Chapter 6
Boredom: What Is It Good For?

James Danckert, Jhotisha Mugon, Andriy Struk, and John Eastwood

Abstract Boredom is an ubiquitous and consequential human emotion. This chapter argues that it functions as a self-regulatory signal indicating that our cognitive resources are not engaged. It provides a definition of state boredom before developing the broad notion that trait boredom represents a chronic disposition toward maladaptively responding to the boredom signal (i.e., state boredom). The chapter reviews the nascent research employing functional neuroimaging to understand boredom and casts it as being mired in the "here and now" with no clear avenues for escape. Next, it outlines a specific hypothesis that trait boredom arises in circumstances of regulatory non-fit – when our preferred mode of goal pursuit does not match our current behavior. Finally, the chapter explores the notion that state boredom is not intrinsically good or bad. The signal itself does not evaluate what we are doing in any obvious way but merely indicates that change is needed.

The boredom of God on the seventh day of creation would be a subject for a great poet.

– Friedrich Nietzsche (1996)

Why would God be bored after having created the universe and everything in it? Tired, sure, but bored? What Nietzsche's quote suggests is that inherent in the act of completing one task is the need to figure out the answer to the obvious question your success provokes – what next? And if what you've just completed is as monumental as having created the universe, perhaps you would be faced with the daunting possibility that there are no goals left worth pursuing. Hence, God gets bored! Although obviously just a touch facetious, the conundrum highlights some key aspects of the emotional, cognitive, and motivational components of boredom (Eastwood, Frischen, Fenske, & Smilek, 2012). As an emotion, boredom signals that we are

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dissatisfied with whatever it is we are currently doing or whatever lies in front of us as options for engagement. We are not simply disengaged – we are dissatisfied and feel that dissatisfaction as negative affect. As a drive state, boredom is crucial for what could be thought of as the "push" to engage in something different (Bench & Lench, 2013; Elpidorou, 2014). While it is born of dissatisfaction, is clearly uncomfortable, and as such, undesirable, the function of boredom is nevertheless adaptive. Successfully responding to the boredom signal is important for effective control of goal-directed behaviors.

What Is Boredom?

The authors have argued elsewhere that boredom is the aversive feeling associated with being cognitively unengaged (Eastwood et al., 2012; Fahlman, Mercer-Lynn, Flora, & Eastwood, 2013). Selectively attending to and processing internal or external stimuli are adaptive. Our survival would be short-lived if we were unable to engage our cognitive abilities in the service of achieving our goals or responding adroitly to environmental demands. Thus, it is reasonable to assume that we have been shaped by evolutionary forces to experience the aversive state of boredom when our cognitive resources are not being optimally utilized. To be clear, being cognitively engaged is not the same as exerting mental effort. In fact, we can "relax" and let our mind drift without any intention to engage with particular stimuli or events, with no concomitant exertion of mental effort and still be cognitively engaged (e.g., perhaps in unintentional mind-wandering or even fantasizing – "What would I do if I won the lottery?", e.g., Seli, Risko, Smilek, & Schacter, 2016). Flow is another example of effortless cognitive engagement (Csikszentmihalyi, 1990). Where mental effort indicates what was required to *become* engaged, boredom indicates that our cognitive abilities *are not engaged*. Nevertheless, this cognitive account of boredom is not complete. Boredom also represents a specific motivational bind. Namely, boredom is the aversive feeling associated with wanting to be cognitively engaged (because it is aversive when we are not) but not being able to find anything in that moment with which to become engaged. When bored, we are restless, agitated, not merely resigned to our fate, but aggressively dissatisfied by it (Danckert, 2013). Disengagement from one's surroundings without that concomitant feeling of dissatisfaction is simply not boredom but is more akin to apathy (Goldberg, Eastwood, LaGuardia, & Danckert, 2011). While boredom and apathy share some things in common, they are clearly distinct cognitive-affective experiences (Goldberg et al., 2011; van Tilburg & Igou, 2011). Unlike apathy, a clear functional account for boredom presents itself – boredom acts as the impetus to find something to do that is more engaging (Bench & Lench, 2013; Elpidorou, 2014). Boredom has also been consistently associated with depression, with each construct sharing a strong negative valence (Farmer & Sundberg, 1986; Goldberg et al., 2011). However, unlike boredom, depression is characterized by unremitting sadness and a difficulty experiencing pleasure (American Psychiatric Association, 2013). The depressed person's interest in doing things is dulled, whereas a distinguishing feature of boredom is the *drive* to find something engaging. In short, then, boredom can best be thought of as a failure to satisfy a desire to be engaged with the world – "a desire for desires" (Tolstoy, 1899). That is, when bored we cannot find anything that we want to do in our current surroundings, but we desperately want to want to do something. In other words, we may not know *what* it is we want to do (or may not feel that the available options are likely to satisfy), but we most definitely know that we want *something* to do.

