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## Introduction

**Does writing expertise affect the ability to successfully escape writer's block through the aid of text-recommendations in a divergent thinking task?**

We present a cognitive network-science based word recommendation algorithm that aims to spark creative ideas (Fig 1, 2 & 3), and compare how novice and expert writers use the Associative Concept Sparker (ACS) tool in a divergent thinking task (Fig 4).

## Methods

**Participants:** 104 experienced writers (Mean Age = 41.34 years, SD = 11.03 years, 71 Female), and 100 novice writers (Mean Age = 35.26 years, SD = 10.50 years, 59 Female) took part in this study.

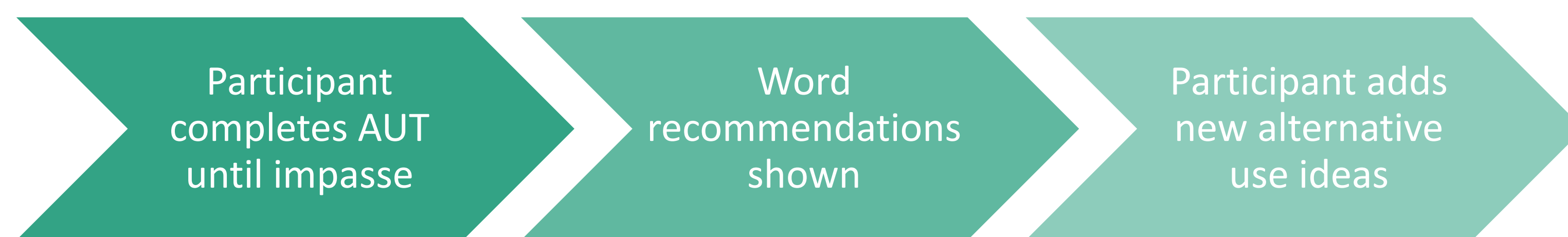


Fig. 1: Experimental procedure

Add your creative ideas for how to use a: **brick**

**Creative idea**

Write your ideas here.

Submit idea

Get prompt

"Flare" 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

**The Associative Concept Sparker (ACS)** is a web-app that provides personalized text-recommendations online to aid participants in an alternative uses task (Fig 1 & 2). The word recommendations are derived from an algorithm crawling a semantic memory network (Fig 3).

**The Semantic Network** is composed of nodes (concepts) and edges (associations between concepts), built from free-association responses to cue words.

### Outcome variables

**Creativity** is measured through SemDis, which computes the semantic distance of the response to the AUT from the cue-word.

**Fluency** is measured as a binary outcome of breaking out of an impasse following the word recommendations or not.

## Word Recommendation Algorithm

**Word-recommendations** vary according to distance (close / far) and direction (towards /away).

**Direction:** In the *towards* condition, the closest node to the pre-impasse responses is selected. In the *away* condition, the farthest node from the pre-impasse responses is selected.

