

# Ultrasound Visual Biofeedback in the Clinical Management of Speech Sound Disorders

Ellie Sugden and Joanne Cleland

University of Strathclyde, Glasgow

Ultrasound visual biofeedback (U-VBF) has been used in intervention to treat<sup>1</sup>:

- Residual speech sound errors
- Persistent speech disorders
- Childhood apraxia of speech
- Speech errors from cleft lip and/or palate

Evidence ranges from case studies to RCTs (mostly single case studies, 44.8%)<sup>1,2</sup>

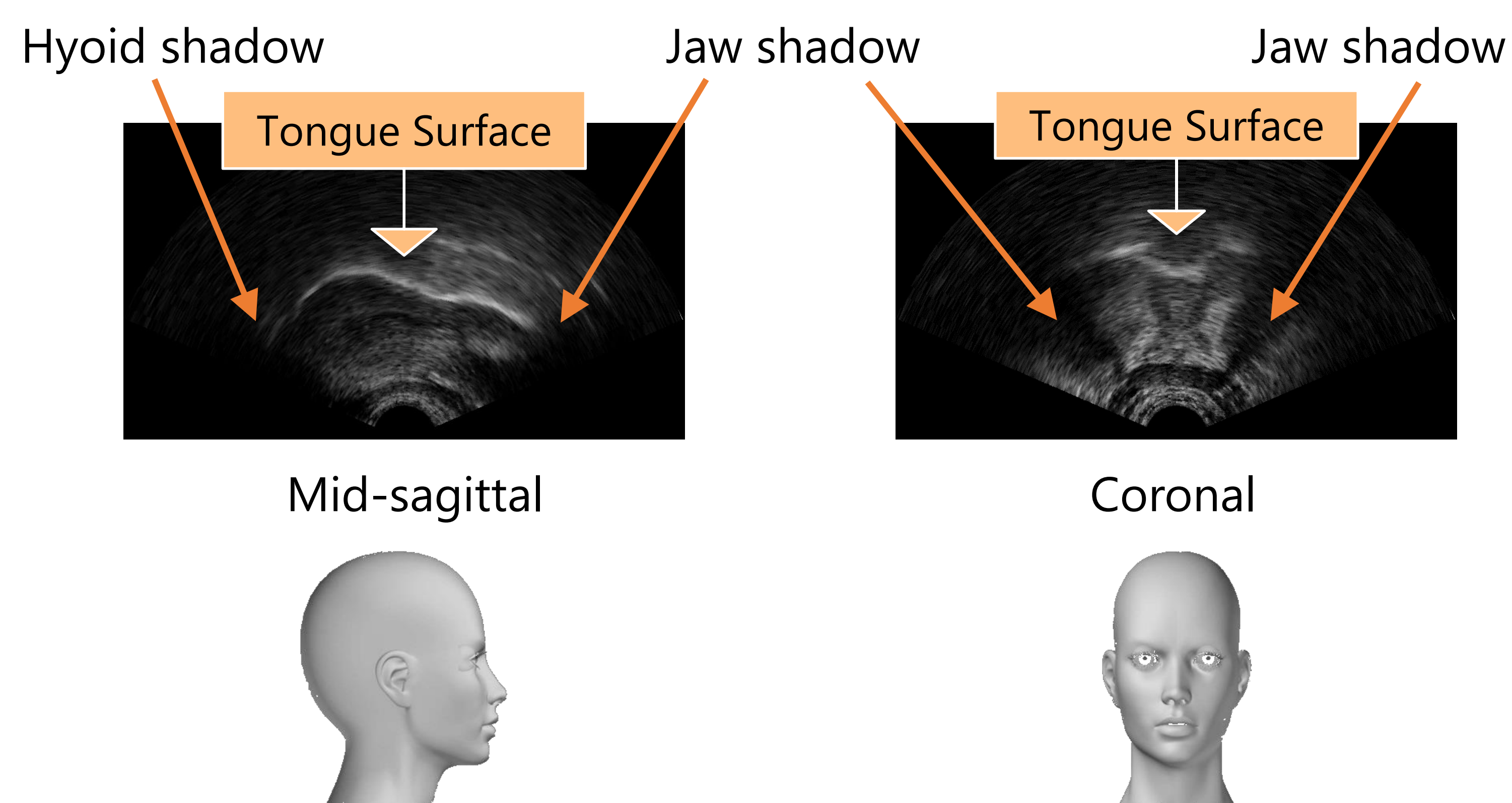
U-VBF can be used to treat many targets:



