Realizing Conventional and Novel Conceptual Blends for Time-Telling Through Multimodal Instruction

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Abstract: This paper uses conceptual blending theory to analyze the construction of meaning in two episodes of multimodal instruction in time-telling, one directed at establishing a conventional way to read times and the other at presenting a novel way to read times noticed by the teacher during the discourse. Throughout both episodes, the teacher uses mapping gestures to link conceptual content to structures on the clock face, building anchored blends to read times. The analyses support the arguments that instruction is an inherently multimodal form of discourse, that it plays a unique role in keeping practices alive in our culture, and that the conventional and creative are distinguished not by conceptual mechanisms but by the perception of novelty and value.

1. Introduction and purposes

Teachers craft meanings with their hands and words, imbuing the world with significance. As they gesture over objects and verbally annotate their movements, they guide learners in seeing structures in specific meaningful ways (Williams, 2008b). Through multimodal instruction, learners come to see with new eyes, perceiving what they could not perceive before and using that perception as a basis for understanding and action.

In the present paper, I analyze the use of multimodal instruction to guide conceptualization for both a conventional and novel way of telling time on an analog clock. My purpose is to show how the multimodal elements of a teacher's discourse function together to create new meanings for learners, whether the meanings are culturally conventional or utterly novel. By comparing conventional and novel cases, I hope to illuminate what they have in common and how they may differ, and thus to consider how creative insights emerge and are communicated.

2. Theoretical framework

The episodes of instruction in clock-reading in this paper are analyzed from the perspective of conceptual integration theory (also known as conceptual blending theory), a theory of meaning construction developed by cognitive linguists Gilles Fauconnier and Mark Turner (1998, 2002). Conceptual integration theory describes how meaning is constructed in networks of interconnected mental spaces—packets of conceptual content—and how, through selective projection, composition, and completion of patterns, blended spaces arise with their own emergent structure. The analyses presented here rely on the concept of material anchors for conceptual blends (Hutchins 2001), wherein a culturally constructed material artifact—in this case, an analog clock face—provides the underlying structure for conceptual blends used to do cognitive work—in this case, to tell time. Learners must be taught to see and use these anchored blends, and teachers use multimodal discourse to activate conceptual content and guide mappings onto the clock face to build conceptual blends and then to elaborate these blends to generate specific time readings in culturally conventional formats such as 'X thirty' or 'half past X' (Williams, 2008a).

3. Data sources and methods

The data presented here come from the pilot for a cognitive ethnographic study of time-telling instruction, carried out in two elementary schools over the course of a school year (Williams, 2004). In the pilot, a graduate student acting as teacher is explaining how to tell time on an analog clock using both absolute ('X thirty') and relative ('half past X') formats. In the course of his instruction, he discovers a novel way to read o'clock times using angle-measures, and he proceeds to explain this new way to tell time by constructing an unusual conceptual blend on the material anchor of the clock face.

The two episodes of time-telling instruction analyzed here were transcribed with speech rendered as text and gestures as annotated still images linked with the corresponding speech. For each of the two instructional episodes, a figure was created for each utterance depicting its effect on the emergent meaning, as in Williams (2006). The resulting figures depict the series of conceptual mappings that construct particular anchored blends, the manipulations of clock states within these active blends, and the resulting time readings. With the sequence of meaning construction thus laid out, the videos and transcripts were examined to consider the role of the teacher's talk, gestures, and clock manipulations in each step of the unfolding meaning. Finally, the two episodes were compared to note commonalities and differences.

4. Findings

Still images from the two instructional episodes are shown in Figure 1. In each episode, the teacher uses a series of gestures on and over the clock face to map conceptual elements profiled in speech to visible structures on the clock face, building the anchored blends needed to read clock times in different ways.

In the conventional blend for reading 9:30 (shown in Figure 2), the teacher first traces from the top of the clock to the tip of the minute hand at the bottom of the clock while saying "the minute hand is down" (Figure 3). He repeats the gesture while saying "down" and continues with "is halfway from the top" (placing his left index finger at the top of the clock) "back to itself" (tracing a path with his right index finger clockwise around the clock face). He keeps his left index finger at the top as he traces a line down the middle of the clock, saying "so it's half an hour," and then traces an arc from the top to the present location of the minute hand, saying "30 minutes." Explicit in these gestures are the mapping of source-path-goal structure for the minute hand's path around the clock face through one clock hour, the dividing of the circle into halves, and the highlighting of the traversed portion of the path leading to the present state. These are all spatial components of the blend for reading time. Not explicit in gesture is the division of one hour into sixty minutes, which is numeric rather than spatial, and which is presumed as prior knowledge on the part of the learner. This use of a series of tracing gestures on the clock face to build anchored blends for time-telling is typical of the clock-reading instruction provided in 1st, 2nd, and 3rd grade classrooms in Williams (2004); analyses of specific examples can be found in Williams(2008a) and (2008b).

