Action influences perception of occlusion duration in prediction- motion tasks

Xuening Li*[1,2], Robin Baures[2], and Sylvain Crémoux[2]

[1]Université Toulouse III - Paul Sabatier – Centre national de la recherche scientifique - CNRS (France) – France

[2]Centre de recherche cerveau et cognition – Institut des sciences du cerveau de Toulouse., Université Toulouse III - Paul Sabatier, Centre National de la Recherche Scientifique – France

Résumé

Background: Correct prediction of occluded object's motion relies on the ability to determine spatiotemporal characteristics of the moving object before its occlusion. Interestingly, any tasks performed before the occlusion distorts perceived velocity of the moving object which results in altered perception of occlusion duration. Less is known when task is done during occlusion. This study investigates the influence of a motor action on prediction motion (PM) performance in two experiments.
Methods: In Experiment 1, 15 participants had to evaluate whether a moving disc reappeared from occlusion too early or too late giving its initial velocity. Participants concurrently had to perform one action at 4 possible Action Times (- 0.5s; 0.2s; 0.75s; 1.3s according to occlusion onset) indicated by a visible green target. Experiment 2 had similar design but included 2 Action Conditions (Action vs. No Action) and 2 Action Times (- 0.5s; 0.75s according to occlusion onset). Action Condition was indicated by the color of the target. For both experiments, individual psychometric functions were computed to determine the Point of Subjective Equality (PSE) and Just Noticeable Difference (JND) in each condition which reflects the PM performance and precision. ANOVAs were performed to evaluate effects of Action Times and Action Conditions on PSE and JND.

Result: Experiment 1 showed a significant effect of Action Time on the PSE. The PSE was significantly negative only for the condition of Action Time -0.5 s, and not different from 0 in the other Action Time levels. Experiment 2 revealed a main effect of Action Condition and a significant interaction between Action Condition and Action Time on the PSE. Specifically, when participants acted in the 0.75 s condition, the PSE was significantly higher than the PSE of all the other conditions. A significant effect of Action Condition was also revealed on JND.
Conclusion: A shift toward positive PSE was observed on temporal estimation only when concurrent hand movement was performed during the occlusion, indicating a tendency to underestimate the duration of occlusion.

Mots-Clés: Keywords: movement, time perception, prediction motion, motion extrapolation

*Intervenant