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From sensorimotor to cognitive: The neural-computational bases of higher-level speech control.

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The neural study of speech production has made considerable strides in describing the adaptive mechanisms of spoken language under varying perceptual and articulatory conditions, generating detailed neural-computational models of speech motor control and learning. Research on adaptive speech production in the cognitive domain, however, has remained comparably scant and less systematic, providing only partial understanding of the factors that influence higher levels of speech planning. To bridge this gap, this presentation will discuss recent evidence highlighting the networks underlying the cognitive control of spoken language, in particular the processes of uncertainty resolution between conflicting alternatives at distinct levels of representational abstraction. Our findings, emerging from the combination of information-theory and functional imaging, suggest that these higher-order processes of speech control rely on a complex frontal-parietal-cerebellar network presumably involved in guiding non-verbal actions but nevertheless crucial for achieving fluent, creative speech production. Possible avenues for integrating this neural assembly with the ?minimal network? of brain regions supporting speech articulation will be discussed.

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