**Pilot localizer and shit**

To get a sense whether we can see PrC with our scanning protocol, we used a block-design one-back localizer, and a lifetime exposure judgement task.

**Actual experiment**

Stimuli were 180 concrete English concepts selected from McRae’s database. They were divided in to 10 sets of 18 concepts, matched on average feature-overlap with respect to the entire database, normative lifetime exposure, log word frequency, number of letters, and number of syllables, using genetic algorithms (van Casteren & Davis, 2007). The match was confirmed with MANOVA in R.

5 sets of 18 concepts were used as frequency stimuli, the rest were used as lifetime stimuli. This assignment was counterbalanced across participants.

During study, the 5 sets were each presented for 1, 3, 5, 7, and 9 times, resulting 450 presentations in total The run order counterbalanced across participants.

During test, the words presented in the study phase were used in the relative frequency judgement task, while the other 5 sets were used for the lifetime exposure task. The two tasks alternate every 5 trials, resulting a total of 180 trials. These trials were divided into 4 runs of 45 trials, again the run order was counterbalanced across participants.

For the study phase, each stimulus was shown for 1 second. The inter stimulus intervals (ISI) were jittered. They were randomly sampled from a truncated exponential distribution using custom MATLAB script. They mean ISI, minimum, and maximum were 1.5 seconds, 1 seconds, and 4 seconds, respectively.

For the test phase, each stimulus was shown or 2.5 seconds. The inter stimulus intervals (ISI) were jittered. They were randomly sampled from a truncated exponential distribution using custom MATLAB script. They mean ISI, minimum, and maximum were 4 seconds, 2.5 seconds, and 10 seconds, respectively.

The ISI sequence remained constant across different block-counterbalance versions. Thus each stimulus was associated with different ISI across versions to control for potential although unlikely ISI effect.

Participants used 2 keys to make the lexical decision in the study phase, and 5 keys to make the frequency/lifetime decision in the test phase on a 5-point Likert scale. The hand/finger mapping was counterbalanced across participants for the test phase tasks, but not for the study phase task, during which key pressing only happens when participant judge a stimulus to be non-word, which are discared from later analyses. In addition to written and verbal instruction about the details of the key mapping, after the study phase and before the test phase, participants completed a practice block to familiarize them with the key mapping. In this practice block, they saw numbers 1-5, and are asked to press the corresponding key on the MRI button box. Participants have to get 45 correct trials successively to pass. Each trial is self-timed. If they make an incorrect response, a figure of the button box with a red box on the correct key will be shown to them for 2 seconds.

After the test phase, participants rated their lifetime familiarity on all items presented in the frequency judgement task, outside of the scanner. They would use the same finger to scale mapping as in the test phase, although the exact keys are different since now participants use a laptop keyboard rather than button boxes. This allow us to control for potential motor learning effect associated with using a new set of finger-to-scale mapping. We also used the same trial timing and measured reaction time for this phase.

The script has built in error handling. At each trial of any phases, the experimenter can press the pause key (P) to pause the experiment after the current trial. Participants’ responses will still be recorded for the paused trial, and saved in the disk as a .mat file with all responses so far for the current phase (study, key\_prac, test). The experimenter can choose to continue the paused experiment by pressing the experimenter pass key (E), which will lead to the presentation of a fixation cross for 2 seconds, then continue to the next trial, with all the appropriate instructions and prompt for the participants. The experimenter can also choose to terminate the paused experiment by pressing the terminate key (T). This is to handle the situation where something happened to the scanner and a separate run has to be started. For the study and the test phase, the script will automatically relunch after pressing the terminate key from the next trial. For the key-prac phase, the script will proceed into the next phase (i.e. test phase) since the stimuli in the key\_prac phase is not of set order but are continuously and randomly sampled. This also allow the experimenter to manully terminate the key\_prac phase if it runs too long.

The raw scanning data are processed with fmriprep 1.5.4, with multi-echo combined. The output space is T1w. The post-preprocess T1 image and raw T2 image are used to segment PrC using ASHS. GLM is done in SPM12.