

## A Dynamic Pragmatic view of negation processing

(Type: either poster or oral presentation)

How negation is represented has been a challenge for embodied theories of language processing. [1-3] suggested that when processing a negative sentence, comprehenders first construct a simulation of the negated information, which then discarded and replaced with a simulation of the actual situation. Negation is encoded by the deviation of these two simulations. [2] found that shortly after reading a negative sentence, participants are faster to respond to an image consistent with the negated information.

[3] investigated the impact of negation on truth value judgement. Sentence-picture verification studies ([4]) found that for affirmative sentences, true ones are faster to judge than false ones, the opposite holds for negative sentences. Reaction times follow a polarity x truth-value interaction:  $TA < FA < FN < TN$ . [3] suggested FNs are faster than TNs because the image matches the first stage simulation.

We argue that the initial simulation of negated information is not mandatory. Compared to affirmative sentences, negative sentences require specific contextual (usually affirmative) motivation. Presented alone, negation triggers an accommodation of the most prominent context, or Question-Under-Discussion (QUD), which is in an affirmative form. It is this accommodation that caused the initial simulation of negated information. When a negative sentence has a negative QUD, such simulation will no longer occur.

Experiment 1 is similar to [2]. We compared simple negative sentences (e.g. “Jane didn’t cook the spaghetti”) with cleft negative sentences (e.g. It was Jane who didn’t cook the spaghetti). They are paired with an image which is either a match to the actual situation (raw spaghetti) or a mismatch (cooked spaghetti). In our design, cleft sentences have a negative presupposition and thus a negative QUD (e.g. “Who didn’t cook the spaghetti). We replicated [2]’s results for simple negative sentences, but found a reverse effect for cleft sentences. Our follow-up compared simple negative sentences with negative questions, and found the same interaction.

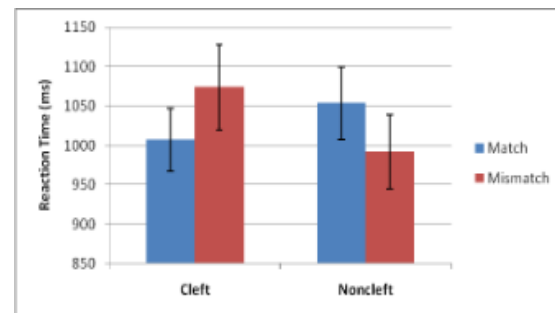


Figure 1: experiment 1 results

Experiment 2 aims to investigate the  $TA < FA < FN < TN$  pattern. We found a “training effect”: participants were initially faster to verify FN. Later, they developed a strategy, and the  $TA < FA < FN < TN$  started to emerge. We suggest that this “training effect” is caused by a conflict of the task question with the accommodated sentence QUD. When this conflict isn’t present, participants no longer develop a strategy. This result is not predicted by [3]. Participants verified simple negative sentences (e.g. the egg isn’t cracked) against an image of one item or two items. The latter group also read cleft filler sentences (e.g. It is the wine glass that is(not) cracked”). We found that a polarity x truth value pattern started to emerge *only* in the one-item context.

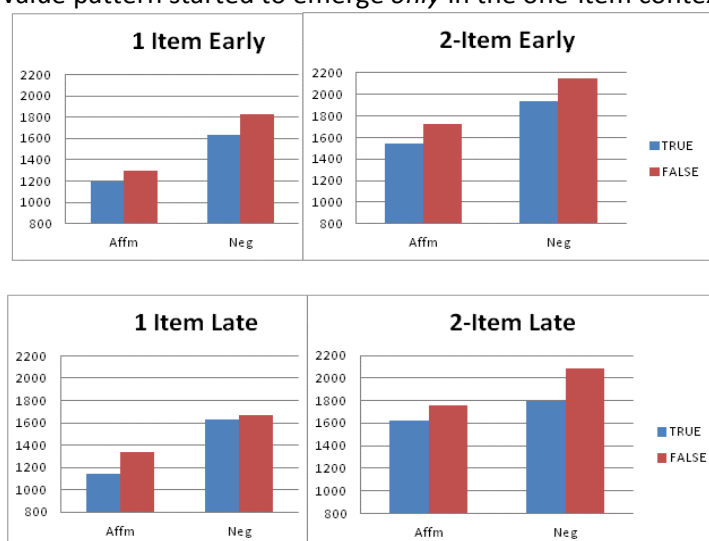


Figure 2: experiment 2 results

References: [1] Kaup, B., Zwaan, R. & Lüdtke, J. (2007). In F. Schmalhofer & C. A. Perfetti, eds. Higher level language processes in the brain: Inference and comprehension processes. pp. 255-288. [2] Kaup, B., Yaxley, R. H., Madden, C. J., Zwaan, R. A., & Lüdtke, J. (2007). QJEP, 60, 976-990. [3] Kaup, B., Lüdtke, J. & Zwaan, R., 2005. Proceedings of the 27th CogSci. [4] Clark, H.H. & Chase, W.G., 1972. CogPsy 3(3), 472-517.