INVARIANCCE AGAIN: WHAT IS PRESERVED IN A METAPHORICAL MAPPING?

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This paper examines what it means for image-schematic structures to be preserved in metaphorical mappings (Lakoff (1990, 1992)). It is shown that only those parts of the image-schematic structure which are compatible with the inherent target domain structure are preserved, and that accordingly only parts of inferential structure are preserved. It is also shown that some putative cases of preservation should be analyzed differently, suggesting that what counts as the preservation of an image-schematic structure constitutes a rather delicate problem.*

0. Introduction

This paper addresses the question, “What counts as the preservation of an image-schematic structure?” After a brief overview in section 1 of the shift from the Invariance Hypothesis (Lakoff (1990)) to the Invariance Principle (Lakoff (1992)), sections 2 and 3 examine the role which inherent target domain structure plays in a metaphorical mapping. Section 4 is devoted to a critical assessment of the validity of metaphor studies by strictly following the preservation thesis. It is shown that the issue of preservation is more complex than might appear at first sight and calls for careful treatment.

1. Source Domain or Target Domain?

Lakoff (1990), who characterizes metaphor as a mapping from a source domain to a target domain, proposes:¹

* I'd like to express my gratitude to Lynne Roecklein, who helped me with her insightful observations and suggested extensive stylistic improvements. I'd like to thank two anonymous reviewers for their comments and suggestions. Thanks are also due to William E. Lee and John G. Russell for kindly acting as informants.

¹ Lakoff uses the terms “image-schematic” and “topological” interchangeably, but I will use “image-schematic” throughout the paper.
The Invariance Hypothesis: Metaphorical mappings preserve the cognitive topology (this is, the image-schema structure) of the source domain. (Lakoff (1990: 54))

Brugman (1990) points out a number of problems with the Invariance Hypothesis (henceforth IH), one of which concerns the question of which domain's properties are preserved. That is, the IH as stated is not explicit enough for us to know whether the source domain properties which are maintained create the image-schematic structure in the target domain or not.

The issue is clearly important because of its far-reaching consequences. If the target domain has no inherent structure and is entirely structured by metaphorical mappings, then it is possible to consider the source domain properties alone in establishing the preserved properties. If, on the other hand, target domain structure exists independently, things are quite different.

Lakoff (1992) makes explicit his stance and advances the Invariance Principle (IP), a revision of the IH.

The Invariance Principle: Metaphorical mappings preserve the cognitive topology (that is, the image-schema structure) of the source domain, in a way consistent with the inherent structure of the target domain. (Lakoff (1992: 215))

The phrase at the end of the statement beginning with “in a way ...” clearly indicates that target domain structure exists prior to metaphorical mappings. Thus not only must both source and target domain properties be taken into account, but target domain properties must be seen as playing a central role in determining the preserved properties.²

A corollary of the Invariance Principle is that image-schema structure inherent in the target domain cannot be violated, and that inherent target domain structure limits the possibilities for mappings automatically. (Lakoff (1992: 216))

² Turner (1993) arrives at a similar conclusion:

In metaphoric 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 image-schematic structure from the source as is consistent with that preservation.

(Turner (1993: 302-303))
Thus the shift from the IH to the IP entails the need to look more closely at target domain properties.

2. Apparent Cases of Non-preservation

2.1. Dimensionality

An important consequence of the shift to the IP is that if inherent target domain structure constrains mappings, then one will be committed to (1).

(1) Source domain structure need not be preserved.

This might appear to seriously weaken the IH as stated. Nevertheless, the shift to the IP is a good move. Image-schematic structures are not always invariant in metaphorical mappings.

Let us consider dimensionality. Certain verbs inherently specify the dimensionality they are capable of expressing. *Stretch* is a bona fide verb involving a one-dimensional line as in (2a). *Extend* is a less clear example of verbs involving one-dimension. In (2b) the width of the road seems to be perceptible in the invoked image. Still, the most salient aspect of *extend* is a linear extension.

(2) a. The road stretched over two hundred miles through the heart of the country. (COBUILD)

       b. The road now extends two kilometers beyond the River. (COBUILD)

*Spread* involves a two-dimensional area, and *expand* a three-dimensional volume.