This description of boredom has it tightly coupled with the pursuit of goals. In the first instance, boredom would not arise without the desire to have one's mental faculties engaged in the pursuit of some goal. And in the second instance, as hinted at by Nietzsche (and more directly argued by Schopenhauer, 1995), boredom may be most prevalent in the *transition between* goals. The argument below posits that boredom represents a kind of self-regulatory failure in which the bored individual knows they want something to engage with but fails to see a viable avenue for goal pursuit that would satisfy that desire. Boredom becomes problematic only when an individual adopts maladaptive behaviors in their attempt to find something satisfying. That is, boredom merely goads us into seeking out satisfying activity; how we respond to that prompt determines whether it is a positive or negative force in our lives. Many people remark to the authors, upon hearing about research on boredom, that they are "never bored." This is unlikely, and what they are really expressing is the fact that, in general, they respond adaptively to the boredom signal.

An analogy to pain should clarify the point: the function of pain is not to *cause* us to feel hurt. The sensation of hitting one's thumb with a hammer certainly hurts and is something we would rather avoid, but that subjective experience of pain does little to describe its *function*. Pain, like boredom, is a signal to the organism that a behavioral response is required. Whether that is an automatic reaction (e.g., drop the hammer and suck your thumb) or a more deliberate response (e.g., get an ice pack), pain signifies the need to act (Inzlicht & Legault, 2014). This functional account of pain is not new. Pain has long been seen as an experience that interrupts our current focus of attention and motivates action, on the one hand to escape the painful experience and on the other to restore the goals we had been pursuing before the pain began (Eccleston & Crombez, 1999). By analogy, this chapter suggests that boredom operates as a self-regulatory signal for the control of behavior. Like pain this is a twofold process: first to escape the sensation of boredom and second to articulate and pursue a goal that would successfully engage our mental faculties. Those who claim never to be bored likely act in ways that address the needs signaled by the onset of boredom. For those who claim to suffer from boredom, the experience is negative precisely because of the failure to *adaptively* heed the signal.

Casting boredom as a self-regulatory signal suggests it is a singular construct, which may appear in different guises depending on our responses to it. This is far from uncontroversial, with many authors suggesting that there are in fact many types of boredom (Goetz et al., 2014; Nett, Goetz, & Hall, 2011). One of the earliest descriptions of boredom comes from a psychoanalytic case study in the 1950s (Greenson, 1953), in which the author proposed a distinction between agitated and apathetic boredom – states his patient claimed to experience at different times. Greenson's account represents the first attempt to carve boredom at some imagined joints. Indeed, the scale most commonly used to measure trait boredom – the boredom proneness scale (BPS; Farmer & Sundberg, 1986) – led researchers (including ourselves) to propose at least two distinct factors underlying boredom proneness: the need for either internal or external stimulation (Malkovsky, Merrifield, Goldberg, & Danckert, 2012; Merrifield & Danckert, 2014; Struk, Scholer, & Danckert, 2016; Vodanovich, 2003a). Although the authors and many others have published work implying the existence of distinct types of boredom proneness in the past (as many as five subtypes in academic settings; Goetz et al., 2014), the authors no longer see a meaningful way to carve boredom into separate subtypes for a number of reasons. With respect to the distinction Greenson made, boredom is an agitated state and what he called apathetic boredom is simply apathy (Goldberg et al., 2011). One key component in the present definition of boredom is that the individual is motivated to engage, a factor that is precluded by the term apathy. With respect to the dichotomy of the need for either external or internal stimulation in trait boredom, evidence has shown that this is likely an artifact of the scale used (Struk, Carriere, Cheyne, & Danckert, 2017). Not only has that two-factor structure been difficult to replicate (Melton & Schulenberg, 2009), it disappears entirely when reverse-worded items are reworded and items with poor discriminatory value are omitted (Struk et al., 2017). This shorter version of the scale is now clearly a one-factor measure, suggesting that trait boredom is a unitary construct characterized by the motivation to engage in something satisfying.

