

Across Time: The Horizontality of Temporal Semantics

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Abstract

Temporal representation is a crucial cognitive choice for many semantic applications. Temporal information is often encoded in language via spatial metaphors. In English, the two predominant temporal metaphors (MOVING-TIME and MOVING-EGO) bring up “horizontal” schemas (i.e. the figure is moving horizontally with respect to the ground). We make the claim that the horizontal nature of these metaphors is directly linked to the predominance of horizontal schemas for motion verbs in English. Spatial realizations of temporal schemas, such as watches and calendars, are shown to have little impact on how we use horizontal language when discussing time. We examine the semantic consequences of this representation and compare English with other languages in which this “horizontality” is not as common. Counterexamples in which time is represented through “vertical” and “circular” schemas are also discussed.

1 Introduction

The passage of time, although universally experienced, is one of the most difficult concepts to express in language. Without resorting to spatial metaphors it would be hard to even imagine what a temporal semantics would look like. We would be left struggling with many referential questions. What does the word “now” refer to? What do “past” and “future” refer to? What does it mean to do something “quickly” or “slowly”? Any semantic theory which does not account for the passage of time will likely be lacking an essential component.

So why are spatial metaphors the preferred choice in representing time? We need not look any further than an elementary physics class. Time is the “primitive” through which we can describe changes in the spatial domain. This is, in fact, the essential meaning of “change”. Change, in turn, serves as a primitive for the concept of motion. We speak of a “figure” *moving* with respect to a “ground” when discussing cognitive representations of motion verbs. Thus, we should expect that verbs of motion will provide good metaphoric material for representing time. However, even using the motion primitive, we have no real-world observable features for time “does it move forward or back, left or right, up or down? Does it move past us or do we move through it? All of these aspects are left unspecified in our experience with the world. They are, however, specified in our language . . . Across languages, people use spatial metaphors to talk about time” (Boroditsky, 4).

The most common metaphoric technique to deal with time in English is to introduce horizontal spatial metaphors:

1. I am looking *forward* to meeting you.
2. Some countries have *backward* policies.
3. Put the past *behind* you.
4. The best years of your life are *ahead* of you.

We are now ready to pose two fundamental questions: Why do English speakers choose to represent time via horizontal spatial metaphors more often than vertical (or any other

type) of metaphors and what are the semantic consequences of this representation?

2 Two Spatial Metaphors for Time

Lynne Feagans has identified two metaphors by which temporal progression is associated with spatial progression

“Using the MOVING-TIME METAPHOR, the individual ego is standing at the point present as time flows along the time line. In this case, the portion of the line to the right of the point present is past time while time to the left of the point present is future time. Using the MOVING-EGO METAPHOR, time is standing still while the individual ego moves along the time line. In this representation, the portion of the line to the left of the point present is past time and the portion of the line to the right of the point present is the future time (Feagans, 530)”

The MOVING-TIME METAPHOR represents the time as the figure and the ego as the ground. Here, the figure time is progressing around the grounded ego (to use further metaphoric language, we may say that the river of time is flowing around the ego). The MOVING-EGO METAPHOR represents the ego as the figure and time as the ground. The ego here is *part of* the river moving over the grounded time.

Interestingly, both metaphors suggest that the figure moves horizontally with respect to the ground. Feagans uses the phrasing “to the left of” and “to the right of” when “above” or “below” could have been used just as effectively. There are no inherent properties of the source and target domains for these metaphors that requires horizontality. Yet, Boroditsky has noted that “on the whole, the terms used to order events are the same as those used

to describe asymmetric horizontal spatial relations (e.g. “he took three steps *forward*” or “the dumpster is *behind* the store”)” (Boroditsky, 4). These examples might correlate to temporal sentences such as: “Are you looking *forward* to your date tonight?” and “Put the past *behind* you?” Even sentences which appear to be using a vertical metaphor may actually evoke a horizontal schema in the listener’s mind. Consider:

1. I have a big test coming *up*.
2. I hope to do well on the *upcoming* test.

One can easily say “there is a bottle coming up on the conveyor belt” or, when taking a tour of a new city, one will hear things like “coming up on your right, is one of Boston’s oldest buildings”. These activities have horizontal paths, and neither *up* nor *upcoming* change that imagery. So why do sentences like “Are you looking *above* to your date tonight?” and “Put the past *below* you.” sound so strange to the ears of an English speaker?

