

An aesthetic for adaptations: Going beyond knowledge and skills in explanations of adaptations

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Abstract: Adaptive expertise is often defined by the presence of both procedural and conceptual knowledge. While knowledge and skills can explain how people find a new path when confronted with a difficulty (a fault-driven adaptation), something else is needed to explain when and why people make a beneficial, but unnecessary change (a prospective adaptation). In an interview, participants gave examples of adaptations from their everyday lives. Their examples appeared to arise from aesthetic judgments, not from a conceptual understanding of the domain. These findings suggest that values and aesthetics ought to be a more explicit focus of research on adaptive expertise.

How are some experts able to adapt to new situations and make effective changes when needed, while others can become stuck in routines? Most studies of expertise emphasize the quantity and structure of experts' knowledge (e.g., Chi, Feltovich, & Glaser, 1981), and the fluency and efficiency of their skills (e.g., Biederman & Schiffrar, 1987). Hatano and Inagaki (1986) distinguish between routine and adaptive expertise, and state that, while routines require only procedural knowledge, adaptations also require conceptual knowledge so that experts can consider alternatives and invent new approaches to problems. Viewing adaptations as conceptually-driven responses to difficulties can effectively explain what can be called *fault-driven adaptations*, which arise in response to a specific difficulty, or impasse. However, this account has more difficulty explaining *prospective adaptations*, which are changes that are beneficial, but not strictly necessary (Martin & Schwartz, in preparation). For example, Martin and Schwartz (2007) had students work on a medical diagnosis task. They found that graduate students spent a significant amount of time at the onset of the task creating an external representation (e.g., a contingency table) of the information in the reference materials. Although undergraduates were *capable* of creating external representations when access to reference materials was restricted, they did not do so spontaneously, but instead worked with the materials as given. The difference between the groups arose not from what students knew, but rather from what they chose to do. These results suggest that conceptual and procedural knowledge are necessary, but not sufficient, to explain prospective adaptations.

Little research has been conducted on unprompted, prospective adaptations. To investigate potential sources for prospective adaptations, adults (graduate and undergraduate students) were asked, in a semi-structured interview, for examples from their lives where they made a prospective adaptation.

Method

Participants

Twelve students (four graduate students, eight undergraduates; five men, seven women) participated in the study. They had just completed a 45 minute medical diagnosis task (see Martin & Schwartz, 2007, for a description of this study) and were paid for their participation. In service of brevity, only data from two participants are presented here.

Procedure

Participants were asked to give examples from their own lives where “you could have gotten by just fine with a default or normal way of doing things, but instead, you invested some time up front, and maybe you were inefficient for a while, in hopes of a benefit later on?” Participants were probed for details as needed.

Results

Two focal examples provide a sample of participants' prospective adaptations and the thinking behind these adaptations. The first example comes from an undergraduate economics major who described her approach to writing in-class essays.

During high school and then college I realized that everyone wanted to get the question and start writing right away.... [Some] people are like, “Oh I have no time, I've got to start writing.” But [my friends], they take out 15 minutes, and write out a really nice outline, and ... once they write the essay it's a lot more effective ... So when I did that, the 15 minutes was really worth it, although people were ahead of me [at first], in the end, it was really easy for me to write the rest of the thing.

Creating an outline is a prospective adaptation, as it is not strictly necessary and it does not directly advance the goal of completing the essay text – as she notes, other students are “ahead” when she completes the outline – but it sets the stage for faster, easier, and more organized writing. What she learned from her friends in this story was not knowledge about how to structure essays or how to create an outline, but rather the *value* of upfront organization. Through her friends, and through her own experience of trying this method, she acquired an aesthetic sense that outlining was a valuable, worthwhile activity – the right way to do things – within the context of in-class essay writing.

The second example comes from an engineering graduate student who does woodworking as a hobby: I'm a woodworker for one ... [and] setting up the wood shop for me takes, forever. I could get right into working on some projects, but it would be inefficient for me in the long run when I'm always looking for, “Where's my chisel, where's my plane, where, hey, what did I'd do with that thing?” ... It's almost a deferred gain. You know that you have to pay a little bit upfront, and then you'll get more in the return.

As he notes, his preparation is time-consuming, is not strictly necessary, and does not occur in response to any immediate difficulty. By these criteria, it is an example of a prospective adaptation. As in the outlining example, the actions he takes are not merely cognitive. He actively arranges his immediate external environment to make it more amenable to his forthcoming activity. He later presents his approach to woodworking as an instance of a more general “life lesson” he has learned on the value of taking time up front to prevent waste.

Discussion and Conclusion

Participants clearly articulated the value they perceived in spending time at the onset of a task to organize and structure their immediate environment to better prepare themselves for future action. Thus, the decision to make a prospective adaptation appeared to come from values-based or aesthetic judgments, not from a conceptual understanding of the domain. Conceptual understanding played a role later in the determination of how to enact the adaptation. Certainly, the data presented here do not suggest that prospective adaptations are never motivated by conceptual knowledge. Instead, they show that a theory of adaptations and of adaptive expertise must go beyond consideration of knowledge and skills to include values and aesthetics. The findings presented here, exploratory as they are, suggest a hypothesis: wherever one finds mature adaptive expertise, one will also find a set of values and aesthetics related to *when* to attempt an adaptation, sacrificing initial efficiency in favor of a long-term benefit. Moreover, these values and aesthetics may be instrumental, not merely epiphenomenal, and thus may be a reasonable target for educational interventions intended to support the development of adaptive expertise.

References

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