

# Effects of stress and coherence on pronoun interpretation

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## Introduction

Much previous work has assumed a pattern by which adults interpret object pronouns in a parallel structure, as intuitions for such sentences can be very strong.

(1) John hit Harry, and then Sarah hit him. (him = Harry)

(2) John hit Harry, and then Sarah hit HIM. (HIM = John)

This was thought to be due to a “parallel function strategy” (Sheldon 1974; Solan 1983), where pronoun stress induces a switch in the choice of referent.

However this intuition has not been directly tested in adults, and furthermore, has not taken into account the effects of the context created by the relationship between the two sentences, i.e., their coherence relation (Kehler 2002).

The type of coherence relation (parallel/similar, or result/cause-effect) may determine the choice of pronoun referent, and it has been further suggested that the pattern can be likewise be systematically reversed by pronoun stress (Kehler 2005).

Are comprehenders influenced by coherence, interacting with stress, when interpreting pronouns? Or do they follow the parallel function strategy?

## Predictions

If object pronoun interpretation is driven by the **parallel-function strategy** and stress sensitivity,

- Stressed pronouns should refer to the subject,
- Unstressed pronouns to the object,
- No effect of coherence relation.

“Anna commended/saved Jenny and similarly/as a result Mary praised her/HER.”

If **discourse coherence, combined with stress sensitivity**, is the driving strategy,

- In **Parallel** (similar) conditions, unstressed pronouns should prefer the object and stressed pronouns may prefer the subject;

“Anna commended Jenny and similarly Mary praised her/HER.”

- In **Result** (cause-effect) conditions, unstressed pronouns should prefer the subject and stressed pronouns may prefer the object.

“Anna saved Jenny and as a result Mary praised her/HER.”

## Materials and Methods

- 2x2 Design: Coherence (Parallel/Result) x (Stressed/Unstressed) using stimuli adapted from Wolf et al. (2004).
- Coherence controlled by clause connectives “and similarly” or “and as a result”; items were tested for stress perceptibility.
- Visual-world eyetracking: subjects (N = 16) heard sentences over headphones while viewing scene (Figure 5).
- Instructions asked subjects to click on “last person mentioned.”
- Eye movements and final choices of referent (via mouse clicks) were recorded.

