Aisha Washington

48752125

LING 445

Whistling and the brain, and how that helps us understand language

Whether you can or you can't, whistling continues to be shown as helpful in illuminating researchers' understanding of language processing in the brain. Neurological processing, as you may know, is conducted in the two hemispheres of the brain—the left hemisphere and the right. The left hemisphere is generally attested to controlling the right side of the body, as well as logical and analytical functions, while the right hemisphere controls the left side of the body and houses our creative centers. In terms of processing natural human languages, it is well understood and attested that the left hemisphere is devoted to processing and perceiving language in the form of its syntax—the grammatical structures of language—and its semantics, or the prescribed meanings of words as we use them. The right hemisphere is all about sound, and processing non-linguistic sounds, like music, melodies, and, yes, whistles.

So what does whistling have to do with language? Even more, how does whistling help researchers understand how the brain processes language? Scattered across the globe there exists pockets of communities that employ whistling as a form of communication. These languages are, perhaps obviously, termed 'whistled languages' and used in indigenous communities on the American continent, on the Canary Islands of Spain, and within remote mountainous regions of Turkey, and among many other locations. Generally, whistled languages are adapted from a spoken language, in order to communicate across large distances of difficult to traverse terrain, as whistled sounds carry across further distances than speaking or yelling would. The whistled version of a language features a variation of the spoken language's phoneme inventory, which is an inventory of all the sounds that can be produced or distinguished in a given language. These phoneme distinctions are the reason why we usually have difficultly pronouncing words of another language, especially when the language is very different from our own. If you're a native speaker of English and have ever tried to say something in Mandarin, you know what I mean. What is interesting about whistled Turkish is that it has a near 1 to 1 mapping of whistled sounds to spoken ones, while also employing the full vocabulary and grammatical structures of spoken Turkish. Most other whistled languages feature a reduced phoneme inventory due to the linguistic makeup of the source language, and are sometimes more limited in the kinds of things that can be communicated. The close relationship between the whistled and spoken forms of the languages gives it a unique place in the study of natural language processing in the brain.

Recent research into whistled Turkish shows that it activates the same

regions of the left hemisphere as spoken Turkish, thereby cementing it as a human language, no different from speaking English, Mandarin, or any of the thousands of other languages in the world. Additionally, perhaps against the grain of common conception, whistled Turkish also showed to have significant activation in the right hemisphere, indicating a greater synthesis in the interaction between the right and left hemispheres of the brain. Intuitively, this becomes clear when we understand it as the right side picking up the musicality of the whistling sounds, and handing the information over to the left hemisphere to translate it as a form of communication. You might be thinking that whistled Turkish is essentially spoken Turkish, but whistled, so of course it would be processed as such. So what does the research say about whistled languages that aren't perfect mappings of their source language, and maybe slightly more arbitrary in their delivery? Well, it says the same thing. Left hemisphere activation is completely in line with that of spoken languages, with complementary right hemisphere activation as a result of the whistling sounds.

In addition to whistled languages, there have been a number of studies done with respect to understanding the right hemisphere's role in human language processing. One study in particular looked at comprehension of language prosody—the rhythms produced when speaking language, utilizing things like sentence stress, intonation, and accent—in people who suffer from aphasia, or communication disorders caused by brain damage. Most suffers of aphasia have damage to the left hemisphere, but this study also looked to people with right hemisphere damage, and some other kinds of brain damage as well. The results showed that all of the patients had difficulties processing language, but the group of patients with damage to the right hemisphere of their brains performed the worst in deciphering stress patterns in words, sentences, and in conversations, as well as intonation. So, these people would have difficulty understanding and processing the differences between "I want to reCORD a REcord", or "JOHN likes Susan" versus "John likes SUSAN?". The kinds of things we may take for granted when speaking or understanding language.

So what does this mean? It means that neurological processing may not be as lateralized as one may initially think. That language is not completely relegated as a function of left brain stimulation, and it is now well known that language processing also utilizes aspects of the right hemisphere for the fullest possible understanding of language. In addition, studies like these shed light on the importance of recognizing and studying languages that may fall outside of the general view of what a language is, and the value of studying languages apart from those most globally spoken.

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