The Physiology of Boredom

Greenson's initial distinction between agitated and apathetic boredom raises another controversy in the literature – should boredom be considered a high or low arousal state? At first blush, the present definition of boredom as an aggressively dissatisfying experience leans toward the high arousal camp. But is it that simple? Using self-report measures, Van Tilburg and colleagues (2011, 2013) consistently find that boredom is reported to be a low arousal experience. This may reflect a hindsight bias, such that when evaluated in retrospect, we associate boredom with doing nothing and so remember it as being under-stimulating and under-arousing. In constrast, "in-the-moment" boredom, characterized as the desire to engage in something meaningful, would be highly arousing. This highlights a key challenge for boredom research (and perhaps for emotion researchers more broadly). Boredom is a dynamic experience that changes over time. High arousal states associated with the desire to engage may eventually give way to a kind of discouragement about the prospect of becoming engaged – something that would likely be appraised as a low arousal state (Eastwood et al., 2012; Fahlman et al., 2013).

Beyond self-report measures, several authors have examined the physiological signature of state boredom using metrics such as heart rate and skin conductance levels (Merrifield & Danckert, 2014; Pattyn, Neyt, Henderickx, & Soetens, 2008). Here too, results are mixed. Some have suggested that boredom is consistently associated with a state of low arousal attributed to situations that offer inadequate stimulation (Barmack, 1939; Geiwitz, 1966; Mikulas & Vodanovich, 1993; Pattyn et al., 2008; Russell, 1980; Vogel-Walcutt, Fiorella, Carper, & Schatz, 2012). Barmack (1939) even suggests that inadequate stimulation associated with boredom results in a physiological state that approaches that of sleep. In contrast, others suggest that boredom is best characterized as an agitated or restless state associated with higher physiological arousal (Berlyne, 1960; Jang, Park, Park, Kim, & Sohn, 2015; London, Schubert, & Washburn, 1972; Lundberg, Melin, Evans, & Holmberg, 1993; Merrifield & Danckert, 2014; Ohsuga, Shimono, & Genno, 2001). A recent study induced boredom via a video mood induction (the video showed two men hanging laundry) and measured skin conductance levels (SCL), heart rate (HR), and cortisol levels (Merrifield & Danckert, 2014). Compared to an induction of sadness, boredom was associated with a pattern known as *directional fractionation* (Lacey, 1959; Lacey & Lacey, 1970). Directional fractionation refers to changes in SCL and HR related to internal and external demands for attention. When attention is focused externally, both HR and SCL decrease (Lacey, 1959; Lacey & Lacey, 1970). Indeed, a study from the late 1970s showed, somewhat counterintuitively, that HR *decelerated* when people read sexually explicit material (Fehr & Schulman, 1978). In contrast, HR increases and SCL decreases when attention wanes. The recent study showed precisely this pattern when people were induced into a state of boredom – HR increased and SCL decreased indicative of a failure to engage attention on the video mood induction (Merrifield & Danckert, 2014). In addition, cortisol levels rose suggesting the experience of boredom was stressful. Jang et al. (2015) partially replicated these results showing decreased SCL when people were bored. In their study boredom was compared to pain and surprise inductions, so it is perhaps not surprising that HR was lowest in the boredom condition.

It is plausible that the resolution to this debate would be to suggest that the experience of boredom includes *both* high and low arousal states (Eastwood et al., 2012; Fahlman et al., 2013). In a recent study, people read different passages of text intended to be either boring (an excerpt from a text on the properties of soil) or interesting (an excerpt from a Harry Potter novel) while their blink rates were measured along with periodic subjective reports of boredom, restlessness, mind-wandering, and sleepiness (Danckert et al., under consideration). Highly boredom-prone people had higher blink rates indicative of poor sustained attention (Smilek, Carriere, & Cheyne, 2010). Furthermore, boredom and mind-wandering were highest, as expected, when reading about the joys of soil. Intriguingly for the arousal debate, self-reports of *both* restlessness *and* sleepiness rose sharply when reading the boring story – particularly when this was the second story read by participants (Danckert et al., under consideration). Asking people how sleepy they felt was intended as an indirect measure of arousal. As Barmack (1939) suggested, the low arousal bored state may approximate sleep in a physiological sense. But at the same time, people were reporting being under-aroused; they were also reporting increasing levels of restlessness. Clearly, more work is needed to explore the dynamics of state boredom. It may be the case that the physiological changes associated with boredom lead to distinct subjective evaluations as captured by this definition of boredom from Vogel-Walcutt et al. (2012):

> State boredom occurs when an individual experiences *both* the (objective) neurological state of low arousal *and* the (subjective) psychological state of dissatisfaction, frustration, or disinterest …. (p. 104; emphasis added).