## Results

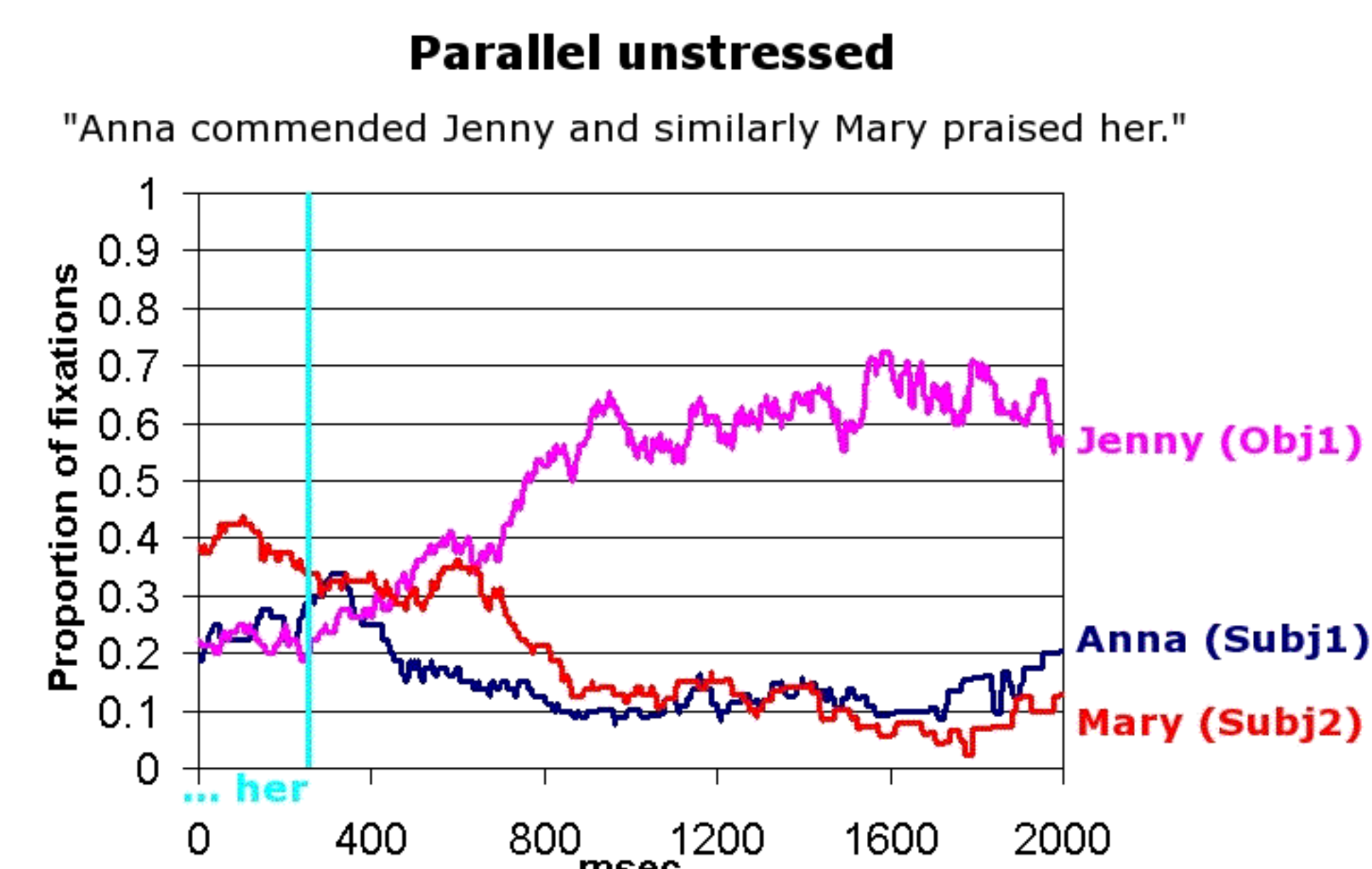


Figure 1. Participants prefer to look at parallel referent (preceding object) over non-parallel referent (preceding subject), significant ( $p < .05$ ) by 800msec post-pronoun onset.