3 Horizontality in Motion Verbs

To answer this question, we first consider the schematic representation of motion verbs in English. Since we humans are the ones experiencing the “flow of time” we would expect that we have an ego-centric temporal representation, so we will first examine human activity. We spend the majority of our lives moving horizontally with respect to the ground (Earth). This is to say that we are more likely to be walking, running, driving and riding than we are to be diving, climbing, digging or jumping. To see that English captures horizontal translation

as the default for these verbs consider the pair of sentences “Albert walked to work” and “Albert walked forward to work”. In the second sentence the horizontal translation is made explicit, but the semantics has not changed dramatically from the first sentence. Now consider the case of a verb like jump: “Albert jumped.” and “Albert jumped up on the table.” In the first sentence, it is ambiguous whether the jump is a “long/broad(horizontal) jump” or a “high(vertical) jump” (in fact, the long jump and high jump are two distinct events in the Olympic games). The semantics only becomes clear when we introduce a preposition as in “jumped up”.

As another example, consider the verb “fly”. The flight schema includes both a vertical and horizontal component. The takeoff includes an upward vertical/horizontal translation, followed by a longer pure horizontal translation, and ending in a vertical/horizontal landing. However, the verticality of flight is completely removed in spoken English. Consider the sentences

1. I flew from Buffalo to Los Angeles.
2. I flew from Buffalo down to Los Angeles.
3. *I flew up from Buffalo and down to Los Angeles.

The first sentence does not express any vertical translation whatsoever. The semantics of the second sentence are closer to “I moved from a higher latitude in Buffalo to a lower latitude in Los Angeles”. Such latitude awareness is perhaps why we call Australia “Down Under”. The third (incorrect) sentence illustrates a failed attempt to introduce the vertical

components of takeoff and landing.

This horizontal stress in motion verb schemas is then simply one of the features of the spatial source domain that is mapped onto the temporal target domain in a large class of TIME-IS-SPACE metaphoric mappings. English speakers consider horizontal metaphoric usage more natural precisely because most of the daily activities (i.e. motion verbs) that we perform are represented by horizontal schemas in English.

4 Realizations of Temporal Schemas

Another approach we may take in exposing our cognitive representation of time is to examine the actual realizations of temporal information that we use. Examples of such realized schemas include calendars, watches, day planners, scoreboards, and family trees. We see here that, once we leave the linguistic domain, time is represented in multiple schemas. The hours of the day are represented circularly on an analog watch, while the days of the week are represented horizontally on a calendar. On the same calendar, the weeks and months are usually represented vertically. This suggests that different time scales may require different schemas, but this doesn't seem to be the case in spoken language. Consider the following sentences:

1. I am looking forward to meeting her later today (correct from horizontal schema)
2. *I am looking around to meeting her later today (incorrect from watch schema).
3. I am looking forward to going home in two weeks (correct from horizontal schema).

4. *I am looking down/up to going home in two weeks (incorrect from calendar schema).
5. I am looking forward to attending the University at Buffalo next year (correct).
6. *I am looking up to attending the University at Buffalo next year (incorrect).
7. *I am looking around to attending the University at Buffalo next year (incorrect. Attempt to use Earth around the Sun is a year metaphor)

The phrase “looking forward to” seems to be time scale invariant in all three of the valid cases and the semantic interpretation is always horizontal.

A baseball scoreboard is another example of a spatial realization of a temporal schema. This is a particularly interesting example because the game of baseball does not have a “game time” and the only notion of progress is the number of outs and the inning number. The baseball scoreboard represents the game unfolding (or becoming complete) through time. The turn at bat for the visiting team are called the “top” of an inning and those for the home team are called the “bottom” of an inning. Yet it still is incorrect to say “I am looking down to seeing my favorite player bat in the bottom of this inning” (we instead say “looking forward”) or “I remember up in the top of this inning when he struck out” (we instead say “back”). The innings themselves are always listed horizontally, and it is appropriate to speak of them horizontally: “I am looking forward to the next inning”. Again we see that the spatial realization of the temporal schema does not change the way we use horizontal spatiotemporal language.

