Homonyms and homophones in spoken word recognition

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Homonyms (like (financial) "bank" and (river) "bank") and non-homographic homophones (like "night" and "knight", hereafter "homophones" for convenience) are complementary subsets of homophones, words that have the same pronunciation but unrelated meanings. There has been much debate on whether the two pattern similarly in word recognition despite their commonalities. Some studies found that it took less time to make visual lexical decisions on homonyms than mono-meaning non-homophones (e.g., Pexman & Lupker, 1999). This was exactly the opposite to what was found for homophones (e.g., Pexman et al., 2001). Other studies, however, found that when homonymy was strictly distinguished from polysemy (a single word having multiple related senses), homonyms also took longer to recognize both visually and auditorily (e.g., Rodd et al., 2002). These conflicting results also led to disagreement on the central mechanism in word recognition: opposing patterns of homonyms and homophones were explained by phonology-to-orthography feedback activation, while the consistent disadvantage was seen as the result of competition and lateral inhibition (e.g., McClelland & Rumelhart, 1981) at the semantic level.

This study aims to resolve this conflict by directly comparing homonyms and homophones in English spoken word recognition. In Exp. 1, participants listened to target stimuli embedded in the quotation sentence "she said…" and made a word/nonword decision within four seconds after sentence onset. Stimuli of interest include 32 homonyms, 32 homophone and 32 mono-meaning non-homophones (controls). We controlled for phonological frequency, phonological neighborhood density and sum of related senses across different groups of words, as well as between-lexeme frequency ratio and sense ratio between homonyms and homophones. The result (*Figure 1*) shows that correct responses to homonyms were significantly faster than controls, but there was no reliable difference between homophones and controls. In Exp. 2, a new group of participants finished the same lexical decision task and were in addition asked to spell the word every time after they made a "word" decision. As shown in *Figure 2*, this spelling task influenced lexical decision results. While responses to homonyms were still significantly faster than controls, responses to homophones were slower than controls and homonyms, though only the latter difference reached significance. In Exp. 3, participants were asked to finish the auditory lexical decision task and in addition to provide a related word after they made a "word" decision. This secondary task led to longer response times for both homophones homonyms, though the differences were not significant (*Figure 3*).

The advantage of homonyms in a pure auditory lexical decision task (Exp. 1) is consistent with findings in visual studies (e.g., Pexman & Lupker, 1999) and can be explained similarly by feedback activation from multiple meanings to a single phonological form. As the auditory lexical decision task remained the same, the secondary tasks in Exp. 2 and 3 clearly biased participants to focus on either orthographic representations or meanings. The effect of homophones shifted from the facilitatory side in Exp. 1 to the inhibitory side in Exp. 2. Though this difference between homophones and control words was not significant in Exp. 2, the difference between homophones and homonyms was. As the most noticeable difference between the two types of words is that homophones do not share orthographic forms, this difference can be attributed to the competition and mutual inhibition at the orthographic level when a selection is required. While neither effect in Exp. 3 reached significance, they were both significantly different from the corresponding effects in Exp. 1 (homonyms: $\beta = .02$, $p = .045$; homophones: $\beta = .02$, $p = .046$). Suggesting that multiple meanings still lead to some inhibition when a selection is required. These results thus suggest homonyms and homophones do pattern similarly when their commonality, the mapping between a single phonological form and multiple meanings, is the focus in processing, but pattern differently when the processing of orthographic forms is involved. This study also provide evidence for both feedback activation and lateral inhibition as active and interacting mechanisms in spoken word recognition.

The following figures report the results yielded by fitting a mixed-effect linear regression model to the data. The dependent variable is log response time. The fixed effects include log word duration, word type, task and the interaction between word type and task. The random effect allows participants to have different intercepts. The dots and whiskers show the coefficients and two standard error intervals of the difference between homonyms/homophones and controls, and the difference between homophones and homonyms is reported on the side.

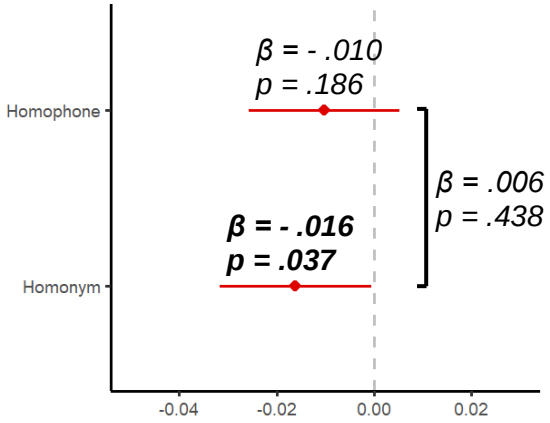

Figure 1. Experiment 1

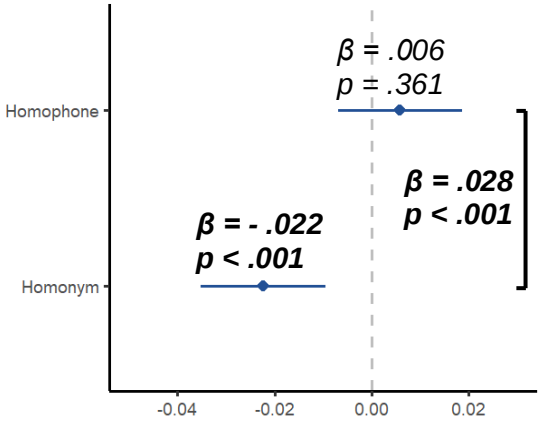

Figure 2. Experiment 2

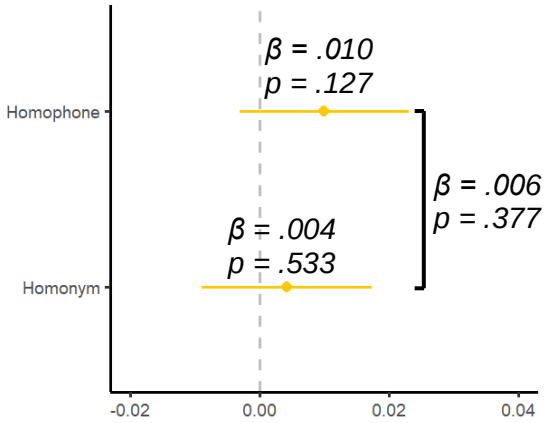

Figure 3. Experiment 3

References

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