

What You Hear Is What You Get, Is It? Irrelevance Induced 'Deafness' For Spoken Words' Language Identification But not For Meaning

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Introduction

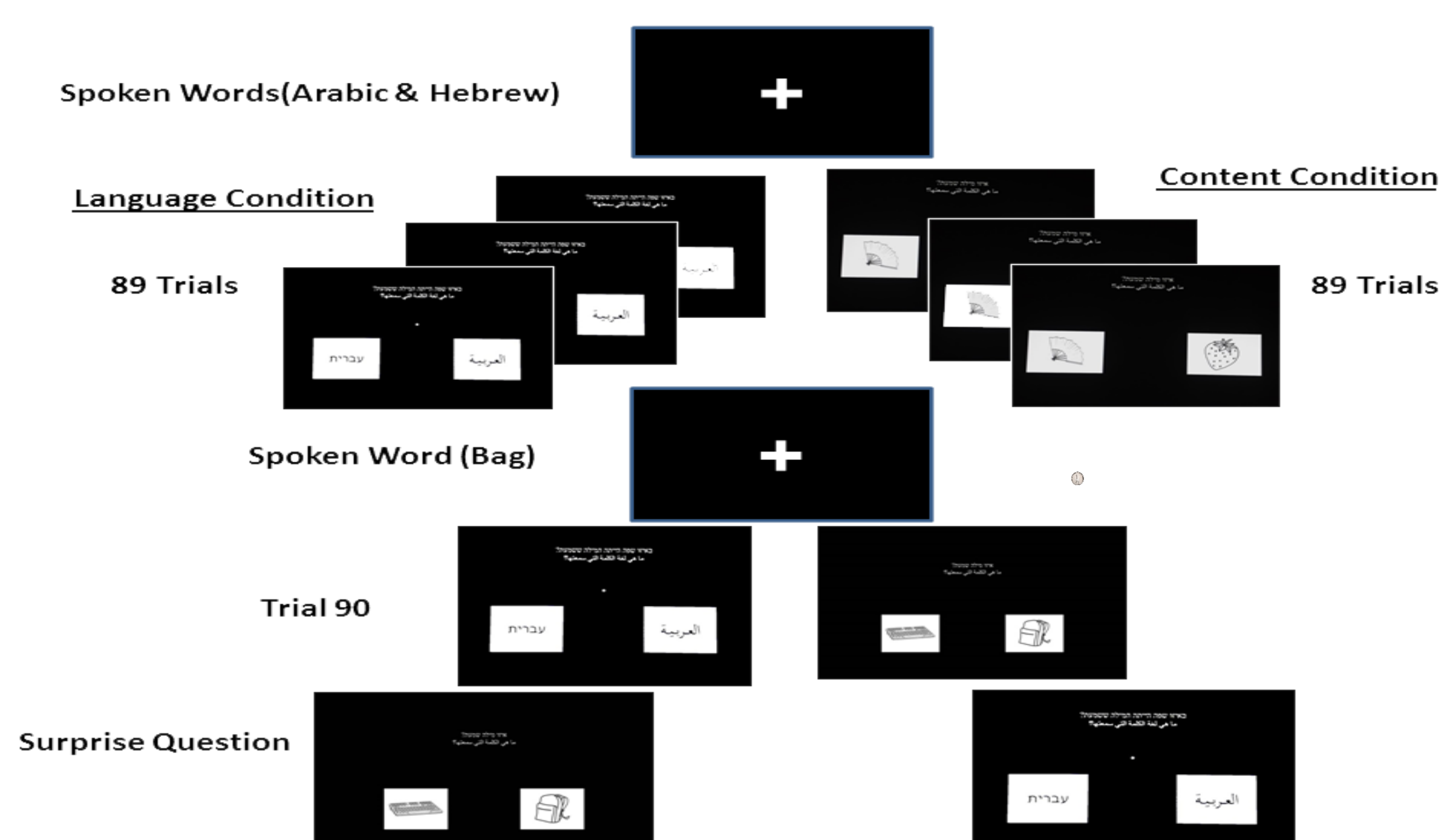
Our lab recently documented the phenomenon of irrelevance induced 'blindness' (Eitam et al., 2013; Eitam et al., 2015)^{1,2}. In these demonstrations, participants failed to report the irrelevant color of an extremely simple stimulus despite having ample resources to do so. These results support the conclusion that task relevance is sufficient to cause strong selection.

