

## CMC Workshop #1: Emotion

The relevance of emotion to cognition has traditionally been downplayed in favor of focusing on cognition in the abstract. Yet, the critical role of emotions for surviving and thriving in challenging physical and social environments – providing a key component of what in natural systems might be called the *wisdom of evolution* – has become ever more clear. Recent progress in emotion modeling and affective computing on understanding the functional relation between emotion and cognition – and, in particular, on incorporating emotion into cognitive architectures – further suggests that the time has come to explore whether a sufficient consensus may be reachable that can inform emotional extensions to the Common Model of Cognition (CMC).

Whereas a *cold* theory of emotion focuses on reasoning and a *hot* theory focuses on physiology, building on an [earlier report](#), the goal here is an intermediary – or *warm* – theory that focuses on architecture, and which ultimately could bridge the cold and hot realms in a complete model of emotions. Such a theory might be structured around: (1) an architectural representation of the emotional state, (2) the processes that affect this state, and (3) the processes that affect other aspects of the architecture given this state. Not in focus here is the development of either hot or cold theories of emotion; however, their interfaces with a warm theory may fit within the scope.

A range of approaches for representing emotional states in general have already been proposed, typically either as a set of symbolic appraisals or a multidimensional metric space. Is there a consensus in favor of either of these two individually, or a hybrid of both, or perhaps even something quite different?

Both reasoning and physiological processes must impact the emotional state, but what is of most direct relevance here is how the architecture senses what is occurring in these cold and hot realms and reflects this plus any uniquely architectural considerations in terms of alterations in its emotional state. With respect to the CMC, we can also ask whether this processing is best considered as part of existing modules versus necessitating new module(s).

In turn, the emotional state affects how other aspects of the architecture – such as decision making, memory retrieval, and learning – function, in addition to possibly providing input back to the cold and hot realms. Questions of interest here include what other aspects of the architecture are affected in this manner and in what fashion, plus what is communicated back to the other realms and how it is communicated. As with the previous topic, the modular status of such processes is also of interest.

How emotion interacts with learning provides another broad topic of interest. This includes how emotion influences both the manner in which learning works and what is learned, how learning may alter emotional processing and content, and whether any new learning mechanisms are required for any of this.