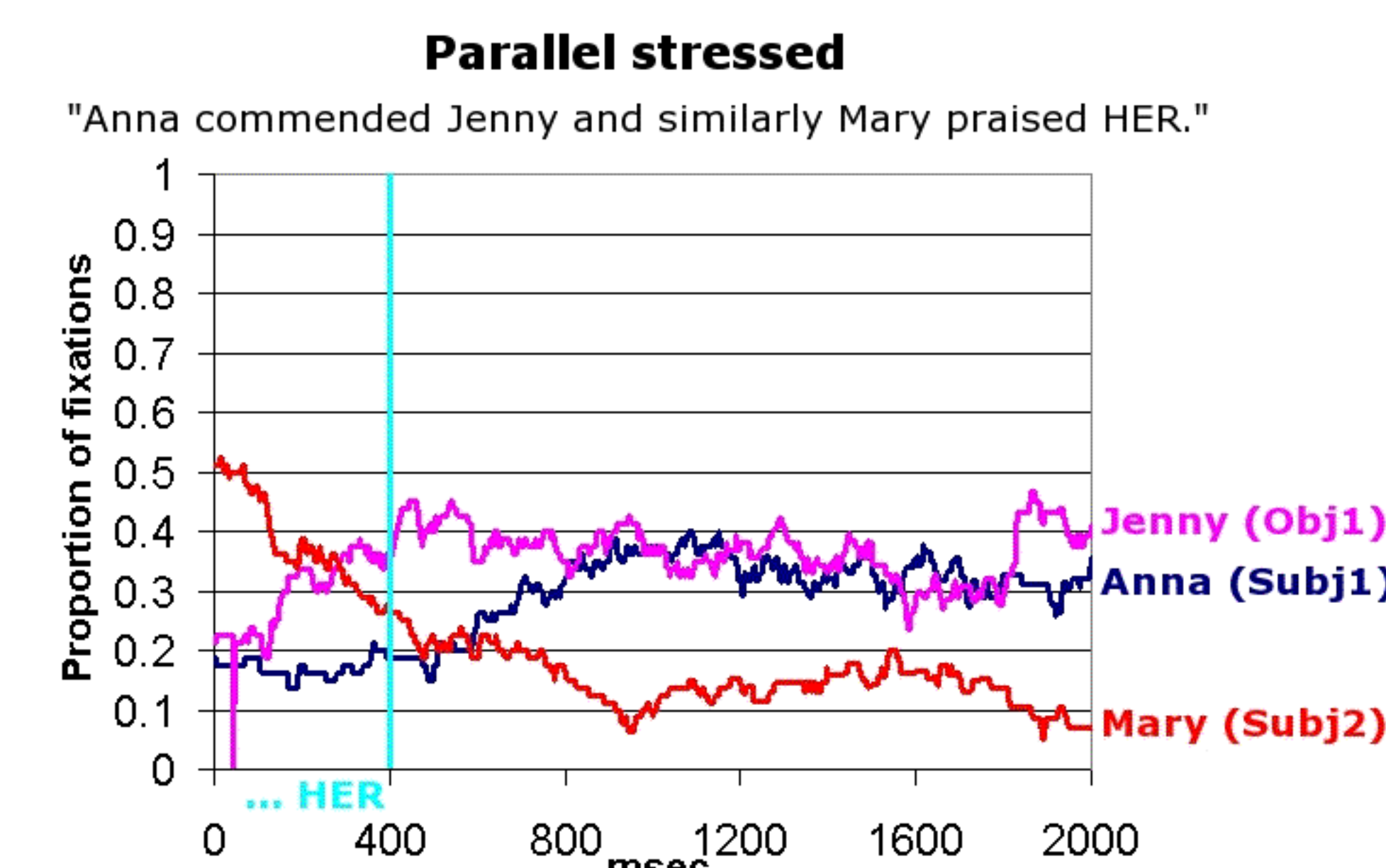


Figure 2. Participants initially show significantly more looks to parallel referent (preceding object) from 400-600ms after pronoun onset ( $p < .05$ ), but after 600ms there is no significant overall preference.