The question we tackle in this study is whether task relevance has the same impact on modalities other than vision – here we explore its effect in the auditory modality.

Method

120 Arabic-Hebrew bilinguals (mean age (SD) = 20.43 (2.15), 10.3% male) were run individually and were randomly assigned to one of two relevance conditions (*Language OR Meaning*). Participants listened to a pre-recorded series of 90 names of simple objects (e.g., *pencil*). Fifty percent of the names were recorded in Arabic and 50% in Hebrew. In the *Language-relevant* condition, participants were asked to report the language of the word they had just heard using a key press. Following the final (90th) trial, they were unexpectedly asked to report the meaning of the word they had just heard (the irrelevant dimension) using a key press. In the *Meaning-relevant* condition participants were asked to report the meaning of the word and following the 90th trial were unexpectedly asked to report the language (irrelevant dimension) of the word they just heard.

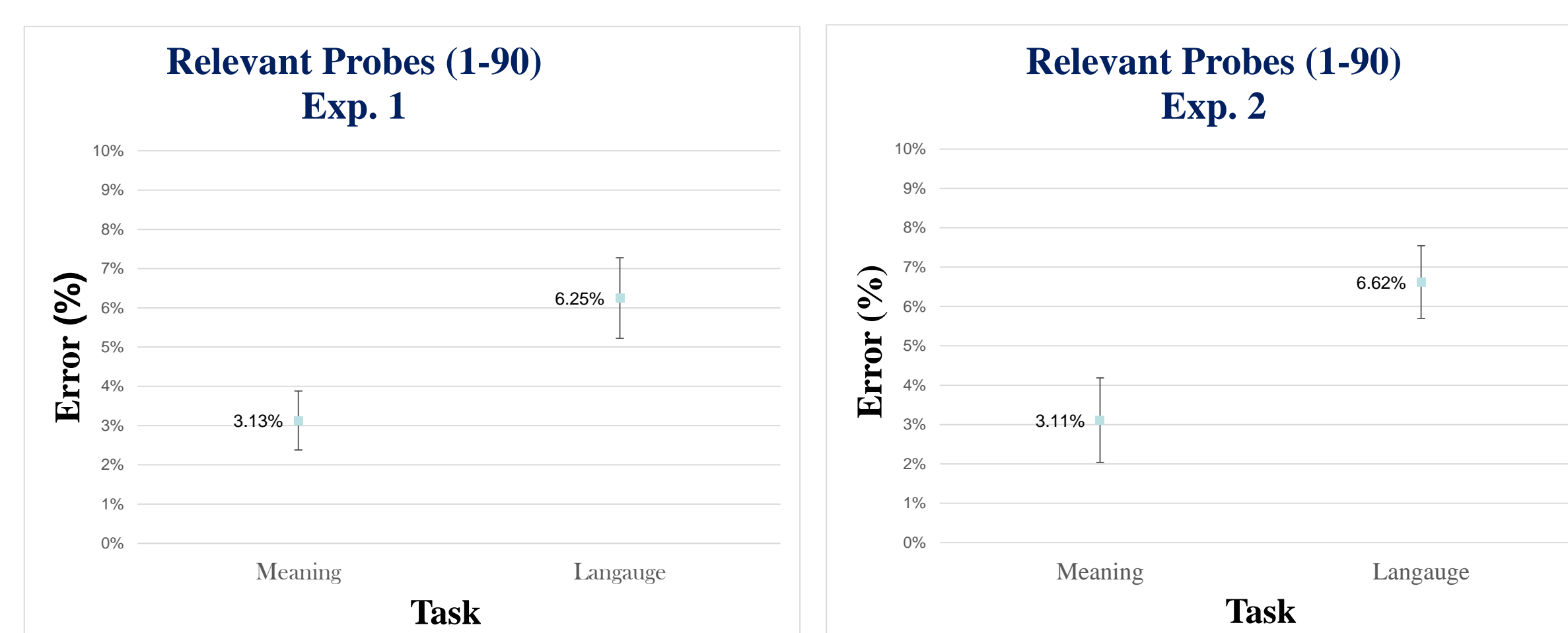
Figure #1: An experimental trial



Results

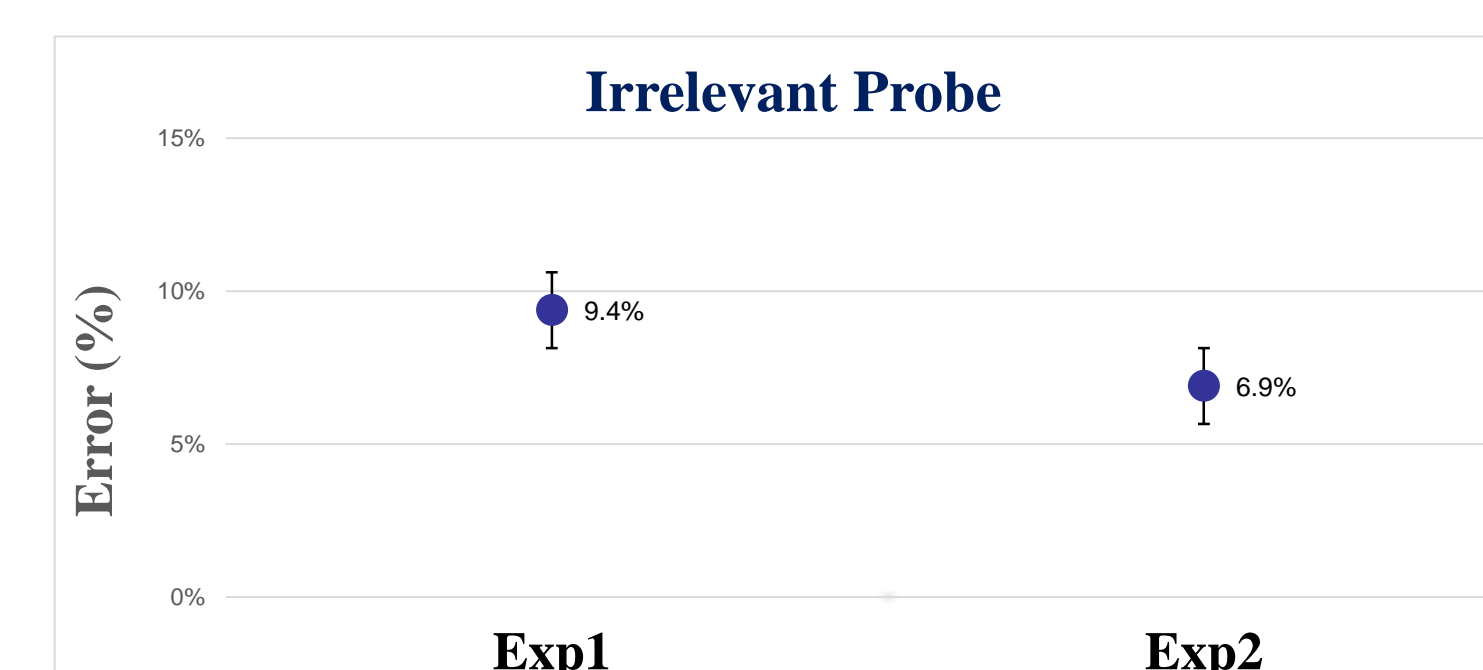
- One participant was excluded from the analyses, due to low accuracy (<85% correct). Participants with incorrect responses in the final task-relevant probe were also not included in the analyses (overall screening, 364/5460 trials, ~7%).
- An exact proportion test compared participants' accuracy on the 90 relevant probes and on the final, task irrelevant (surprise) probe.
- For the 90 relevant task-trials accuracy for *language* was significantly lower (7% errors) than that for *meaning* (3% errors)
- *When irrelevant* accuracy for the meaning of the word was perfect and performance of language was significantly lower (19% error)
- These pattern replicated in a second experiment

Figure #2:: Error rates for the 90 relevant probes (95% Ci's)