Clearly, a sense of dissatisfaction and frustration represent *high* arousal negative affective evaluations (Russell, 1980). In addition, differences in the subjective experience of boredom-related arousal might follow distinct stages of goal pursuit: that is, the subjective experience of arousal likely depends on the specific stage of goal pursuit/engagement we are currently experiencing. For example, consider trying to complete a task we do not want to do – like finishing our taxes. This task may fail to hold our attention and engage our cognitive abilities – thus, we experience boredom. Initially, when unengaged we may be experiencing low arousal as the task of doing taxes is not very stimulating. If we decide to redouble our efforts and push through to completion, this clearly requires an increase in arousal. It is difficult to maintain attention when under-aroused. We may strategically try to upregulate our arousal by fidgeting, tapping our pencil, or drinking a third coffee for the night. If we still fail to become cognitively engaged by our taxes, we will now likely be experiencing a higher level of arousal, a restless, irritable agitation. The point here is that we may be equally unable to focus our attention and engage our cognitive abilities with the task during both phases (i.e., equally bored), but our arousal levels would differ during the early and late phases.

One possible key to this arousal conundrum relates to one's sense of autonomy or control – more specifically, arousal levels may track the *prospect* of attaining successful engagement of our cognitive faculties (Struk, Scholer, & Danckert, 2015). That is, as our taxes example above highlights, when we first realize that what we are doing has not engaged our cognitive abilities sufficiently, we are likely experiencing lowered levels of arousal. That realization, the initial phase of the boredom signal, may rapidly lead to increasing levels of arousal as we attempt to engage our cognitive resources with the boring situation (or, if possible, engage in a novel situation). In other words, as we seek out new activities or find our continued attempts to engage with the current activity failing, arousal levels will increase. Should a failure to engage persist, frustration and high arousal boredom will give way to discouragement with an eventual return to lower levels of arousal as we find ourselves mired in boredom, unable to successfully respond to the need for engagement. A recent study explored this possibility by having people play the children's game of "rock, paper, scissors" against a computer opponent (Struk et al., 2015). The subjective sense of control was manipulated in the task by having one group win 100% of the time regardless of their plays and another group lose 100% of the time. Those who won all the time reported the highest levels of boredom – the task was facile, monotonous, and hence, boring. For those who lost all the time, initial subjective reports were indicative of increased arousal as they tried in vain to "figure out" their opponent's strategy. This high arousal soon dissipated as failure continued. In a follow-up study, two groups played against an opponent that adopted a uniform play strategy (i.e., choosing each option equally often; Struk et al., 2015). One group were told of this circumstance and therefore understood that there was no way for them to win more than one third of the time. A second group was erroneously told that their opponent was playing an exploitable strategy that they had to "figure out" in order to win more often. This latter group reported lower levels of boredom suggesting that the mere prospect of gaining control over a circumstance was enough to ward off boredom. What this work highlights is that subjective feelings of boredom and the associated judgements of arousal likely depend to some extent on our belief in the possibility of attaining successful engagement.

This Is Your Brain on Boredom

Functional neuroimaging work has only recently examined the neural circuits active when we are bored (Dal Mas & Wittmann, 2017; Danckert & Isacescu, 2017; Danckert & Merrifield, in press; Ulrich, Keller, & Grön, 2016; Ulrich, Keller, Hoenig, Waller, & Grön, 2014). Two networks are critical to the understanding of boredom: the default mode network (DMN; Andrews-Hanna, 2012; Greicius, Krasnow, Reiss, & Menon, 2003; Mason et al., 2007; Weissman, Roberts, Visscher, & Woldorff, 2006) and the salience network (SN; Menon & Uddin, 2010). Originally reported in the early 2000s, the DMN is a collection of brain regions including the posterior cingulate, precuneus, and medial prefrontal cortex that has been associated with "off-task" thinking – anything from internally focused thoughts (i.e., thinking of the past, imagining the future) to mind-wandering (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Fox, Spreng, Ellamil, Andrews-Hanna, & Christoff, 2015; Mason et al., 2007; Weissman et al., 2006). The DMN is typically active when there are few external demands on attention and is commonly associated with concomitant decreases in activation of frontal cortical regions comprising the central executive network (CEN; Andrews-Hanna, 2012; Buckner, Andrews-Hanna, & Schacter, 2008). The second network critical to understanding boredom is the so-called *salience network* (SN) that consists primarily of the insular cortex and its connections with the CEN. The SN is important for detecting behaviorally relevant events in the environment ultimately to engage the CEN when needed. In a sense then, the SN switches between the DMN and the CEN in response to goal-relevant information (Menon & Uddin, 2010; Sidlauskaite et al., 2014; Uddin, 2015).

