introduction

This paper is about the nature of metaphorical mapping. Metaphor is not just a poetic or figurative mode of expression; instead, it is a conventional way of conceptualizing the world. The conceptual metaphor is characterized as the mapping of a conceptual structure from the source domain to the target domain. Recently Lakoff (1990) proposes the topological or image-schematic constraint on metaphorical mapping, which he calls 'the Invariance Hypothesis.' This constraint requires that in metaphorical mapping the image-schematic or topological structure of the source domain must be maintained in the target domain. The purpose of this paper is to examine the Invariance Hypothesis as a general constraint on metaphorical mapping. I will examine this view on the basis of the investigation of some temporal prepositions in English, and point out that in some cases not all the topological properties in the source domain will be carried over to the target domain; rather, some of them will be abstracted away through metaphorical mapping. I will also discuss when metaphorical mapping will not preserve fully the source-domain's image-schematic structure, and argue that the schematic pattern of a particular metaphor will select the aspects of the source domain that are relevant to metaphorical mapping.

1. The Invariance Hypothesis about Metaphorical Mapping

Since Lakoff & Johnson (1980), the view that metaphor is a conceptual mapping from the source domain to the target domain has been widely accepted within cognitive-oriented linguists. According to this view, a metaphor carries the conceptual structure of the source domain over to the target domain. Lakoff's recent proposal that the metaphorical mapping is generally constrained by what he calls 'the Invariance Hypothesis' has been one of the most lively discussed topics in the study of conceptual metaphors. The Invariance Hypothesis is concerned with which aspect of the source domain is maintained or which aspect of the target domain is kept intact in metaphorical mapping. Lakoff (1990: 54) formulates this principle as follows:

- (1) Metaphorical mappings preserve the cognitive topology (this is, the image-schematic structure) of the source domain.

He exemplifies this point in his analysis of the metaphorical mappings from the container's structure to the category's structure and from the path's structure to the quantity's structure as well as the metaphorical mapping from the spatial structure to the

temporal structure. According to him, the basic image schema for spatial motion is continuous dynamic change of location along a one-dimensional locus. This is also seen in the temporal use of motion verbs like *come* or *pass* and path adverbs like *ahead* and *behind* (Lakoff 1990: 56):

- (2) a. The time will come when ...
 b. I'm looking ahead to Christmas.

There are many instances of metaphorical mapping that are consistent with the Invariance Hypothesis. It has been widely observed, for example, that many prepositions share a schematic semantic structure for the spatial use and the temporal use (Clark 1973; Traugott 1975, 1985; Lakoff & Johnson 1980; Jackendoff 1983, Kobayashi 1996). In this case the configuration involving the Figure and the Ground can be also recognized in the temporal use.

However, it is not really clear whether all the aspects of an image schema are preserved in any metaphorical mapping. It is noted, for example, that the Conduit Metaphor does not carry over specifications about container object, though it preserves specifications about content and containment (Clausner 1993). Thus, the metaphorical expressions concerning the containment relation and the content sound nice, but those concerning the container object like the lid or the opening are not allowed:

- (3) a. Don't force your meanings into the wrong words. (Clausner 1993: 104)
 b. His words carry little meaning. (*ibid.*)
 c. *Sam keeps {the lid/the opening} on his words so secure that you never know what he means. (*ibid.*: 108)

In addition, as Brugman (1990) points out, the Invariance Hypothesis has several conceptual problems. One of the problems which will be relevant for the discussion below is about the definition of topological or image-schematic structure. Brugman notices that there are two different characterizations of them. One is the characterization Johnson (1987) gives. He defines an image-schema like this: "A schema is a recurrent pattern, shape, and regularity in, or , of ... ongoing ordering activities (for actions, perceptions, and conceptions) ... (they are) continuous structures for organizing our experience and comprehension" (Johnson 1987: 29). This definition is quite broad in coverage and is not concerned with what kind of concept topological structures represent. Thus any structure will be qualified as image-schematic or topological only if it recurs regularly in our experience. Under this definition the Invariance Hypothesis will be a strong constraint since it will require a great variety of structures should be preserved. A more restrictive definition is offered by Talmy (1988, n.d.). He characterizes topological properties as relativistic and flexible rather than absolute and fixed. More specifically, topological properties are characterized as neutral (i.e., having no fixed absolute value) with respect to size, shape, rate, material, closure and discontinuity (Talmy n.d.: 6-10). Though he himself uses this definition to characterize grammatical (as opposed to lexical) morphemes and does not apply it to the constraint of metaphorical mapping, his