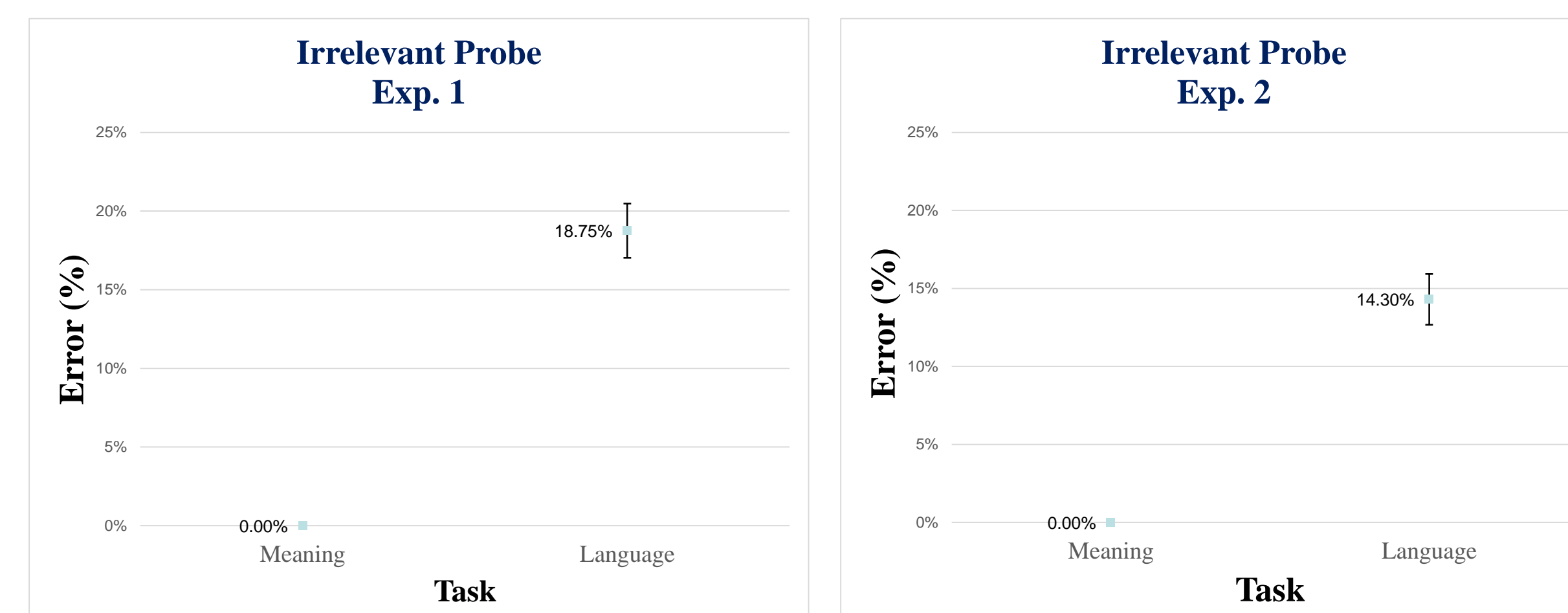
In both experiments, accuracy was significantly lower for *Lang-Relevant* than for *Meaning-Relevant*, $P < 0.05$

Figure #3: Irrelevance Induced 'Deafness' as measured in the current study, regardless of Task Conditions



Relatively small effect of relevance induced 'deafness' comparing to findings on visual modality, 95% CI's, $P < 0.05$

Figure #4: Error rates for the irrelevant (surprise) probe (95% Ci's)



In both experiments, accuracy was significantly lower for *Lang-Irrelevant* than for *Meaning-Irrelevant*, $P < 0.05$

Conclusions

- Two experiments demonstrate, for the first time, the phenomenon of irrelevance induced 'deafness' in the context of available resources
- But, and unlike the visual domain, (transient) task-relevance did not lower the extraction of the meaning of the auditory stimulus
- These results may indicate that for spoken language meaning is a 'chronically relevant' dimension (Eitam & Higgins, 2010)³
- Future research will test whether this pattern extends to non-bilingual participants and to other dimensions (e.g., gender of speaker)
- One caveat is that the words were pronounced by a non-native Hebrew speaker with a slight accent when speaking Hebrew. We are replicating the study with an Arabic speaking Native Hebrew speaker

References

1. Eitam, B., Yeshurun, Y., & Hassan K. (2013). Blinded by irrelevance: pure irrelevance induced "blindness". *J Exp Psychol Hum Percept Perform*, 39(3), 611-615.
2. Eitam, B., Shoval, R., Yeshurun, Y. (2015). Seeing without knowing: task relevance dissociates between visual awareness and recognition. *Annals of The New York Academy of Sciences*, 1339, 125-137
3. Eitam, B., Higgins, E.T. (2010). Motivation in Mental Accessibility: Relevance Of A Representation (ROAR) as a New Framework. *Soc Personal Psychol Compass*, 4(10), 951-967.