Ulrich et al. (2014) contrasted the experience of boredom with that of flow – a state of optimal engagement in which attention is so focused on the task at hand that everything else fades to the background (Csikszentmihalyi, 1990; Csikszentmihalyi & Csikszentmihalyi, 1992). They had participants complete a series of mathematical sums that varied in difficulty level from too easy (which they presumed led to boredom, much like the 100% win rate in rock, paper, scissors), too hard (which they referred to as a cognitive overload condition), or "just right" (i.e., problems titrated to an individual's ability, presumably leading to flow). They observed increased CEN activity and decreased DMN activity when people were in a state of flow – doing math problems experienced to be at a "Goldilocks" level of difficulty. This condition also led to increased activity in the insula indicative of engagement with the task at hand. When doing the easy math sums, participants were bored and demonstrated increased activity in the DMN with concomitant decreases in CEN activity.

Rather than exploring boredom as a consequence of a primary task as Ulrich et al. (2014, 2016) have done, a recent study used the mood induction film of two men hanging laundry to directly induce boredom (Danckert & Isacescu, 2017; Danckert & Merrifield, in press). Activity while watching this mind-numbingly dull film was contrasted with a more traditional resting state scan in which people are instructed to simply relax for 8 min with nothing but a fixation cross to look at (Buckner et al., 2008). Importantly, differences in these two scans will reflect differences between being bored and simply having nothing to do. As with the Ulrich study, boredom was associated with upregulation of the DMN. Much the same network was also observed when people were simply at rest. Where the two conditions differed was with respect to insula activity. When bored, the insular cortex was anticorrelated with the DMN. That is, as the DMN was upregulated, the insula was downregulated. No such relationship was evident in the rest condition, a result recently replicated (Danckert & Isacescu, 2017; Danckert & Merrifield, in press). The key distinction between the rest and boredom mood induction conditions is the presence or absence of something to at least try to engage with. During rest there was little to nothing in the external environment to engage with. In this case, DMN upregulation may reflect mind-wandering (e.g., Christoff et al., 2009; Mason et al., 2007). The biggest task in this scanning session is to avoid falling asleep! The boredom video is a different beast altogether – something is constantly happening on screen (although one might be loathe to call it action, things are happening). Anticorrelated activity in the insula may reflect continued failed attempts to engage with what is a monotonous, uninteresting series of events. There is really only so much one can do to engage with a video of two men hanging laundry! Successful engagement would presumably involve the SN signaling the CEN that something relevant and of interest is present in the world. At the same time, attending to the movie would be expected to lead to downregulation of the DMN, which was clearly not the case. One prominent theory regarding the anterior insular suggests that it represents our conscious, embodied experience of the here and now (Craig, 2009). We have claimed that state boredom is adaptive, functioning as a signal telling us that we are currently underutilizing our cognitive abilities. But some situational factors make it impossible to act on that adaptive signal, and thus the feeling of boredom becomes protracted and we feel stuck. The inescapable environs of an fMRI experiment in which participants were made to watch two men hang laundry are one such circumstance that both prompt the boredom signal and prevent any action to respond adaptively to it. They cannot, for example, fully give themselves over to mind-wandering because they are supposed to be watching the film. Boredom signaled the need to engage in something else, but the circumstance prevents it.

Finally, Dal Mas and Wittmann (2017) recently had people perform three different tasks – first, deciding whether a picture frame was blurry or not (the boredom condition); second, performing a somewhat challenging visual search task; and third, simply reporting their preference for visual images (i.e., "How much do you like this image?"). After doing these tasks, participants were asked how much they would be willing to pay for a music download. The logic was that, when bored, people ought to be more willing to pay higher amounts for music – a metric of how desperate they were to avoid boredom. Indeed, when people were bored, they were willing to pay more for music. Interestingly, activity in the insula was associated with just *how willing* people were to pay to avoid boredom – higher willingness to pay for music (which presumably eliminated boredom) was associated with increased activity in the insula (Dal Mas & Wittmann, 2017). On the one hand, then, *failures* to engage are reflected in downregulation of the insula (Danckert & Isacescu, 2017; Danckert & Merrifield, in press), while an increased *desire to be engaged* (by paying more to *avoid* boredom) is associated with upregulation of the insula (Dal Mas & Wittmann, 2017).

If the insular cortex is important for switching between the large-scale neural networks involved in off-task thinking on the one hand (i.e., the DMN) and goal-directed behavior on the other (i.e., the CEN), then boredom may represent a kind of interminable present. That is, activity in the insula may be a metric of the desire to engage, with inactivation reflecting the inability to extricate oneself from the current circumstance. Certainly, when bored, we often complain about being *stuck* in the moment. In this sense, boredom is a desire to engage that is at its most intense when that desire goes unfulfilled.

