Incorporating Simulated Animal Attacks in Human Technology Interaction Interfaces: The Predictive Power of Biosemiotics and Evolutionary Psychology

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ABSTRACT

Enhanced cognition within the temporal vicinity of animal attacks arguably allowed our hominid ancestors to better build and associate memories related to the animals and their typical habitat markers, which in turn increased their survival chances. This may be at the source of an unusual phenomenon with limited but interesting practical uses in the design of human-technology interaction interfaces for learning tasks: the phenomenon involves modern humans’ short-term memories being instantaneously turned into long-term memories through surprise in the form of simulated animal attacks. This study explores this phenomenon in the context of a computer-supported learning task, by testing the prediction that a simulated snake attack will lead to cognition enhancement within its temporal vicinity. In an experiment, those participants who were surprised by a Web-based snake screen did significantly better in the test questions for Web-based learning modules that were temporally adjacent to the snake screen.

Keywords: biosemiotics; cognition; evolutionary psychology; incoterm; Web-based learning

INTRODUCTION

Human-technology interaction can arguably be understood based on a biosemiotics and evolutionary psychological perspective (Barbieri, 2006; Cosmides & Tooby, 1992; Kravchenko, 2006). Certain adaptive mental mechanisms that were evolved to improve reproductive success in our ancestral past may have spread throughout most of the spe-
cies (Buss, 1999; Cosmides & Tooby, 1992; Plotkin, 1998), and thus would be at the source of observable patterns in human-technology behavior today. Understanding the role of these mental mechanisms today would not only lead to interesting predictions regarding the interaction of humans and technology, but also a better understanding of the human mind (Pinker, 1997; Trivers, 2002; Wilson, 2000). Moreover, technology designers could greatly benefit from this understanding as it would enable them to develop technologies that would be more effective in supporting certain tasks and have greater commercial success. Technology features whose design is motivated by an understanding of evolved brain mechanisms are likely to have universal appeal among users.

The potential of ideas underlying the new fields of biosemiotics and evolutionary psychology to explain human-technology interaction behavior, however, has been largely unexplored among technology design researchers. With a few notable exceptions (Hubona & Shirah, 2006; Kock, 2004; Kurzban & Weeden, 2005), the situation is generally the same among researchers in many related fields, such as human evolution and evolutionary psychology. The study presented here aims at bridging this research gap by showing that a biosemiotical and evolutionary psychological perspective of human-technology interaction has the potential to lead to counterintuitive predictions that are fairly well-aligned with empirical results.

This study is the first to look into how simulated animal attacks can be incorporated into computer-based interfaces in order to enhance those interfaces’ knowledge communication effectiveness. Underlying the study is the theoretical assumption that animal attacks are surprise events that enhance cognition, particularly memorization of contextual information that would allow an individual to recognize the attacker’s habitat upon entering it in the future (Nairne, Thompson, & Pandeirada, 2007). The co-evolution of snakes and our primate and hominid ancestors (Boaz & Almquist, 2001; Isbell, 2006) likely make reactions to real or simulated snake attacks particularly strong today. Thus, a computer-simulated snake attack is a particularly well suited surprise event for the purposes of this study.

Investigations of snake attacks and encounters with humans (Hung, 2004; Shine & Koenig, 2001) allow for the development of a generic and typical scenario involving an unintentional hominid-snake encounter. A schematic representation of a hominid walk where an attack by a venomous snake takes place is shown in Figure 1. It illustrates the point that enhanced cognition in animal attack situations likely contributes to increasing reproductive success. One key assumption here is that the hominid whose footprints are shown in the schematic representation survives the attack after being treated for his or her wounds. Nevertheless, many such attacks in the environment of our evolutionary
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