A HOT-COOL SYSTEM ANALYSIS OF GOAL-DIRECTED VOLITION: SUBSTITUTING SELF-CONTROL FOR STIMULUS CONTROL

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It is a commonplace recognition that while some people seem able to adhere to stringent diets, give up cigarettes after years of smoking them addictively, or continue to labor for distant and difficult-to-obtain goals, others fail at these efforts even when they know it may cost them their health and life. Such failures were called *akrasia*, a deficiency of the will, by the ancient Greeks, and contemporary lay (and sometimes professional) explanations using similar concepts of a character trait leave it equally mysterious today. The thrust of this presentation is to outline a framework, developed a number of years ago by Walter Mischel and me, for understanding how people may be able to control their impulses, and overcome the power of the stimulus to elicit automatic reactions. Doing so entails exerting the self-control strategies or "willpower" essential for the execution of their difficult-to-achieve intentions. Despite a virtual explosion of research and theorizing about self-regulatory processes, the nature of willpower remains debatable. For example, Baumeister and Heatherton (1996, p.3) discussed the under-regulation that occurs when willpower fails as "a matter of inadequacy in one's strength to override the unwanted thought, feeling or impulse," and describe many of the conditions that may enhance or undermine such strength. We defined willpower as the ability to inhibit impulsive responses (towards, say, the chocolate sundae) that undo a person's larger commitment (say, to healthier living). I will ilustrate how the interaction of two hypothetical systems—one "hot" and the other "cool"— may enable people to overcome the power of stimulus control and prevent impulsive immediate responses.

The two types of processing—hot and cool—involve interacting systems. The *cool cognitive system*, which we called the "know" system, is specialized for complex spatio-temporal and episodic representation and thought. The *hot-emotional system* is specialized for quick emotional processing and responding based on unconditional or conditional trigger features. We called it the "go" system. Of critical importance to self-regulation and to goal-directed volition is the interaction of these two systems. The cool system is narrative, weaving knowledge about sensations and emotions, thoughts, actions, and context into an ongoing narrative that is coherent, goal sensitive, and strategic. Cognitive rumination is a hallmark of this system. This system, in and of itself, is devoid of emotion and vitality. The lack of action, in the cool system, can be advantageous, though, since it allows control. The hot system contributes the feeling components and is thought to be largely under "stimulus control." It is characterized by rapid automatic triggering, conditioned responding, inflexibility, stereotopy, and affective primacy. The hot system is nearly always the culprit in impulsive maladaptive behavior, though without its contribution, cool cognition would be unmotivated and listless. The hot and cool systems work in concert to produce experiences that are both cognitive and emotional.

The interconnections between hot spots (the internal representations of the hot system) and cool nodes (the internral representations for the cool system) have important implications for control processes and for communications between the two systems. One and the same nominal feature of the situation or stimulus configuration may be represented by both a hot spot and a cool node: activation of the former gives rise to affect and emotional reactions related to that

stimulus; activation of the latter records its occurrence, context, and consequences, allows access to its interrelations and connections to other concepts and features, and allows self-reflection and metacognition, providing knowledge *about* the state, but not the state itself. One method of activating particular hot feelings and reactions, for example, is by evoking their corresponding cool nodes in thinking and fantasy. Merely thinking about an object is not enough, though: the person must specifically think about the aspects of the object that have a corresponding hot spot. This entails thinking about the object of desire in a particular way that we could summarize as giving it a "hot" framing, because of the connection of these particular nodes to the hot system. With sufficient activation of a particular cool node, which has a corresponding hot spot, activation spreads automatically across systems. Thus, thinking directed at appropriate locations in the cool network may result in hot activation that motivates action.

Conversely, the activation of a hot spot under normal conditions will result automatically in some activation of the knowledge that the emotional reaction occurred because the corresponding cool node also will become activated. The fact that the cool nodes that have direct hot spot counterparts are normally connected to many other surrounding cool nodes that do not have such cross-system connections can have control value: cool intervention and mediation becomes possible because most of the ideation can become *captured* within the cool system, even though the initially provoking event was hot.

Factors that Influence Cool Capture of Hot Impulses

When the hot system is dominant, mere exposure to hot stimuli will tend to elicit the automatic relevant response. One of the most reliable conditions determining the dominance of the hot versus the cool system is the developmental phase of the organism. The hot system develops early, whereas the cool system develops later. Second, even in mature humans, when ambient stress levels become excessive, the cool system becomes less dominant and the hot system predominates (see Jacobs & Nadel, 1985; Metcalfe & Jacobs, l998). Third, chronic activation of either hot nodes or cool nodes, selectively, can result in learning that can affect the dominance of the entire systems. Such biased activation may come about because of practiced ideation, and may be under strategic control. In addition, though, environmental factors, such as chronic stress, can affect the dominance of the hot versus the cool systems.

Strategies for Potentiating Cool System Control under Temptation

The hot-cool analysis can be used with reference to a number of strategies that could be used to promote cool capture. Some of these, including altering the salience of the hot stimulus either by external intervention or internal framing, diversion of attention, distraction by means of cool distractors, and distraction by use of hot distractors, and the importance of stress reduction, will be discussed in this presentation. It remains to be seen if the hot/cool framework will allow characterization of the dynamics of a range of self-defeating and self-destructive behaviors and failures of self-control that reflect distinctive dysfunctional interactions between the hot and cool systems.