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Coordinating Hands, Eyes, and Voice

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Introduction

How do two people in conversation keep track of what they are doing together? In most conversations they rely on a process of grounding--establishing the mutual belief that they have been understood. Only part of that process is visible. We see acknowledgments and repairs, but not the moment-by-moment changes in their beliefs. In this report, we show how people take advantage of moment-by-moment changes in evidence of understanding when they are visible.

Method

Pairs of students worked together as one of them, the director, told the other, the builder, how to assemble forms out of Lego blocks. The director began with a model, and his job was to get the builder to assemble an exact copy. The builder couldn't see the director's model, but the two of them could talk as much as they needed. For 14 pairs, the directors could see the builders assemble their copies; for another 14 pairs, they could not. Half the time, the director and builder could see each other's faces; for the other half, they could not. Each pair created ten copies.

Results and Discussion

Pairs were fastest when the directors could see the copies in progress (Legos visible). Pairs took twice as long when the directors could not see the copies (Legos hidden). (There were almost no errors.) It made no difference whether the two of them could see each other's faces. So grounding was very different depending on whether the Legos were visible or hidden. The issue is how.

When the Legos were hidden, grounding was accomplished entirely with words. Directors would describe a block, and builders would confirm. Directors would describe where the block was to go; builders would ask for confirmation or more information. Even after the builders were done, directors would often check on the result.

When the Legos were visible, builders sped up grounding by exploiting gestural signals of two main types. (a) Exhibiting. Once directors described a block, builders would hold up a candidate block for the directors to look at. They used this gesture to ask about the identities of objects. (b) Poising. When directors described where a block should go, builders would hold the block poised above where they thought it should go. They used this gesture to request confirmation of its placement before attaching it to their copy-so-far. In this way, builders gave directors moment-by-moment evidence of their understanding of the instructions so far.

Directors exploited the builders' gestures. They would regularly interrupt their utterances to confirm an exhibited or poised block and then proceed to the next instruction. Or they would interrupt themselves to correct a misconstrual in an exhibited or poised block. When the Legos were hidden, directors rarely interrupted themselves in this way. As a result, the time to place a block averaged 10 sec when the Legos were visible, but 17 sec when they were hidden. The checking time averaged 1 sec when the Legos were visible, but 5 sec when they were hidden. Together, these account for the two-to-one advantage in the speed of the two conditions.

In face-to-face conversation, therefore, the participants make use of visible evidence of understanding when it is available. Addressees make gestures to display their understanding so far, enabling speakers to alter their utterances in opportunistic directions. It is in these ways that gestures and eye gaze can be essential to efficient communication.

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