After delivering instruction on conventional time-reading, the teacher appears to notice something about the clock face. This moment is marked by a pause in which he turns the clock face slightly toward himself and then returns it to its initial position. He then turns toward the listener and asks, "How would you read the time without seeing the numbers?" This question initiates the next series of mapping gestures that produces the novel blend shown in Figure 4. In

this blend, the geometric scheme for measuring angles in degrees is mapped onto the clock face with zero at the top and angles measured clockwise. The angle to be measured is defined by the minute hand at the top and the hour hand positioned somewhere around the dial, so the blend is specifically for recognizing o'clock times without the numbers being present. It should be noted that it is not unconventional to recognize o'clock times by the configuration of the hands alone; what is unconventional is defining these times by the number of degrees in the angle formed by the two hands.

The series of mapping gestures that constructs the blend is shown in Figure 5. The teacher starts by saying "we'll put our zero angle up here," tracing a line along the minute hand to the top of the clock and writing a '0' in the air with his finger. He then proceeds to map three landmark angles onto the clock face, first by tracing a line back and forth between the clock center and right side while saying "ninety degrees is three," then drawing a line from the clock center to the bottom while saying "a hundred 'n' eighty degrees is six," and then drawing a line from the center to the left side while saying "two hundred and seventy"—here he mumbles "or ninety degrees the other way" while gesturing a small arc counterclockwise from the top back toward the indicated position, and then he traces the full arc from zero clockwise to the present position while saying "two seventy," and then finishes the thought with "is nine." The added complexity of the gestural depiction for 270 degrees may have resulted from the teacher's sense of the potential unfamiliarity with measuring angles greater than 180 degrees or with the recognition that times at this point are often referenced to the upcoming hour (e.g., as "quarter till"); this cannot be discerned from the data. What is evident is that the gestures add paths defining the directions of measurement for the two ways of stating the angle.

In the next portion of discourse, diagrammed in Figure 6, the teacher "runs" the blend by manipulating the clock hands into the states for three o'clock, six o'clock, and nine o'clock, coinciding with the landmark angle-and-time correspondences he has just established. At six o'clock, he traces up and down over the clock hands, highlighting their vertical alignment, and then he distinguishes that these are two hands forming an angle by tracing with both hands from the center outward (left up, right down) while saying "pointing up and down."

5. Discussion

The analysis of these two episodes has several implications. First, it's hard to imagine how complex cognitive activities like clock-reading could be perpetuated in our culture without multimodal forms of instruction. Words alone won't do the job, and words and pictures are mostly insufficient without pointing, tracing, manipulating, and annotating to link conceptual content with structure in the world; as Hutchins (2010) notes, we make material patterns into representations through enactment. The same could be said for other representational formats and artifacts (vertically-written subtraction problems, equations, maps, charts, and so on). Second, there are no discernible differences between the multimodal discourse used to build the culturally conventional blend and that used to build the novel, unconventional blend. Though the first is extant in our culture and the second arises in a moment of insight, both must be communicated to an unknowing novice using the same tools—talk, gestures, and manipulations—that make up the multimodal discourse we recognize as instruction, often precisely because it is marked by a higher level of multimodality than the preceding or subsequent discourse. Third, while the clock angles blend is novel, it is unlikely to persist as a means of telling time. Using Boden's (2004) criteria for creativity, we see that while the blend is *new* and *surprising*, it is not *valuable*. For time-telling, the hand configurations are useful, but

the angle measures are not; they might become useful if they are found to have other applications, such as using a wristwatch as a makeshift protractor or compass.

Overall, we find a continuity between conventional and novel blends, both relying on common conceptual mechanisms and being communicated through similar forms of multimodal discourse. Creativity, in the sense of finding connections and forming new blends, is inherent in thought and communication, though it generally goes unnoticed unless it is both novel and useful. Emergent structure often fails to persist, and much teaching goes into making sure that the conceptual-material-cultural practices we value are kept alive across the generations.

References

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Figures are below.

Constructing Blends *in situ*

Conventional blend:
Reading 9:30

Novel blend:
Reading o'clock times by angles

Figure 1. The construction of two anchored conceptual blends through multimodal discourse consisting of talk with gestures on and over the clock face. The first (conventional) blend is used to read 9:30 by the location of the minute hand halfway around its hourly path. The second (novel) blend is used to read 6 o'clock by the angle of 180 degrees.

