**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), two (Experiment 2), or five (Experiment 3) 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. The design and analysis plan for Experiments 1 and 2 were pre-registered and can be viewed here: <https://osf.io/2nup7/> . The current pre-registration pertains to Experiment 3 of this study.

**Experiment 3**

In Experiment 3, participants will read five sentences per item, which will either contain a reference to a color in the first or the final sentence (which is counterbalanced across items). Following each story they will see a picture that is shown either in color or in grayscale. 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, meaning that participants responded faster when the color in the picture matched the color that was implied in the sentence. The research question of interest here is whether this color is deactivated once it is no longer explicitly referred to in the story. In Experiment 3, the color of the object is either mentioned in the first sentence or in the final sentence. We expect to find a significant match advantage, meaning that participants will respond faster when the picture matches the color mentioned in the sentence, compared to when the picture does not match (i.e., is shown in grayscale). Secondly, we expect there will be no significant difference between the sentence condition, as we believe that the even if the color is not explicitly referred to in the final sentence, that the mere mention of the object will reactivate the color in the mental simulation.

**Design**

The experiment is a 2 (sentence: color vs. blank) x 2 (match: 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. Onderweg werd hij gepasseerd door een bus. De bus sneed hem plotseling af. Gelukkig kon hij op tijd uitwijken en weer doorrijden. Bij het station stapte hij van zijn fiets.

*English: The boy rode on the red bike to the station. On the way he was passed by a bus. The bus suddenly cut him off. Luckily, he could dodge in time and continue riding. At the station he got off of his bike.*

**Sentence version 2.** De jongen reed op de fiets naar het station. Onderweg werd hij gepasseerd door een bus. De bus sneed hem plotseling af. Gelukkig kon hij op tijd uitwijken en weer doorrijden. Bij het station stapte hij van zijn rode fiets.

*English: The boy rode on the bike to the station. On the way he was passed by a bus. The bus suddenly cut him off. Luckily, he could dodge in time and continue riding. At the station he got off of his red bike.*