As a final example, we consider the spatial representation of a family tree. Family trees

are almost exclusively organized with time moving from the top to the bottom of the tree (interestingly, this is the reverse direction of growth from an actual tree, which grows bottom up over time). Marriages are represented with a horizontal bar and children are listed beneath their parents. At first glance, the fact that English speakers have adopted this schema would appear to contradict the horizontal schema of time. But we must consider what a family tree is trying to represent in the first place. Looking at a family tree we can identify: children and parents, cousins, grandparents, aunts and uncles. These are all familial relationships, not purely temporal relationships. There is no motion verb schema elicited when we say “King Richard II was the father of King Richard III” and it is somewhat incorrect to say “King Richard II was above King Richard III”, but it is perfectly natural to say “The reign of King Richard II came before King Richard III”. Temporal information such as order of birth for siblings, order of death, and lifespan is not represented vertically in this spatial schema. Order of birth for parents and children is represented vertically, but this is simply a consequence of our semantic knowledge that parents are born before children.

In English, we use the phrase “hand-me-down” to mean something given from an older sibling or parent to a younger sibling or child. In the family tree schema, this can move the object across or down the tree. But the item is *called* a hand me down because it is given from a older (and usually taller) person to a younger (and usually shorter) person. This can be seen from the fact that the object can move horizontally in the family tree. Clothing which no longer fits an older sibling is given to the younger sibling as a “hand-me-down”. It

is interesting to note that , even though we grow vertically taller from birth, we don't use this vertical growth in our temporal schemas.

The family tree layout does give rise to at least one valid vertical temporal statement “Object X was passed/handed down through the ages”. Here, we are forced to consider an object passing from antiquity above to our current position below. Usually we will say something like this about an object that has survived many generations and has thus has obtained some sentimental or monetary value, rather than just any everyday object. Consider the following pair of sentences:

1. The painting was passed down through the ages.
2. The cup was passed down through the ages.

In the second example, the listener gets the sense that the cup must be something special (i.e. not just an ordinary cup). The object that is passed/handed down is not actually moving vertically, so we are only speaking metaphorically. These statements are consistent with Lakoff's UP-IS-GOOD-DOWN-IS-BAD metaphor. We obtain a valuable item from above so it makes us better. It is for this reason that any organizational hierarchy is given with the most powerful or important entities at the top.

5 Lifespan and Timeline

We now turn our attention to the time line. The time line is almost always represented as a horizontal line with dots marking significant events. The granularity of the dots is up to the time line's "author". The dots can represent exact dates, or years. A time line is usually sensitive to scale. If two events occur in close proximity to each other in time the dots will appear closer to each other than if the events had occurred further apart in time. Another important feature of this schema is that it allows for us to talk about intervals of time as well as points. Some horizontal spatial metaphors continue to function with intervals, while some do not, but the vertical "above/below" continue to fail:

1. The holiday season is just ahead.
2. *The holiday season is just above.
3. The industrial revolution was a half century before the technological revolution.
4. *The industrial revolution was behind the technological revolution.
5. *The industrial revolution was below the technological revolution.

5.1 Time Line vs. Number Line

The interval time concept is closely related to our conception of the number line. A mathematical statement like $5 \leq x \leq 10$ is represented (and taught) by bracketing an interval on a horizontal line between points at 5 and 10. Like the time line, a number line only requires a one dimensional line schema on which points can be arranged. There is no requirement that this line is horizontal, we could just as easily order points and form intervals on a vertical

line. Even though statements like: “6 is *bigger* than 5” and “5 is *smaller* than 6” seem to suggest a vertical schema, the direction and orientation of magnitude is still ambiguous. We cannot say any of the following “6 is *taller* than 5”, “6 is *wider* than 5”, “5 is *shorter* than 6”, or “5 is *thinner* than 6”. However, the horizontal before/after continue to function: “5 is before 6” and “6 is after 5”. Even the symbols for the relations “greater than” ($<$) and “less than” ($>$) suggest a horizontal schema for the number line.

