

Conscious and Unconscious Processes in Artificial Behavior Generation

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Introduction

There are two different meanings for the word "Neurotechnology". From one side, this word might mean the use of technology to help improving the field of Neurology in Medicine. A different meaning for the same term might include the many kinds of inspiration from neuroscience to the improvement of intelligent systems techniques. This contribution is pertained to this second meaning for the word "Neurotechnology".

Among the many theories of consciousness, the Global Workspace Theory, from Bernard Baars investigates from the point of view of neuroscience, how conscious experiences can be correlated to specific brain signals, obtained through fMRI or other means, and also how other signals might be associated to some sort of unconscious processing happening in the brain. By using a contrastive analysis, he discriminated among conscious and unconscious phenomena which were unified in a theory having a remarkable characteristic: it can be simulated by means of a computational procedure, and potentially emulated by means of the design of parallel machines.

Following some results found in the literature, from researchers trying to pursue the same goal of creating new technologies from the work of Baars, in this work we investigate how conscious and unconscious processes might be interacting to each other in order to evolve complex behavior in an artificial creature.

Materials and Methods

We rely mainly in Baars descriptions of his theory, and also on computational implementations of his theory provided by the group of Stan Franklin from University of Memphis, with his LIDA Framework. We disagree with some of the interpretations of Baars theory from Franklin's group, so we started our own development of a computational framework with our interpretation of some specific details of the theory. Our disagreement is related to the issue we want to investigate with this work, i.e. the interaction among conscious and unconscious processes.

Results

This is the report of an ongoing research. At this point, we don't have final results, from the experimental point of view. But our results are computational specifications for the construction of algorithms, which might have a significant impact on the creation of new kinds of neurotechnology.

Discussion

We propose that unconscious processes do not need access to the global workspace to be activated, and that the global workspace is just an interference point where conscious and unconscious processes are able to interact. Using this, unconscious automated processes work as if in a kind of subsumption architecture. Nevertheless, conscious processes are able to interfere in these unconscious processes, resulting in a different behavior.

Conclusion

Due to this interference, conscious processes can be used to train and adapt new unconscious processes, leading to a kind of machine which is able to learn new kinds of behavior, incorporating this to its legacy automatic procedural behavior.