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

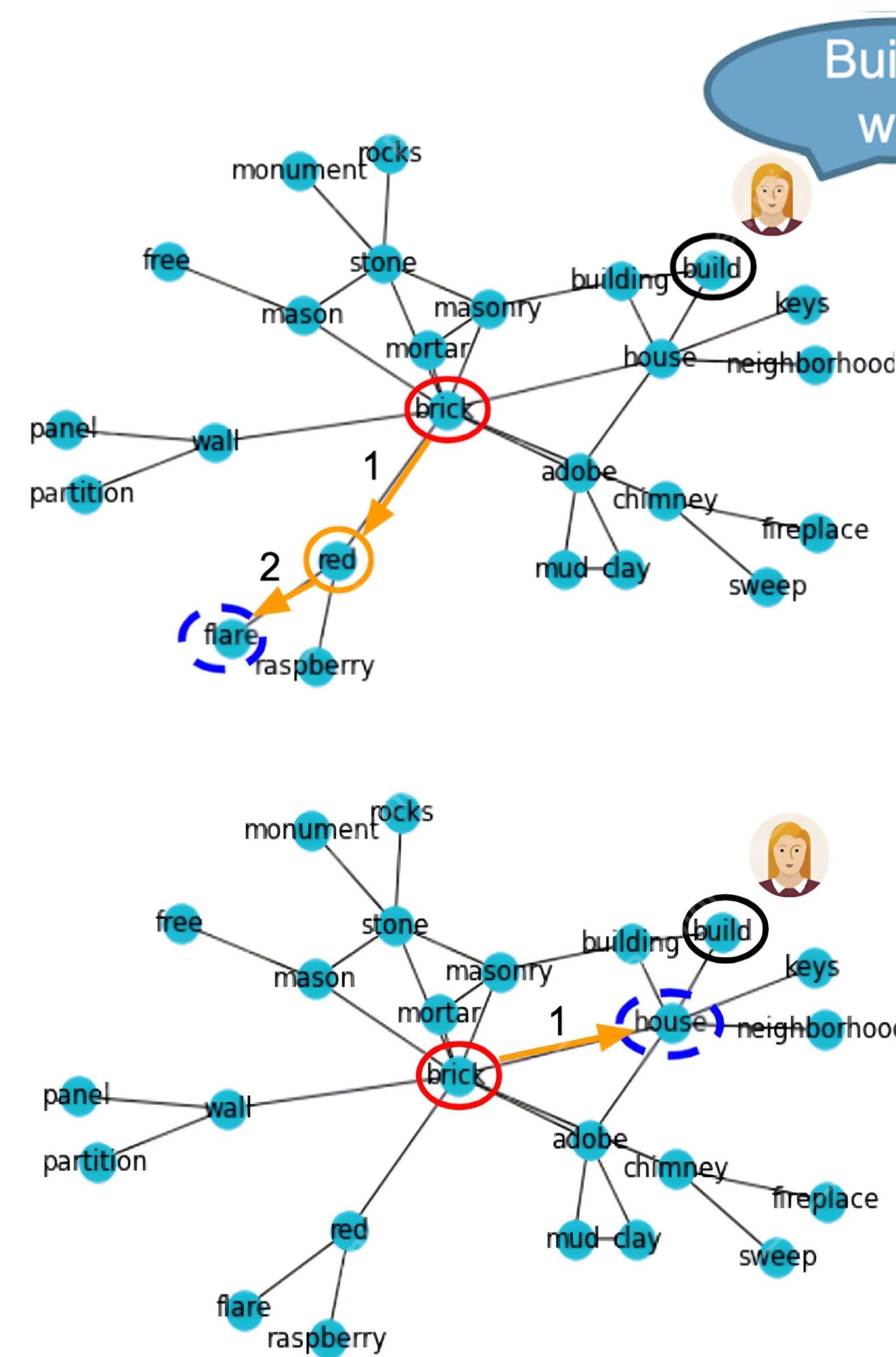


Fig 3: Illustration of the neighborhood of *brick* in the semantic network.

**Away** (top): The *weighted random walk* starts at '*brick*' and walks two steps **away** from the word *build*. The random walk stops at *flare*,

**Towards** (bottom): The *weighted random walk* starts at '*brick*' and walks one step **towards** the word *build*. The random walk stops at *house*, which is recommended to the participant.