In some sense, the time line *is* a number line. It gives us the ability to order events sequentially. We can say things like “Breakfast is *first*, lunch is *second*, dinner is *third*”. Here we are giving an ordinal significance to the three meals. Even though there are events occurring between breakfast and lunch, we can specify their ordering using this number line construction. It may be a chicken and egg question to ask whether it is our notion of time line that is influencing our number line schema or if the number line is somehow more primitive. When we consider the time line as a horizontal number line however, we are making a cognitive choice that influences the semantics of other observable phenomena. For example, the notion of velocity in physics is taken to be the change in position over the change in time. We represent this graphically in two dimensions on the Cartesian plane with time *always* occupying the horizontal x-axis. The first derivative of velocity is acceleration (that is, change in velocity over change in time). We talk about this derivative as the *slope* of the tangent line to the velocity curve. Here, the semantics of *slope*, as in the “slope” of the mountain, helps us understand the more complex notion derivative (which in turn helps us

give spatial semantics to the still more complex notion of acceleration). The metaphor is that of climbing the velocity curve as if it were a mountain. The reason we can use the word slope in the first place is because time is represented on the horizontal axis. If time is represented on the vertical axis, there could still be an interpretation for acceleration, but not using the familiar notion of slope.

5.2 The Circle of Time

Another schema for time, used even less frequently than the vertical schema, is the circle.

This gives rise to phrases such as:

1. What goes around comes around
2. Passover is right around the corner
3. I will get around to it

The first sentence captures the notion that events in time sometimes repeat themselves. The second sentence also uses this idea. We use the phrasing, just around the corner to indicate that some event that occurs at a regular interval in the yearly calendar is nearing. The third sentence evokes an interesting schema. Getting “around” to some activity suggests that the we are not taking the normal path (i.e. the horizontal “normal” progression), but rather that we are avoiding it and will have to make some special spatial maneuver to come back to doing it. This works well with the horizontal time line schema. An event has an expected completion time t_1 . Time t_1 passes and the event has not been completed (or perhaps has not even been started) and we reach time t_2 . We metaphorically go “around”

to grab the event waiting at t_1 so that we can do it at some later time t_3 .

While the circle schema is a useful tool for characterizing the repetitive nature of some events in time and to represent the manner in which we adhere to a schedule, it does not have the same impact as the horizontal schema. The horizontal schema has an implicit direction in both the MOVING-TIME and MOVING-EGO metaphors. When we say “I will get around to washing the dishes” it is not clear how time is moving. Are we moving counterclockwise or clockwise? Is time moving over us clockwise or counterclockwise?

5.3 Lifespan and the Afterlife Schema

If we adopt a linear horizontal schema like the time line for our temporal representation then our lifespan can be represented as a line segment whose endpoints are birth and death. The common way to denote lifespan on a tombstone is to write the year of birth, followed by a horizontal line, followed by the year of death. This is almost a proxy for the horizontal line segment representation.

Interestingly, the Christian notion of afterlife requires a vertical schema. We spend our lives moving horizontally through time (performing all of our horizontal motion verb activities) and then we die. We are then sent to heaven (vertically upward) or to hell (vertically downward). Heaven and hell are eternal (which is to say timeless) places, so this verticality works quite nicely against the horizontality of normal (which is to say mortal) time.

In Jewish history we find a similar idea. The Israelites “wander the dessert for 40 years” (of all the types of terrain the dessert is the most horizontal) but Moses must climb Mount Sinai (vertically) in order to receive the ten commandments (which are set in stone to be *timeless*). Thus, with the inclusion of Lakoff’s UP-IS-GOOD-DOWN-IS-BAD metaphor, we can extend the time line representation and say that time functions normally in the horizontal direction, but abnormally (or in a special way) in the vertical direction.