definition is more specific about what is topological and what is not, and gives a weaker but probably more realistic version of the Invariance Hypothesis. Moreover, since Talmy's definition characterizes an image-schematic properties more narrowly, it makes it less likely that the Invariance Hypothesis is violated. If the more restricted set of topological structures turn out not preserved during metaphorical mapping, the Invariance Hypothesis will confront a more serious problem. Thus in the discussion below I will assume Talmy's definition of topological or image-schematic structure.

2. The Topological Property of Some Temporal Prepositions

My study of some temporal prepositions in English has revealed, however, that even under the Talmy's version of the definition of topological or image-schematic structure there are cases where the image-schematic properties of the source domain are not fully preserved in metaphorical mapping. I will examine three prepositions, i.e., *through*, *around* and *over*, and, based on the previous analyses, clarify the image-schematic structures of their spatial uses and then compare them with those of the temporal uses in order to examine how much image-schematic structure is preserved during metaphorical mapping from time to space.

2.1. *Through*

First take a preposition *through*. The spatial use of this preposition has a few specifications about the spatial configuration it refers to. First, as is often noted, *through* denotes the path of motion or the location in and across the two- or three-dimensional space (Bennett 1975; Hawkins 1984, 1988; Quirk et al. 1985; Dirven 1993; cf. Kaufmann 1993; Cuyckens 1995).

- (4) a. Twice a week he drove his tallyho over the Santa Cruz road, upland and through the redwood forest, with orchards below him at one and hand, and glimpses of the Pacific at the other. (BROWN E11 6-9)
- b. ... I went right at the end of it, through a garden to a small building at the back ... (BROWN E13 169)

As well as the horizontally extended Ground, *through* may take the vertically extended Ground. In this use the Ground and the path of motion are conceived of as overlapping at a zero-dimensional point, though the Ground extends along the axis perpendicular to the direction of the path.

- (5) Going through a door into another small court, I had the Throne Room directly in front. (BROWN E13 160-161)

Each of these uses is common in having the Ground that has more than two dimensions. This feature of multiple-dimensionality is demonstrated clearly by Talmy (1983). He observes that if different prepositions can apply to a single scene, each of them reflects a different conceptual structuring of that scene. He illustrates this point by using *through* and *across* (Talmy *ibid.*: 265):

- (6) a. The man went through the wheatfield.
 b. The man went across the wheatfield.

According to him, in (6a) the wheatstalks are construed as a three-dimensional medium and the presence of the horizontal land is conceptually backgrounded and irrelevant, whereas in (6b) the volumous shape of the wheatfield is abstracted and the horizontal extension and its boundaries are salient. The fact that the same objective scene is construed differently when the different prepositions are applied suggests that *through*, like *across*, designates the path traversing completely an area, but specifies the Ground as three-dimensional unlike *across*. Cuyckens (1996: 188) observes that the Dutch preposition *door*, the corresponding item to *through*, cannot be used with the NP referring to the surface.

- (7) Zij liepen door het plein.
 they walked through the square
 'They walked across the square.'

Second, the path of motion which *through* denotes traverses the Ground completely, i.e., from one side of the Ground to the other. Here I haste to add that complete traversal does not have to be actual; *through* can be used only if complete traversal is expected, as in *He was walking through the woods*. As Kaufmann (1993) observes, if the condition of complete traversal fails to hold, *through* cannot be used. Consider the following examples:

- (8) a. the path through the wood
 b. ? the stick through the room
 c. the bar diagonally through the room

In (8a) it is quite natural to interpret the path as running from one side of the wood to the other; on the other hand, in (8b) we can hardly consider that the stick runs from one side of the room to the other since a stick normally is not expected to be so long. In other words, in (8a) the condition of complete traversal is satisfied, whereas in (8b) it is not. Hence, (8b), but not (8a), sounds bizarre. This analysis receives further confirmation from a sentence like (8c). As the example suggests, if the sense of complete traversal is supplied contextually (in this case by the adverb *diagonally*) the use of *through* is permitted again.

Obviously the two- or three-dimensional configuration of the Ground specified by *through* is shared by *in*.

