As Predicted Template, Version 1.10

Participating Authors (Up to 5)

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AsPredicted Questions

1. **Data collection.** Have any data been collected for this study already?

* Yes, we already collected the data. (Not an accepted answer.)
* No, no data have been collected for this study yet.
* It’s complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

1. **Hypothesis.** What’s the main question being asked or hypothesis being tested in this study?

When trying to remember sequences of words, does word similarity interfere with memory because of the similar *acoustic* *properties* or *mental representations* of the items?

1. **Dependent variable.** Describe the key dependent variable(s) specifying how they will be measured.

Word lists will be presented at a fixed rate through headphones under conditions that manipulate the acoustic properties and mental representations of words, and we will measure strict serial recall accuracy (i.e. the number of items recalled in correct positions) and serial position accuracy (i.e. the number of items correctly recalled at each position) across all conditions.

1. **Conditions.** How many and which conditions will participants be assigned to?

In a within-subject manipulation, each participant will hear a list of acoustically similar words and a list of acoustically dissimilar words. All of the words will have been degraded using a vocoder, which filters out much of the fine spectral and temporal information present in the speech signal. In a between-subject manipulation, participants will be assigned to one of two training conditions for the acoustically similar word set. In the Phonologically Overlapping Mental Representations condition, participants will be trained to map vocoded acoustic signals to phonologically similar words. In the Phonologically Distinct Mental Representations condition, participants will be trained to map vocoded acoustic signal to phonologically distinct words.

1. **Analyses.** Specify exactly which analyses you will conduct to examine the main question/hypothesis.

The primary analysis is a mixed-measures Phonological (2) x Acoustic (2) ANOVA, in which the Phonological factor is between-subjects (Phonologically Distinct Mental Representation vs. Phonologically Overlapping Mental Representation) and the Acoustic factor is within-subjects (acoustically similar word set vs. acoustically dissimilar word set). If the data obviously violate normality, we will move directly to the model comparisons using Bayes Factors as described below.

1. **More analyses.** Any secondary analyses?

Two alternate scoring methods will be used explore the effects of phonological similarity on item versus serial order memory. In the item-only scoring procedure, participants will be given credit for any correctly recalled item regardless of serial position. To assess serial order memory independent of item-position binding, participants will be given credit for any correctly chained items. In this scoring procedure, an item will be counted as accurate if it is recalled following its preceding item from presentation. For example, if the presented list was *A, B, C, D, E, F* and the participant recalls *A, B, D, E, F, G,* the conventional scoring method would award 2 points as only *A* and *B* are recalled in their presented positions. Item scoring would result in 5 points for *A, B, D, E,* and *F.* The chained scoring procedure would award 4 points for *A, B, E,* and *F*.

The expected outcome is that the locus of the phonological similarity effect is in the mental representation of the words, rather than the acoustic properties of the words. In this outcome, all participants should perform equally well for acoustically distinct words, because both the acoustic and phonological representations have little overlap. In contrast, when words are acoustically similar, performance should be better for participants trained on distinct phonological representations than for participants trained on similar phonological representations. Goodness-of-fit will be compared between a model of the expected outcome and models of the following alternative outcomes to determine which model best explains the data: (1) the acoustic properties of the acoustically similar wordlist will induce a phonological similarity effect, regardless of the phonological distinctness of the mental representation. In this model, participants in both training conditions will perform equally well on the acoustically similar wordlist; (2) performance is the same across all conditions; and (3) performance across all conditions is unrelated.

Additionally, differences in item identification will be explored by examining the amount of time spent learning to map the trained phonological representation to each acoustic signal.

1. **Sample size.** How many observations will be collected or what will determine sample size? (No need to justify decision, but be precise about exactly how the number will be determined.

80 normal-hearing adults will take part in this study (40 in each between-subject Phonological condition). Participants will be between the ages of 19 and 29.

1. **Other.** Anything else you would like to pre-register? (e.g., data exclusions, variables collected for exploratory purposes, unusual analyses planned?)

We will collect musical experience and strategy usage data in anticipation of a follow-up study involving musical stimuli. Participants will be excluded from analysis if they indicate any of the following: awareness of the study aims, over-experience with vocoded speech, failure to learn the word list mappings within 10 proficiency checks, use of medication that impairs cognitive function, or hearing or vision impairments. Data will also be excluded in the case of technological failure in data collection. For the ANOVA analysis, data will be excluded if performance on any task is more than 3 standard deviations away from the mean; Bayesian modeling approaches will include all data.

1. **Name.** Give a title for this AsPredicted pre-registration. (Suggestion: use the name of the project, followed by study description.)

Acoustic vs. Mental Phonological Similarity

Finally. For record keeping purposes, please tell us the type of study you are pre-registering.

* Class project or assignment
* Experiment
* Observational/archival study
* Other: \_\_\_\_\_\_\_\_\_