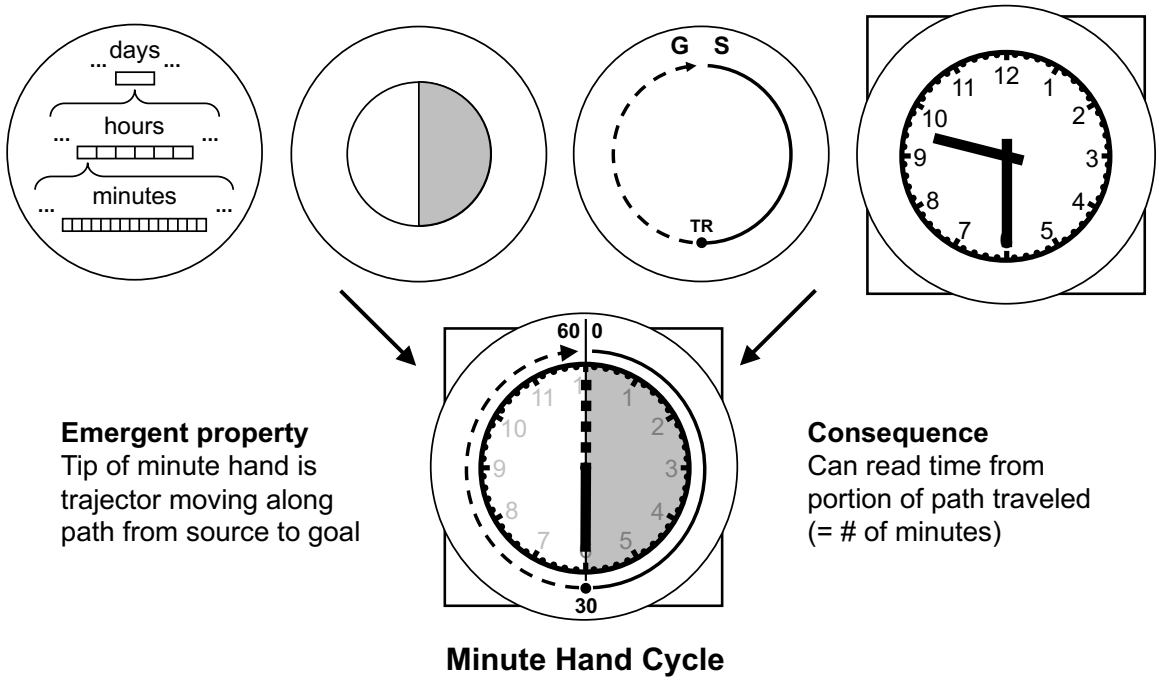

Figure 2. The conventional blend for reading absolute clock times (only the minute hand is shown). Conceptual inputs include the division of the day into hours and minutes, the division of a circle into halves (to read 9:30), and the movement of a trajector along a path from source to goal. The blend is anchored by the clock face.

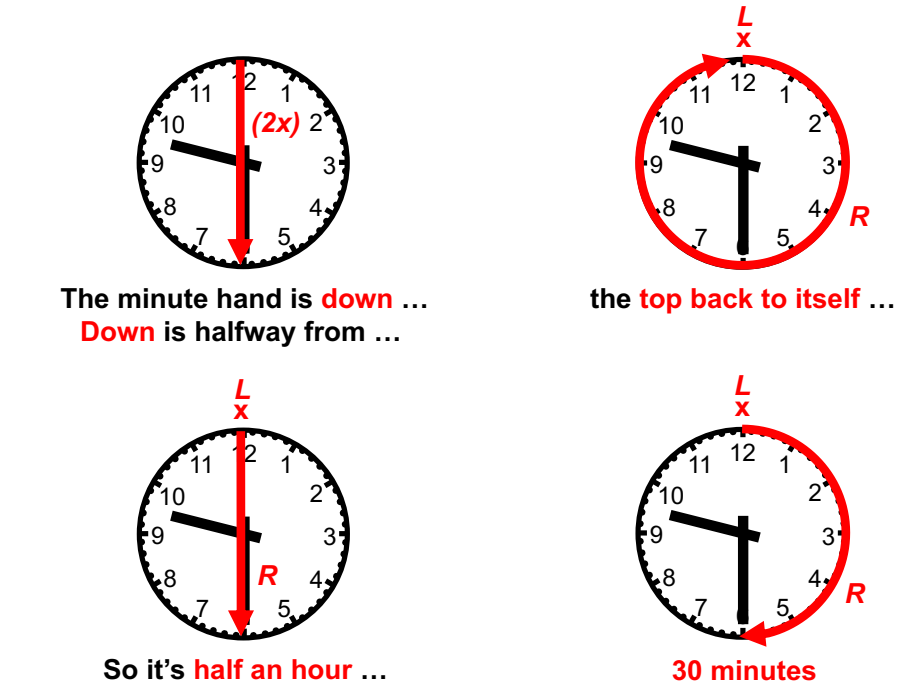

Figure 3. The series of mapping gestures (tracing with extended index finger) used to build the conventional minute-hand-cycle blend and to read the minutes as "thirty." Red text indicates the speech that co-occurred with the gesture.

