Gesturing makes learning last

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QuickTime™ and a decompressor are needed to see this picture.
Introduction

• Gestures are a part of who we are as humans- they are a movement of the body used to clarify a person message or idea (done usually with hands and arms)

• Gesticulation is known to be more significant when one is producing it with new thoughts than when a thought is being reproduced or reenacted.
Gesturing Makes Learning Last

• Experimental work done to examine if gestures presented during instruction of a new concept to children aided them in improving their preservation of the new concept post-trial
Introduction

• In exploration of this theory, a group of selected children were given a numerical problem to solve, and then were asked to give gestures that reflected how the problems were solved. These results were then compared to a group of children who were asked to create only a spoken explanation. Would one or the other work better, or a combination of both?
QuickTime™ and a decompressor are needed to see this picture.
Participants

• 84 third and fourth grade children
• Limited demographics

Materials

• White Board
• Instructor
• Set of addition problems with identical addends on each side of the equation
Procedure

Pre Test
• SIX problems were presented to the students
• Failure of the pretest was a requirement to participate

Pre-Instructional Phase
• Random assignment to three groups
• Instructor demonstrates behavior and the child has to mimic three times
Three Groups

- Speech
- Gesture
- Gesture+Speech

- No answers were given during the instruction period
The Equalizer Strategy

• The experimenter repeated the equalizer strategy in speech and gesture twice on each of the six problems.

• Just before and just after adding up the numbers on each side
Instruction

- All were exposed to the same spoken and gestured representations of mathematical equivalence
- This increases the chance that at least some would learn to solve the problem
- Then they were given a problem on their own and had to reproduce the behavior earlier mimicked
Post Test

- Immediately after instructional period children completed a posttest similar to the pre test

Follow up Test

- 4 weeks later
- Completed a follow up test similar to the pre and posttest but in a new context
- Administered by the child’s classroom teacher on a normal day
Results

- All children improved with instruction
- Similar number of correct problems answered during instruction and on posttest
- Differed in ability to maintain the knowledge gained
Gesture+Speech. Gesture. Speech

[Graph showing the comparison between Gesture+Speech, Gesture, and Speech in terms of number correct on follow-up.]
Gesture + Speech

Gestures + speech condition

Number correct on follow-up
Gesture

![Graph showing Gesture condition and Number correct on follow-up]
Speech
Regression Model

- Gesture: p<.0001
- Gesture and Speech: p<.0001
- Speech: p=.069, p<.01 and p<.01
- Strong relationship between posttest and follow up for all groups except Speech

- Gesturing children during the lesson retained an average of 85% of the posttest gains
- Not gesturing only helped the children to retain about 33% of the gains
Speech Group

• Relationship between instruction and learning is weak.
• Failed to maintain the gains through the follow up—some improved on the follow up but not on posttest

Fisher’s Exact Test

• See differences in retaining
• Significant difference across conditions
• Those not in the Speech group were more likely to retain learning and not reliably different from one another
Natural Inclination to Gesture

- Two groups: Spontaneous gesture on pretest and no spontaneous gesture.
- Non-gesture at pretest: $p=.05$
- Gesture at pretest: $p=.03$
- In both groups, the speech condition was associated with significantly less retention

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<thead>
<tr>
<th>Non- Gestures</th>
<th>Gestures</th>
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<tbody>
<tr>
<td>$G+S$ vs. $S$, $p=.02$</td>
<td>$G+S$ vs. $S$, $p=.01$</td>
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<tr>
<td>$G$ vs. $S$, $p=.03$</td>
<td>$G$ vs. $S$, $p=.05$</td>
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Overall Result

- By instructing the children to gesture, there was an effective promotion of lasting learning that was even evident in children who, prior to the lessons, did not produce gestures spontaneously.
Discussion

• Of the three group conditions, the gesture condition proved to be equally as successful as the gesture and speaking condition.

• The speaking condition after the 4 week period proved to be the least successful.
Discussion

• Performing gestures tends to take less time to format than actual sentences.
• How gestures affect our long-term memory
• The study considered the environment of where the children were tested.
Discussion

• It is unclear if the data found in the experiment is generalizable or not.
• The children were only shown gestures that would fit under the “equalizer strategy.”
• The gestures can both excel and hinder performance.