# Method

## Participants

Ten participants were recruited using Prolific, an online participant recruitment platform. For each session they completed, participants were paid at a rate of 6.50 GBP/hour. Nine of the ten participants completed a total of ten sessions, while the remaining participant completed nine sessions. Participants were provided with plain language statements and consent forms and gave informed consent prior to the start of the first session of the experiment.

## Stimuli and Apparatus

The experiment was run online and presented in the browsers of participants’ computers. Software written in JavaScript using the jsPsych library (de Leeuw, 2015) controlled stimulus presentation and recorded responses. Participants were instructed to use the same display between sessions, and to keep the browser in fullscreen mode for the duration of each session, with the intention that while hardware will inevitably vary across participants, the experimental conditions for each participant should be consistent across sessions.

Stimuli were six-letter words drawn from the SUBTLEXus database (Brysbaert & New, 2009). Word frequencies ranged from 10 and 500, which represents the number of times the word appears in the corpus of 51 million words. From this pool of words, study lists were constructed according to one of three experimental conditions. In the orthographic condition, lists of words were chosen that minimized the Damerau-Levenshtein distance between all the words in the list. The Damerau-Levenshtein distance is a measure of the minimum number of substitutions of single letters or transpositions of two adjacent letters needed to transform one word into another (because all words were six letters long, insertion of deletion of letters was not possible).

In the “unrelated” condition, words were selected without constraint on the relationships between words in the same list.

Words were displayed in 24 point Courier New white font positioned in the center of a uniform gray mean luminance field. The use of a monospaced font and the restriction to four letters ensured that stimuli always occupied the same amount of space relative to the size of the screen.

## Procedure

Participants completed the experimental tasks over a maximum of ten sessions. Each session consisted of 15 blocks, and each block consisted of eight trials.

Each of the three sessions consisted of 120 trials, presented in 12 blocks of ten items each. Each block consisted of a study phase, a mathematics distractor phase, and a source recall phase. There were a further five practice trials at the beginning of each session, the data from which was not included for analysis.

The only difference between experimental conditions was the list of stimuli shown in a block. Blocks were presented in a randomized order.

At the start of each trial, participants were presented with a black marker positioned on a randomly generated angle on the outline of a circle, as well as a word positioned at the same angle as the marker, offset by a longer radius. The precise location of the word relative to the marker was determined by the sector the angle was in, with the word being offset to one of eight points on the bounds of the text box, corresponding to the middle of each of the four sides, and the four corners (i.e. in the North sector, the anchor was the bottom middle of the text box, while in the Northeast sector the anchor was the bottom left of the text box). The stimulus display remained visible for 1000 ms. Once the stimulus display time had elapsed, to ensure that participants attended to the source information, they were instructed to indicate the previous location of the cross on the blank target circle using a computer mouse. Responses made within π/8 radians of the true target location were classified as attended and advanced participants to the next item. There was no time limit for this response. Responses further away were deemed unattended and the words “TOO DISTANT” was displayed for 1000 ms, then the location was then re-presented and the verification task was repeated.

After studying each of the items for that block, participants were then instructed to complete a distractor task, which involved 30 seconds of arithmetic problems. These problems were presented as three single digit integers, which summed to a fourth number which would either be the correct sum, or a number that was one higher or lower than the actual sum. Participants indicated if the sum was correct by pressing the keys 0 (false) or 1 (true).

Finally, in the source memory retrieval task, participants were cued with the words for 1500 ms, and then indicated the recalled location by a moving the mouse from the starting point in the center of the circle to a point on the circumference of the response circle. Response time was measured from the first movement of the mouse beyond a calibration marker, which was a circle with a radius of 8 pixels in the center of the screen. The cursor was required to be centered on this calibration marker to begin each trial. There was no time limit on the decision task. A schematic for one trial in each of the phases is shown in Figure 3.