(3) The syrup spread out. (Lakoff (1987))

(4) Metals expand when they are heated. (OALD^4)

When these verbs are used in certain non-spatial domains, their differences with respect to dimensionality vanish. *Stretch* and *extend* in (5) invoke a linear image as before.

(5) a. The minutes had now stretched into hours.

       b. the end of a saga extending over thirty years

       (COBUILD)

But *spread* in (6) invokes a linear image as well.

(6) Their experience of elation was spread over twenty years.

Even *expand* expresses a linear extension in (7).

(7) expand payments to five months

Thus in these examples the source domain properties with respect to dimensionality are not kept intact.
2.2. Inherent Domain Structure

If, as the IP entails, inherent target domain structure constrains metaphorical mappings, it follows that why certain source domain properties are not preserved should be accounted for in terms of inherent target domain structure.

This position is in line with Jackendoff (1992), who argues that the parallelism between spatial and non-spatial concepts is not created by a metaphorical mapping, and that perfect parallelism fails because of inherent domain properties. Jackendoff illustrates this point using concepts of possession. The italicized words in the possessional expressions in (8) also appear in sentences about spatial motion in (9), thus instantiating the spatial-possessional parallelism.

   b. Harry received/got a book from Bill.
   c. The book was a present/gift from Bill to Harry.
   d. Harry gave the book back to Bill.
   e. Bill gave the book away.

(9) a. Bill went to the store.
   b. Harry came from the store.
   c. We were on a train from Boston to Philadelphia.
   d. Then we went back to Boston.
   e. Bill pushed the food away. (Jackendoff (1992: 60-61))

The parallels between the two domains are very limited, however, for the two domains are quite differently structured. They differ as to dimensionality.

Physical space is of course 3-dimensional, so an object can move up, down, forward, backward, and sideways. By contrast, the possessional parallel has no dimensions: one can’t give something upward or forward. (Jackendoff (1992: 64))

Jackendoff’s account makes perfect sense in the current context, although he does not use terms like metaphor or image-schematic structure. Let us go back to (5)-(7), to which the same line of reasoning seems applicable. Note that (5)-(7) are instances applied to the temporal domain. As Clark (1973) observes, time is conceptualized as linear:

First, because time is one-dimensional, it ought to be described using one-dimensional spatial terms. (Clark (1973: 49))

Given that one-dimension is the only possibility in the temporal domain, it comes as no surprise that spread and expand express a line.
2.3. Spread

Let us extend our scope of investigation further. The discussion up to this point has been mainly concerned with dimensionality, but there are other image-schematic properties whose preservation in a mapping is sensitive to inherent target domain structure. Jackendoff (1992) observes that in addition to dimensionality, spatial and possessional domains differ as to whether the space is continuous or not.

Physical space is continuous: if something moves from point A to point B, it occupies all the intermediate positions between A and B along the way. By contrast, the possessional parallel is discontinuous: there are no intermediate positions that an object traverses between being owned by X and being owned by Y. One can move a book toward or even partway toward Bill; but one cannot give a book toward, much less partway toward, Bill. (Jackendoff (1992: 64))

Dimensionality and continuousness of the relevant “space” are different from domain to domain, so that these properties are not invariant in mappings across domains. To illustrate, let us consider spread, which appears in a number of semantic domains.

First, in the spatial domain, where physical space is three-dimensional and continuous, spread may express a mass’s movement over a two-dimensional area.

(10) The syrup spread out. (Lakoff (1987: 432))

Alternatively, spread may describe a radial movement of multiplex entities as in (11).

(11) a They spread south and colonised the plains of Africa. (COBUILD)

b. Settlers soon spread inland. (OALD⁴)
Let us consider the temporal domain next. As already seen, the temporal path is one-dimensional and continuous. In (12), a continuous, linear entity occupies a certain extension on the temporal path.

(12) Their experience of elation was spread over twenty years.

As with the spatial domain, multiplex entities or a mass may be located on the time line. In (13), occasions of payment are distributed evenly on the time line.

(13) spread the payments over three months  (OALD⁴)

In the possessional domain, as Jackendoff (1992) observes, possessional pseudo-space ranges over “the discontinuous, unstructured set of individuals” (p. 65). This limited range prohibits senses involving continuous movement or extension. (14), which may be paraphrased as “to distribute”, seems to be one example applied to the possessional domain.

(14) He spread the wealth among his five children.
Finally, consider (15), which is similar to the sentences in (16).

