



# A picture is worth a thousand... sounds?

## Modality specific interactions of imageability and phonology in psycholinguistic tasks

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### INTRODUCTION

Many psycholinguistic studies have demonstrated the effects of imageability and phonological neighborhood (PN) size. Very few studies have been done to see if imageability and phonology interact with one another. A recent imaging study (Binder, Westbury, McKiernan, Possing, & Medler, 2005) found evidence implicating overlapping brain regions in abstract word access and phonological processing. This suggests that abstract words will be more sensitive than concrete words to phonological variables. We tested this hypothesis by manipulating imageability and PN in a set of lexical decision, semantic decision, and sentence plausibility experiments, using both auditory and visual presentation.

### SINGLE WORDS

#### LEXICAL DECISION TASKS

##### Methods

We tested 31 participants in an auditory lexical decision task, and 33 participants in a visual lexical decision task. The stimuli consisted of 48 words, manipulated for high or low PN and high or low imageability (abstract or concrete), and 48 non-words.

##### Results (Figure 1)

In the auditory task, an interaction effect was found [ $F(1,30)= 16.21$ ;  $p<0.001$ ], as well as main effects of imageability [ $F(1,30)= 40.69$ ;  $p<0.001$ ], and PN [ $F(1,30)= 12.21$ ;  $p<0.001$ ]. In the visual task, only a main effect of imageability was found [ $F(1,32)= 53.96$ ;  $p<0.001$ ]. There were no interaction effects [ $F(1,32)= 1.52$ ;  $p<0.230$ ], or main effects of PN [ $F(1,32)= 0.28$ ;  $p<0.600$ ].

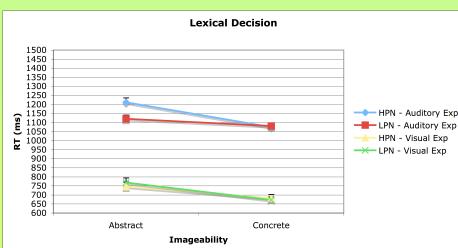


Figure 1: Lexical Decision by PN, Imageability, and Modality

### SEMANTIC DECISION TASKS

Lexical decision places weak demands on semantics. In the second set of experiments we emphasized semantics more strongly by asking subjects to undertake a semantic decision task instead of a lexical decision task. We expected that we would see an increased PN x imageability effect.

##### Methods

We presented participants with a word and asked them to decide if it was concrete or abstract. We tested 27 participants in the auditory task, and 31 participants in the visual task. The stimuli were the same 48 words used in the lexical decision experiments.

##### Results (Figure 2)

In the auditory task, an interaction effect was found [ $F(1,26)= 8.52$ ;  $p<0.01$ ], as well as main effects of imageability [ $F(1,26)= 57.81$ ;  $p<0.001$ ], and PN [ $F(1,26)= 6.13$ ;  $p<0.02$ ]. In the visual task, only main effects of imageability [ $F(1,30)= 71.25$ ;  $p<0.001$ ] and PN [ $F(1,30)= 12.04$ ;  $p<0.002$ ] were found. There was no interaction effect [ $F(1,30)= 0.65$ ;  $p<0.800$ ].

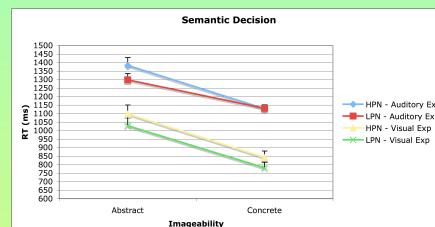


Figure 2: Semantic Decision by PN, Imageability, and Modality

### CONCLUSIONS

These experiments were inspired by the fMRI results of Binder et al. (2005), who found that abstract words activated brain regions normally associated with phonological processing. The results of our study lend behavioral support to the conclusion of that study, that abstract words are more reliant on and sensitive to phonological factors than concrete words. This also supports Pavio's Dual Coding theory (1986), that abstract words depend on a lexical system only, but concrete words are able to use imagery in addition to the lexical route.

### SENTENCES

#### SENTENCE PLAUSIBILITY JUDGMENT

But what about context? Schwanenflugel challenges the Dual Coding theory with the Context Availability theory (1989): when words are put in context, imageability effects often disappear. To investigate this, we presented participants with sensible and nonsense sentences (containing words manipulated on imageability and PN) and asked them to make plausibility judgments (Figure 3).

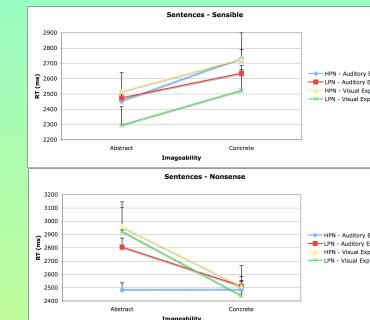


Figure 3: Sentence Plausibility Judgment by PN, Imageability, and Modality

### CONCLUSIONS (?)

In the context of sensible sentences, similarly to the single word experiments, interaction effects only occur in the auditory versions. However, the imageability effect reverses - sentences with abstract words are processed faster than sentences with concrete words. We are not sure why: What do you think?

### REFERENCES

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