Across the evidence base, U-VBF has typically been used as an adjunct to other phonetic-based approaches<sup>1</sup>

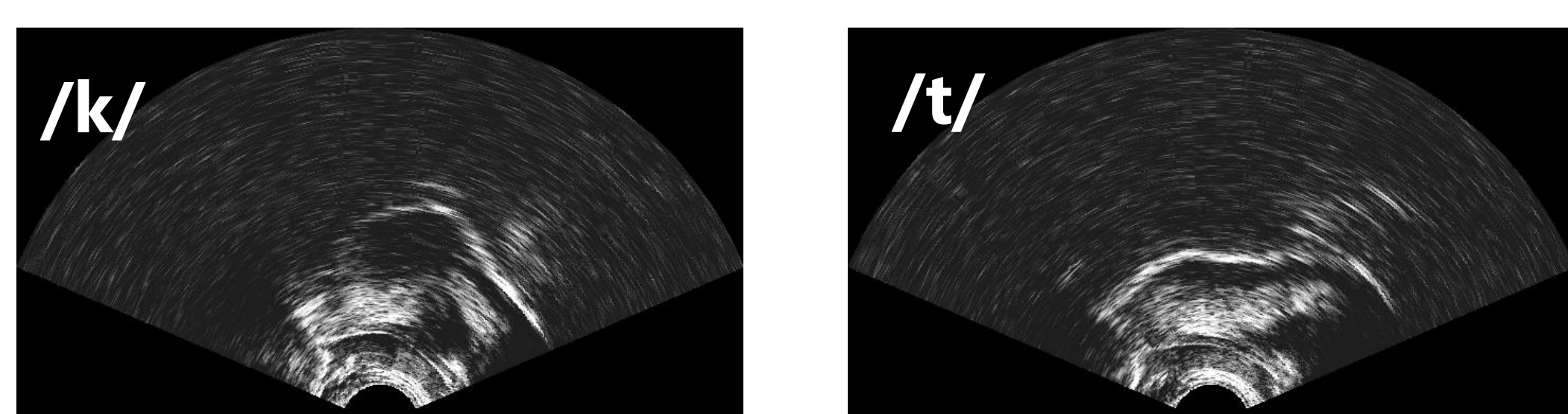
Facilitates the acquisition of targets, but some difficulties with generalisation for some participants<sup>1,3</sup>

