

# On the relationship between eye-movements and activation: Active vs. passive tasks during ambiguous pronoun resolution

P220

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## Background

**Visual World eyetracking Paradigm (VWP) is frequently used to study real-time reference resolution**

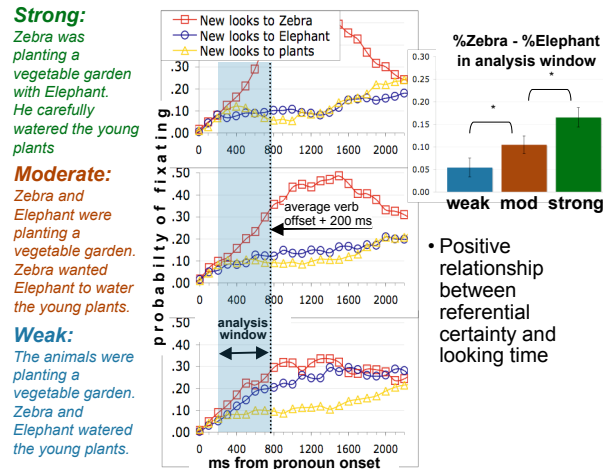
- Assumption: Visual attention is positively correlated with referential certainty (i.e., people look at things as they are referred to: more looks = higher certainty)
- Reasons for looking in VWP?
  - "Automatic":
    - Activation of referent drives shift in attention to it
  - Goal-directed:
    - To guide action (e.g., hand movement)
    - To verify interpretation: Visual information provides feedback to support interpretation

**Predictions for task differences:**

- "Automatic" looking will occur regardless of task
- Goal-directed looking:
  - Action-based tasks ("pick up", etc)
    - Positive relationship ought to hold because eyes guide hand movements
  - Passive listening tasks (pronouns do not easily lend themselves to active tasks)
    - If looking used to verify interpretation, it is unnecessary when verification unnecessary
    - So, looking may increase as a function of activation up to a point, but when referent already highly active, it will decrease.

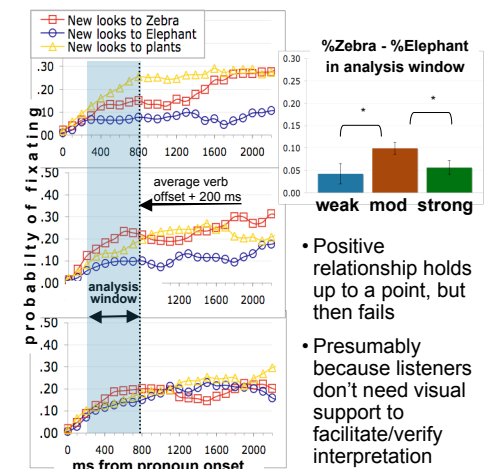
**How do goals influence the relationship between allocation of visual attention and referential certainty?**

## Results: Active task, new looks



Later, *he decided* to add more varieties  
**BECP!**

## Results: Passive task, new looks



Later, *he decided* to add more varieties  
 (Heller, Yee & Sedivy, CUNY 2007)

## Methods

- 3 conditions, 21 stories/condition determined by offline question (e.g., *Who decided to add more varieties?*)
- 42 filler stories • 42 participants/experiment

**Instructions:**

- You will see a picture and hear a story about it
- Listen carefully to the story and be prepared to answer some questions about it

**Strong bias:**

Zebra was planting a vegetable garden with Elephant.  
 He carefully watered the young plants

**Moderate bias:**

Zebra and Elephant were planting a vegetable garden.  
 Zebra wanted Elephant to water the young plants.

**Weak bias:**

The animals were planting a vegetable garden.  
 Zebra and Elephant watered the young plants.

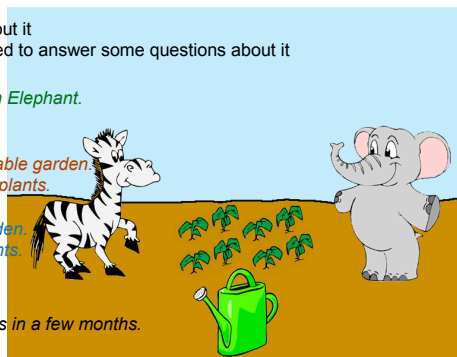
**Critical sentence (+ final sentence)**

Later, he decided to add more varieties.

They looked forward to eating the vegetables in a few months.

**Questions:**

- Who decided to add more varieties?
- Did the animals plan to eat the vegetables?

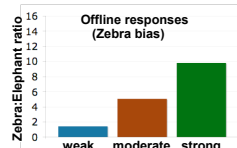


**Active Task**

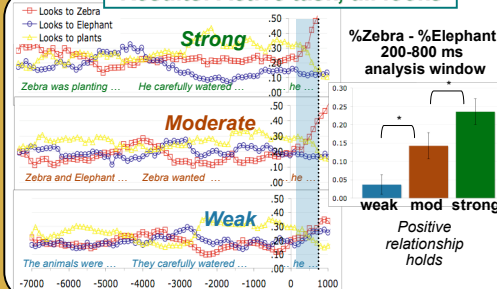
- Touch last mentioned animal upon hearing beep
- In critical trials, beep occurs after verb that follows ambiguous pronoun (e.g., directly after "he decided")

**Passive Listening**

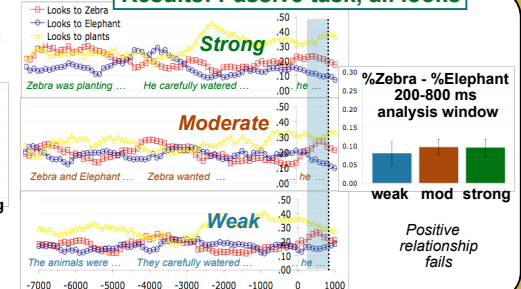
- No task
- No beeps



## Results: Active task, all looks



## Results: Passive task, all looks



## Conclusions

- Practical implications: Task matters
  - In passive listening, looks may not reflect activation at high levels of certainty
  - Active tasks are preferable because they force tighter link between certainty and visual attention:
    - Goal directed looks are positively correlated with certainty
- Theoretical implications: Visual attention is goal-directed
  - Feedback from visual scene used verify interpretation
    - If "goal" is rapid comprehension with no action, when a referent is sufficiently foregrounded, it becomes "given" information and requires no additional visual attention -- we "move on" to process & predict other aspects of the language/scene
  - Reduced visual attention at high certainty may be due to same mechanism causing reduced referential expressions (e.g., pronoun production, shortening), briefer gaze duration during picture naming, priming