A Myth Understanding System

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Myths are stories that often contain religious beliefs of a society. They portray actions of gods, ghosts, goblins and a seemingly endless variety of other supernatural creatures. Recently cognitive scientists of religion have argued that the most widespread supernatural concepts are minimally counterintuitive in the sense that they violate a few category level intuitive assumptions about agents or objects (Boyer 1994). Furthermore, they have argued that being minimal counterintuitiveness facilitates the transmission of such concepts by making them easier to recall and retell than intuitive or maximally counterintuitive concepts i.e., concepts that violate a large number of intuitive expectations. However, it was unclear as to why human memory evolved to preferentially remember minimally counterintuitive concepts. Recently, Upal (2005) proposed a computational model to explain why an intelligent agent should preferentially remember and retell minimally counterintuitive concepts. The models explains that minimally counterintuitive (MCI) concepts are a cognitive optimum because

- unlike ordinary intuitive concepts, MCI concepts indicate a gap in an agent's existing world model and

- because they unlike maximally counterintuitive concepts that are too bizarre to explain and hence categorize, the occurrence of MCI concepts can be justified, *post hoc*.

This article summarizes the key ideas behind our work on the design and development of an automatic story understanding system, called MYTHU, that instantiates this theory.

Given a representation of elements of a story (as propositions) similar to most existing story understanding systems (Charniak & Wilks 1976; Dyer 1983; Cullingford 1986; Ram 1999; Smith and Hancox 2000), MYTHU constructs explanations that justify the presence of these elements in the story. The explanations are ranked by their coherence (Smith & Hancox 2000) with a representation derived from the most prominent explanation being retained at the end of comprehension and stored in episodic long term memory. The representations derived from stories relate information in the stories to an agent's background knowledge. They can be used to generate predictions about subsequent parts of the story. When these predictions do not come true, MYTHU is forced to abandon an explanation as subsequent elements of a story decrease its coherence. When that happens, MYTHU recognizes that it is dealing with a novel/counterintuitive concept/story and is forced to seek alternative more coherent explanations for the story elements. Upal's (2005) memorability hypothesis reframed

in terms of a story understanding system suggests that the different between minimally and maximally counterintuitive concepts is that while an understanding agent is able to find a coherent explanation for a minimally counterintuitive concept, it is unable to find coherent explanations for the maximally counterintuitive concepts. Upal (2005) further suggests that memory of an intelligent agent should evolve to preferentially remember those concepts that require the most computational effort to create a coherent explanation for them. MYTHU implements this by storing representation for those explanations that are successful in explaining a complete story. For each stored concept, MYTHU stores a tag that denotes a measure of computational effort spent on deriving that representation. When MYTHU's memory becomes full and it needs to delete information, it starts deleting those representations that have a low computational effort value.

We are currently designing and testing the system to see if it can simulate the findings with human subjects regarding better recall for MCI concepts. If our modeling effort is successful, it can

- potentially explain as to why intelligent agents (whether natural or artificial) should preferentially remember minimally counterintuitive concepts, and

- allow us to design a society of interacting myth-understanding agents to grow artificial culture (Gessler 2005).

References

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