

How effective, accurate and repeatable are subjective CI microphone checks?

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The problem

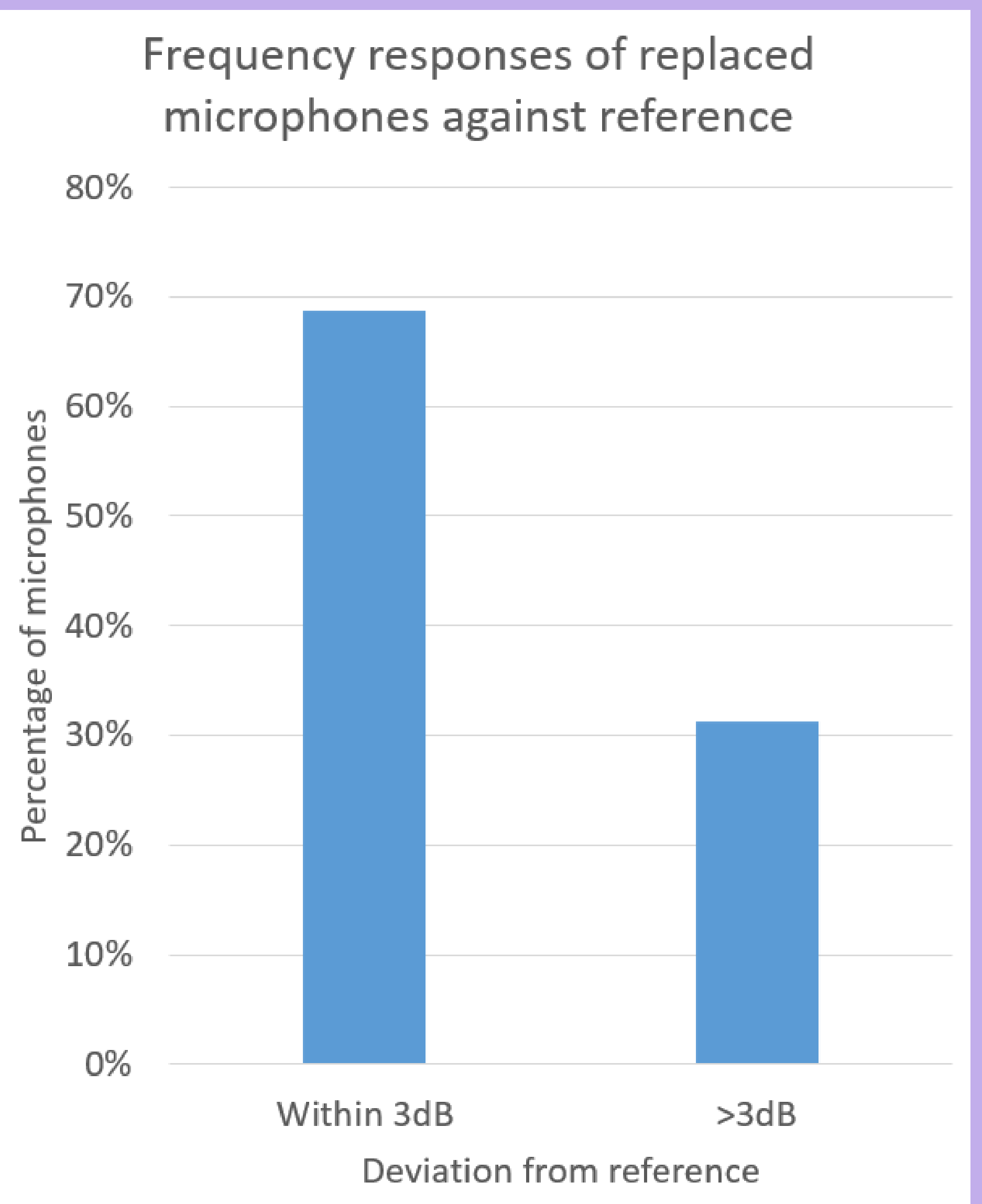
Cochlear implant microphones can deteriorate due to moisture, dust, wear and tear etc. Hearing aids can be measured in test boxes, but the only way of measuring CI microphones is subjectively (e.g. AB Listening Check[®]).

Microphones may be replaced unnecessarily “just in case”, generating significant expense.

Are faulty microphones really faulty?

We developed and built a microphone tester. We compared the frequency response of 32 microphones that the University of Southampton Auditory Implant Service sent for repair with the average frequency response of 4 new microphones.

We found that most of the tested microphones had frequency responses within 3dB of the reference microphones at all frequencies from 100Hz to 10kHz.