(15) Our products spread from a child’s tricycle to a two-cylinder motorcycle. (Pittman (1965))

(16) a. Our clients range from psychiatrists to psychopaths.
    b. This theory ranges from the sublime to the ridiculous. (Jackendoff (1983: 196))

They are all instances applied to what Jackendoff (1983) calls “Identificational field”, which concerns categorization and ascription of properties.

Identificational space seems to be continuous and one-dimensional. Thus the image-schematic structure of (15) is as shown in Fig. 6.

2.4. Consequences of the IP

It has been shown that certain image-schematic properties, in particular dimensionality and mass/multiplex characteristics, are not invariant in mappings due to inherent target domain properties, in accordance with (1).

(1) Source domain structure need not be preserved.

At the same time two consequences of the IP have been revealed.

First, (1) is not to be taken to indicate that there is no such thing as preservation, or that source domain structure may be violated without limits, although a strictly literal interpretation might create those impressions. In all the cases seen thus far where image-schematic properties are not invariant in mappings, the inherent target domain structure restricts which possibilities in the source domain are available. In no case is the range of possibilities wider in the target than in the source. Nor is it the case that the two senses related via a metaphor have nothing in common.

Section 2.1. has shown that when spread and expand are used in the temporal domain, their image-schematic structures change from two-dimensional and three-dimensional to one-dimensional. One dimension is a limited portion of two dimensions and three dimensions, and in this sense parts of the image-schematic structure can be said to be
This is also true of *expand* used in the quantity domain, which Lakoff (1990) characterizes by LINEAR SCALES ARE PATHS along with MORE IS UP; LESS IS DOWN. In (17a) metals become larger in all directions, as in Fig. 7 (a). By contrast, in (17b) only the vertical line is preserved as in Fig. 7 (b).

(17) a. Metals expand when they are heated.
   b. Between 1960 and 1970 the city's population expanded by 12 per cent.

The same line of reasoning applies to the various image-schematic properties exhibited by *spread* in 2.3. While in the spatial domain the

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3 Maybe we should take the issue of dimensionality somewhat flexibly. Even in the spatial domain *spread* may invoke images which are not strictly two-dimensional. Lynne Roecklein (personal communication) has pointed out the following examples, where the image of a linear movement is salient.

(i) a. Her voice spread through the room.
   b. Water spread through the soil.
4 In 4.1. I will challenge Lakoff's claim that this metaphor maps the logic of paths onto that of scales, but this does not deny that scales are linear.
5 Lynne Roecklein (personal communication) has pointed out that the image of (17b) is three-dimensional when the city's population is taken to refer to people, rather than to the number. In this interpretation, the target domain is no longer characterized by the LINEAR SCALES ARE PATHS metaphor.
6 *Swell* behaves similarly to *expand* in this respect, as in (i).
(i) The number of people swelled to 500.
William Lee (personal communication) has pointed out that *compress* also shifts from 3-dimensional to 1-dimensional when applied to the temporal domain.
(ii) The intensive course compressed two semesters of English into three weeks.
whole set of possibilities are available, in the non-spatial domains the possibilities are reduced. Only those parts of the image-schematic properties that are compatible with the inherent target domain structure are preserved: Linear, continuous paths in the temporal and identificational domains, and endpoints of the path in the possessional domain. Thus image-schematic properties ARE preserved, although partially, and this consequence of the IP is better stated as in (18), rather than (1).

(18) Only parts of the source domain structure may be mapped onto the target domain.

The second consequence of the IP is (19).

(19) Different image-schema structures are preserved in different metaphorical mappings.

Section 2.3. has illustrated the variability in preserved properties with spread, which can be summarized as in Fig. 8.

(19) is a natural consequence of the IP: Inherent target domain structure determines what is preserved in a mapping. Different domains are differently structured. Therefore, different image-schematic properties are preserved across different target domains.

2.5. Further Examples

2.5.1. In, within

The discussion up to this point has focussed on verbal semantics, but the variability in the preserved image-schematic properties is observable
outside of verbs as well. The preposition *in*, when used in the spatial sense, may describe the position of an object which is enclosed by three-dimensional entities (e.g. *in a box, in a bag*). Now consider the temporal senses of *in* exemplified in (20):

(20)  
(a) In 1872, Chicago was burned to the ground.  
(b) He learnt to drive in six months.  
(c) In another five minutes it'll be pitch dark.  
(d) I haven't seen him in years.  

