



Support of Optimal Arousal

This section will include summaries of articles on arousal and the neurobiology of arousal...suggesting that optimal arousal level is important for learning to occur.

Cosand, L.D., Cavanagh, T.M., Brown, A.A., Courtney, C.G., Rissling, A.J., Schell, A.M., & Dawson, M.E. (2008). Arousal, working memory, and conscious awareness in contingency learning  Consciousness and Cognition, 17(4), 1105-1113.

There are wide individual differences in the ability to detect a stimulus contingency embedded in a complex paradigm. The present study used a cognitive masking paradigm to better understand individual differences related to contingency learning. Participants were assessed on measures of electrodermal arousal and on working memory capacity before engaging in the contingency learning task. Contingency awareness was assessed both by trial-by-trial verbal reports obtained during the task and by a short post-task recognition questionnaire. Participants who became aware had fewer non-specific skin conductance responses and tended to score higher on a digit span assessment. Skin conductance level was not significantly lower in the aware group than in the unaware group. These findings are consistent with studies showing that lower arousal and greater cognitive processing capacity facilitate conscious perception of a greater breadth of information within a scene or a task.

Lee, T.R., Davis, J.M., Vye, N., & Bransford, J.D. (2008). Do higher levels of arousal predict better learning? an investigation of learning and physiological responses. International Conference on Learning Sciences, 72-74  Pdf (136 KB)

The ability to connect new information to relevant, previously acquired knowledge can facilitate comprehension and memory. This study shows that the addition of person knowledge, or knowledge organized around familiar people, in the design of learning materials has the potential to improve learning while decreasing the amount of effort and attention exerted by the learner; this is measured through skin conductance levels as a physiological correlate of attention. Findings provide explanatory evidence for why people-focused methodologies, such as video cases or written case studies, contribute to longer-term benefits and improved learning.

Dillon, D.G., & Labar, K.S.(2005). Startle modulation during conscious emotion regulation is arousal-dependent. *Behavioral Neuroscience*, 119, 1118-24.

Conscious regulation of negative emotion has been shown to affect human eyeblink startle responses, but whether these results depend on modulation of arousal- or valence-based processes is unknown. The authors presented participants with negative, neutral, and positive pictures and directed them to enhance, maintain, and suppress emotional responses. On emotional picture trials, startle responses decreased as a function of cue in the following order: enhance > maintain > suppress. Analysis of negative and positive picture trials separately revealed similar patterns of startle modulation by emotion regulation. There were no effects of emotion regulation on neutral trials. Results indicate that arousal, not valence, may be critical to startle modulation via conscious emotion regulation. (c) 2005 APA

Pliner P, Loewen R. (2002). The effects of manipulated arousal on children's willingness to taste novel foods. *Physiol Behav*. 2002 Aug;76(4-5):551-8.

We examined the effects of manipulated arousal on willingness to taste moderately novel and extremely novel foods in children ranging from 7 to 12 years of age. Children were assigned at random to one of three arousal conditions (low, moderate, and high). Twice during the 30-min manipulation period, the children rated their willingness to taste the foods, with the understanding that these ratings would be used to determine which foods they would taste later in the session. Results of an Age x Gender x Arousal condition analysis on willingness to try the novel foods revealed a significant effect of arousal condition; willingness increased with decreasing arousal. Separate analyses for the moderately and extremely novel foods yielded significant condition and age effects for the former and no significant effects for the latter. The results were discussed in the context of optimal level of arousal theories.