

Stress and imagining future selves: resolve in the hot/cool framework

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Abstract

Although Ainslie dismisses the hot/cool framework as pertaining only to suppression, it actually also has interesting implications for resolve. Resolve focally involves access to our future selves. This access is a cool system function linked to episodic memory. Thus, factors negatively affecting the cool system, such as stress, are predicted to impact two seemingly unrelated capabilities: willpower and episodic memory.

In “Willpower with and without effort,” Ainslie (2020) characterizes the mechanisms underlying willpower (as distinct from mere habit) as being suppression and resolve. He consigns the hot/cool framework of willpower and of memory (Metcalfe & Jacobs, 1996, 1998, 2000; Metcalfe & Mischel, 1999) to a class of “visceral” theories of willpower that pertain only to reward perception and its suppression. Although not denying that the hot-cool balance can affect reward characterization and suppression, we argue, here, that it also makes important predictions concerning the other component, namely, resolve.

Explicit or episodic memory depends on the cool system. As detailed below, this system is responsible for mental projection into one’s future, as well as for remembering one’s past.

Thinking about the future is necessary for an individual to “recursively self-predict” – the cognitive process that Ainslie argues is at the core of resolve. It follows that if cool system functioning were selectively impaired by stress (or for other reasons), an individual’s ability to engage in recursive self-prediction, and with it their resolve, would also be impaired, with adverse results for willpower.

Resolve, within the Ainslian framework, involves perceiving a particular instance or violation as being a test-case of a larger category. Smoking a single cigarette is more than an inconsequential isolated act; it is seen as typifying an undesirable although specific behavior that jeopardizes one’s future health. One resolves to do something, such as resist cigarettes, to benefit one’s future self (who is imagined, in this case, to be healthy). Although not explicit in Ainslie’s framework, his notion of recursive self-prediction implies the construct of a future self. The proposal that people use an internally generated image of their future selves to activate present behavior has a distinguished history in psychology going back to the study of Markus and Nurius (1986) and elaborated extensively by others (e.g., Hershfield, 2019; Oettingen & Mayer, 2002; Oettingen, Sevincer, & Gollwitzer, 2018; Urminsky, 2017). Many studies show that the mental recruitment of future selves predicts effective self-regulation (Frazier & Hooker, 2006; Frazier, Schwartz, & Metcalfe, in press; Leondari, Syngollitou, & Kiosseoglou, 1998; Oyserman, Destin, & Novin, 2015; Oyserman & Markus, 1990). These “future selves” are characterized as mental representations of who we are – our own identities – projected into the future. They are an embodiment, on the positive side, of the person we aspire to become (Higgins, Roney, Crowe, & Hymes, 1994; Stokes, 2019). On the negative side, they comprise a graphic portrayal of the alternative dismal fate to which we might succumb. Accessing such future selves readily is necessary for resolve-based willpower, which Ainslie argues is underpinned by ongoing monitoring of progress toward this goal. We evaluate if smoking the cigarette represents behavior that gets us closer to the healthy future self or to the dismal fate, and make a decision to act accordingly.

Many take temporal discounting – an adult variant of Mischel’s (2014) “delay of gratification” paradigm – to be the prototype paradigm of willpower. The role of the future self in this paradigm is obvious. In the temporal discounting paradigm, an individual is asked to abjure immediate but small rewards for the present self in favor of larger rewards for an imagined future self. If the individual cannot conjure up a future self then presumably those hypothetical future rewards are meaningless. There is no reason to resist immediate impulse. Willpower and the resolve that underpins it collapse. The extent to which the individual clearly imagines and identifies with the future self, then, appears to be crucial for the value accorded to those future rewards. Within the hot/cool framework, stress disrupts the ability to imagine a future self.

In the hot/cool framework, explicit or episodic memory is a cool system function, whereas conditioning and taxonomic and implicit learning are hot system functions. There is considerable evidence, from the amnesia literature, that cool explicit memory is dissociable from hot forms of memory. This selective cool-system-related explicit memory impairment seems, at first blush, to be unrelated to future thought or to willpower. Studies of amnesics, however, show that the explicit memory system and people’s ability to think about the future are deeply linked (Tulving, 1985, 2002). For instance, psychologists have studied amnesic patients, such as KC, who was purportedly unable to

recall any particular instances of events from his life. Interestingly, KC, and other such amnesics, also experience enormous difficulty in thinking about the future (e.g., Schacter et al., 2012). Furthermore, there is considerable evidence from neuroimaging that the same neural systems underlie both remembering events from one’s own past and generating projections of oneself in the future (Okuda et al., 2003). Mental self-time travel pertains to both past and the future.