("In (a time)" may mean "during that particular time" as in (a), "during and up to the end" as in (b), "after that particular time" as in (c), or "for that particular length of time" as in (d). Notice that all these temporal senses of *in* invoke a linear image, due to the inherent properties of the temporal domain.7

The same is true of *within*, which may take three-dimensional entities as reference objects in the spatial domain, but not in the temporal domain.

(21)  
(a) Within minutes I was called to his office.  
(b) Sixteen houses were vandalized within a few weeks.  

("Within (a time)" may mean "before that particular time has passed" as in (a), or "during that particular time" as in (b), in both of which the invoked image is one-dimensional, again due to the inherent properties of the temporal domain.

2.5.2. *Around*

In the spatial domain *around* typically indicates a two-dimensional area surrounding something as in (22a). *Around* may also be used to talk about time or number as in (22b), in which case *around* means “approximately”.

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7 Here again, a remark similar to the one in footnote 3 is in order. As Hawkins (1984: 99) observes, the dimensionality of *in* is variable with spatial meanings.

(i)  
(a) Doctors Pierce and Winchester are in the operating room. (3-dimensional)  
(b) To vote, put an X in the appropriate box. (2-dimensional)  
(c) Hey buddy, you gotta stand in this line just like the rest of us. (1-dimensional)

What is crucial is not that *in* may express one dimension, but that *in* is limited to one dimension in the temporal domain.
(22)  a. We were sitting around a tree.  
     b. around 10 people

The relevant domain for *around* as an approximative is clearly that of quantity, which is characterized by LINEAR SCALES ARE PATHS and MORE IS UP, as already seen. *Around* in the spatial domain and *around* as an approximative can be thus described as in Fig. 9.

![Diagram](a) around a tree  
(b) around 10

**Figure 9**

Since only one dimension is available in the quantity space, the two-dimensional area which *around* is capable of expressing in the spatial domain is reduced to a line in the case of *around* as an approximative.

Interestingly enough, *around* as an approximative illustrates a case of invariance in a mapping as well. Wierzbicka (1986), in distinguishing a number of approximatives, observes that while *around* applies to a whole area or a whole period surrounding a point, *about* is used as a guess, an estimate, or a 'shot' at one particular point in time. Thus (23a) refers to a few years, e.g. 1878-1883, but (23b) one particular year, viz., 1880.

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

(Wierzbicka (1986: 603))

Wierzbicka further observes that the idea of ‘rounding’ is encoded in *around*, but not in *about*.

In fact, around 6 or 7 people sounds as if one was rounding some fractional number, such as six and a half, or six and three quarters. (Ibid.)

These observations can be taken to indicate that *around* as an approximative refers to the vicinity of a point on a linear scale, parallel to the spatial *around*. Although physical space and quantity space differ with respect to dimensionality, they are both continuous, allowing the sense of vicinity to be preserved in a mapping. Consequently, *around* as an approximative applies to a whole area surrounding a point
on the quantity scale, that is, a number of points: X, and some points a little more than X and some points a little less than X.

Thus around well illustrates the role that inherent target domain structure plays in a metaphorical mapping.

3. Inferential Structure

One of the considerations that led Lakoff to propose the IH (and IP) is that metaphors preserve inferential structure. Lakoff reasons as follows: Metaphorical mappings preserve the image-schematic structure of the source domain. Certain kinds of inference are due to the image-schematic structure. Therefore, inferential structure is preserved in a mapping.

While this reasoning seems secure, one must be careful about what it means for inferential structure to be preserved. Since preservation of the image-schematic structure is sensitive to inherent target domain structure, we can expect that inferential structure is not necessarily kept intact in mappings, contrary to Lakoff's (1990) claim that "all source domain inferences due to cognitive topology (image-schema structure) will be preserved in the mapping" (p. 54). Below we will consider a couple of cases in which inferential structure is not fully preserved.

3.1. Exclusive Location

Consider (24), a typical example of physical motion.

(24) John went from Chicago to New York.

From (24) we can infer not only that John is in New York at the termination of the event, but also that he is no longer in Chicago then. This inference pattern is expressed as in (25), where t₁ is the initial time and t₂ the final time.