Self-Regulation and Boredom

Up to this point, the focus has been mostly on state boredom. Far more work has been conducted looking at boredom through the lens of an individual trait (see Eastwood et al., 2012 for review). This chapter has cast the function of *state* boredom as an adaptive self-regulatory signal pushing the individual to seek satisfaction and optimal utilization of cognitive resources. Despite voluminous research, the concept, definition, and measurement of *trait* boredom are underdeveloped (Struk et al., 2017; Vodanovich & Watt, 2016). The functional account of state boredom offers a precise and testable way of thinking about trait boredom. Namely, trait boredom arises from a chronic failure to respond successfully to the self-regulatory signal of state boredom. This approach links state and trait boredom in a coherent way and provides a parsimonious account for the myriad relations between state boredom and other negative affective states and outcomes (e.g., depression, anxiety, increased aggression, impulsivity, increased sensation seeking, and a susceptibility to addictive behaviors from problem gambling to drugs of abuse; Blaszczynski, McConaghy, & Frankova, 1990; Isacescu, Struk, & Danckert, 2016; Iso-Ahola & Crowley, 1991; Johnston & O'Malley, 1986; Mercer & Eastwood, 2010; Rupp &

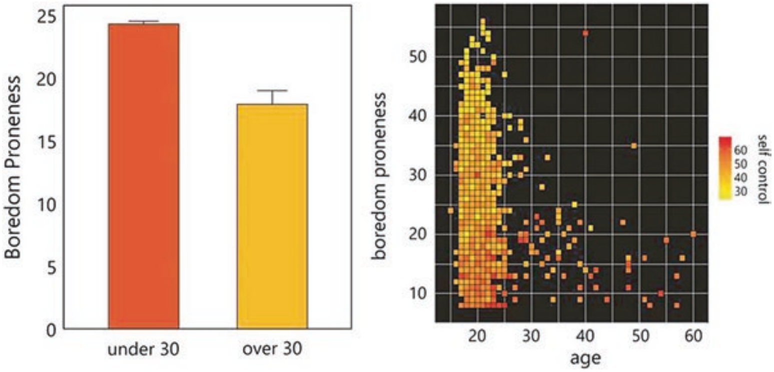

Fig. 6.1 The left panel shows boredom proneness scores for those under (orange) and over (yellow) 30 years of age. The right panel shows boredom as a function of both age and individual trait levels of self-control (Data adapted from Isacescu et al. (2016)

Vodanovich, 1997; Sommers & Vodanovich, 2000; Vodanovich, Verner, & Gilbride, 1991; Watt & Vodanovich, 1992; but see Mercer-Lynn, Flora, Fahlman, & Eastwood, 2011, for discussion of the influence of which boredom measures are used in determining the nature and direction of these associations). These well-replicated associations appear to reveal that trait boredom is a failure of self-regulation. Put another way, a failure to appropriately regulate one's own thoughts, feelings, and actions may be at the heart of each of these distinct relationships. If the state of boredom represents a signal to act (do something more engaging than your current activity), then the trait, more than simply reflective of increased frequency and intensity, reflects maladaptive responses – borne of poor self-regulatory control – to the boredom signal.

The authors have shown that those who have a higher propensity to experience boredom also report lower levels of self-control (Isacescu et al., 2016; Struk et al., 2016), which fits well with the findings touched on above. This casts lower levels of self-control as the cause of maladaptive responses to the boredom signal (not necessarily the cause of boredom itself). Depending on the age range tested, age has been shown to be a *negative* predictor of boredom proneness (Essed et al., 2006; Hill, 1975; Isacescu et al., 2016; Vodanovich & Kass, 1990; although see Spaeth, Weichold, & Silbereisen, 2015, showing *increases* in boredom with age during early adolescence). As we approach our late teens and early 20s, we also attain higher levels of self-control which may in turn reduce the susceptibility to experiencing protracted boredom (Fig. 6.1; Isacescu et al., 2016). This narrow age range encompasses a period of neurodevelopment in which the frontal cortices, that part of the brain critically important for effective self-control and self-regulation, reach full maturity (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001; Gogtay et al., 2004; Keating, 2012; Poletti, 2009).