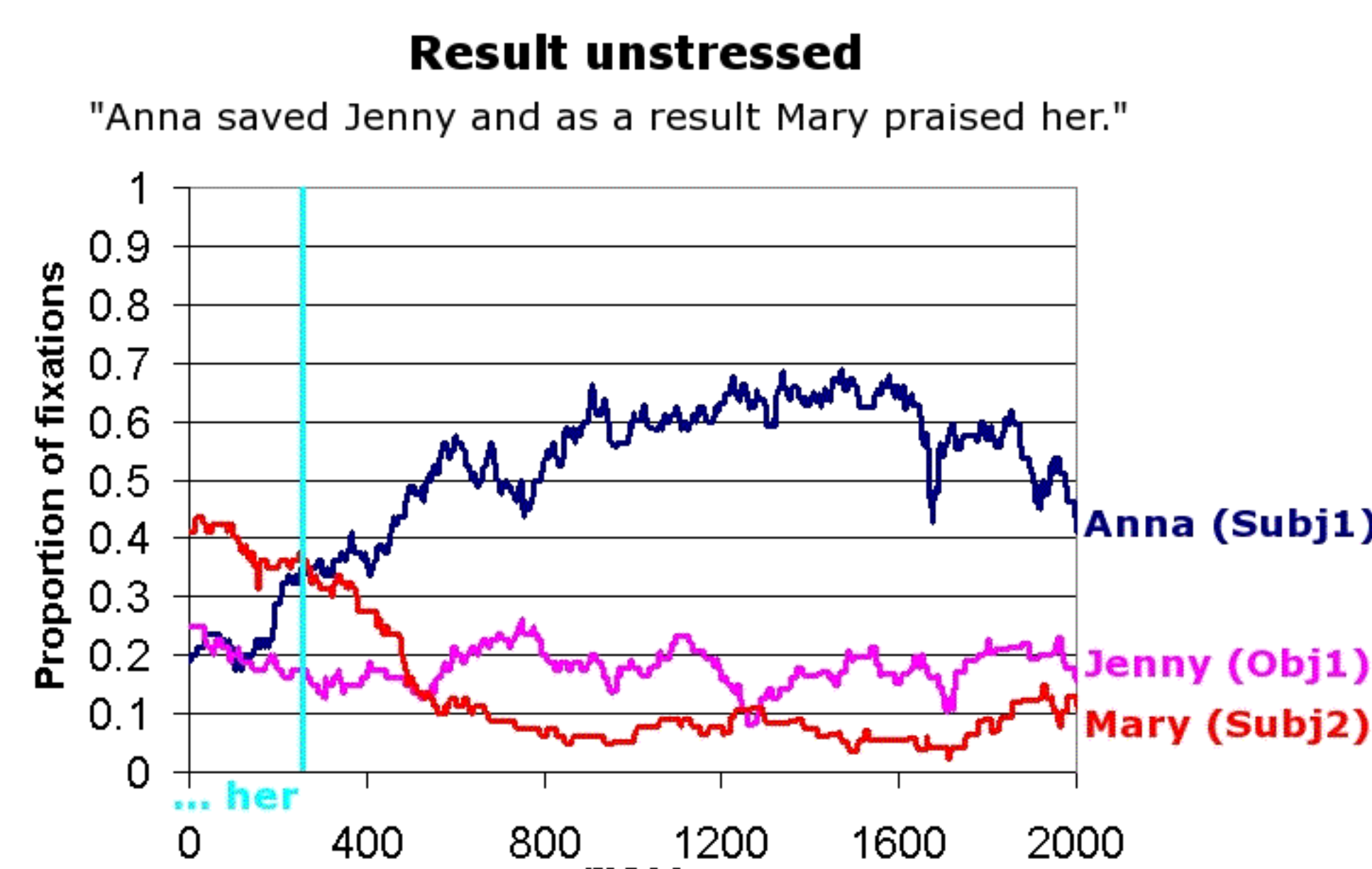


Figure 3. Participants fixate on the non-parallel referent (preceding subject) significantly more often as early as 200msec after pronoun onset ( $p < .05$ ), with very little consideration to parallel referent (preceding object).