(25) If X moves from A to B, then
(a) at t₁, X is at A and not at B.
(b) at t₂, X is not at A and at B.

This inference pattern is preserved across non-spatial domains. At the termination of the event, the meeting is no longer on Tuesday in (26a); John is no longer the owner of the inheritance in (26b); the light is no longer red in (26c); the temperature is no longer 20°C in (26d).

(26)  a. We moved the meeting from Tuesday to Friday.
     b. The inheritance went from John to his son.
     c. The light changed from red to green.
d. The temperature rose from 20°C to 30°C. This might appear to be a truism, but Jackendoff (1990) observes that this inference does not hold in the field of information transfer.

If Bill transfers information to Harry, (...) we can infer that Harry ends up having the information. But since information, unlike objects, can be in more than one place at a time, Bill still may have the information too. (Jackendoff (1990: 27)) Thus in the spatial domain (and many non-spatial domains as well) an object cannot be in two places at the same time, while this is not true in the domain of information transfer, whose inference pattern is expressed as in (27).

(27) If X (=information) moves from A to B, then
(a) at t₁, X is at A and not at B.
(b) at t₂, X is at A and at B.

This is one instance where inference structure is not kept intact, due to the inherent domain properties.

3.2. The Temporal Path

As seen in section 2, the temporal path is a continuous line. But the temporal path has other characteristics which differentiate it from the spatial path (and perhaps from any other abstract path as well). It is uni-directional and fleeting: Unidirectional in that time necessarily changes from the past to the future, not in the reverse order; Fleeting in that time flows incessantly, and the moment we are conscious of the present moment, it vanishes. Because of the fleeting nature of time, the temporal path disappears the moment it is traversed, in contrast with the spatial path, which is fixed and is independent of our traversal of it.

These characteristics of the temporal path account for why actions do not continue to exist after they occur. Lakoff (1992) points out that you can give someone a kick, even if that person doesn’t have it afterward, and argues that this is because the ACTIONS ARE TRANSFER metaphor does not map part of the logic of giving:

In the source domain, where there is a giving, the recipient possesses the object given after the giving. But this cannot be mapped onto the target domain since the inherent structure of the target domain says that no such object exists after the action is over. (Lakoff (1992: 216))

Lakoff does not explicate what specifically is responsible for the non-
existence of the object, but evidently it is the inherent nature of the temporal path: Actions (and events) are located on the time line, so that as soon as we go through them, they no longer exist.8

3.3. Causative *Give*

The verb *give* presents still another instance where inference structure is not fully preserved. Lakoff (1990) cites (28) and (29) as examples of the CAUSES ARE FORCES metaphor.

(28) The practice of Zen meditation gave Harry patience.
(29) Problem 3 gave Harry trouble. (Lakoff (1990: 63))

Note that when you give someone an apple, the apple starts out from you. But this is not the case with causative *give*'s. It does not follow from (28) and (29) that the practice had patience, or that problem 3 had trouble. In other words, with the causative *give* the subject is not a Source.9

4. Apparent Cases of Preservation

Thus far we have seen cases in which image-schematic structure is only partially preserved, due to inherent target domain structure. This suggests the need to be careful in speaking of preservation. Yet even apart from cases of limited preservation, care needs to be taken. Section 4.1. takes up a case where image-schematic structure is supposedly preserved but closer scrutiny suggests otherwise. Section 4.2. presents a case where the supposedly preserved property is not very relevant in characterizing the phenomenon in question.

4.1. Path Inference

4.1.1. Lakoff (1990)

Lakoff argues that the LINEAR SCALES ARE PATHS metaphor maps the logic of paths onto that of linear scales.

Path inference: If you are going from A to C, and you are now at an intermediate point B, then you have been at all points between A and B and not at any points between B and C.

8 Space limitation prevents me from discussing this conceptualization in detail. See Iwata (1994b).
9 Goldberg (1989) correctly captures this fact in her account of the metaphorically extended use of a double object construction. See also Green (1974) and Cattell (1984) for further examples of *give* whose subject is not a Source.
Linear scale inference: If you have exactly $50 in your bank account, then you have $40, $30, and so on, but not $60, $70, or any larger amount. (Lakoff (1990: 53))

Lakoff’s claim that the image-schematic structure of the path is preserved in the mapping is not as secure as his exposition would have us believe.

