PhD position
(Program « Quality of Life and Aging » from Rhône-Alpes Region, France)

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Audiovisual binding and speech perception in noisy environment: neurocognitive characterization and audiological implications

General Objective

Seeing the face of one's interlocutor not only helps to better UNDERSTAND through "lip reading", but also to better HEAR, thanks to a recently discovered mechanism of extracting auditory information from the landmarks of lips movements. The goal of this doctoral study will be, firstly, to characterize this AUDIOVISUAL BINDING mechanism on normal subjects using both neurophysiological and behavioral approaches and, secondly, to study pathological populations that may exhibit deficits in this mechanism.

Methodology

We have recently developed a new experimental paradigm showing that the identification level is preceded by a binding level in the process of audio-visual speech decoding. The idea here is to precede the target stimulus by a contextual audiovisual stimulus in which sound and image are incoherent. This contextual inconsistency modulates the audiovisual perception due to a binding/untying effect, according to which subjects consider that, since the sound and picture are incoherent, they should not be merged and then untie the two sensory modalities. Untying effects seem to be fast, one to two seconds are enough to produce the effect.

We aim at a better understanding of how the binding mechanism work in subjects with normal hearing, through a combination of behavioral and neurophysiological approaches, and also to determine, by comparison, how these mechanisms work in patients with hearing deficits. The study will be organized into three parts:

1. Behavioral characterization of the audiovisual binding mechanism and its implications in the processing of speech in noise. The goal here is to determine whether the inconsistent audiovisual context that causes the multimodal untying would also diminish the benefit of vision in noisy conditions.

2. Neurophysiological characterization of the binding mechanism, in order to study the neurophysiological correlates of the binding/untying process, using a electrophysiological tool (EEG).

3. Study of specific populations, like hard of hearing, presbyacusia and aging patients, and deaf patients rehabilitated with cochlear implants. We aim at checking whether this binding mechanism is less efficiently in pathological cases. If the binding/untying mechanisms can partly explain multisensory deficits of speech understanding in noise, then we can provide tools for improvement and rehabilitation of these mechanisms.

Required skills

Good knowledge of experimentation in cognitive science and neuroscience. A specific interest and expertise on handicap and/or modeling skills are welcome.

To apply

Send resume and motivation letter to Jean-Luc Schwartz (jean-luc.schwartz@gipsa-lab.grenoble-inp.fr) before June 10, 2012. Preselected candidates will be interviewed by June 28, and the decision will be communicated on June 30 at the latest.

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