**Pre-registration: Do representations of color fade over time?**

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When reading a story, an object is usually introduced with a specific color label (e.g. the boy rode the red bicycle to the station). Once this color has been named, the object is still referred to throughout the story, but the color is no longer repeated (e.g. when he came back the bicycle was still there). Does the mental representation of the color of the object remain activated throughout the story, or does it fade away as it is no longer explicitly referred to in the text? In the current study, participants read either one (Experiment 1) or two (Experiment 2) sentences where the final sentence either includes a reference to a color or does not. Following this participants see a picture of an object, where they have to respond “yes” if the pictured object was mentioned in the previous sentence, and “no” if it was not mentioned in the previous sentence. The pictured object will either match the color that was mentioned in the sentence, or will appear in grayscale.

**Experiment 1**

In Experiment 1, participants will read one sentence, which will either contain a reference to a color or will not (which is counterbalanced across items). Following this sentence they will see a picture that either matches or mismatches the color mentioned in the sentence. The participants have to complete a sentence-picture verification task, where they have to respond “yes” when the pictured object was mentioned in the previous sentence, and “no” when the pictured object was not mentioned in the previous sentence. Hoeben Mannaert, Dijkstra, and Zwaan (2017) found that color is represented in mental simulations as they found a significant match advantage. Even though the current experiment does not contain items that are as strong of a mismatch as in that study (e.g. showing a green tomato when a red tomato was implied), we still expect to find a significant facilitatory effect, whereby participants respond faster to pictures that match the color explicitly mentioned in the previous sentence. We expect that there will be no significant difference between pictures shown in grayscale and color when the sentence does not contain a reference to color, as all of items used are low in color diagnosticity.

**Design**

The experiment is a 2 (sentence: color vs. blank) x 2 (picture: color vs. grayscale) within-subjects design. Four lists have been constructed to ensure sufficient counterbalancing, so that a sentence can either include a color referral or not, and that a picture can either be shown in color or in grayscale.

Participants will see 48 experimental sentence items, and 48 filler sentence items. Similarly, they will see 48 experimental pictures and 48 filler pictures. In total they will therefore see 96 sentence items and 96 pictures. Additionally, participants will receive 24 comprehension questions.

**Sample**

A power analysis was done using the results of Experiment 1 from Hoeben Mannaert, Dijkstra, and Zwaan (2017), which used a similar paradigm to test whether color is represented in mental simulations. With an effect size of *f*  = 0.13, it was calculated that a minimum of 82 participants would be required to find an effect if there is one (α = 0.05, power = .80). To ensure our study has sufficient power, 100 participants will be recruited to ensure that possible exclusions do not lead to an underpowered study. Participants will be recruited from the Bachelor of Psychology at the Erasmus University Rotterdam.

**Analyses**

Participants who have a total accuracy score that is less than 80% will be excluded from the analyses.

The reaction time for accurate responses will be compared using a repeated measures ANOVA. Accuracy scores will also be compared using a repeated measures ANOVA.

**Example Sentence Item**

**Sentence version 1.** De jongen reed op de rode fiets naar het station. *English: The boy rode on the red bike to the station.*

**Sentene version 2.** De jongen reed op de fiets naar het station. *English: The boy rode on the bike to the station.*

**Experiment 2**

In Experiment 2, participants will read two sentences, where either the first or the final sentence will contain a reference to a color (which is counterbalanced across items). Following the final sentence they will see a picture that either matches or mismatches the color mentioned in the final sentence. We expect that the sentence items containing a reference to color in the final sentence will lead to participants responding significantly faster to pictures shown in color compared to those shown in grayscale. In sentence items where the first sentence refers to a color and the final does not, we expect to have a non-significant difference in reaction times between colored pictures and grayscale pictures, as the color may be less activated in the mental representation.

**Design**

The experiment is a 2 (sentence: color vs blank) x 2 (picture: color vs grayscale) within-subjects design. Four lists have been constructed to ensure sufficient counterbalancing, so that the final sentence can either include a color referral or not, and that a picture can either be shown in color or in grayscale.

Participants will see 48 experimental sentence pairs, and 48 filler sentence pairs. Similarly, they will see 48 experimental pictures and 48 filler pictures. In total they will therefore see 96 sentence pairs and 96 pictures. Additionally, participants will receive 24 comprehension questions.

**Sample**

Similar to Experiment 1, 100 Dutch participants will be recruited from the Bachelor of Psychology at the Erasmus University Rotterdam.

**Analyses**

Participants with an accuracy score that is less than 80% will be excluded from the analyses.

The reaction time for accurate responses will be compared using a repeated measures ANOVA. Accuracy scores will also be compared using a repeated measures ANOVA.

**Example Sentence Items**

**Sentence version 1.** De jongen reed op de rode fiets naar het station. Bij het station stapte hij van zijn fiets af. *English: The boy rode on the red bike to the station. At the station he stepped off his bike.*

**Sentence version 2.** De jongen reed op de fiets naar het station. Bij het station stapte hij van zijn rode fiets af. *English: The boy rode on the bike to the station. At the station he stepped off his red bike.*