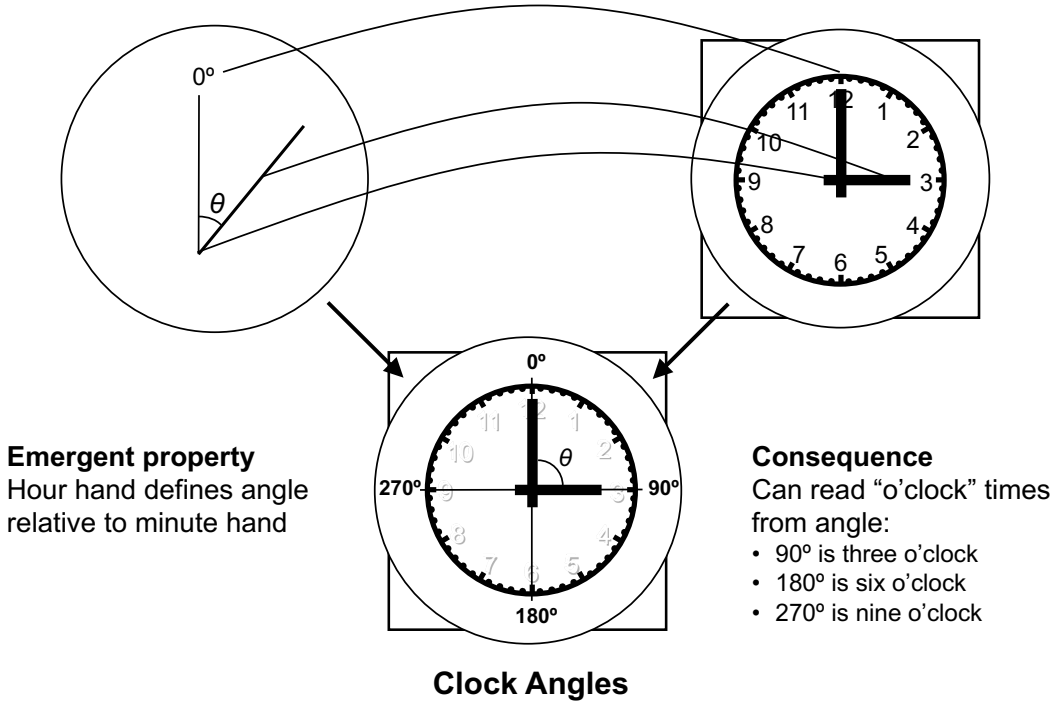

Figure 4. The novel blend for reading o’clock times. The unusual conceptual input is the geometric scheme for measuring angles from zero to 360 degrees. This is aligned with the clock face with zero degrees at *12* and angles measured clockwise. The clock face anchors the blend.