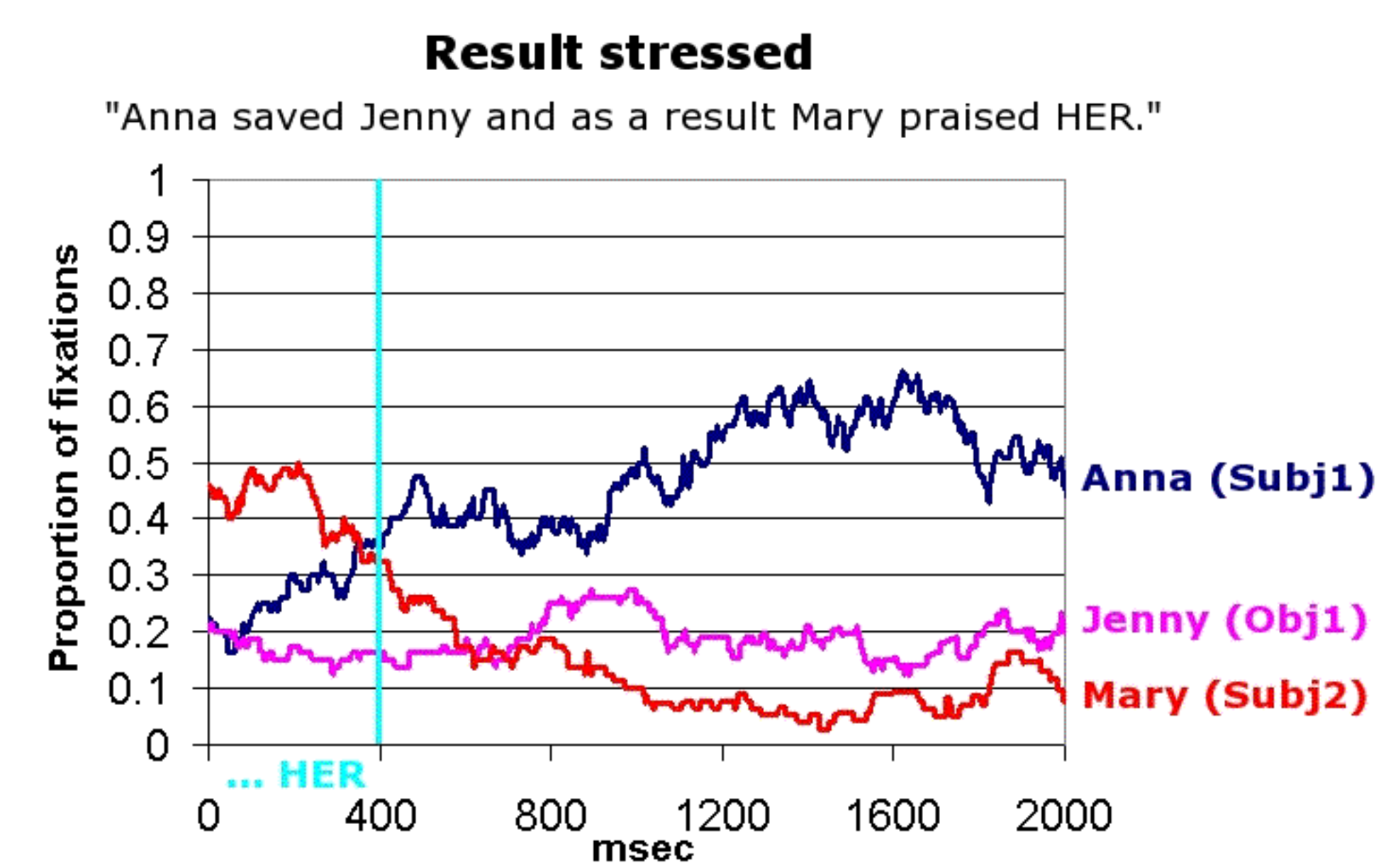


Figure 4. As in Result unstressed, there are significantly more looks to non-parallel referent at 200msec post-pronoun onset ( $p < .05$ ). However there is briefly no significant difference at approximately 800msec.

