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**Authors**

Popov, Vencislav
So, Matt
Reder, Lynne

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# Word frequency affects binding probability not memory precision

**Vencislav Popov**
Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

**Matt So**
Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

**Lynne Reder**
Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

## Abstract

Normative word frequency has played a key role in the study of human memory, but there is little agreement as to the mechanism responsible for its effects. To determine whether word frequency affects binding probability or memory precision, we examined working memory for spatial positions of words. Each of three experiments included 300 trials in which five words were presented sequentially around an invisible circle followed by one of those words shown in the middle of the circle as a probe to test its location. Participants had to click on the associated location and the degree of error around the circle was the dependent measure. Across experiments we varied word frequency, presentation rate and the proportion of low frequency words on each trial. A mixture model dissociated memory precision, binding failure and guessing rates from the continuous distribution of errors. On trials that contained only low- or high-frequency words, low-frequency words lead to a greater degree of error in recalling the associated location. This was due to a higher word-location binding failure and not due to differences in memory precision or guessing rates. Slowing down the presentation rate eliminated the word frequency effect by reducing binding failures for low-frequency words. Mixing frequencies in a single trial hurt high-frequency and helped low-frequency words, but frequency composition and presentation rate did not interact. These findings support the idea that low-frequency words require more resources for binding and that the binding fails when these resources are insufficient.