

Mother's behavioral corrections tune infant's brain to angry tone

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The same brain network that adults use when they hear angry vocalizations is at work in infants as young as six months old, an effect that is strongest in infants whose mothers spend the most time

controlling their behavior, according to a new study in the open-access journal *PLOS ONE* by Chen Zhao of the University of Manchester, UK, and colleagues. The study indicates that the network recruited in adult vocal emotion processing is up and running quite early in life, and that its sensitivity to anger is partly a result of maternal interactions.

It has been recognized for generations that infants can distinguish the emotional content of their mothers' voices long before they understand words, based on intonation, tone, rhythm, and other elements. In adults, that emotional content is processed in the frontal and temporal lobes. Brain imaging studies in infants have been performed, but the noise of an MRI machine has made analysis of response to sounds challenging.

In the current study, the authors overcame that limitation by using functional near [infrared spectroscopy](#), a silent, noninvasive method that measures [blood flow](#) to cortical areas, while infants sat in their mothers' laps and listened to recorded non-speech vocalizations that were angry, happy, or neutral in emotionality. Separately, the team also observed the same mother-infant pairs during floor play, quantifying the mother's interactions in terms of both sensitivity to infant behavior as it changed, and directiveness, or the degree to which the mother sought to control the infant's behavior.

They found that both angry and happy vocalizations activated the fronto-cortical network, and the level of activation in response to anger was greater for those [infants](#) whose mothers were more directive in their interactions. The results suggest that greater experience with directive caregiving, or the stress it produces, heightens the infant brain's ability to detect and respond to angry vocalizations.

Zhao adds: "Brain science shows that babies' brains are sensitive to different emotional tones they hear in voices. Such tones can cause different activation patterns in the infant's [brain areas](#) which are also

known to be involved in processing voices in adults and older children. These patterns also reveal that the early care experienced by babies can influence brain responses so that the more intrusive and demanding their mother, the stronger the [brain](#) response of these 6-month-olds is to hearing angry voices."

More information: Zhao C, Chronaki G, Schiessl I, Wan MW, Abel KM (2019) Is infant neural sensitivity to vocal emotion associated with mother-infant relational experience? *PLoS ONE* 14(2): e0212205. doi.org/10.1371/journal.pone.0212205

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