UC Merced

Title

Multimodal integration as predictions. An explanation of the McGurk effect

Permalink

https://escholarship.org/uc/item/0mv0j42k

Journal

Authors

Flores-Coronado, Marco A.
Ciria, Alejandra
Lara, Bruno

Publication Date

2022

Peer reviewed

Multimodal integration as predictions. An explanation of the McGurk effect

Marco Flores-Coronado
Universidad Autónoma del Estado de Morelos, Cuernavaca, Mexico

Alejandra Ciria
Universidad Nacional Autónoma de México, Ciudad de México, Mexico

Bruno Lara
Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, Mexico

Abstract

During speech perception, humans constantly sense multiple sources of information. As so, the McGurk effect has been typically conceived as a prototypical example of language multi-modal integration, specifically, it has been used to study audio-visual integration during speech. The McGurk effect arises when in-congruent audio-visual stimuli are paired and perceived as a different syllable (auditory /ba/ + visual /ga/ = percept "da").

We developed a hierarchical computer model, based on self-organizing maps and Hebbian learning to study speech multi-modal integration. Our architecture allows studying the McGurk effect purely on bottom-up processing of audio-visual information. We trained several versions of the model and measured the activation similarity between McGurk alike stimuli and congruent ones by means of mutual information. Our results suggest that the illusory percept arises from the best congruent representation that reduces uncertainty. Furthermore, the reliability of each sensory modality determines the best congruent representation.