

PRIMING EFFECTS WITH COMPLEX DETERMINERS

Introduction. This study presents a novel experimental technique, Probe Before-and-After in a Self-Paced Counting (PBA-SPC) paradigm, which allows us to obtain information about the semantic entities used in the verification of quantified statements. We report on an experiment which used this methodology and yielded two kinds of priming effects.

The PBA-SPC. In the PBA-SPC paradigm, participants verify target statements (Q1) relative to dot arrays of varying sizes displayed on a computer screen. The dots are uncovered in groups of 2 or 3 as participants press the spacebar. After participants finish the verification portion of a trial, they are on some occasions asked a follow-up question (Q2). Q2 either asks for information gathered as part of the verification of Q1, or it asks for information that is unrelated. We expect to see priming effects in accuracy and/or in reaction times for the related Q2-type but not for the unrelated type.

Methods, materials and results. In our experiment, 30 participants verified statements as in (1a-b) relative to arrays containing dots of three different colors. Q2 was as in (2a-b): it either asked for the cardinality of a set explicitly mentioned in Q1 ($|X|$, e.g. ‘blue dots’) or it asked for the cardinality of a set that wasn’t explicitly mentioned in Q1 ($|Z|$, e.g. ‘green dots’). We expect $|Z|$ to be primed by (1b), which involves the comparisons $|X| > |Y|$ and $|X| > |Z|$, (3b); but not by (1a), which only involves the comparison $|X| > |Y|$, (3a). Our expectations are corroborated both for accuracies and for RTs: we observe two main effects (Q2-Type and Determiner-Type). (a) $|X|$ has faster RTs and is more accurate than $|Z|$ ($p < 0.05$); (b) Q2s that are paired with “ $|X| > \text{each}$ ” items have faster RTs and are more accurate than those paired with “ $|X| > |Y|$ ” items ($p < 0.05$). (b) is particularly striking given that during the verification portion (Q1), “ $|X| > \text{each}$ ” items are significantly slower than “ $|X| > |Y|$ ” items ($p < 0.05$).

Discussion. We suggest that the priming effects are due to the form as well as the compositional semantics of the complex determiners in Q1. Specifically, the main effect of $|X| > |Z|$ can be attributed to the fact that X was referenced in Q1 while Z was not. The main effect of “ $|X| > \text{each}$ ” $>$ “ $|X| > |Y|$ ”, on the other hand, can be attributed to the fact that verifying the former but not the latter requires determining $|Z|$, (3a-b).

Future work. In ongoing work, we are applying PBA-SPC to the study of the proportional determiners *most* and *more than half* and to counting determiners like *more than n*. In addition, we are exploring different ways of presenting Q2, including non-linguistic quantity estimation tasks for novel object arrays.

- (1) a. Are there more blue dots than red dots? Q1: “ $|X| > |Y|$ ”
 b. Are there more blue dots than each of the other colors (separately)? Q1: “ $|X| > \text{each}$ ”
- (2) a. How many blue dots did you see? Q2: $|X| = ?$
 b. How many green dots did you see? Q2: $|Z| = ?$
- (3) a. [more dots are blue than red] = 1 iff $| \text{blue dots} | > | \text{red dots} |$
 b. [more dots are blue than each of the other colors] = 1 iff for all colors C,
 $| \text{blue dots} | > | \text{C dots} |$

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