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Week 8

Peer Interaction and Problem Solving: When Are Two Heads Better Than One?

This paper attempts to rigorously nail down the effect of collaboration on problem solving and generalization skill among children, as opposed to independent learning. In a nutshell, the paper demonstrates quite dramatically that children with the most to learn from a task (i.e. novices) learn significantly better when paired with a peer expert. The other conditions (solitary task practice, skill-matched pairings) did not show anywhere near the same level of improvement. This has serious implications for human-robot collaboration in specific cases. First, this research seems to indicate that pairing a human with a robot is not likely to be to the human's cognitive learning benefit unless it is part of a highly constrained interaction in which the robot is, or appears to be, significantly more expert than the human - as the paper mentions, acquisition of strategies may depend on whether the individual realizes that those strategies are helpful or effective. But perhaps more importantly, the paper identifies specific areas in which the novice may benefit from the collaboration with an expert. While a robot is currently much less capable even than a human novice, by pairing a robot with a human expert and providing it with the ability to focus on specific task strategies of the human, we may be able to accelerate robot learning in the collaborative context to some degree. In particular, the paper shows that the significant facilitators of learning were observational learning and guidance. It therefore would seem to make sense to design a robot to be able to learn from demonstration and task-focused conversation.

The Design Of Guided Learner-Adaptable Scaffolding In Interactive Learning Environments

This paper describes a piece of educational software that incorporates scaffolding -- a means for focusing the learner's attention on important aspects of the task, away from distracters, and implementing a gradated scale of simplification of the task -- in a fashion that can be "faded" deliberately by the user. I found the scaffolding and fading in this paper to be somewhat simplistic, perhaps due to the age of the paper -- for example, the principal fading mechanisms were "don't remind me again" checkboxes on dialogs, and customizable levels of "advanced" application functionality, which any user of modern software should be familiar with. However, I found it instructive to place these in the formal context of scaffolding, and it did identify the need for more sophisticated fading mechanisms. For example, while I frequently turn off reminders I find pointless, there are some cases where I leave them on -- not because I feel I need reminding, but because I want to retain a checkpoint step for actions that have serious consequences. For example, I find it highly irritating that once the 'really delete these items?' dialog in iTunes has been faded, there is no option for turning it back on. The paper does not seriously tackle non-monotonic fading, which is perhaps a weakness. However, it does seem to make a point that should be well taken by Microsoft et al. -- enabling all of the most advanced

settings by default, e.g. in Microsoft Word, is not necessarily the best way of scaffolding the novice user. These questions should be seriously taken into account when designing a relational machine. In particular, the inability of the system presented in this paper to retain individualized preferences should be an immediate cautionary example that relational machines could elegantly demonstrate progress from.

Affective Agents: Sustaining Motivation to Learn Through Failure and a State of Stuck

This paper is a primarily speculative/proposal piece that motivates further research into affective response/engagement with a system in order to mediate feelings of frustration. Again, its principal usefulness is to structure the discussion in terms of axiomatic descriptors, in this case the states of Flow and Stuck. We would like users to spend more time in Flow than Stuck, and we would like them to be able to recover and learn from periods of Stuck as easily and productively as possible. I do not find the argument that because conscious awareness of Flow diminishes both the state and its affective effects, therefore awareness of Stuck will also have a similar diminishing effect, to be immediately convincing; I think it could also be argued that awareness of Stuck might have a reinforcing, positive-feedback effect, but I will be interested to read more about actual results in this area. The sample dialogues with the two fictional user archetypes could be interesting to use as a seed when thinking of how to structure the dialogue with a relational machine, and knowing when and how to interrupt the focus of the engagement.