- (9) a. Francis and his friends were drinking tea in his room. (*Longman's language Activator*)
 b. I wanted to play in the garden. (*Cobuild*)
 (10) a. Francis and his friends walked through his room out to the garden.
 b. I went through the garden.

As to *in*, the Ground may be a three-dimensional volume as in (9a) or a two-dimensional area as in (9b). This ambiguity about the Ground's dimensionality will be found in

through, as shown in (10): in (10a) the Ground has a three-dimensional shape, while in (10b) it is two-dimensional. This parallelism about the Ground's dimensionality suggests the same structure is involved in the semantics of these two prepositions (Hawkins 1984, 1988; Kaufmann 1993).

So far we have noticed two topological properties involved in the semantic structure of the spatial use of *through*. First, the path of the Figure's real or abstract motion traverses completely the Ground. Second, the Ground has to have a three- or two-dimensional configuration, within which the Figure's path runs. Note these properties are qualified as 'topological' by Talmy's definition since they are relativistic rather than absolute. The notion of complete traversal is independent of the particular size of the Ground or the particular length of the path, and the two- or three-dimensional configuration of the Ground is not associated with the specific size or shape of the Ground. Given this analysis, the Invariance Hypothesis predicts that these conceptual structures in the spatial use of *through* will be mapped to the temporal use without any change. I will show, however, that this prediction is untenable. Before that, I will look at the temporal use of *through*.

Through has some different uses for a temporal relation. Interestingly they sometimes are different syntactically. For example, consider (11) below. In (11a) *through* takes a complement NP after itself. In (11b), however, it is at least superficially more like coordinators such as *and* or *or* than prepositions since it occurs together with two complement NPs, each standing before and after it respectively.

- (11) a. To the contrary, through the past six weeks violence has been piled upon violence. (BROWN B3 66-67)
- b. During her busy season (March through June), she often completes as many as fifty paintings a week. (*Cobuild*, 2nd edition)

These two uses are also different semantically. More specifically, they differ as to what portion of the entire path is expressed as the complement. The use like (11a) takes the complement NP implying the whole region whereby the path is defined. On the other hand, the use like (11b) takes the complements implying the starting point and the end point of the entire temporal path. But these two uses also share a common semantic property: they denote an entire temporal region which covers between two specific points in time. Thus, in (11a) the Ground (i.e., the past six weeks) denotes a bounded temporal region, and *through* refers to the path which traverses completely the region; in (11b) *through* refers to the whole temporal path starting in March and ending in June. *Through* has another temporal use, as exemplified in (12).

- (12) These publications replaced the U.S. Naval Medical Bulletin, published continuously from 807 through 1959 ... (BROWN H10 164-166)

This use is similar to the use such as (11a) syntactically in taking only one complement, but it is like the use such as (11b) semantically. In (12) the complement of *through* expresses the end point of some relevant period, not that period as a whole, and thus the

PP *from 1807 through 1959* can be paraphrased approximately to *from 1807 to 1959*.

Now we have found the temporal analogue of the notion of complete traversal in the spatial use. This analysis is confirmed by the aspectual property of the VP which occurs with the temporal use of *through*. For example, in (11) and (12) the VPs refer to repetitive events. Generally repetitive events are temporally unbounded like the state or the activity, so can cover entirely any temporal region. In fact, the stative verb can stand together with *through*, as in *The current exhibition, which remains on view through Oct. 29, has tapped 14 major collections and many private sources* (BROWN C12 143-145). On the contrary, verbs for instantaneous events cannot be used together with *through*, as in (13).

- (13) a. * John arrived here through the past six weeks.
 b. * John's arrival through the past six weeks.

We can account for this by assuming the temporal version of complete traversal. The time span covered by the event of John's arrival cannot extend completely over the Ground, the past six weeks. Therefore (13) is not acceptable. Particularly, if we compare (13b) with (8b) above, it will be noticed that their status of acceptability is accounted for in a unified manner: the Figure is too short to traverse completely the Ground. From this consideration we may conclude that the topological property of the Figure's complete traversal of the Ground is preserved in the metaphorical mapping from space to time.

