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Gesture in Everyday Scientific Reasoning and Explanation

Robert F. Williams
Lawrence University

My research focuses on the functions of gesture in everyday problem solving and in communicating with and teaching others. I approach these topics from the perspective of distributed cognition, showing how gestures coordinate conceptual models with environmental structures to produce functional outcomes (Hutchins, 2005; Williams, 2008b), and from the perspective of cognitive linguistics (emphasizing image schemas, mental spaces, and conceptual integration [Fauconnier & Turner, 1998, 2002]), showing how gestures guide conceptual mapping and anchoring in the quest for common ground and mutual understanding (Williams, 2007, 2008a).

The present study focuses on the question: How does gesture function in everyday scientific reasoning and the communication of scientific ideas? To explore this question I have made videorecordings of small groups of college students discussing and explaining their answers to such questions as "What causes the seasons?" "What causes the phases of the moon?" and "What causes the tides?" These questions involve consideration of the relations among multiple entities—the sun, earth, and moon—and their relative motion and effects on one another in a three-dimensional space. In responding to these questions, students must negotiate their conceptions of the situation, including such common misconceptions as the earth being closer to the sun in the summer (vs. the earth tilting toward or away from the sun), the earth casting its shadow on the moon (as producing the crescent moon vs. an eclipse), and the gravitational effect of the moon being the sole cause of tidal motion (disregarding the lesser effect of the sun and how it aligns with the moon). These prompts elicit many gestures from students during both the discussion and explanation phases of the activity.

The gestures produced by students are analyzed in terms of their conceptual functions in the problem-solving and communicative situation. Particular attention is paid to gestures that contribute to referential meaning (in the sense of chapters 9 and 10 of Kendon [2004] but analyzed here from the perspective of distributed cognition and conceptual integration theory). Preliminary findings include students producing gestures to anchor their own reasoning, copying and elaborating the gestures of others in communicating and coordinating their conceptions (establishing shared cognitive artifacts), and gesturing together in a shared space when describing the relative motion of the sun, earth, and moon simultaneously. These findings will be discussed in terms of their implications for our view of gesture and its functions in human activity.

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