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# The neural network sustaining crossmodal integration is impaired in alcohol-dependence: an fMRI study.

Pierre Maurage<sup>\*†</sup>, Frédéric Joassin<sup>1</sup>, Mauro Pesenti<sup>1</sup>, Cécile Grandin<sup>2</sup>, Alexandre Heeren<sup>1</sup>, Pierre Philippot<sup>1</sup>, and Philippe De Timary<sup>2</sup>

<sup>1</sup>Faculty of Psychology, Catholic University of Louvain (UCL) – Belgium

<sup>2</sup>Faculty of Medicine, Catholic University of Louvain (UCL) – Belgium

## Abstract

**Background:** Crossmodality (i.e. the integration of stimulations from different sensorial modalities) is a crucial ability in everyday life. Nevertheless, while sensory binding difficulties have been described in several psychiatric conditions, crossmodality *per se* has not received much attention in psychiatry. We showed earlier that crossmodal processing is impaired at behavioural (Maurage et al., 2007) and electrophysiological (Maurage et al., 2008) levels in alcohol-dependence, but the brain areas involved in this deficit are still undetermined. Centrally, it is unknown whether this crossmodal deficit is related to (1) the accumulation of unimodal impairments; (2) specific crossmodal areas alterations; (3) reduced connectivity between these areas. The present study investigated the cerebral correlates of crossmodal integration in alcohol-dependence.

**Methods:** 14 alcohol-dependent subjects and 14 paired controls were scanned while performing a categorization task on faces (F), voices (V) and face-voice pairs (FV). A subtraction contrast [FV-(F+V)] isolated the brain areas involved in crossmodal face-voice integration. The functional connectivity between unimodal-crossmodal areas was explored using psychophysiological interactions (PPI).

**Results:** Alcohol-dependent subjects presented only moderate alterations during unimodal processing. More centrally, in the [FV-(F+V)] contrast, they did not show any specific crossmodal brain activation while controls presented activations in crossmodal areas. Moreover, PPI analyses showed reduced connectivity between unimodal and crossmodal areas in alcohol-dependence.

**Conclusions:** This first fMRI exploration of crossmodal processing in alcohol-dependence showed a specific face-voice integration deficit indexed by reduced activation of crossmodal areas and reduced connectivity in the crossmodal integration network. Using crossmodal paradigms is thus crucial to correctly evaluate the deficits presented by alcohol-dependent subjects in real-life situations.

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\*Speaker

†Corresponding author: pierre.maurage@uclouvain.be