The other topological property of the spatial use of *through*, however, seems not to be preserved by the space-to-time metaphor. This is particularly true when we assume the basic nature of the space-to-time metaphor. As I will argue in section 3, the space-to-time metaphor maps the one-dimensional shape of the locus of motion to the temporal domain, so the locus of temporal passage is given a one-dimensional shape. Consequently, this metaphor cannot map any more-than-one-dimensional spatial structure to the temporal domain. The Ground's one-dimensionality of the temporal use of *through* is also confirmed by the following fact:

- (14) The past six weeks was {long/*high/*wide} for me.

The subject NP, the past six weeks in (14) is the same as the complement in (11a). If the period of the past six weeks can be conceptualized as more-than-one-dimensional, the dimensional adjectives other than *long* can be also used in (14). But this is not the case. This fact implies that the topological property about the Ground's dimensionality is not preserved in the space-to-time metaphor when it applies to the preposition *through*.

2.2. Around

Next I will consider a preposition *around*. Though *around* belongs to different grammatical classes, i.e., preposition, particle, adverb (Schulze 1993), I will focus on the preposition below. Taking first the spatial use, several interrelated uses can be distinguished with respect to the configuration of the Figure and the Ground (Hawkins 1984, Schulze 1993, Taylor 1995; cf. Wunderlich 1993). Hawkins (1984: 216-223)

recognizes nine different spatial uses for *around*, each of which will be exemplified in the following:

- (15) a. The little kids pranced around the May Pole.
 b. The rope tightened around Buck's neck.
 c. The torero paraded boldly round the ring.
 d. Thirty-three cars raced endlessly around the Indy track.
 e. We walked around Madrid for hours looking for our car.
 f. There are thousands of useful throwaways around your house.
 g. There was a swarm of angry bees around the terrified infant.
 h. There were little acorns all around the mighty oak trees.
 i. The school is around the corner.

(Hawkins 1984: 216)

(15a) and (15b) share as the Figure a circular entity. (15c) and (15d) share the circular path of motion, and these two and (15e) may be said to share the curved path. (15f) and (15g) share the three-dimensional Figure. Despite these commonalities, no feature is common throughout all the uses. Though Hawkins analyzes the Ground in (15a), (15b), (15g), (15h) and (15i) as an entity which fails to have significant extension in any dimension, so can be conceived of as zero-dimensional, I think it is more appropriate to analyze it as two- or three-dimensional for the reason discussed afterwards. Thus, these uses share the two- or three-dimensional Ground. Accordingly, all the spatial uses in (15) have either a two-dimensional or a three-dimensional Ground. This semantic property of the dimensionality of the Ground is particularly important for the present purpose.

Another important property is about the shape of the path of the Figure's motion or the location occupied by the Figure. The notion of encirclement is an important property for the meaning of *around*. This intuition is shared among the previous studies which treat systematically the semantics of the preposition, though their particular analyses are different in many ways. For example, Hawkins (1984: 239-240) states that, though the circular path configuration and the radial relation "are not characteristic of all predicates in this category, they are rather significant in distinguishing around from other spatial prepositions in English." Shulze (1993: 404) includes the property of the circular path into the definition of the core meaning of *around* from which all other uses are derived. Wunderlich (1993: 113-119) specifies the common semantic structure of German preposition *um*, the item corresponding to *around*, as 'the Figure is located in the proximal exterior of the Ground and the Figure's dimensional extension encloses the Ground.' However, as they notice, the property that the path of the Figure's motion and the Figure's location encircles the Ground is not always relevant and some of them actually lack it. First, in the uses exemplified by (15f) to (15h) the Figure's location need not be in a circular shape only if it encloses the Ground. Second, in the use exemplified by (15e) the shape of the Figure's motion may be curved, but not a full circle. Moreover, in the 'detour' use exemplified by (15i) the path will never be in a full circle, instead it is

always semi-circular. This semi-circular shape of the path is independent of the Ground's individuality since a fully individual and completely bounded object like a car can serve as the Ground of the 'detour' use, as in (16):

(16) John rushed around the car to the front door.

As far as the uses recognized in the previous analyses are concerned, however, we can say that the path of the Figure's motion and the Figure's location either are in a curved shape or encloses the Ground. Probably the core property of encirclement is extended to that of being curved in one way and to that of enclosure in another. Each of these configurations may be considered to be topological in Talmy's sense since they are neutral with size, material, frequency and even shape. And if they are topological structures, the Invariance Hypothesis predicts that they have to be preserved in metaphorical mapping from space to time. The same thing is also true of the property of the Ground's dimensionality. Given the Invariance Hypothesis, the entire information of the Ground's dimensionality must be mapped from the source domain to the target domain.

