

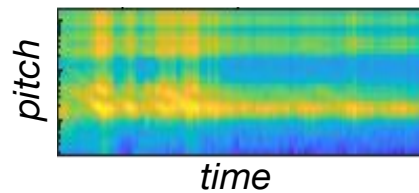
1. The basic idea: Artificial echolocation

Robin makes an ultrasonic **Emission**, reflected as ultrasonic **Echoes**:



Emission

Echoes

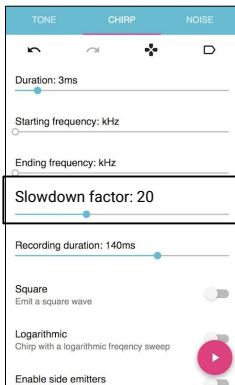


We can only hear these sounds if they're slowed down to human-audible frequencies

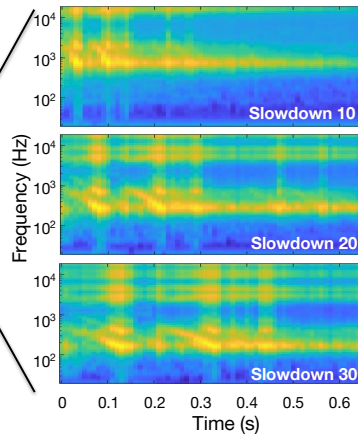
I can hear them just fine!

2. What we've already been doing

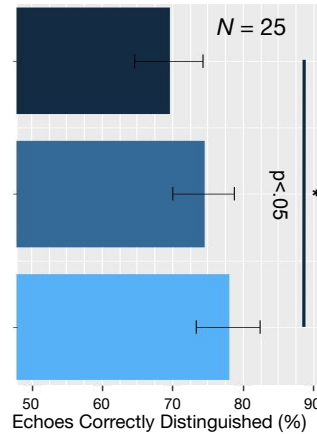
Early testing suggests **slower echoes are more distinctive**:



Slowdown: one of many settings



The same echo slowed by a factor of 10 to 30



How well people can tell echoes apart

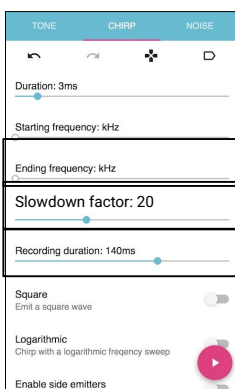
Slowing the signal by 30x greatly improves echo distinctiveness compared to 10x

Reynolds, I., & Teng, S. Design and optimization of assistive ultrasonic echolocation. *J. Tech. Pers. Disabil.* (2024)

Bhattacharyya, P., Tam, R., Reynolds, I. & Teng, S. Optimizing Signal Parameters to Enhance Echoacoustic Perception in Humans. *IMRF* (2025).

3. Where we hope to go from here

We explore **optimal settings** for other, more realistic situations



? Distinguishing objects

? Navigating spaces

? Identifying different places

? Training for "natural" echolocation

Different signals might work best for different objects, scenes, tasks...

Eventually, we could simplify, automate, and integrate echo-inspired signals with existing tools (smart glasses, phones)