## Interpreting the Ultrasound Image

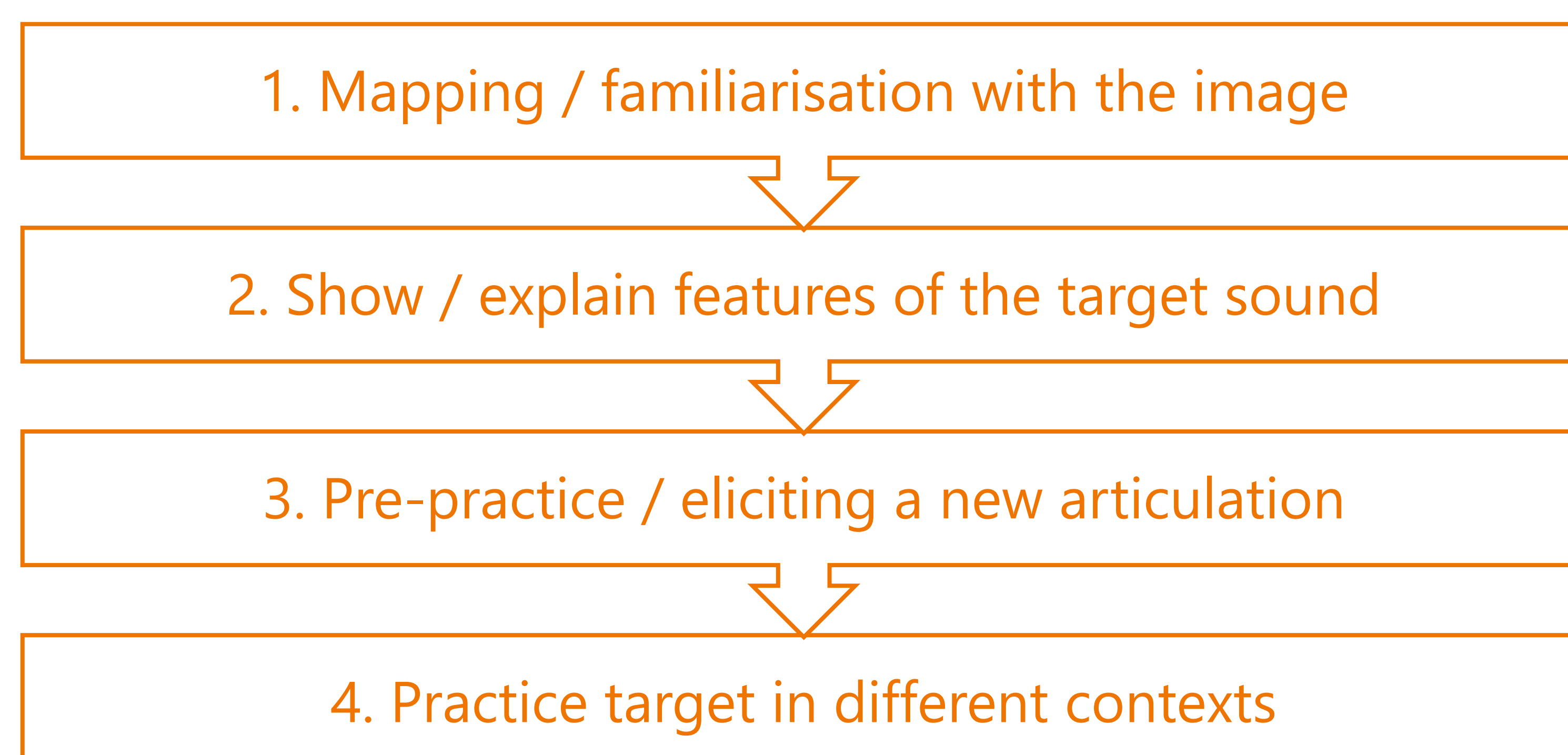


The ultrasound can be used in **assessment** to confirm transcriptions, identify unusual speech errors, or identify covert contrasts

Comparing /k/ and /t/



## Steps in Ultrasound Intervention<sup>4</sup>



Consider the *Principles of Motor Learning* in therapy<sup>5</sup>



## References

1. Sugden, E., Lloyd, S., Lam, J., & Cleland, J. (2019). Systematic review of ultrasound visual biofeedback in intervention for speech sound disorders. *International Journal of Language and Communication Disorders*. <https://doi.org/10.1111/1460-6984.12478>
2. Furniss, R., & Wenger, T. (2018). Seeing the big picture: The use of ultrasound in treating functional speech disorders in school-aged children in a community health setting. *Journal of Clinical Practice in Speech-Language Pathology*, 20, 76-82.
3. Sjolie, G.M., Leece, M., & Preston, J.L. (2016). Acquisition, retention, and generalization of rhotics with and without ultrasound visual feedback. *Journal of Communication Disorders*, 64, 62-77.
4. Cleland, J., Wrench, A., Lloyd, S., & Sugden, E. (2018). *ULTRAX2020: Ultrasound Technology for Optimising the Treatment of Speech Disorders: Clinicians' Resource Manual*. Glasgow: University of Strathclyde. <https://doi.org/10.15129/63372>
5. Maas, E., Robin, D. A., Austermann Hula, S. N., Freedman, S. E., Wulf, G., Ballard, K. J., & Schmidt, R. A. (2008). Principles of motor learning in treatment of motor speech disorders. *American Journal of Speech-Language Pathology*, 17(3), 277-298.

## Disclosure

The research is supported by an Engineering and Physical Sciences Research Council UK (EPSRC) grant awarded to Dr Cleland (EP/P02338X/1)