Now turn to the temporal use of *around*. The preposition has a temporal use which can be roughly paraphrased to *approximately*.

(17) As it began raining at around eight o'clock on December 26th, I retired into my tent early... (BROWN G47 144-145)

At first, it seems to be difficult to notice some semantic commonality between the spatial uses and the temporal use of *around*. But the temporal use exemplified in (17) can be reasonably considered to denote temporal contiguity to the reference point of time (i.e., eight o'clock). So the temporal use is related to the spatial uses exemplified in (15a), (15b), (15c), (15f), (15g) and (15h), all of which imply spatial proximity. This analysis accounts for why *around* means 'approximately' despite the fact that no spatial uses of the preposition cannot be paraphrased that way. *Approximately* is one of the ways to express temporal contiguity, which is carried over from the spatial uses through metaphor. In this respect Wierzbicka (1986) makes an interesting observation. She notes that the temporal use of *around* refers to a nearby period as a whole surrounding the temporal reference point, while the semantically similar preposition *about* applies to one particular temporal point. Thus the PP in (9a) implies a few years, e.g., 1878 to 1883, whereas the PP in (9b) refers to one particular year, viz., 1880.

- (18) a. Hats of this kind were worn in Paris around 1880.
 b. Hats of this kind first appeared in Paris about 1880.

(Wierzbicka 1986: 603)

This fact about the temporal use of *around* is expected given that it denotes temporal contiguity. *Around* in the temporal use refers to some unspecified temporal points near the reference point of time. Hence its search domain covers some temporal area surrounding the reference point. This corroborates our analysis that the temporal use of *around* not serves just as an approximative but designates temporal contiguity to the

reference point.

As to *around*, however, we find the incomplete preservation of the topological structure in the source domain. This is seen both about the shape of the Figure's location or that of the path of its motion and about the Ground's dimensionality. First, consider about the shape. The uses in (15a), (15b) and (15c) specify the shape of the path or the location as a full circle, but the temporal use just refers to nearby unspecified temporal points before and after the reference time. Thus the two temporal points cannot encircle the reference time. The spatial uses in (15f), (15g) and (15h) specify the Figure as more-than-one-dimensional (more specifically, (15f) and (15g) have the three-dimensional Figure and (15h) the two-dimensional Figure). Therefore, regardless of which spatial use is the source of the temporal use, there must be some restructuring of the source-domain's topological configuration during metaphorical mapping. Turn to the dimensionality. As argued above, all the spatial uses of *around* specify the two- or the three-dimensional Ground, but in the temporal use the Ground is a single momentary temporal point like eight o'clock in (17), which is almost cannot be conceived of as having extension in three- or even two-dimensions. Rather, it is more likely that it is conceptualized as a virtually zero-dimensional entity. Thus the dimensionality of the Ground is also restructured during metaphorical mapping from time to space.

Taylor (1995: 275-277), based on Wunderlich (1993), notes the spatial use of *around* is ambiguous with respect to whether the path of motion is exterior or interior to the Ground.

- (19) a. The boy ran round the lake.
b. The boy sailed round the lake.

In (19a) the path of the boy's running is interpreted as located outside the lake, whereas in (19b) the path of the boy's sailing is interpreted as being inside the lake. This distinction concerning the path's interiority or exteriority to the Ground suggests that it is better to analyze the Ground as two- or three-dimensional than zero-dimensional since a zero-dimensional object cannot have the internal space by definition. In the temporal use, however, this ambiguity is lost; *around* can only imply the exterior relation. This is because the Ground in the temporal use has to be a zero-dimensional time-point. This fact supports our claim that the restructuring of the Ground's dimensionality occurs during metaphorical mapping.