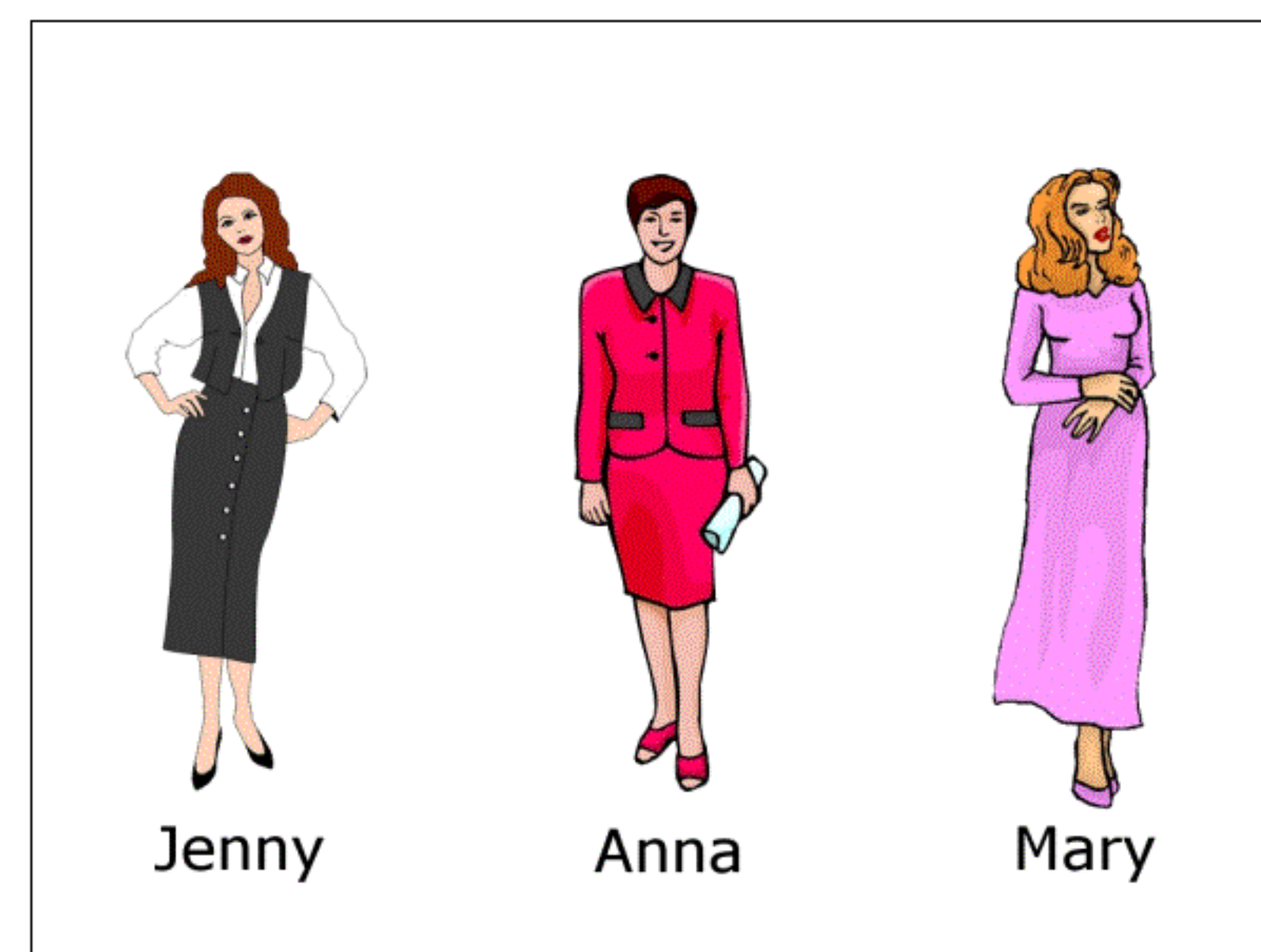


Figure 5: Example of target stimuli

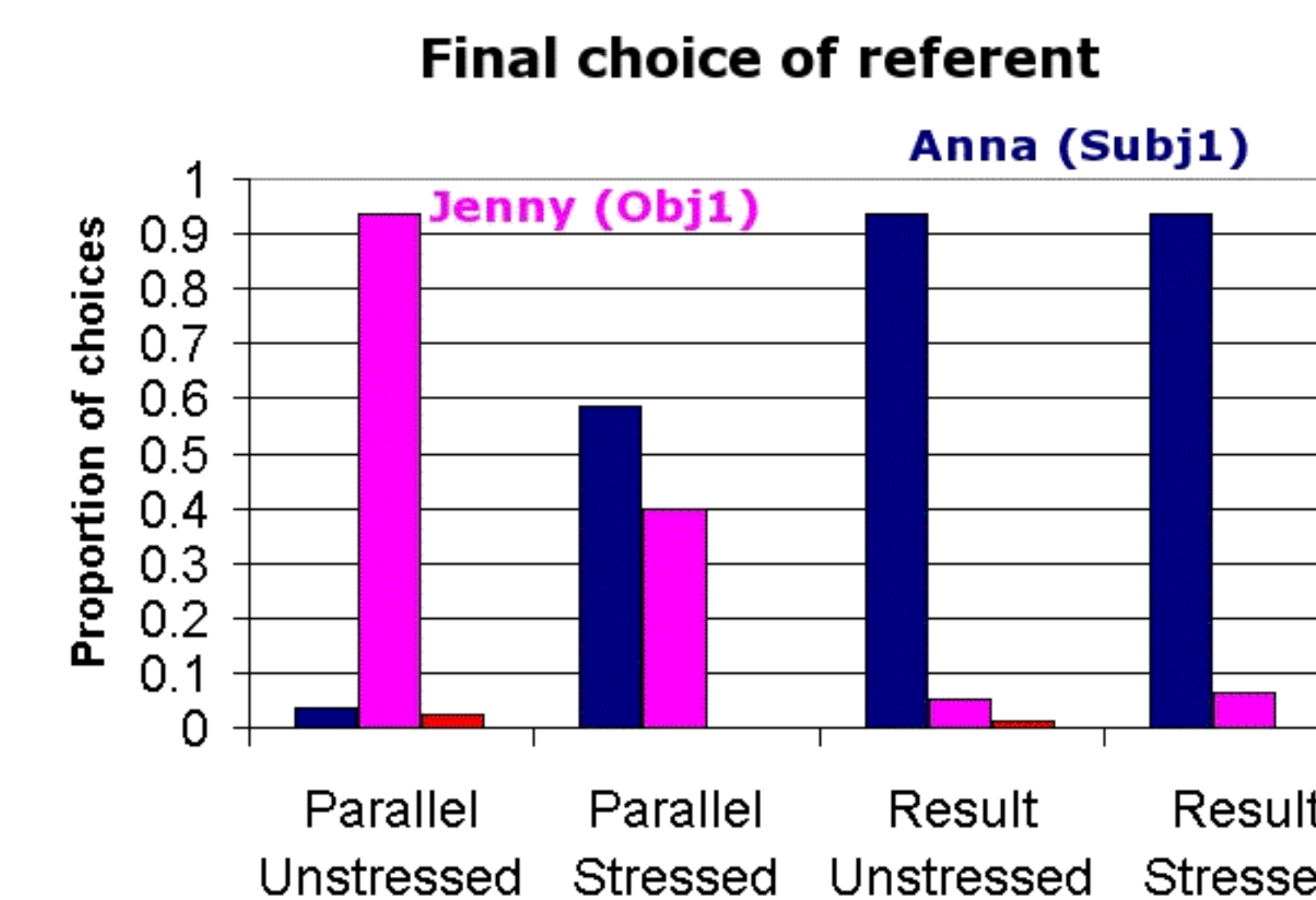


Figure 6. Participants' explicit choices for pronoun referents. Except for Parallel Stressed, choices followed early fixations.

## Discussion

In the Parallel coherence conditions (Figures 1 and 2) participants initially fixate on the preceding object entity (Jenny). In the absence of pronoun stress, participants continue to fixate the object and ultimately choose it as a referent (see Figure 6 for participants' explicit choices). When the pronoun was stressed, there was no consensus; both final referential choices and fixation patterns are split. However, participants who were “switched”, and ultimately chose the preceding subject (Anna), did not fixate it significantly more often until approximately 1000msec after pronoun onset.

The Result coherence conditions produced similar gaze patterns. Participants fixated the preceding subject entity (Anna) early and were only weakly influenced by stress. Participants who were “switched” by stress in the Parallel-stressed condition also gave more consideration to the “switched” referent (preceding object, Jenny) in the Result-stressed condition, but all participants overwhelmingly chose the preceding subject.

## Conclusions

The results show an effect of discourse coherence:

Parallel conditions differ from the cause-effect conditions, as predicted by the coherence view.

However, although stress has an effect in the parallel conditions and leads to greater consideration of the preceding subject, it does not trigger a full reversal of the referential preferences.

Stress also fails to reverse the pattern in the cause-effect conditions, which show an overall subject preference.

Our results are thus compatible with the view that reference resolution is influenced by multiple cues, and that stress is a weaker cue than coherence relation.

## Partial references

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