What’s the difference between a pit bull and a hockey mom?

Palin’s Joke

- Evokes image of a pit bull wearing lipstick
- Draws on stereotype of pit bulls as ferocious dogs
- Draws on stereotype of hockey as a violent game
- Conveys her ferocity as a political candidate while simultaneously highlighting her conformity to stereotype of traditional American female
  - Role as Mother
  - Nurturing caretaker
  - Stern disciplinarian
  - Vicious in defense of her children
  - Sexually Attractive

Conceptual Blending

- Non-compositional processes for information integration
- Combine partial structure from 2 or more mental spaces in a blended mental space
- Involves:
  - Establishment and/or exploitation of mappings
  - Activation of background knowledge
  - Mental imagery, mental simulation
- Occasionally bizarre, but many examples where blends support reasoning with real-world consequences
Creative Language Use

• Palin’s joke does not rely on particularly innovative language use, e.g. metaphor, but does cue a novel construal of her political identity
• Exploits
  – selective recruitment of conceptual structure
  – integration of concepts from different domains
• This in turn can prompt
  – further recruitment of conceptual structure from active domains for integration with extant structure
  – activation of novel construals

Semantic Indeterminacy

• Meaning in natural language is underspecified – even in very straightforward communicative contexts
• Speakers exploit a variety of resources to help evoke construals with the necessary degree of specificity
• Gestures

Multi-Modal Discourse Comprehension

• Language prompts the construction of cognitive models in working memory

Language in Oregon

…the snake was right here.
Gestures and speech jointly activate stored knowledge.

**Particular Issues**

- **Real-time processing of iconic gestures**
  - are gestures processed semantically?
  - are gestures integrated with preceding nonlinguistic context?
- **Do speakers integrate gestural information with linguistic information in the accompanying speech?**
  - does speech-gesture congruity affect visual processing of the discourse referent?
  - does gestural information lead to more visually specific expectations about discourse referents?
- **Does the presence or absence of gestural information affect the real-time processing of speech?**

**Beats**

**Emblems**
Iconic Gestures

Indeterminate semantic status

Action  Iconic Gesture  Sign Language

?  

Similar forms map to different meanings

the gum that’s coming out is set very very perfect

here’s where you put your feet

Same meaning can map to different forms

it has three stripes

white with a few yellow stripes

Gestures are not informative

“… it may be that much of the gesture’s meaning is illusory. In the absence of speech, the very same gesture’s meaning can be quite opaque, communicating little, if anything.”

Krauss, Morell-Samuels, & Coissante, 1991

Gestures are communicative resources

“… descriptive gestures, rather like drawings or pictures, can achieve adequate descriptions with much greater economy of effort and much more rapidly than words alone can manage.”

Kendon, 2004
Previous Studies

• Behavioral studies support both views
  – Gestures for the speaker’s benefit ONLY
  – Gestures used by speakers and hearers

Language ERP Effects

• N400
  – Negative-going wave
  – 200-700 ms post-word
  – Peak approx. 400 ms
• Modulated by
  – Word Class
    • Kutas & Van Petten, 1990
  – Contextual Congruity
    • Kutas & Hillyard, 1980
  – Cloze Probability
    • Kutas & Hillyard, 1983
• Index of difficulty of lexical integration
• Index of processing the meaning of an event

Words and Pictures elicit N400

The old man lay on the grass and lit his pipe

The old man lay on the grass and lit his carrot

Ganis, Kutas, and Sereno (1996)

Results
Real-time Processing of Gestures

- Does the real-time processing of iconic gestures invoke brain processes associated with the comprehension of meaningful visual stimuli?
- Do contextually incongruous gestures elicit an N400-like ERP component?

Wu & Coulson (2005)

Needed

- 100-200 iconic gestures
  - spontaneously produced
  - half contextually congruous
  - half contextually incongruous
- Go to CogSci Happy Hour
- Ask people to describe cartoons
- Show cartoon clip followed by appropriate or inappropriate video of description

Real-time Processing of Iconic Gestures

- Task: Indicate via button press whether silent video “goes with” the preceding cartoon

Wu & Coulson, 2005

Experiment 2

Task: Relatedness Decision to Probe Word

Wu & Coulson, 2005

Predictions

If comprehending gestures recruits processes similar to those activated by meaningful images, contextually incongruent gestures should elicit enhanced N400 relative to congruent ones.

Gesture N450

Wu & Coulson, 2005
Multimodal Discourse Comprehension

- Gestures engage semantic integration processes
  - Speakers exploit gestural input in their construction of meaning

Particular Issues

- Real-time processing of iconic gestures
  - are gestures processed semantically?
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- Do speakers integrate gestural information with linguistic information in the accompanying speech?
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Language underspecifies meaning

“It’s actually a double door.”

 Speakers use iconic gestures to enhance their cognitive models

“It’s actually a double door.”

Speech-Gesture Integration

- Using conceptual blending processes, listeners integrate
  - propositional information in speech with
  - analogue information in iconic gestures
  - to form more specific expectations about discourse referents

Empirical Assessment

- Vary Speech-Gesture Congruity
  - Test impact on ERPs to picture probes
- Vary Picture Probe Congruity with prior discourse
  - Test impact on ERPs to picture probes
ERPs elicited by photographs

McPherson & Holcomb 1999

Vary Speech-Gesture Congruity

Congruous

Incongruous

"two throw pillows"

Wu, Habekost, and Coulson, in prep

Design

Congruous Prime

Incongruous Prime

throw

ERPs elicited by highly related picture probes

Wu, Habekost, and Coulson, in prep

Slightly more natural paradigm

• All speech-gesture pairings congruous
• Vary how well picture probe matches prime

Cross-Modal Match

Speech-Only Match

Procedure

Wu & Coulson, 2007b
Conclusions

- Cross-modal pictures are easier to identify than speech only ones
  - as indexed by less negative N300
- Cross-modal pictures are easier to integrate with discourse primes
  - as indexed by less negative N400
- Analogue information in gestures is integrated with propositional information in speech to form more perceptually specific representations

Particular Issues

- Real-time processing of iconic gestures
  - are gestures processed semantically?
  - are gestures integrated with preceding nonlinguistic context?
- Do speakers integrate gestural information with linguistic information in the accompanying speech?
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- Does the presence or absence of gestural information affect the real-time processing of speech?

“Where there’s a green parrot – fairly large”
Design

Speech & Gesture

"Where there is a green parrot - why, there!"

Speech & Neutral

"Where there is a green parrot - why, there!"

Continuous Speech

Picture Probes

Mean N400 Amplitude

Related Probe

Unrelated Probe

Speech & Gesture

Speech & Neutral

Language in Oregon

...the snake was right here.
Creative Language Use

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Multimodal Discourse

- Exploits
  - selective recruitment of conceptual structure
  - integration of structure from different modalities
- This in turn can prompt
  - further recruitment of conceptual structure from active domains for integration with extant structure
  - activation of novel construals

Multimodal Discourse Comprehension

- Gestures engage semantic integration processes
  - Speakers exploit gestural input in their construction of meaning

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What’s the difference between Sarah Palin and George Bush?
lipstick…

Language in the Wild