Before leaving this section, I will discuss only briefly whether the approximative use of *around* really designates a temporal relation. It might be argued that it only refers to some approximative numerical values instead of temporal contiguity and so it cannot be considered that this case is an instance of the space-to-time metaphor. This implies that the approximative use of *around* only occurs with numerals, and thus cannot be used with a temporal expression without involving a numeral. But this is not true, as shown in the following examples:

- (20) a. During the period of about 4 hours around sunset, skywave transmission

conditions are building up until full nighttime conditions prevail; during the same period around sunrise, skywave transmission is declining ... (BROWN H23 69-72)

- b. Probably around midnight, give or take an hour either way. (BROWN L1532)

2.3. Over

Like *through* and *around*, a preposition *over* is also used for both spatial and temporal relations. Through the systematic analysis of the spatial uses, Brugman (1981), followed by Lakoff (1987), shows that it denotes a great variety of spatial relations, which are different from but interrelated with each other. Brugman and Lakoff (1989) distinguish three types of spatial uses, each of which is further divided into several subtypes (Brugman and Lakoff 1989: 493). The three types are called 'the above-across sense,' 'the above sense' and 'the covering sense.' The above-across sense is further subdivided with respect to (a) whether the Ground is vertical (V) or not, (b) whether the Ground is extended (X) or not, (c) whether the Figure and the Ground are in contact (C) or not, (d) whether the path of the Figure begins and ends on the ground (G) or not, and whether the end-point of the path is focused (E) or not. Consequently, nine uses are distinguished:

- | | | | |
|------|----|--------------------------------|-----------|
| (21) | a. | The bird flew over the yard. | (X) |
| | b. | The plane flew over the hill. | (V.X) |
| | c. | The bird flew over the wall. | (V) |
| | d. | Sam drove over the bridge. | (X.C) |
| | e. | Sam walked over the hill. | (V.X.C) |
| | f. | Sam climbed over the wall. | (V.C) |
| | g. | The dog jumped over the fence. | (V.G) |
| | h. | Sam lives over the hill. | (V.X.C.E) |
| | i. | Sausalito is over the bridge. | (X.C.E) |

The above sense is further divided into two subsenses concerning whether the Figure (for which Brugman and Lakoff use the term *trajector*) is a one-dimensional object (1DTR) or not. As the name suggests, this sense does not permit contact between the Figure and the Ground:

- | | | | |
|------|----|---|--------|
| (22) | a. | Hang the painting over the fireplace. | |
| | b. | The power line stretches over the yard. | (1DTR) |

The covering sense is also divided further into seven subsenses. The relevant parameters are (a) whether the end-point of the path is focused (E) or not, (b) whether the path of motion is involved (P) or not, (c) whether the Figure is a multiplex entity (MX) or not, (d) whether the path consists of a collection of points (MX.P) or not, and (e) whether the Figure is rotated (RO) or not. The covering sense generally requires at least two-dimensional Figure and is neutral with respect to contact between the Figure and the

Ground unlike the above sense:

- (23) a. The board is over the hole.
 b. The clouds is over the the city. (P.E.)
 b. The guards were posted over the hill. (MX)
 c. I walked all over the hill. (MX.P)
 d. There was a veil over her face. (RO)
 e. As the rain came down, it froze and ice spread all over the windshield. (P.E.RO)
 f. There were flies all over the ceiling. (MX.RO)
 g. The spider had crawled all over the ceiling. (MX.P.RO)

Unfortunately, Brugman and Lakoff are not clear enough about what kind of concept on these parametric semantic distinctions belong to. They use featural notations for these distinctions, and at the same time they also make such distinctions in terms of image-schematic representations. Therefore it is difficult to decide whether these semantic properties should be regarded as image-schematic or not. However, they argue that some of the parametric features are related to each other through image-schematic transformations. The image-schema transformations they postulate are (Brugman and Lakoff 1988: 505):

- (24) a. between path-focus and end-point-focus
 b. between multiplex and mass
 c. between a zero-dimensional Figure and a zero-dimensional moving Figure that traces a path

And they state that “the topological properties of the concept are necessary to characterize ‘image-schema transformations’ in terms that are cognitively natural, rather than in terms of an arbitrary calculus” (Brugman and Lakoff 1988: 479). Therefore, we can say at least that they think of the end-of-path (E) and multiplex (MX) as image-schematic properties despite their featural notations, because these are mentioned by the image-schematic transformations. As to the other properties their own view is unclear, but the Ground’s extendedness, its verticality, the contact between the Figure and the Ground, the Figure’s dimensionality, the involvement of the path of motion may be considered to be of topological nature in Talmy’s sense. I will ignore the remaining features.