6 The Case of Mandarin

Boroditsky has noted that, in addition to the English speaking horizontal temporal metaphors, speakers of Mandarin “also systematically use vertical metaphors to talk about time. The spatial morphemes *shang* (“up”) and *xia* (“down”) are frequently used to talk about the order of events, weeks, months, semesters, and more. Earlier events are said to be *shang* or “up,” and later events are said to be *xia* or “down”” (Boroditsky, 5). She notes that these are absolute terms, functioning in a manner similar to the absolute terms earlier and later in English. To me, this indicates more of an ordinal relation of time (with the relationships earlier-than and later-than). Boroditsky explains how “earlier” is treated as an absolute:

Terms like *before/after* . . . can be used not only to order events relative to the direction of motion of time, but also relative to the observer. When ordering events relative to the direction of time, we can say that Thursday is *before* Friday. Here, *before* refers to an event that is closer to the past. But, we can also order events relative to the observer, as in “The best is *before* us.” Here, *before* refers

to an event closer to the future ... one cannot say that “the meeting is earlier than us” to mean that it is further in the future. (Boroditsky, 5-6)

One obvious and relevant difference between Mandarin and English is that English is written horizontally from left to right and Mandarin is written vertically from right to left. Boroditsky dismisses this as an influence claiming that if this were the case “Mandarin speakers should always be faster to answer time questions after vertical than after horizontal [spatial] primes” (Boroditsky, 16). I believe that this ignores the fact that Mandarin speakers have *both* a horizontal and vertical notion of time. Showing vertical spatial primes may confuse someone with two parallel metaphoric notions of time. I don’t believe that it is a coincidence that a vertical writing scheme was developed by a set of dynastic people who would be quite interested in passing information “down through the ages.” Clearly, there are cultural differences to consider. What is really interesting to consider is why Mandarin speakers use two, seemingly opposing, spatial metaphors when they partake in all of the same horizontal motion verbs that English speakers do.

6.1 Reading as Progress

So let us now turn to the activity of reading. English text is written left to right and top to bottom on a page. However the meaningful semantic pieces of a text, the words, are always represented horizontally. A book must have a set of lines moving vertically down the page because of the demands of space on a page, but one could imagine any such book printed on a long horizontal strip. Most works of fiction are arranged with time moving forward as the narrative progresses. Literary devices such as flashbacks may shift the sequence of

temporal progression, but not the direction of time's arrow. Thus, as time moves forward for the characters in the narrative, real time is moving forward as the reader moves his/her eyes left to right on the page. When asked how much progress we have made in reading a book we either answer with a chapter number or a page number. These are nothing but spatial representations of horizontal temporal progress through the book. The amount of time we have spent reading will translate directly into the horizontal displacement of pages (and marked chunks of pages which form chapters).

I believe that, at least for English speakers, the horizontality of text direction is a factor in our preference for horizontal temporal schemas. The basic formula for any fairy tale (an early act of storytelling and reading in a child's life) requires us to start by saying "Once upon, a time..." and to end by saying "The End". This frames the story in such a way that we may really cognitively process: "Once upon a point on the time line" in the beginning and "The Endpoint" at the end.

7 Conclusion

We have seen that the representation of time is a crucial cognitive choice that will affect the semantic character of an entire language. The pervasiveness of horizontal motion verb schemas in English has seeped into our temporal representation. English speakers prefer horizontal spatial metaphors for representing temporal information. We have observed that the realized internal schemas of our temporal representations do not significantly alter the

horizontality of our metaphoric language. We have examined the relationship between the time line and the number line. The semantic effects of interpreting the time line *as* a number line were shown to be far reaching. Such an interpretation helps us understand complex real-world concepts like acceleration and derivative metaphorically by using the more familiar concepts of change and slope. The presence of vertical and circular temporal schemas was examined and the function of these schemas was shown to fit well within a system dominated by horizontality. The Mandarin vertical representation of time, a system which developed alongside a horizontal system, was discussed. We speculate that the direction of text does have a profound effect when treating reading as temporal progress through a narrative.

In closing we acknowledge that we have only examined a small set of cases, in just the English language. To do a more comprehensive, cross-linguistic study of spatial metaphors for time might yield some more answers to our fundamental questions. We can conclude, however, that all languages must use some sort of TIME-IS-SPACE metaphor in order to fully capture our cognitive experience.

References

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