That the path inference and the linear scale inference are really parallel is rather suspect. As the term ‘path’ suggests, some notion of directed motion is essential for the path inference to hold. In the statement of the path inference quoted above, the if-clause (i.e. If you are going from A to C) explicitly mentions a directed motion. By contrast, no comparable notion is found in the statement of the linear scale inference. The linear scale inference holds over a certain static configuration, independent of any notion of directed motion.

The difference between the two inferences becomes clearer when considering the temporal dimension. Motion along a path can be described as in Fig. 11. The mover, M, is at location l₀ at time t₀. At the next moment t₁ M is at l₁, and at t₂ at l₂, and so on.

As seen in 3.1, the mover cannot be in more than one location at a time. Thus the logic of paths can be stated as in (30).
(30) If you are going from A to C, and you are now at an intermediate point B, then you are not at A or at any point between A and B.

Lakoff’s statement of the path inference mentions the past history of the mover, thus making essential reference to the temporal dimension, although this is implicit in his statement.

In contrast, the linear scale inference makes no reference to the temporal dimension. It says merely that a particular amount or quantity entails all the points lower on the scale but not any point higher. An inference parallel to (30) would go as in (31), which is clearly absurd.10

(31) If you have $50, you do not have $40 or $30 etc.

One might be tempted to attribute this absurdity to the inherent properties of the quantity domain, but this is not so. We can construct an example in the quantity domain whose logic conforms both to the path inference as Lakoff states it and to that stated in (30):

(32) The temperature rose to 70°C.

(33)  
  a. If the temperature is continually rising and is now 70°C, then it was 50°C at some prior time but is not 100°C yet.
  b. If the temperature is continually rising and is now 70°C, then it is not 50°C or 40°C, etc.

All this indicates that the path inference and the linear scale inference are actually different inferences.11 If anything, the latter is more closely related to what is called “scalar implicature” in the literature (See Fauconnier (1975), Horn (1989) inter alia).

4.1.2. Inferences Applied to Other Domains

The distinction between the two inferences is made clearer by applying them to other semantic domains. Consider the identificational domain first, where change of property is the counterpart to physical motion, as in (34).

10 (31) might be acceptable under a metalinguistic negation interpretation (cf. Horn (1989)), but this is irrelevant to the present discussion.
11 Johnson (1987: 122) also points out that the path schema and the scale schema are distinct, which escaped my attention at the time of the initial submission of this paper.
(34) The color changed from yellow to red.

As pointed out above, the static configuration is not enough for the path inference to hold. It sounds quite bizarre to say (35) of various colors constituting a linear continuum of different wavelengths shown in Fig. 12.

(35) The color is yellow now. It was blue before. It is not orange or red.

violet blue green yellow orange red

Figure 12

For (35) to be intelligible, it must be assumed that the color continuously changes in a certain order along the continuum, e.g., in a chemical test setting.

When directionality is evident, the path inference is readily applicable. Consider (36).

(36) The traffic signal changed from yellow to red.

It makes perfect sense to say (37a) and (37b), for our general knowledge tells us that the color of the traffic signal changes in a fixed order.

(37) a. The traffic signal is yellow now. It was green a minute ago. It is not yet red.

b. The traffic signal is yellow now. It is not green.

Figure 13

Let us turn to the linear scale inference. As pointed out above, this inference is related to "scalar implicature". Horn (1989: 232) cites many examples of a scale like that in (38), where \(\langle... P_j, P_i, ...\rangle\)
indicates that $P_j$ outranks (is stronger than) $P_i$ on the relevant scale.\(^{12}\)

(38) a. $\langle$all, most, many, some$\rangle$
    $\langle$, $6$, $5$, $4$, $3$, $2$, $1$\rangle$

b. $\langle$boiling, hot, warm$\rangle$
    $\langle$frieezing, cold, cool, (lukewarm)$\rangle$
    $\langle$beautiful, pretty, attractive$\rangle$
    $\langle$hideous, ugly, unattractive, plain$\rangle$

Those in (38a), related to quantities, can be said to be instances of the linear scale in the quantity domain, while those in (38b), related to properties, count as instances of the linear scale applied to the identificational domain.

Let us turn to the inferences in the temporal domain. (39a), which is based on the assumption that we humans are located on the time line with our location being the present time, seems to be an instance of the path inference applied to the temporal domain. (39b) is possible as well.