The temporal use of *over* refers to the relation of the Figure’s traversal or coverage of the Ground, so it may be defined roughly as ‘during all of the long period.’ For example:

- (25) This lack of co-operation was a problem he encountered again and again over the next few years. (*Longman’s Language Activator*)

Given the definition, it is easily noticed that the temporal use is derived either from the above-across sense or from the coverage sense. These two senses refer to the concept of totality, which is shared by the temporal use. I can not determine which sense serves as

the source-domain concept of the temporal use; instead I will argue that, whichever is the source, the image-schematic structure is not fully preserved through metaphorical mapping. Suppose that the coverage sense is the source-domain concept. Although this use has various subuses, they have in common the property of the Figure's two-dimensionality. But obviously this is not true of the temporal use.

- (26) a. The period when he encountered the lack of co-operation again and again was long.
 b. * The period when he encountered the lack of co-operation again and again was {high/ wide}.

Therefore, regardless of which subuse of the covering sense is the source, this topological property will necessarily fail to be preserved. Then, suppose that the across-above sense is the source-domain concept. As stated previously, this sense is divided with respect to whether there is contact between the Figure and the Ground, and thus the subsenses in (21d), (21e), (21f), (21h) and (21i) specify the contact relation, while the other subsenses in (21) do not. But whether the contact relation is involved or not, all of the subsenses require that the Figure is located at some upper place than the Ground since this is a fundamental feature of the above schema. But this vertical alignment of the Figure and the Ground will not be mapped to the temporal domain through the metaphor.

- (27) * The time when he encountered the lack of co-operation was higher than the next few years.

From this consideration we may conclude that in the metaphorical mapping from the spatial use of *over* to the temporal use not all of the topological properties in the source domain will not be carried over to the target domain.

Note that I do not argue that all the topological properties are abandoned during the metaphorical mapping. (25) refers to the situation where the multiple occurrences of his encountering the lack of co-operation were spread over the following few years. This suggests that the conceptualization of multiplex entities as mass is kept intact during the metaphorical mapping, though the Ground's dimensionality, and thereby the Figure's one, too, are reduced.

3. Discussion

I have seen three cases in which the topological or image-schematic structure is not fully preserved during the metaphorical mapping from the spatial domain to the temporal domain. Only some parts of the complex topological configurations observed in the semantic structure of the spatial use of *through*, *around* and *over* are observed in those of their corresponding temporal use. What is common in these cases is that the image-schematic structures not adaptable to the linear structure of the time axis are disregarded in the metaphorical mapping.

One way to explain this is to attribute the partial preservation of the image-schematic structure to the inherent nature of the target domain. In this view, the reason

why some of the image-schematic structure is dropped out during metaphorical mapping is that it is not admitted to the target domain because it is contradictory to the inherent structure of the target domain. In fact, this account is offered by Turner (1993) and followed by Iwata (1995). Turner's version of the Invariance Hypothesis is different from Lakoff(1990)'s in maintaining that the image-schematic structure of the target domain, not of the source domain, has to be maintained in metaphorical mapping (Turner *ibid.*: 302-303):

- (28) In metaphorical mapping for those components of the source and target domains determined to be involved in the mapping, preserve the image-schematic structure of the target, and import as much as image-schematic structure form the source as is consistent with that preservation.

Based on Turner's proposal, Iwata accounts for the partial preservation found in the space-to-time metaphor in terms of the inherent structure of the target domain. He argues, for example, that the Ground's dimensionality is changed from the source domain to the target domain because the target domain, i.e., the temporal domain, is inherently structured one-dimensionally. But it seems that he presupposes *a priori* the inherent one-dimensionality of time. Note that his presupposition is not in accord with what Lakoff (1990, 1993a) states about the one-dimensionality of time. Lakoff claims that the linear structure of time passage is derived metaphorically. Lakoff (1993a: 216-217) characterizes the space-to-time metaphor at a schematic level as follows:

- (29) Ontology: Time is understood in terms of things (that is, entities and locations) and motion.

Background condition: The present time is at the same location as a canonical observer.

Mapping:

Times are things.

The passing of time is motion.

Future times are in front of the observer; past times are behind the observer.

One thing is moving, the other is stationary; the stationary entity is the deictic center.

Entailment: Since motion is continuous and one-dimensional, the passage of time is continuous and one-dimensional.