There is also growing evidence that stress, especially at high levels, selectively impairs the cool system, while possibly even enhancing function of the hot system (Jacobs, Brown, & Nadel, 2017). For example, Eich and Metcalfe (2009), tested marathon runners who had just completed a 26.2 mile race (as compared to unstressed marathoners tested days earlier). They found selective stress-related impairment of explicit memory. Similarly, when New York City firefighters were tested for their memory of events experienced in dangerous fires, Metcalfe, Brezler, McNamara, Maletta, and Vuorre (2019) found that the degree of explicit memory impairment depended on the stressfulness of the fire. The “cool” system, then, is impaired under stress.

The hot/cool framework indicates that when stress selectively impairs the cool system it is not only explicit memory that is impaired, but also future projection. When people are experiencing high levels of stress, they are less able to contemplate their own future selves. As a result, their resolve, mediated by Ainslie’s recursive self-prediction mechanism, dissolves. Stress-related dysfunction of the cool system, then, directly affects resolve-mediated willpower. The vulnerability of resolve to factors that negatively affects the cool system provides a testable explanation for why people under extreme stress exhibit two otherwise seemingly unrelated symptoms: impaired episodic memory and impaired willpower.

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Conflict of interest. The authors declare no conflicts of interest.

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Most goal-directed activities offer not just one but multiple distinct rewards (for a comprehensive account, see Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, 2017). In this commentary, we focus on a specific subset of such multi-attribute activities, namely activities that offer a combination of delayed and immediate rewards. Goal pursuits are often selected for delayed outcomes, that is, for the prospect of reaping rewards that materialize at a later point in time (e.g., Mischel, Shoda, & Rodriguez, 1989). Yet, many goal pursuits also offer immediate rewards that lie in the goal-directed activities themselves or in small interim targets (e.g., Rheinberg, 1989; Woolley & Fishbach, 2016). For example, the activities of “community work” and “studying” may be primarily motivated by the prospect of achieving delayed rewards (e.g., for community work: contributing to societal good; for studying: good grades). However, engaging in these activities also offers immediate rewards (e.g., for community work: the enjoyment of engaging with people; for studying: the enjoyment of learning about interesting topics). We refer to activities that offer both types of rewards, immediate and delayed ones, as *mixed-reward* activities.

Assuming that many goal-directed activities are best described as mixed reward activities, we suggest that people frequently face a distinct type of choice: choosing among multiple mixed-reward options. More specifically, we suggest that mixed-reward choices are ubiquitous in multiple goal pursuit contexts. People usually strive for multiple long-term goals in their everyday lives (e.g., multiple work, leisure, and family goals; Freund, Knecht, & Wiese, 2014). Balancing the demands of these goals can be challenging, as the amount of resources available for any goal pursuit (e.g., time) is finite. Choosing to act on *one goal* (e.g., studying) thus often comes at the expense of not being able to act on *another goal* (e.g., community work). Accordingly, whenever two (or more) mixed reward goal pursuits compete for the same finite resource, people are faced with the task of prioritizing among mixed-reward options.

To promote and sustain success in multiple mixed-reward long-term goals, people have to negotiate on a regular basis *when* to work on *which* goal, and for *how long*. Yet, despite their importance, mixed-reward choices are yet to be addressed by self-control research. Navigating mixed-reward choice options can be challenging because the use of *suppression* and *resolve*, as conceptualized by Ainslie (this volume), may be particularly effortful.

Suppression: When attempting to prioritize one mixed-reward activity over another mixed-reward activity, the alternative option may act as strong temptation, as it offers both immediate and delayed rewards. This can render *suppression* (i.e., blocking or interfering with a positive reevaluation of alternative options) particularly effortful. For example, choosing to spend the afternoon at the library studying is difficult on a beautiful summer day, when the alternative of doing community garden work would offer not only higher immediate rewards (e.g., engaging with people and enjoying the weather) but would also allow for promoting the associated delayed reward of contributing to societal good. In short, temptation posed by alternative options that are temporarily preferred for their immediate rewards is further bolstered by the prospect of also promoting valued delayed rewards.

Resolve: Navigating mixed-reward decisions by means of *resolve* (i.e., avoiding perceived risks to larger incentives) can also be challenging, as these choices may be particularly susceptible to perceptions of what Ainslie termed “credible exceptions to one’s rule.” Changing one’s plans from studying at the library to

Self-control from a multiple goal perspective of mixed reward options

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Abstract

We introduce a distinct type of choice that has yet to be addressed by self-control research: Choosing between activities that offer *both* delayed and immediate rewards. We describe when and why such mixed-reward choices pose challenges to self-control, and suggest that self-control in mixed-reward choices may be supported (rather than undermined) by delay discounting.

Similar to most self-control research, the target article by Ainslie conceptualizes self-control (or willpower) as the process of foregoing smaller sooner rewards in favor of larger later rewards. Prioritizing delayed over immediate reward activities can be challenging, and we do not dispute the importance of understanding how people negotiate such choices. Yet, we suggest that a more complete picture of self-control challenges involves a different type of choice people frequently face: choosing among activities that offer *both* delayed and immediate rewards.

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