

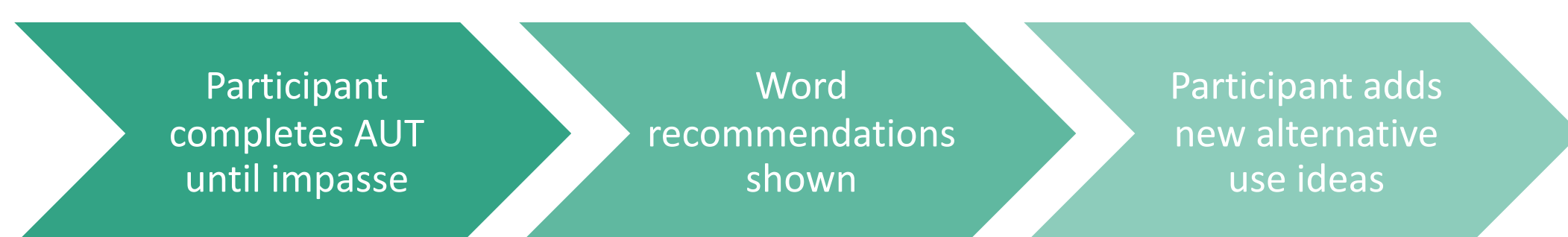
## Introduction

### How can word-recommendations help us overcome writer's block and develop more creative ideas?

Creative block is a familiar foe to any who attempt to create and is especially related to “writers block”. While significant effort has been focused on developing methods to break such blocks, it remains an active challenge.

We present a proof-of-concept for a cognitive network-science based word recommendation algorithm that aims to spark creative ideas (**Fig 1 & 2**).

## Methods



**Fig. 1:** Experimental procedure

**Participants:** Nineteen participants took part in this proof-of-concept study (Mean age = 29.52 years, SD = 11.02 years, eight women). Participants were divided into low- (n = 9) and high-fluency (n = 8) groups based on a mean of their fluency in the AUT.

**The Semantic Network** is generated from free association responses to cue words. Each word is a node in the network and if two words were free-associated, they share an edge. Fig 3 shows the neighborhood of ‘brick’: only words that are one or two edges away from ‘brick’ are shown.

**The Weighted Random Walk** generates word-recommendations by crawling the semantic network starting from the AUT cue (brick or paperclip).

Add your creative ideas for how to use a: brick

**Creative idea**

Write your ideas here.

