DECREASE OF THE "TOOL EFFECT" IN OLDER ADULTS: AN INSUFFICIENT UPDATING OF THE BODY-SCHEMA?

Marion Luyat, Kévin Dumez, Myriam Noel, Emin Altintas, Cédric Campion, Michel Guerraz

A DECREASE OF THE TOOL EFFECT IN OLDER ADULTS

Marion Luyat [1], Kévin Dumez [2], Myriam Noël [1], Emin Altintas [1], Cédric Campion [3], Michel Guerraz [4]

1 Univ. Lille, laboratory PSITEC (ULR 4072), F-59000 Lille, France
2 Clinique du Val de Lys (Groupe Ramsay), 167 rue Nationale, F-59200 Tourcoing
3 Lens Hospital Center, 99 route de la Bassée, F-62300
4 Laboratory of Psychology and Neurocognition, CNRS UMR 5105, Univ. Savoie Mont Blanc (USMB), F-73000

INTRODUCTION

Holding a phone or grasping an object are daily activities that require internal model of action, based on body segments parameters: the body schema. In young adults, the perceived limits of reachability are augmented after using a tool (e.g. a rake). This is interpreted as the result of an extension of the body schema (embodiment), reflecting its high plasticity at least in young individuals.

Aims. The goal of our research is to test the possible defect of body schema updating process in older adults by using the tool effect task.

METHODS AND MATERIALS

Forty-six young participants, 20 non-demented older participants and 37 older participants with cognitive impairment took part in the experiment. The task consisted in visually judging the possibility to reach targets positioned at different locations on a table before and after using a rake.

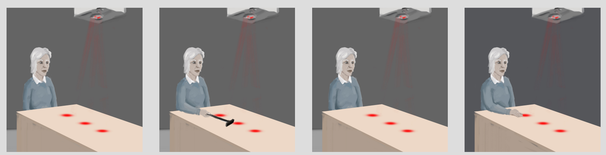

Figure 1. Experimental procedure

RESULTS

The results showed a strong tool-effect in the young participants group. They overestimate their competence once they no longer use the tool. This result, in accordance with previous research, suggests a tool-embodiment in young adults: the body schema has been modified to incorporate the tool.

By contrast, we observed a decrease of the tool effect in the older participants group and even a quasi-complete loss in the participants suffering from neurocognitive disorders even the difference between the two groups was not significant.

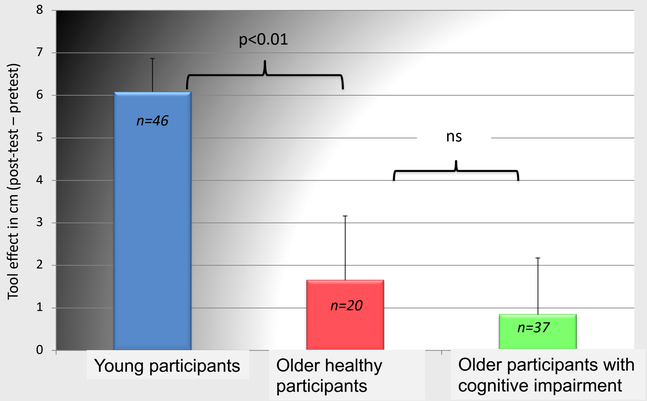

Figure 2. Tool effect in cm (maximum perceived reach after using the rake – maximum perceived reach before) as function of groups

DISCUSSION

The main result showed that the classic “tool effect” observed in young people, decreases with age and even could disappear if the person suffers from neurocognitive disabilities. This is in line with the assumption of an updating process deficit of the body schema with advanced age and could explain over- and underestimation of motor capabilities often found in researches on the elderly.

CONCLUSIONS

A decrease of the tool-effect was found with advanced age, suggesting a reduced plasticity of the body schema and therefore a reduced plasticity and adaptability of motor-action programs. This could enhance the risk of loss of postural control due to misjudgments of intended actions. Thus, the "tool-effect" task could serve both to detect those in high risk of fall and to evaluate the improvement of the plasticity of the motor-action model in rehabilitation process.

REFERENCES

1. Cardinali L, Frassinetti F, Brozzoli C, Urquizar C, Alice C. Roy A.C, Farnè A. (2009). Tool-use induces morphological updating of the body schema, Current Biology Vol 19 No 12
2. Carello, C., Grosofsky, A., Reichel, F.D., Solomon, H.Y., Turvey, M.T. (1989). Visually perceiving what is reachable. Ecological Psychology, 1, 27-54.
3. Gabbard, C., Cordova, A., & Lee, S. (2007). Examining the effects of postural constraints on estimating reach. Journal of Motor Behavior 29(4), 242-246. 3

CONTACT

Marion Luyat
Research Unit: Psitec
Email:marion.luyat@univ-lille.fr
Phone: (+33) 6 62 86 70 53
Website: https://psitec.univ-lille.fr