## Results

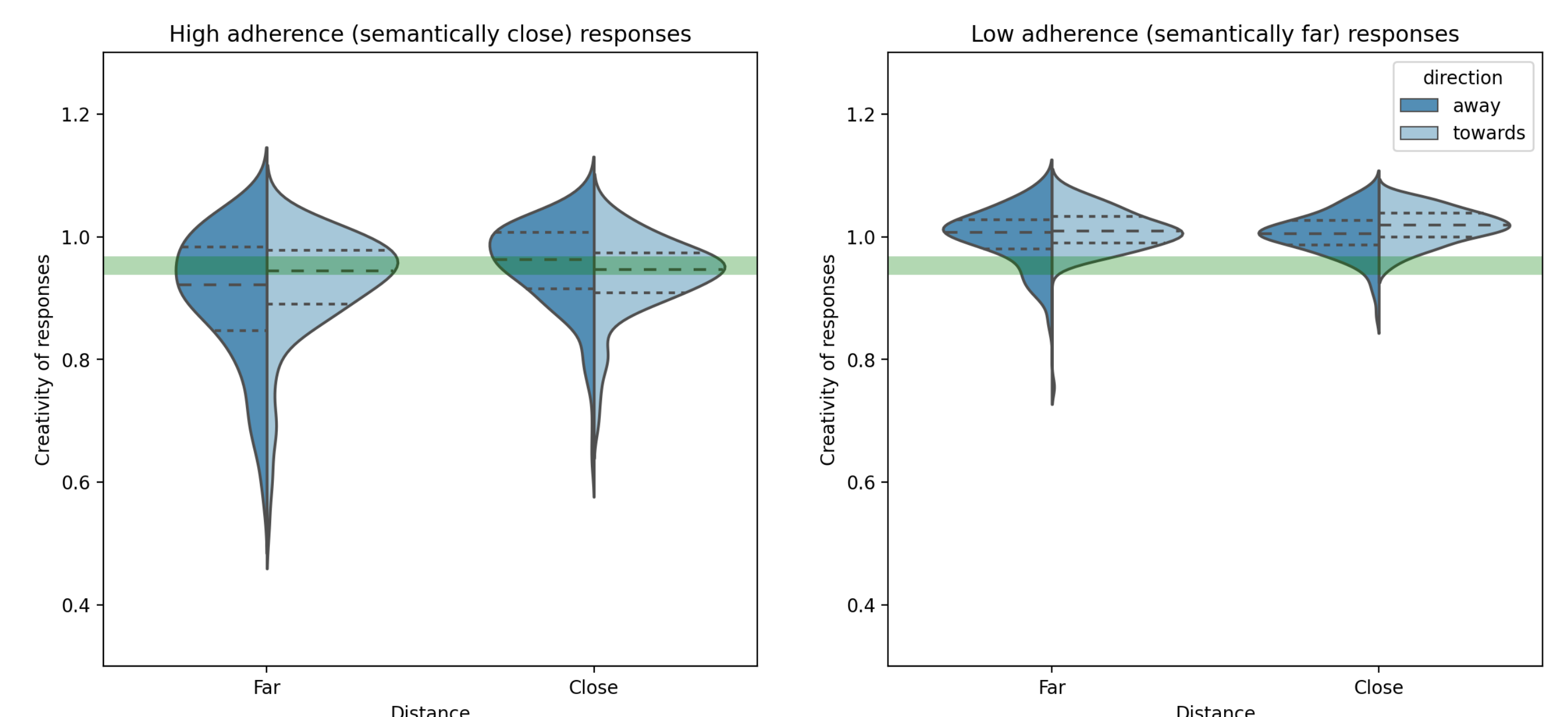


Fig. 4: Creativity.

Responses with low semantic adherence to the word recommendation (right) are more creative than closely related ideas (left).

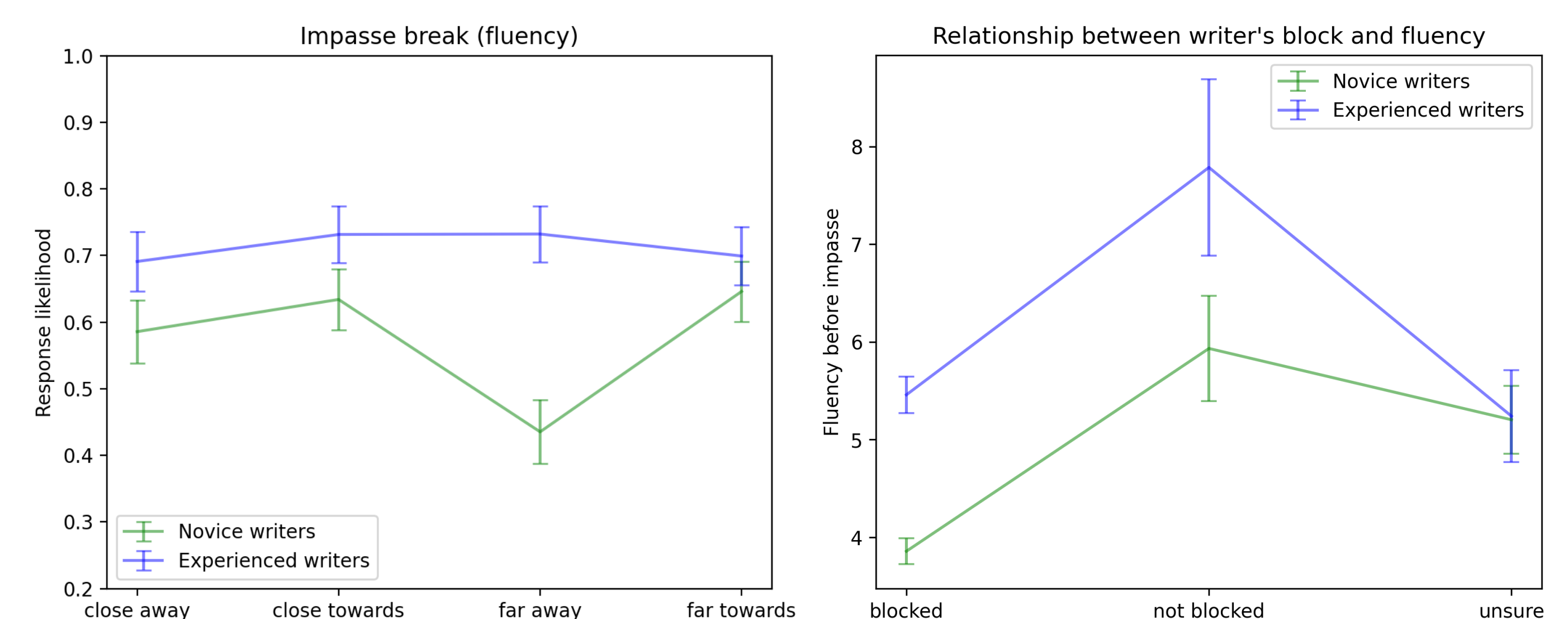


Fig. 5: Fluency.

Experienced writers demonstrated greater fluency, especially in the Far-Away condition (left). Novice writers associated writer's block with low fluency before impasse (right).

## Conclusions

Our results indicate that the Associative Creativity Sparker tool successfully breaks participants out of writer's block and creative fixations: especially for experienced writers.

The location of word recommendations affects the fluency and creativity of one's ideas. In addition, novice writers have a difficult time breaking out of impasse with the aid of the word recommendations compared to experienced writers.