Further evidence supporting a link between self-control, frontal maturation, and trait boredom comes from work with patients who have suffered traumatic brain injuries (TBI; e.g., Seel & Kreutzer, 2003). That is, TBI, commonly arising from acceleration-deceleration injuries (e.g., concussions, car crashes), prominently involves the orbitofrontal cortex – part of the brain involved in reward processing (Elliott, Newman, Longe, & Deakin, 2003; Gottfried, O'Doherty, & Dolan, 2003; O'Doherty, Kringelbach, Rolls, Hornak, & Andrews, 2001). The sine qua non of TBI is the dysexecutive syndrome in which patients exhibit increased impulsivity, sensation seeking, and poor inhibitory control – many of the same issues prevalent in those high in boredom proneness (Dockree et al., 2004, 2006; Joireman, Anderson, & Strathman, 2003; Kass & Vodanovich, 1990; Mercer & Eastwood, 2010; O'Keeffe, Dockree, Moloney, Carton, & Robertson, 2007). Studies showed recently that boredom proneness was indeed elevated in patients who had suffered moderate to severe TBI (Isacescu & Danckert, 2017; see Kenah et al., in press for a recent review).

Self-control is a rather vague term encompassing the regulation of thoughts, behaviors, and emotions (Baumeister & Vohs, 2003; Struk et al., 2016; Tangney, Baumeister, & Boone, 2004). Self-regulation in the pursuit of goals has been explored in more nuanced ways that examine an individual's preferred mode of goal pursuit (Kruglanski et al., 2000). In that context, boredom proneness may be related to two distinct regulatory modes – locomotion and assessment (Kruglanski et al., 2000; Mugon, Struk, & Danckert, under consideration; Struk et al., 2015). Locomotion refers to individuals who prefer to get on with things moving rapidly from one action state to another – in other words, preferring to "just do it." In contrast, the assessment regulatory mode represents a preference for carefully considering options before moving from one goal to another – in other words, preferring to "do the right thing" (Kruglanski et al., 2000). One could consider these distinctions in terms of calculations of risk. A person who adopts the assessment mode (i.e., an assessor) values minimizing the "risk" of making the wrong behavioral choice, whereas a person adopting the locomotion mode (i.e., a locomotor) has a higher risk tolerance for making the wrong choice and instead values efficiently achieving the goal at hand. Consider the following anecdote: You're on a long road trip with your family and need to stop over in a small town for lunch before continuing to drive to your destination. While the town is small, there are a number of dining options. You see a sign for "Mom and Pop's Diner" – the first restaurant on the right as you come into town – and pull over. Your spouse meanwhile is still busy with a smartphone evaluating the myriad options for dining in the small hamlet of *where-the-hell-are-we* and is decidedly unimpressed by Mom and Pop's. You, in this scenario, are a locomotor, preferring to just get things done and move on toward the ultimate goal of finishing the road trip (and the next goal and the next). Your spouse is an assessor and is not willing to risk a less than average meal; instead, your spouse carefully evaluates the available options to ensure that does not happen. While this description of our locomotor may sound like "satisficing" (e.g., Schwartz et al., 2002), the emphasis here is less on the locomotor's decision to choose the first restaurant he sees and more on the fact that she/he wants to get quickly to the end goal – the final trip destination. As Kruglanski and colleagues put it, getting on with things in a "straightforward and direct manner, without undue distractions or delays"

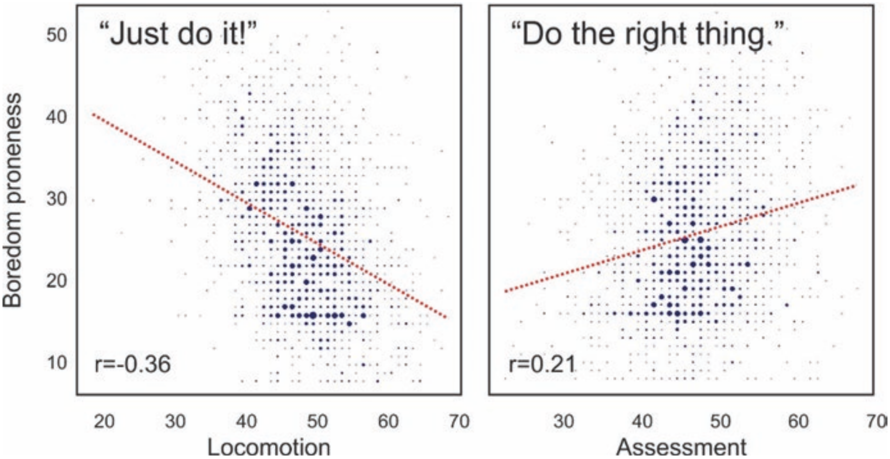

Fig. 6.2 Correlations between boredom proneness (as measured by the shortened version of the BPS; Struk et al., 2015) and locomotion (left) and assessment (right) regulatory modes ($n = 1,727$, collected in the winter term of 2016; see also Struk et al., 2015 for regression analyses of similar data and Mugon et al., under consideration for a full discussion of multiple data sets). Larger data points reflect the fact that multiple individuals fall at those data points

(Kruglanski et al., 2000, p. 794). Thus, the locomotor is characterized by a preference for action. Assessors should not be construed as merely maximizers – the assessor is not characterized by attempts to maximize value or utility. Rather, the assessor is characterized by a preference for deliberation so as to do the right thing and avoid doing the wrong thing – eating at a substandard restaurant in the example (Kruglanski et al., 2000). Clearly, avoiding the wrong choice (a motivating consideration for the assessor) is different than maximizing value or reward.