(39) a. It is May 5 today. We have been at all the temporal points prior to May 5, and not at any points posterior to May 5.

b. It is May 5 today. It is not May 3, May 2, and so on.

Since time is inherently directed, as pointed out in 3.2, the path inference holds.

On the other hand, the linear scale inference seems inapplicable, for (40) is absurd.

(40) It is May 5 today. It is May 4, May 3, and so on, but not May 6, or May 7.

Again, this seems to be due to the inherent nature of time. In all the cases seen so far where the linear scale inference holds, the quantity or its analogue is cumulative. But time is fleeting, and cannot possibly be cumulative. On May 5, neither May 4 nor May 3 exists any longer.

Finally, neither the path inference nor the linear scale inference holds in the possessional domain. Both inferences make essential

\(^{12}\) Actually, Horn (1989) attempts to unify paired scales like $\langle$hot, warm$\rangle$ and $\langle$cold, cool$\rangle$ into a single scale so as to give a comprehensive treatment of facts like the following:

(i) a. It's cool if not $\langle$cold/freezing/#lukewarm/#hot/#boiling$\rangle$
    b. It's warm if not $\langle$hot/boiling/#lukewarm/#cool/#cold/#freezing$\rangle$

(Horn (1989: 239))

See Horn (1989) for details.
reference to continuous paths, but as already seen, the possessional
path consists of endpoints alone, without intermediate positions be-
tween being owned by X and being owned by Y. Consequently,
neither of the two inferences can be true of the possessional path.

To recapitulate, the path inference and the linear scale inference are
distinct. Therefore, one cannot claim that the path image-schema is
preserved in the mapping in question.

One might still argue that the path image-schematic structure
preserved in the mapping is quite abstract, neutral with regard to
the presence vs. absence of the temporal dimension. But such an
abstract image-schema expresses nothing more than a precedence
relation, to the effect that given three points A, B, and C arranged in
this order, B comes after A and before C. Neither the path inference
nor the linear scale inference directly follows from this highly abstract
schema. This seriously undermines Lakoff's claim that inferences are
due to image-schematic structures. If image-schematic structures are
too abstract to reflect the distinction between the path and linear scale
inferences, then one could no longer make as specific claims about
inferential structure as Lakoff does.

4.2. FORM IS MOTION

Lakoff and Turner (1989) analyze the following sentences in terms of
the metaphor FORM IS MOTION:13

(41) a. The road runs on for miles and then splits.
b. The path stretches along the shore of the lake.
c. The fence dips and rises in parallel with the terrain.

They argue that a form is understood in terms of the motion tracing the
form.

Turner (1993) analyzes (42) in terms of the same metaphor.

(42) Trees climb the hills toward the Golan and descend to test
their resolve near the desert.14 (Turner (1993: 298))

Turner further argues that the metaphor is legitimate because the

13 For ease of exposition, I will use these terms in the discussion below, but this
does not mean that the term FORM is fully appropriate. See Iwata (1994a).

14 Although the following discussion is exclusively concerned with the adequacy
of FORM IS MOTION, Turner actually analyzes (42) in terms of EVENTS ARE
ACTIONS in addition to FORM IS MOTION. But as Jackendoff and Aaron
(1991: 330) point out, EVENTS ARE ACTIONS is simply an invited inference, not
a metaphor.
image-schematic structure is preserved in accordance with the image-schematic constraint on metaphor:

We can understand the form of the line of trees as the trace (or "summary scan") of a movement: the trace of a climb that crests and then descends has the same image-schematic structure as the line of the trees. Consequently, when one is mapped onto the other, there is no violation of the image-schematic structure of the target. (Turner (1993: 299))

This analysis might appear to be intuitively appealing. But here again, we must be careful in determining what is preserved in a mapping.

Notice that the above quote from Turner merely conveys that the path is identical across FORM and MOTION senses; an important difference between the two senses is missed. Compare (42), the FORM sense, with (43), its MOTION counterpart.

(43) The men climbed the hills toward the Golan and descended to test their resolve near the desert.

Crucially, the subject is a point-like, moving entity in the case of the MOTION sense seen in (43), whereas the subject constitutes an elongated, static object in that of the FORM sense in (42).