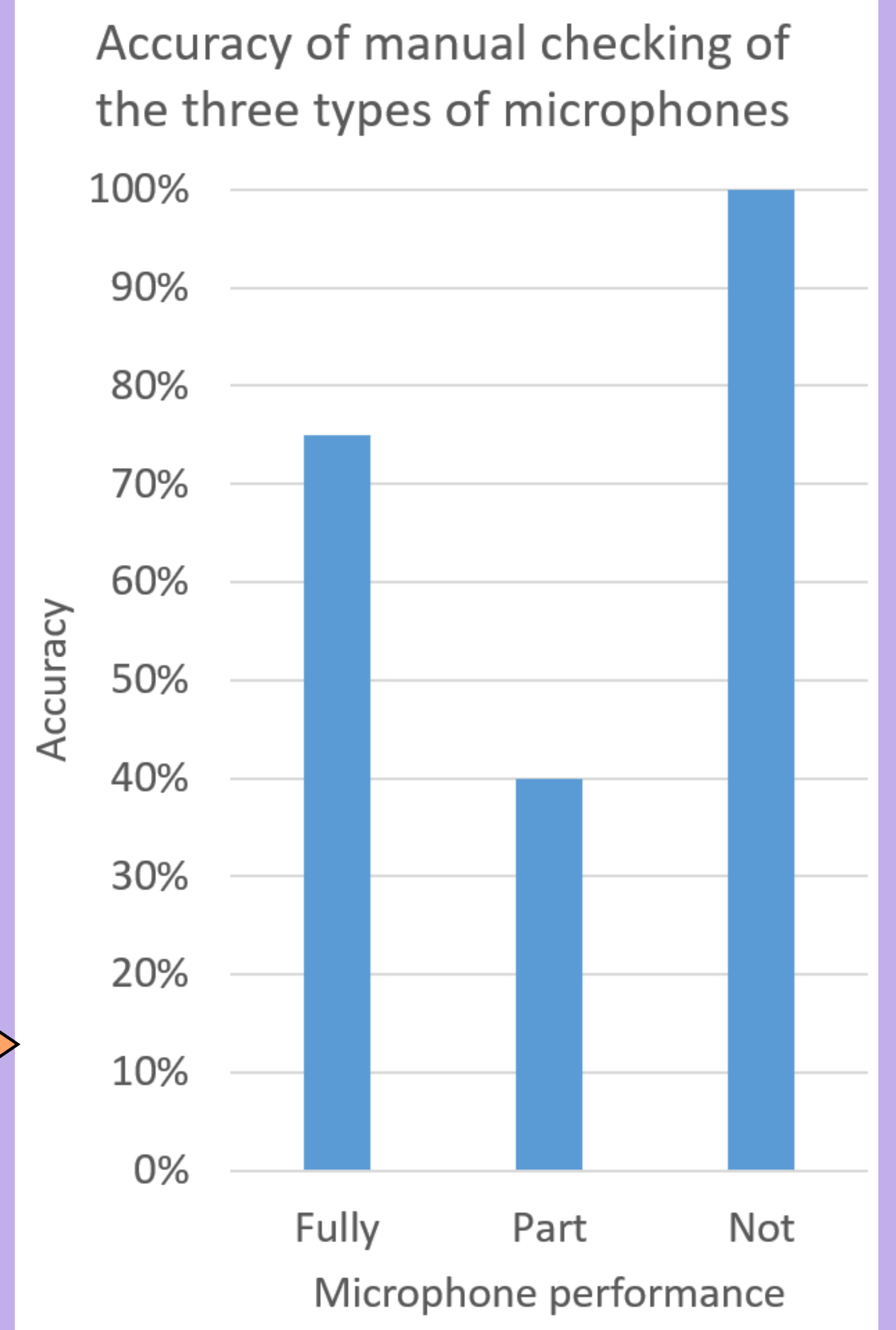
How accurate are subjective listening checks?

We asked 10 people with normal hearing to assess whether T-mic microphones were **fully working**, **partially working**, or **not working** using the Listening Check[®]. Partially working microphones had a frequency response showing deviations from new microphones by at least 15dB in some frequency regions. Not working microphones had no output. Participants had no specialist knowledge of microphones, similar to many parents of children with cochlear implants.

It was easy for listeners to identify the microphones that were not working (100% correct identification). Microphones that were fully working were correctly identified 75% of the time. Those that were partially working (reduced output at some frequencies) were less easy to identify. Worryingly, they were classed as fully working 20% of the time.

Error analysis		Response		
		Fully	Part	Not
Presented category	Fully	75%	20%	5%
	Part	20%	40%	40%
	Not	0%	0%	100%

Next experiment: are CI clinicians better at subjective listening checks?



Conclusions

- CI microphones are being replaced unnecessarily
- Subjective listening checks may not pick up degraded microphone performance

