Should I stay or should I go? Neural bases of the street crossing decision

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Résumé

Time to contact (TTC) is the remaining time before a moving object reaches its observer or another point in space. In order to catch a ball or to cross the road safely it is necessary to make a correct estimation of the TTC of the moving object. If this estimation function is essential to maintain the autonomy of the person, it is still poorly understood. The objective of this study is to determine which brain area(s) are involved in the realization of this TTC estimation task in a street crossing context.
For this purpose, a causal approach allowing a very precise temporal resolution is used: awake surgery. Patients with brain tumors participate in the study. During awake surgery, the neurosurgeon can stimulate a brain area which will temporarily inactivate it. The patient performs the task at the same time. If the patient is able to perform the task during preoperative tests, but is no longer able when an area is inhibited, we can deduced that this area is involved in the performance of the task. Nevertheless, in these patients, the areas tested are located on the surface of the cortex. Thus, in order to test the involvement of more deeply located cerebral areas, a second part was added to the study using another method: intracerebral EEG.

This second method is a correlational and non-causal technique but allows to test deeper areas, has high spatial and temporal resolutions and provides information about the dynamics of the TTC estimation. The participants are drug-resistant epileptic patients implanted with deep electrodes in order to localize the epileptogenic focus for performing a surgical removal of this focus. These patients perform the same tests of TTC estimation as the awake surgery patients. Only two patients could be included in the study for the moment due to the small number of patients implanted because of the extremely invasive context of this method. The results obtained by these 2 methods will be presented.

Mots-Clés: Time, to, contact, awake surgery, sEEG

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