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Week 8

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

What I found the most interesting about this paper is the independence of the improvements experienced by the test subjects in the mixed dyads from the metrics one would commonly associate with such improvements. I don't have the short paper abstracts at hand right now, but at CHI I heard a presentation on a paper where the author suggested the interesting idea that such improvements may well be based on competition. What I say from here are my own thoughts from that viewpoint, not the thoughts of the presenter, though s/he started my thoughts along that line.

From a very early age, we are drilled with the fact that we must be better than the average (though in fact the proposition leads to striving for the perceived average). However, the idea of "average" in terms of cognition is perceptually very context driven, and it is usually the case that in a dyad a person will compare him/herself to the other as being the average. Therefore, it is not surprising that the novice in the mixed dyad felt a high degree of pressure to perform at least as well as the other in the dyad. However, the expert member of the dyad did not feel threatened by this (as it is rather natural to rest on the laurels of being initially better), and thus does not feel compelled to improve further. If my hypothesis is correct, it fits perfectly the behavior exhibited, since the added pressure on the novices to improve would increase internal cognitive loading without affecting the outward manifestation of the collaboration. I am myself tempted to say "oh, 5 year olds are too young to think that way." However, studies have shown time and again that these sorts of socially mediated mental patters are exactly the sort that very young children exhibit from the earliest moments of linguistic understanding and comprehension.

At any rate, proceeding with the assumption that the above hypothesis is in fact correct, this suggests a very interesting method of creating companion agents. Obviously, if the agent was continuously "better", such a relationship would only produce a cumulative negative level of stress and dislike. However, if the agent was crafted to strategically be better or worse depending on more or less important concepts, the agent could be well liked (sort of like liking the dumb nice guy in a class), but at the same time could apply pressure when most needed to maximize the effects of learning. This would provide a the correct balance of camaraderie and competition that I have always thought to be important in collaborative learning.

The Design of Guided Learner-Adaptable Scaffolding in Interactive Learning Environments

I think the overall idea here is very sound, though the overall approach is so tightly tied to the GUI that it's somewhat difficult to decouple and analyze the issues independently. I think the primary stumbling block in a relational agent-type scenario is that such agents

do not have an easy way to “background” suggestions. The choice of whether to make it or not is more binary. When a computer acts like a computer, which it definitely does in this case, the problem is minimal, because the user expects a certain level of “computer savant-ness” from the system, and thus absorbs a good bit of abuse by simply ignoring it. However, if the system was designed to be more relational, the problem would be that the relational aspects would cause the user to expect higher levels of intelligence and social correctness, which would in turn undermine the effectiveness of the agent as a learning companion. However, that is perhaps not a fair critique of the paper, which seems fairly well thought out, because the system is really designed for a more classical computer-as-tutor role.

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

Of course, it is entirely in the spirit of the Media Lab to turn everything on its ear and having the agent be as stuck as the human it is trying to help. However, I think the best truism is stated right there in the beginning: failure is the key to success. Doing what one can do just causes stagnation, something that is widespread in the educational system as it stands. It perhaps applies much less to rote learning than the more explorative learning that is geared towards understanding of a concept. As a single example, if I fail to learn a computer language, it would be a mental aberration. On the other hand, if I failed to design an efficient algorithm for a task, it is simply a setback. The latter sort of learning benefits from setbacks, while the prior does not. Sadly, it seems we have retrofitted education to support the latter sort of learning, without retrofitting the educational method to support it. A quick look at a so-called “standardized test” should be enough to make that point.

That aside, I do somewhat wonder if the external level modeling of the affective output process actually fully describes the affective state. In the sample cases, there are a lot of assertions indicating that there is a probabilistic leap made about that actual state using the combinational effect of the various physical level sensors. However, these sensors do not take into account a holistic or long-term model of the internal states that are reflected by these external outputs. Lacking such a model, it is unclear how the agent would ever be able to deal with the plethora of novel emotional states that a human being is liable to produce in less constrained situations. Moreover, the lack of high-level modeling prevents the system from understanding problems that are not relative to the initiation of the encounter. For example, someone coming in to work after finding a big scratch on his precious car is likely to exhibit the same external affect but not respond to the same solution as someone who is simply shaken by the complexity of the problem at hand, and therefore the intervention is likely not only to be irrelevant but worse, it is likely to alienate the user, because the user is likely to see the agent as patronizing or clueless. Of course, I could be misreading the paper and concentrating too much on the user studies, but this would seem, *prima facie*, to be problems that are certainly worth at least highlighting in the paper.