It is true that the path is identical across FORM and MOTION senses. However, it is not the path but the character of the subject which constitutes an essential part of the phenomenon. In fact, Lakoff (1987) advances an analysis by means of an image-schema transformation which makes essential reference to the subject's character.

(44) a. Sam went to the top of the mountain. (0DMTR)
   b. The road went to the top of the mountain. (1DTR)

(Lakoff (1987: 442))

Here a one-dimensional trajector (1DTR) and a zero-dimensional moving trajector that traces a path (0DMTR) are linked by a transformation. Lakoff states the experiential basis for this transformation as follows:

0DMTR $\leftrightarrow$ 1DTR: When we perceive a continuously moving object, we can mentally trace the path it is following. (Lakoff (1987: 442-443))

The image-schema-based approach, which correctly captures the different characters of the subject, seems to be on the right track, rather than the metaphor-based approach.

It might be objected that the metaphor-based approach is adequate to the extent that "the essence of metaphor is understanding and
experiencing one kind of thing in terms of another” (Lakoff and Johnson (1980: 5)). However, the following consideration argues for an approach based on image-schema rather than on metaphor. The MOTION/FORM contrast finds parallels in non-spatial semantic domains, as in (45) and (46).

*Temporal*

(45)  
- a. We moved the meeting from Tuesday to Thursday.  
- b. The conference went from Tuesday to Friday.

*Identificational*

(46)  
- a. The coach changed from a handsome young man into a pumpkin.  
- b. Our clients range from psychiatrists to psychopaths.

(45a) and (46a) are MOTION sentences, which assert that a point-like entity changed its position on an abstract path in order over time. In contrast, (45b) and (46b) are FORM sentences, where the subject occupies the entire abstract path.

Crucially, the metaphor-based approach and the image-schema-based approach will lead to different treatments of FORM sentences with non-spatial meanings. The image-schema approach builds on the assumption that MOTION and FORM sentences have distinct but related image-schema structures. The non-spatial uses are therefore obtained by combining the image-schema structures with metaphors, as in Fig. 14.\(^\text{15}\)

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MOTION — metaphor — (45a), (46a)

transformation

FORM — metaphor — (45b), (46b)
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Figure 14

By contrast, the metaphor approach would appear as in Fig. 15.

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MOTION — metaphor — FORM — metaphor — (45b), (46b)
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Figure 15

\(^{15}\) The metaphors might be phrased as TIME IS A LOCATION and PROPERTIES ARE LOCATIONS.
Non-spatial FORM sentences would be obtained by applying two metaphors successively to the MOTION sense. But what kind of structure is preserved in these mappings? The image-schema structure preserved in the FORM IS MOTION metaphor should be neutral as to the differences between MOTION and FORM senses. This image-schema would also be preserved in the second mapping, so that non-spatial FORM senses (45b) and (46b) would end up with image-schema structures that are neutral as to the MOTION/FORM distinctions. In other words, the metaphor approach would have to say that the MOTION and FORM senses have the same image-schema structure and would be unable to distinguish between (45a) and (45b) or between (46a) and (46b), in spite of the fact that the two senses exhibit different topological properties.

Thus considering mappings in terms of the preserved image-schema structure reveals the flaw in the metaphor approach, contrary to Turner's original intention.16

5. Concluding Remarks

To the initial question “What counts as the preservation of an image-schematic structure?”, sections 2 and 3 offered the following answer: Only parts of the image-schematic structure that are compatible with inherent target domain structure are preserved in mappings. In a sense, this is not surprising. Metaphorical mappings do not preserve every component of the source domain (cf. Lakoff and Johnson (1980), Lakoff and Brugman (1986)), and the above conclusion merely shows that the preservation of image-schematic structures is no exception.

At the same time, the partial nature of mappings should not be an excuse for lack of precision or the “Anything goes” attitude. It is not always easy to tell what truly counts as the preservation of image-schematic structures, but as section 4 shows, sometimes a careful consideration tells us what counts and what does not.

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16 I am suggesting only that the phenomenon in question is to be analyzed in terms of image-schemas rather than metaphor, and not that Lakoff's (1987) analysis as it stands is perfectly correct. The FORM sense is not limited to a one-dimensional trajector, as witnessed by (i).

   (i) a. The city spreads for miles to the north.
       b. At the foot of the mountain the city spread out to the bay. (COBUILD)
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