Toward a Speech Neuroprosthesis

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Abstract:

Spoken communication is a basic human function. As such, loss of the ability to speak can be devastating for affected individuals. Stroke or neurodegenerative conditions, such as amyotrophic lateral sclerosis, can result in paralysis or dysfunction of vocal structures that produce speech. Current options are assistive devices that use residual movements, for example, cheek twitches or eye movements, to navigate alphabet displays to type out words.While some users depend on these alternative communication approaches, these devices tend to be slow, error-prone, and laborious. A next generation of rehabilitative technologies currently being developed, called brain-computer interfaces (BCIs), directly read out brain signals to replace lost function. The application of neuroprostheses to restore speech has the potential to improve the quality of life of patients with neurological disease, but also including patients who have lost speech from vocal tract injury (eg, from cancer or cancer-related surgery).