Submit idea

Get prompt

“Flare” and “partition” might help you come up with new ideas

I Am Completely Out Of Ideas

**Submitted ideas**

Build a wall

Build a pizza oven

Use them as weights at the gym

**Fig. 2:** The experiment interface

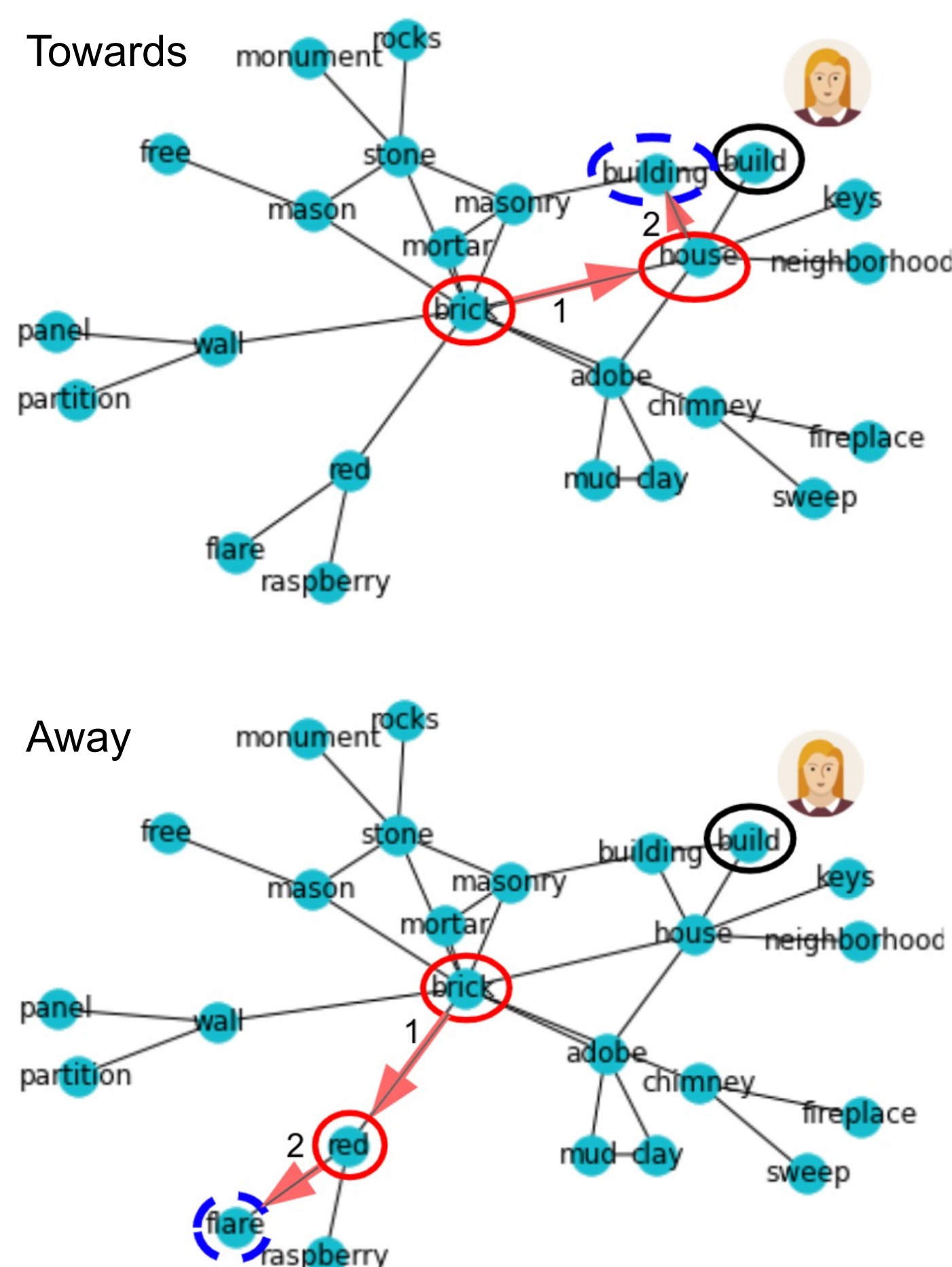
## Weighted Random Walk Algorithm

**Weighted Random Walk.** Word-recommendations vary according to distance (close / far) and direction (towards /away), relative to the AUT cue and the participants responses (**Fig 3**).

**Direction** In the *towards* condition, nodes that are closer to the words in the pre-impasse responses are more likely to be selected.

In the *away* condition, nodes that are distant from the pre-impasse responses are more likely to be selected.

