

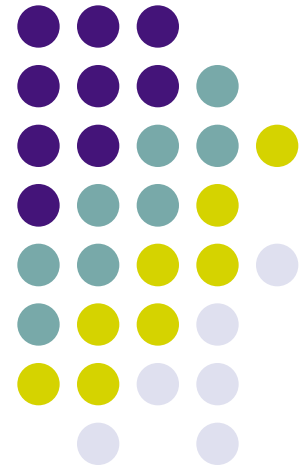
Mind and Body

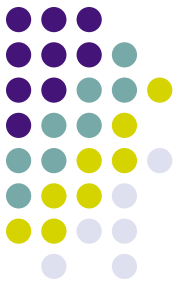
Alexia C Toskos

Indiana University

Cognitive Science Q400

February 2, 2005





Overview

Goal: Explore the role of the body in cognition.

- | What is embodied cognition?
- | It's in the eyes
- | It's in the arms
- | It's in the mouth
- | It's everywhere
- | Controversial questions

What is embodied cognition?



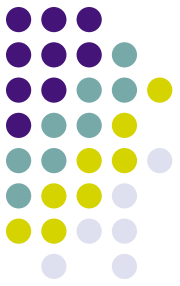
I Traditional Thought

- I Sense-Think-Act
- I “High-level” processes are not influenced by “low-level” processes
- I The role of the body is simply to interact with the environment

I Embodiment

- I Cognitive processes grounded in human anatomy
- I Traditional separation of thought from perception / action has led us astray
- I “Low-level” can affect “High-level”

The eyes...



- | Eye movements are not random in the absence of visual stimuli
 - | Spivey & Geng (2001)
 - | *“Imagine that you are standing across the street from a 40 story apartment building. At the bottom there is a doorman in blue. On the 10th floor, a woman is hanging her laundry out the window. On the 29th floor, two kids are sitting on the fire escape smoking cigarettes. On the very top floor, two people are screaming.”*
 - | Laeng & Teodorescu (2002)



The hands...

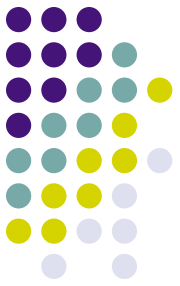
- | Feedback from gestures influences vocal output
 - | Wolff & Gutstein (1972)
 - | “The moon is circling the earth as the day wears on, hopefully. As the day wears on Bill gets older; as Bill gets older, so does his family.”
- | Language perception filters through the motor system
 - | Floel, Ellger, Breitenstein, & Knecht (2003)



The mouth...

- | Language may have evolved from gesture
 - | Motor Theory of Speech Perception
 - | Lieberman & Mattingly (1985)
 - | Studdert-Kennedy (in press)
 - | McGurk Effect
 - § http://www.media.uio.no/personer/arntm/McGurk_english.html
 - § <http://www.faculty.ucr.edu/~rosenblu/VSMcGurk.html>

It's everywhere...



- | Special neurons fire in the premotor cortex of monkeys when they both perform and *watch* a particular task.
 - | Rizzolatti, Fadiga, Gallese, & Fogassi(1996)
- | Posture change in infants causes the system to “re-start”
 - | Smith & Thelen(2003)
 - | Smith (current work)



Controversial Questions

- | If we constantly use our bodies to help us think, is that to say that those who have physical handicaps (ie. paraplegics, the blind, the deaf...) can't think?
- | If our concepts are grounded in the body, what is innate and what is learned? Are our thoughts in part functions of the state of our bodies at a given time?
- | If language is spatial (thus embodied to a certain extent) and different languages treat space differently, then can the language you speak affect the way that you think about the world?



In Sum

- | Evidence from psychology and neuroscience suggests that the body is important for:
 - | Imagery
 - | Memory
 - | Speech processing
 - | Speech perception
- | “[A person picturing his nursery in his mind’s eye]... is not being a spectator of the resemblance of his nursery, but he is resembling a spectator of his nursery,” (Ryle, 1949).

References



- | Floel, A., Ellger, T., Breitenstein, C., & Knecht, S. (2003). Language perception activates the hand motor cortex: implications for motor theories of speech perception. *European Journal of Neuroscience*, 18, 704-708.
- | Laeng, Bruno & Teodorescu, Dinu-Stefan. (2002). Eye Scanpaths During Visual Imagery Reenact Those of Perception of the Same Visual Stimulus. *Cognitive Science*, 26, 207-231.
- | Liberman, A.M. & Mattingly, I.G. (1985) The motor theory of speech perception revised. *Cognition*, 21, 1-36.
- | Rizzolati, G., Fadiga, L., Gallese, V., & Fogassi, L. (1996a) Premotor cortex and the recognition of motor actions. *Brain Research. Cognitive Brain Research*, 3, 131-141.
- | Ryle, G. (1949). *The concept of mind*. London: Hutchinson.
- | Smith, L. B., & Thelen, E. (2003). Development as a dynamic system. *TRENDS in Cognitive Sciences*. 7(8) 343-348.
- | Spivey, M. J. & Geng, J. J. (2001) Oculomotor mechanisms triggered by imagery and memory: Spontaneous eye movements to objects that aren't there. *Psychological Research*, 65, 235-241.
- | Studdert-Kennedy, M. (in press). The particulate origins of language generativity: From syllable to gesture. *Cambridge University Press*.
- | Wolff, P., & Gutstein, J. (1972). Effects of Induced Motor Gestures on Vocal Output. *The Journal of Communication*, 22, 277-288.