Note that in Entailment he states the one-dimensional structure of time is metaphorically given. Moreover, Brugman (1990: 262) argues that, if the image-schematic structure is acquired through our repeated recognition of it in our experience, time is so abstract that we can hardly notice its inherent topological structure through our experience.

If time is inherently one-dimensional, we can never conceptualize it differently. But consider the following facts.

- (30) a. For a long time I didn't tell anyone ... (*Cobuild*, 2nd edition)
 b. Adam didn't spend (*a) much time in his grandfather's office.

Although the phrases *a long time* and *much time* both imply a large quantity of time, the construal behind them is quite different. In the former expression, as in (30a), time is conceptualized as a one-dimensional entity, and the dimensional adjective *long* applies to that dimension. On the other hand, the latter expression, as in (30b), reflects the conceptualization of time as mass, for the conceptualization of which the physical shape is irrelevant (Langacker 1987a). The difference of construal about individuality of time is grammatically encoded by the distinction between count nouns and mass nouns: *long time* can take the indefinite article *a/an*, but *much time* cannot, as shown in (30). This suggests that time is not necessarily one-dimensional at least in our conception. Probably when the passage of time or the relative location of time on the passage of time matters, time is conceptualized as a one-dimensional entity. This becomes clearer when we compare the noun *time* with the noun *period*. The noun *period* designates some non-instantaneous length of time, so the concept of the passage of time is essentially relevant to its meaning. In other words, it is defined relative to the frame of the linear time axis. Thus the quantifier *much*, which is only used with a mass noun, generally cannot be applied to it.

(31) This crisis might last for {a long/*much} period.

The fact that unlike *period* the noun *time* can be used for the shapeless mass of time suggests that our concept of time need not depend on the linear configuration. Therefore, it may be one-dimensional, but not inherently.

One remaining possibility of the partial preservation of the source-domain's image-schematic structures is that it is forced by the nature of the metaphorical mapping from space to time. Almost all the examples of this metaphorical mapping Lakoff (1993a, 1993b) cites are about the change of location relative to a reference point or the location relative to a reference point, and not concerned with the configuration of the Ground or the shape of the path, like *come*, *go*, *follow*, *precede*, *ahead*, *behind*, *pass*, *here* and *close to*. These expressions may motivate the metaphorical conceptualization of time as a linear object since their conceptual structures do not require a two- or three-dimensional descriptive space as the frame in which they are characterized. The spatial relations these expressions refer to are described only in terms of the straight linear path and two point-like entities, one of which serves as the Figure and the other of which serves as the Ground. When these spatial relations are metaphorically mapped to the temporal domain, time is always structured one-dimensionally. Probably this recurrent pattern of the metaphorical mapping is abstracted into a higher-level mapping schema (Langacker 1987). This schematic metaphor will constrain every lower-level mapping that instantiates it. If the spatial concepts which do not conform in some parts to the schematic pattern of mapping are metaphorically mapped, those parts are disregarded by the metaphor. In other words, the schematic metaphor selects beforehand the aspects of the source-domain's structure to be mapped by the metaphor. And only the selected structure will be subject to the Invariance Hypothesis. This view states that what part of

the source-domain's structure will be mapped by metaphorical mapping is not determined only by the Invariance Hypothesis, but results from the interaction of the Invariance Hypothesis with the schematic pattern of a particular metaphor.

4. Conclusion

In this paper I discussed the topological or image-schematic constraint on metaphorical mapping. I pointed out that there are cases where some part of the topological or image-schematic structure in the source domain are not mapped to the target domain, contrary to what the Invariance Hypothesis predicts. I demonstrated this point by examining the three temporal prepositions in English. I argued that which source-domain's structures are preserved in metaphorical mapping is determined by the interaction of the Invariance Hypothesis and the schematic pattern of a specific metaphor.

Notes

1. Interestingly a similar pattern of semantic extension is observed elsewhere in English grammar. The verbs which can stand in the double-object construction includes those denoting the future reception of a gift like *bequeath*, *allocate* and *reserve* as well as the actual reception of it like *give* and *pass*. For detail see Pinker (1989) and Goldberg (1992).
2. The Ground has to be temporally bounded because otherwise it has no specific starting point and the end point and thereby no intermediate portion, either.
3. As to the criticism of the analysis of the Brugman-Lakoff style on this point, see Vandeloise (1990) and Dewell (1994).

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