Review Process

• Over 500 papers on gesture

• Review focused on:
  – Purpose of gesture
  – Gesture and learning
  – Gesture in science and math education
Gestures

• What is a gesture?

• Roth, 2001:
  – Must begin from, and end in, a state of rest
  – Must have some sort of “peak”
  – Must have beginning and end
  – Often symmetrical
Classification of Gestures

**Iconics:** gestures attempt to match speech

**Iconic:** gestures that are representational

**Metaphorics:** describing abstract things

**Beats:** speech punctuation

**Deictic:** gestures that are not representational

**Abstract Points:** highlighting objects, things
Gesture as Communication

• Through the lens of education research, gestures are viewed as communication

• Of interest: How gesture relates to language
Who benefits from gesture?

• Evidence that gestures help the recipient understand the communicator

• Evidence that gestures aid the communicator in understanding herself

• Lozano & Tversky, 2006:
  – Both are probably correct
Gestures help people learn.

• Observation of gestures aids in student understanding

  – Spoken language, combined with gesture use, shows significant improvement

  – Depending on lesson, gestures alone can be just as effective as speech
How do gestures help?

- Attention grabbing
- Repetition
- Separate mode of language
- Conceptual mapping
- Indexing of physical world
- Lighten cognitive load
Gestures are *part* of our language.

- McNeill & Levy, 1992 and 1993
- Gestures are tied to our processing of language – *communicative dynamism*
- Gestures are processed along with speech, *not* as compliment to it
speech
Gestures help us *index*.

- Valenzeno, Alibali, & Klatzky, 2003

- As we learn new vocabulary, we will index words with visual or multimodal reference

- With more abstract things, gestures can help
Gestures lighten our cognitive load.

- Ping and Goldin-Meadow, 2010

- Gestures can ease working memory by linking words to real objects

- Basically, can help us do / learn two things at once
Gesture in Math and Science

• Roth, 2001:
  • Gesture use is primarily helpful in learning math and science as they “typically deal with abstract matters.”
Deictic Gestures in Math

• Lots of pointing

• When deictic gestures were used in basic algebraic equations, performance improved 30%

\[7 + 6 + 5 = ____ + 5\]
Iconic Gestures in Math

• When adding, students and teachers will sometimes “stack” numbers

• When dividing, using fractions, students will “slice”
Deictic Gestures in Science

- Pointing to specimens, diagrams
- Helps brain index objects before a proper name is learned
Iconic Gestures in Science

- Tend to reference real objects, real events
- Can help develop an advanced spatial understanding of phenomena
Where we stand:

• Very little that is contradictory

• There have been a number of studies, but by a fairly limited group of authors

• Going Forward:
  – Standardization?
  – Other grade levels?
  – Other, unintended effects on the learning process?
References


References


References


References


References


References


References


References


