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ACT-R Tutorial

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ACT-R (Anderson, Bothell, Byrne, Douglass, Lebiere & Qin, in press) is a cognitive theory and simulation system for developing cognitive models. It assumes cognition emerges through the interaction of a procedural memory of productions with a declarative memory of chunks and independent modules for external perception and actions. Since its release in 1997, ACT-R has supported the development of over 100 cognitive models, published in the literature by many different researchers. These models cover topics as diverse as driving behavior, implicit memory, learning backgammon, metaphor processing, and emotion. We have recently developed a new version, ACT-R 5.0 that is more interruptible, achieves greater across-task parameter consistency, has better mechanisms of production learning, and is more in correspondence with our knowledge of brain function. The tutorial has no prerequisite knowledge, and is intended to on the one hand give an overview of the theory, and on the other hand offer some direct demonstration of ACT-R models. Although a half day is not sufficient to cover all material, it can wet the appetite for the full ACT-R tutorial that is available on <http://act-r.psy.cmu.edu/>. This website also provides for the necessary software, and overview of researchers using ACT-R, and it has a list of ACT-R publications (many of them downloadable).

During the tutorial, following Taatgen, Lebiere and Anderson (submitted) five popular research paradigms within ACT-R will be used as a vehicle to explain the architecture:

Instance learning

Learning by retrieving old experiences from memory, similar to Logan's instance theory.

Utility learning

Learning which of several available strategies is optimal by keeping track of costs and probability of success.

Working Memory Capacity

Models in which the amount of spreading activation is varied, which can explaining individual differences in working memory capacity

Perceptual/Motor constrained processing

Models in which the main factor in explaining human performance lies in the limitations of their perceptual and motor systems.

Rule learning

Models in which new production rules are learned on the basis of combination of old rules and substitution of declarative knowledge.

Although these individual research paradigms have produced interesting models by themselves, the full potential of the architecture can only be seen when they work together in models of complex cognition.

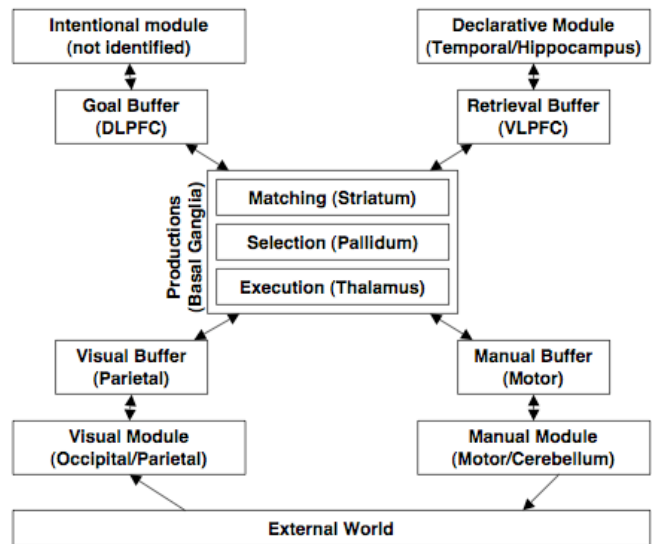


Figure 1: Overview of the architecture

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