

# The impact of rhotic variation on spoken-word recognition in Maltese

Holger Mitterer<sup>(1,2)</sup> & Eva Reinisch<sup>(3)</sup>

(1) University of Malta, Msida, Malta

(2) Hanyang University, Seoul, South Korea

(3) Austrian Academy of Sciences, Vienna, Austria

Allophones are considered pivotal in lexical access. In Maltese, word-initial /r/ is produced with either an alveolar trill or tap ([r,r] or approximant [ɹ]), with a relatively equal split between these two allophones (Reinisch & Mitterer, 2024, iClave). Here we ask how this rhotic allophonic variation influences spoken-word recognition. A similar study in German (Llompert et al., 2021, Front. Psychol.) showed a preference for the most frequent rhotic variant, the uvular fricative. The absence of a frequency bias in Maltese allows us to focus on other factors while frequency is controlled for. First, do listeners prefer their own variant, as gestural theories of speech perception would predict? In this case, listeners who produce approximants should recognize words faster when they are produced with an approximant as well. Previous work on selective adaptation showed a special status of trills in perception (Mitterer & Reinisch, 2023, AP&P), suggesting a preference for trilled variants independent of the listeners' own productions.

We ran two visual-world eye-tracking studies in which participants heard /r/-initial target words—produced with either a tap or an approximant and embedded in a carrier sentence. Moreover, participants performed a short production task. Experiment 1 used partially predictive sentences (following Llompert et al., 2021) and participants had to find a picture on the screen matching the critical /r/-initial target word. Experiment 2 used printed words and a fixed, uninformative sentence frame (“*Find the word....*”). The experiment also asked whether the type of /r/ allophone influences whether /l/- or /d/-initial words are stronger competitors, given that a tap is more similar to a /d/ than an /l/. Experiment 1 showed neither an effect of stimulus allophone nor its match to the listener's own variant on target fixations. Experiment 2 showed faster target fixations on /r/-initial target words and stronger activation of /d/-initial competitors when the /r/ was produced as a tap, while approximant /r/ led to stronger activation of /l/-initial competitor words. As in Experiment 1, there was no evidence on listeners own allophone in production on their reactions during perception.

These results indicate that there is no strong link between perception and production and that there is a subtle preference for trills as the “most prototypical” version of /r/. This preference, however, is easily overruled when participants have semantic information to potentially predict a target, as in the sentence of our first experiment.