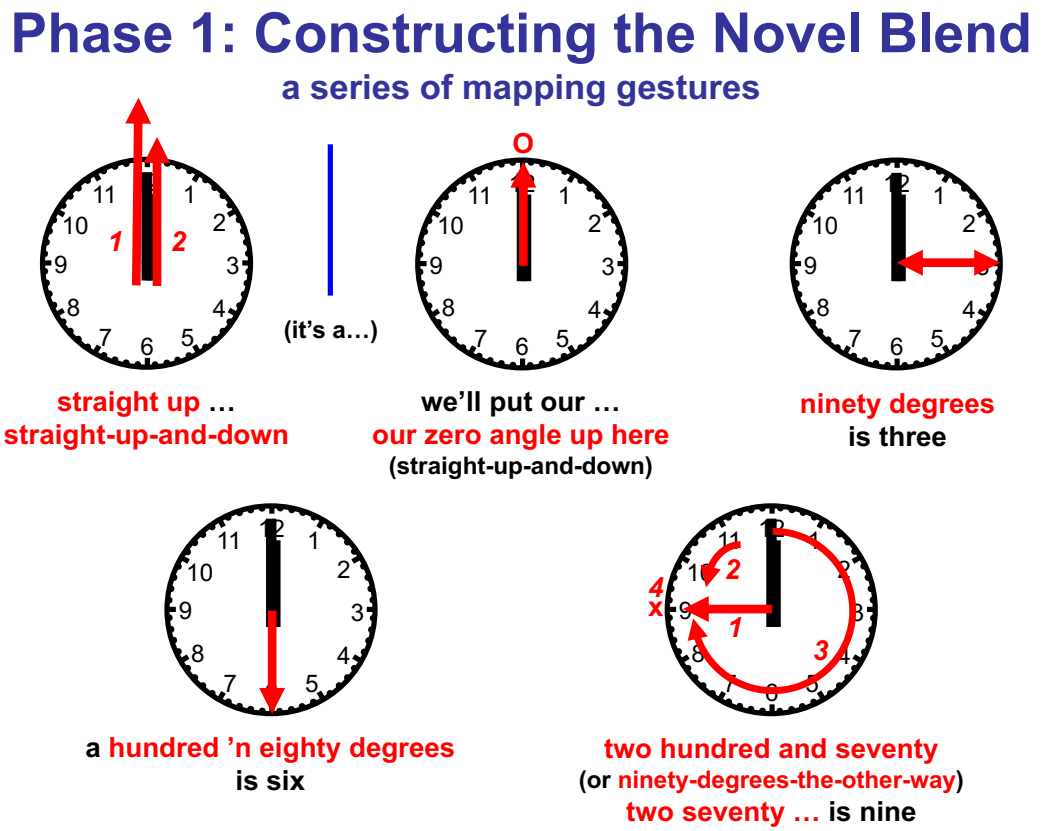

Figure 5. The series of mapping gestures used to build the clock-angles blend. Red arrows indicate tracing gestures, and red text indicates co-occurring speech.

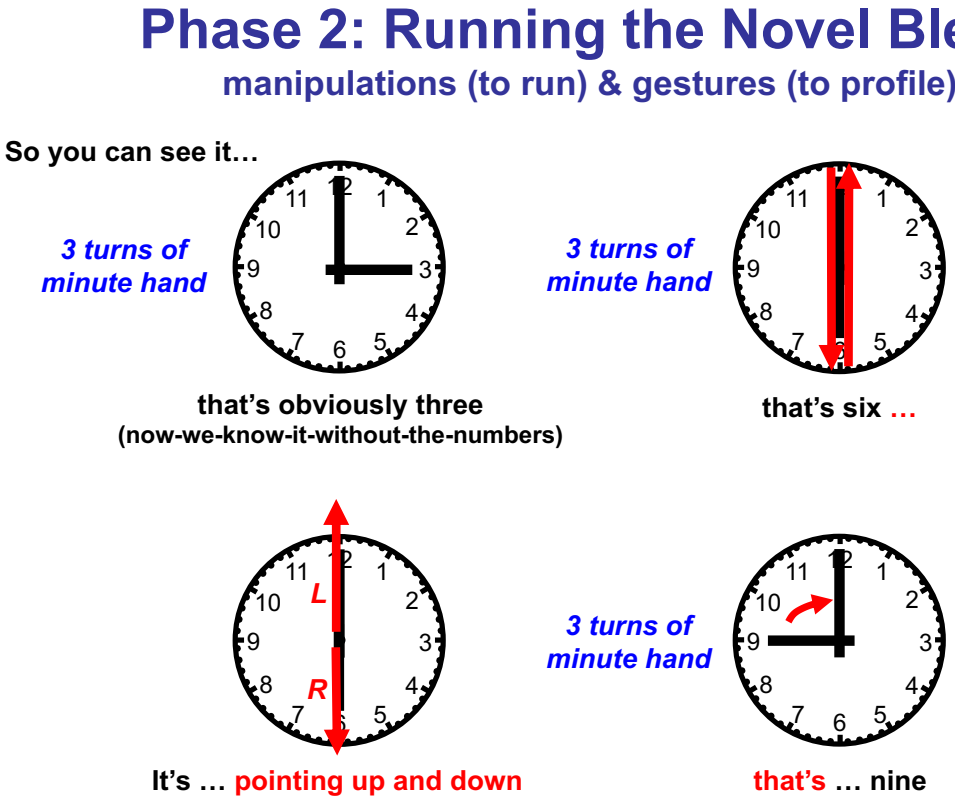

Figure 6. Using the blend to read o'clock times. Turns of the clock hand are used to change the clock state in the anchored blend. The resulting time is named, and tracing gestures profile the clock hand angle, with co-occurring speech indicated in red.