

A. Serna, V. Rialle, H. Pigot. *Observation and modelling of executive processes and associated dysfunction in aging and dementia for cognitive assistance systems. Gerontechnology 2008; 7(2):208.* Older people and Alzheimer patients suffer from cognitive and executive disorders (such as poor abilities for planning and control of actions)<sup>1</sup>. As a consequence, they gradually lose their autonomy in carrying out activities of daily living (ADL). Smart homes are technological environments aimed to support these persons offering medical monitoring and cognitive assistance for ADL completion. To improve their efficiency and their responsiveness, cognitive remediation and assistive systems should be based on a better understanding of cognitive dysfunctions and their impact on people's daily living. Observation and modelling of executive processes allows mechanisms involved in ADL performance to be observed and to be better understood. **Methods** This work aims to study executive process, functions, especially executive control of the cognitive impairment due to aging and dementia. A three steps approach has been applied: (i) experiment to observe executive mechanisms; (ii) analysis to qualify these mechanisms and their impairment; and (iii) theoretical and computational model of these results within an existent neuropsychological theory (Norman and Shallice's model<sup>2,3</sup>). Based on occupational therapeutic assessments, the experiment has been realized on three populations: young subjects, older subjects and MCI-AD subjects (Mild Cognitive Impairments and Alzheimer's Disease). Subjects were asked to perform an ADL, which was perturbed in order to observe and to qualify their abilities to control their actions, to adapt or correct their behaviour when abnormal or unexpected situations occur. **Results** Observations show an impairment of executive process functions of cognitive impairment. Older people and MCI-AD people show difficulties to adapt their behaviour, especially to change the strategy or the plan. They need help from the experimenter and more time than young subjects to complete the task. With these observations, planning and control processes have been specified to elaborate a model of executive processes. The model is based on the implementation of Norman and Shallice's model<sup>4,5</sup>. **Conclusion** Such a model, with a computational implementation and a simulation part, could predict the most frequently made errors for specific ADL and could be used to improve the design of smart homes and cognitive assistance systems.

## References

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