**Distance** The path length of the random walk (close/far).

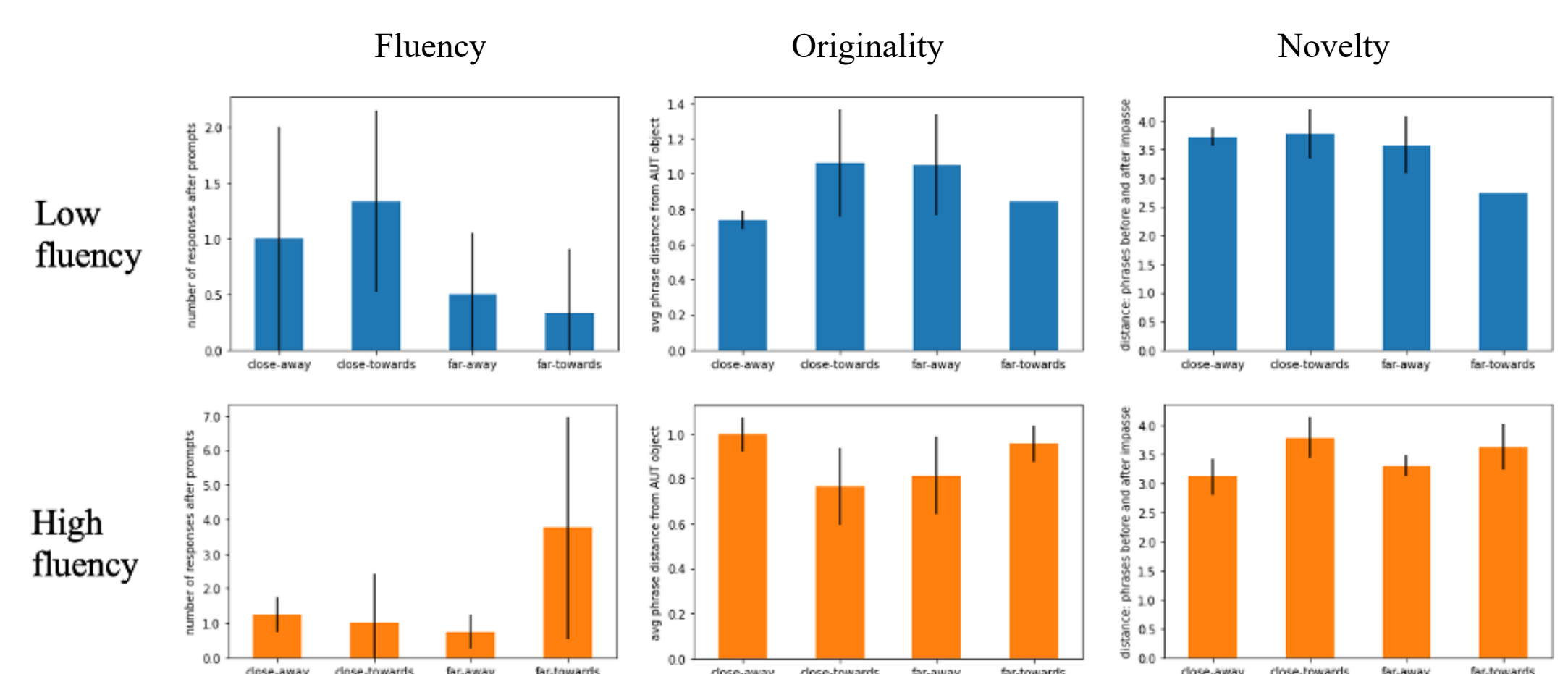


**Fig 3:** Illustration of the neighborhood of *brick* in the semantic network.

**Towards:** The *weighted random walk* gravitates **towards** the word *build*. The random walk stops at *building*, which is recommended to the participant.

**Away:** The *weighted random walk* starts at the *ArandomUT* object word *brick* and then walks two steps, gravitating **away** from the word *build* which was in the participants idea *build a wall*. The random walk stops at *flare*, and this word is recommended to the participant.

## Results



**Fig 4:** Effects of the word recommendations on fluency and creativity of post-impasse AUT responses. Shown on high and low fluency individuals.

**Fluency** – the number of responses after the word-recommendations: We found that low fluency individuals benefitted from closer word recommendations, while high fluency individuals benefitted most from the far-towards word recommendations.

**Originality** – the semantic distance of the responses to the AUT cue word: We found an interaction effect in the high fluency group between Distance and Direction, suggesting that close-towards and far-away recommendations were respectively too similar to the participants’ original ideas and too distant from possible uses of the AUT object.

**Novelty** – the semantic distance between the post-impasse and pre-impasse responses: We found that in the high fluency group towards word-recommendations resulted in higher novelty responses.

In the high fluency group, the far-towards condition resulted in high fluency, novelty and originality of responses, while in the low fluency group the close-towards condition resulted in high fluency, originality and novelty of responses.

## Conclusions

Our results indicate that the location of word-recommendations affects the fluency and creativity of one’s ideas, and that low- and high- fluent individuals differently benefit from these word-recommendations.

Future work includes a larger scale study and further exploration of how semantic network-based word-recommendations can help break creative impasses in writer’s block.