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A Computer Simulation Of Emotion Based Development and Processing

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This work models the evolution and use of emotional responses by a simulated agent during its development. It investigates the utility of emotions using a realistic script to model an agent's interactions as a child and adult. The roles of emotions that are examined include: goal formation, information processing and emotional development. The purpose of this simulation is to give some insight into the way early experiences are reflected in an individual's selection of partners.

This investigation is a computer based simulation of situations encountered by Philip, the main character in *Of Human Bondage* Somerset Maugham's vintage work of fiction (Maugham, 1915-1992). This research was based upon a novel to minimize the possibility of investigator bias determining the outcome of the investigation (Lenat, 1984). It was also felt this novel having proven itself a classic would represent something resonant with a larger population. This particular novel was also appealing in that the type of events experienced and actions taken are somewhat mundane, little happens that is outside the realm of common human experience.

One of the more controversial aspects of this book is the protagonist's (Philip) attachment to one woman (Mildred) over another (Norah) who seems much more appealing. This simulation was used to investigate this relationship and identify its potential motivation.

In doing this I model the protagonist's emotional development during the events described in the book. The development consists of an evolving set of Idealized Cognitive Models (ICMs) (Lakoff, 1987) which are refined during his interaction with other characters in the book.

Each ICM consists of a model prototype that identifies specific features important to the model. These features are coupled with a model

specific neural network to measure the quality of match between individuals and the ICM's idealized representations. All events were entered into the script by hand and represent fragments of important events in *Of Human Bondage*. However both the ICM features and the neural network are derived dynamically by the agent during the simulation.

In this simulation, the agent receives an event and processes it in a manner determined by the type of action and its internal state. The agent's cognitive architecture is framed in terms of previous interactions with other agents over time. An agent's goals and assessments are independent of, albeit influenced by, other agents in the situation.

The result of the simulation indicated that Philip's attachment to Mildred is primarily because she is so unlike another character in the book who had hurt him. This was unexpected as he had been raised by a somewhat aloof couple and it was expected that her similarity to them would be more of a factor.

This result indicates that a simple set of "noticing processes" coupled with the fuzzy matching afforded by neural network-based models can be diagnostic of behavior and goals in simulated agents. This shows the potential of using these mechanisms with a simple set of rules to achieve a good level of discrimination and generalization.

References

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