

Mirror Neurons in Teaching Vocal Skills*

AKA: The Uses and Limitations of Imitation.

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Mirror Neurons are nerve cells within the brain that are active during both the performance of an action and the perception (via sound, sight, or through spoken/written language) of the same action (1-3).



There is a flow on effect down to the level of the muscles involved in that action (4,5). This flow on effect may be responsible for the sensations we feel in our own body when we listen to other singers who sing in a vocal tone similar to own.

Current Theories of Mirror Neurons and Imitation	Implications for teaching Vocal Skills
Will only be activated if the person can do the precise action already. Otherwise the recognised components of the action that exist within the person’s repertoire will be activated (6,7)	<p>People can only accurately imitate what they have already done in the past, otherwise they will do the closest they can</p> <p>Perhaps explains the high success of using basic emotional/vegetative vocalisations as stepping stones to more complex tasks</p> <p>Helpful for teachers to be able to produce common, if not all, “errors” so that they can more quickly hypothesise what is happening differently & provide a bridge to the goal</p>
Activation is beyond conscious control – automatic priming (9)	<p>The teacher must be sure all aspects of the model they demonstrate are what they want imitated, as students may unconsciously imitate aspects the teacher didn’t intend</p> <p>Need to work towards the student gaining voluntary control if they require it.</p>
Circuitry is developed through motor exploration with attention to the sensory results – associative learning (10,11)	Supports ensuring students pay attention to the sound and kinaesthetic sensations of their singing
These neurons can be activated by verbal labels (2)	Supports the use of labelling particular behaviours (e.g. “vibrato”) to enable voluntary retrieval and reproduction later

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Some Areas for Future Research

- Mechanisms of interference vs. enhancement of mirror neuron activation and vocal imitation?
 - Nervousness versus a feeling of safety in the lesson/therapy session.
- When is it more useful to have a student name or describe a modelled vocal quality in their own words rather than the teacher giving it a specific label?
- How is visual & auditory information integrated in the activation of mirror neurons controlling the vocal tract?

Research into infants' neuronal responses to observing movements that are within & beyond their repertoire has helped us start to understand mirror neurons



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