Distributed Cognition and Gesture: Propagating a Functional System Through Impromptu Teaching

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Abstract: On a beach in France, a lifeguard makes three attempts to teach a colleague how to use a wristwatch and the sun to find compass directions. Each attempt involves constructing and coordinating representations in multiple spaces: sand, surroundings, watch, and air (gesture space). Close examination reveals how the hands, eyes, and body construct and connect these representations and enact their coordination in a cognitive functional system.

Overview

In keeping with the conference theme of "Learning and Becoming in Practice," this poster examines aspects of distributed cognition and gesture (Williams 2013) in impromptu teaching in an outdoor work setting. The data consist of a video-recording of a lifeguard on a beach in southwestern France teaching a colleague how to locate cardinal directions using an analog wristwatch and the position of the sun. The lifeguard makes three attempts to teach his colleague how to coordinate these elements to fix south and from there to locate north, east, and west. Our poster examines in each of these attempts, rendered as a sequence of annotated images, how orchestrated movements of the hands, eyes, and body guide conceptualization (Williams 2008ab). From this analysis, we argue for a distributed view of human cognition, situated view of instruction, and embodied view of teaching.

Distributed Cognition: Cognitive Functional Systems

Among the most distinguishing features of human cognition is how brain, body, and world interact to produce impressive cultural and cognitive achievements (Clark 1997). Hutchins (1995) argues for a distributed perspective on human cognition: he claims that cognitive activites are accomplished through coordinations of conceptual and material elements in functional systems. In moments of human practice, we instantiate functional systems to transform inputs (say, a configuration of hands on a clock face) into outputs (a time reading [Williams 2008ab]). Functional systems involve ways of perceiving and acting that coordinate system elements to fix the targeted outcomes. Cultural processes preserve and perpetuate the material artifacts, cognitive models, and bodily practices of conventional functional systems. Much of schooling is devoted to mastering these systems so children can instantiate them in everyday life and keep them extant in our culture.

A Functional System for Finding Directions

The data analyzed in this poster relate to the functional system shown in Figure 1, reproduced from "Use your wristwatch as a compass" at lifehacker.com. The directions on the lifehacker website are simple: "Hold a watch with 12 o'clock at left. Move your arm so the hour hand points at the sun. The spot halfway between the hour hand and the 12 is south." During Daylight Saving Time, find the spot halfway between the hour hand and 1. This system works in the northern hemisphere when the sun is visible and an analog wristwatch is present. Once south is fixed, the user can use a mental model of the compass rose to locate north, east, and west.

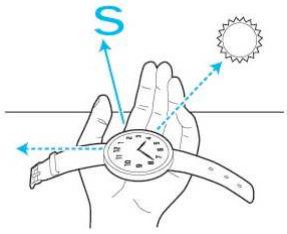

Figure 1. Using a Wristwatch to Find South.

The Teaching Situation: On the Beach

The data were recorded by Simon Harrison on the beach at Anglet, in southwestern France, in July 2011. In the video, the lead lifeguard is trying to teach another lifeguard how to find south using this system, while a third lifeguard watches. It is early afternoon and the sun is visible, but the lead lifeguard is wearing a digital (not analog!) wristwatch, and there are no traditional drawing or writing tools readily at hand. The lifeguard is confronted with the problem of how to represent: (1) the elements of the system, and (2) the process of bringing them into coordination to locate south. In particular, the expert needs to represent the elements and operations in such a way that the novice can understand the system and use it successfully; in this case, the expert needs to do so while simultaneously monitoring the swim zone, his primary work task.

First Attempt: Sand and Surroundings

The first attempt at instruction is rendered on the poster in filmstrip form as in Figure 2 (below), adapted from Williams & Harrison (2012). It involves the construction of a diagram in the sand, gestural enactments over the diagram, and coordinated gesture and gaze shifts to link represented elements to the geographic surroundings.

Second Attempt: Sand, Digital Watch, and Air (Personal Gesture Space)

The second attempt is rendered in filmstrip form (a portion is shown in Figure 2) with annotations of bodily actions in representational spaces coded by color (sand in blue, digital wristwatch in lavender, and the air in front of the speaker [personal gesture space] in red). Speech is rendered as text in English (translated from French). Most of the instructional gestures are enacted over material representations, with only a brief interlude of gesturing in personal space, first to establish a virtual structure and then to model an object in relation to it.

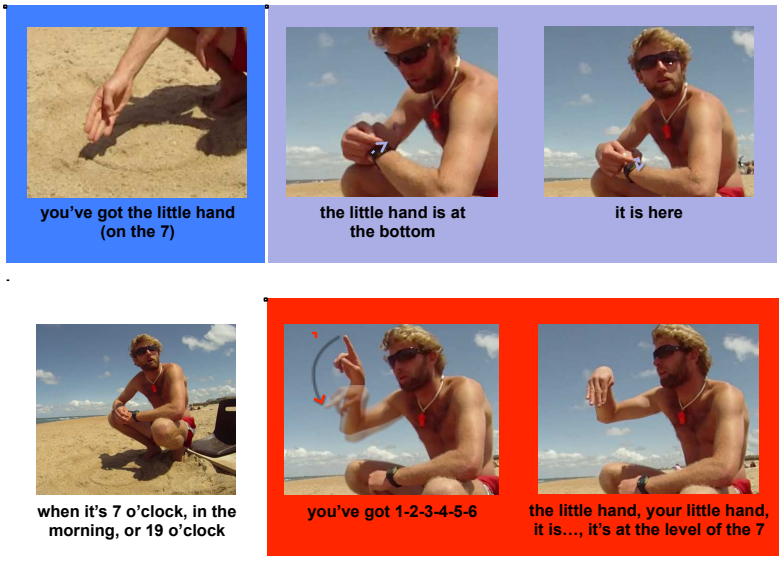

Figure 2. A Portion of the Second Attempt

Third Attempt: Watch, Surroundings, and Enactment

The third attempt is likewise rendered in filmstrip form (as in Figure 2) and includes a full-body enactment of the process of coordinating the represented virtual elements of the functional system to fix south.

Discussion

In his instructional discourse, the lifeguard constructs and coordinates representations in four different representational spaces: in the sand, in the surrounding environment, on top of his digital wristwatch, and in the air in front of his body (personal gesture space). The poster considers the different affordances of each of these spaces and analyzes the following: (1) how the lifeguard creates representations in the different spaces; (2) how he signals shifts between representational spaces while linking their counterpart elements; and (3) how he enacts the process of coordinating these elements in a functional system to find directions. In particular, the analysis focuses on the use of the body in situated instruction, highlighting how bodily orientation, gaze, gesture, movement, and speech are orchestrated to guide conceptualization. The poster closes with implications for our understanding of teaching as an embodied, situated activity and of the functions of gesture during instruction.

Selected References

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