In large samples of undergraduate students (ranging from 927 to 2,660) over multiple terms ($n = 7$), there are consistent relationships between trait boredom, as measured by the boredom proneness scale, and these regulatory modes (Mugon et al., in press). For locomotion the correlation is consistently negative (ranging from −0.27 to −0.39) suggesting that engaging in an action of some kind acts as a prophylactic against boredom (Fig. 6.2). In contrast, there is a modest but highly consistent positive correlation between boredom proneness and the assessment regulatory focus (ranging from 0.21 to 0.28; Fig. 6.2).

This raises an intriguing possibility: those most prone to experiencing boredom may be stuck in a decision phase, trying (but failing) to decide on the best possible outlet for their desire to engage. This chapter has cast boredom as a failure to be effectively engaged by the world. Although speculative at this stage, one potential antecedent of this failure is a fruitless rumination on the potential options for engagement. That is, those who adopt a locomotion mode of goal pursuit have little trouble deciding what to do next and simply get on with it. Those with an assessment mode of goal pursuit may be more prone to boredom for many reasons: first, interminable evaluation of potential options for engagement leads to a kind of "failure to launch" into an activity. Second, all options for engagement may be tarred with the same gray brush – that is, they fail to see *any one action* as more valuable than another. Third, highly boredom-prone individuals may have an elevated fear of failure impeding their ability to get started on a task. Finally, willingness to commit to a goal may be lower in the highly boredom prone. This last hypothesis is striking for its counterintuitive nature – surely an agitated individual desperate for engagement would do anything to achieve that? The reduced willingness to commit makes some sense if one considers the common parental anecdote of the bored child imploring them for a remedy. As any parent knows, despite the child demanding that the parent solve their ennui for them, all suggestions to redress their boredom are immediately discounted as though none are appealing enough or the effort to achieve them is deemed not worth it. While research is clearly needed to more directly address these hypotheses, the subjective sense that each consequence of fruitless rumination outlined above represents an impediment to effective engagement, and hence elevated boredom proneness, is appealing.

The notion that boredom proneness may be underpinned by a ruminative cognitive style may also shed light on the link between boredom and depression (Farmer & Sundberg, 1986; Goldberg et al., 2011; Vodanovich, 2003a). Excessive rumination is also a key component of the syndrome of depression (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Mor & Winquist, 2002; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Whereas for depression those ruminations tend to be self-focused and negative in an evaluative sense, for boredom proneness, the ruminations are outwardly focused – the world is not enough. Although this chapter has reviewed evidence that boredom is distinct from depression, the two still share a large amount of variance (Goldberg et al., 2011). The focus of ruminations may represent one factor that helps to differentiate the two affective experiences. Interestingly, a study exploring the effect of citalopram on depression in cancer patients found that patients who reported high levels of both boredom and depression showed early improvements in symptoms of depression, but no improvements in boredom until much later (Theobold, Kirsh, Holtsclaw, Donaghy, & Passik, 2003). It may be the case that repeated failures to engage with the world, a key determinant of boredom, precede the sense of helplessness that is characteristic of depression and turns ruminations inward. This casts boredom as a risk factor for depression. Clearly, there is a complex relationship at play that warrants further exploration.

Boredom proneness may not only be related to an assessment regulatory mode orientation, it may also be related to what is referred to as regulatory fit (Avnet & Higgins, 2003; Higgins, 2005). Regulatory fit refers to the match, or non-match, between the strategic means used to achieve a goal and a person's regulatory mode orientation. That is, although an individual could be said to have a *preferred* regulatory mode (i.e., beliefs and values that represent a locomotion or assessment orientation), it is possible to use each regulatory mode in the moment to achieve particular goals. Indeed, different situations may be more optimally suited toward one regulatory mode or another. Returning to the travelling family, consider the driver who wants to stop at the first greasy spoon he/she sees to keep acting and moving efficiently to the final goal. If her/his regulatory mode orientation is indeed locomotion, there is no conflict if the family stops at “Mom and Pop’s Diner” to eat – she/he wants to get on with things and acts accordingly. The assessor on their smartphone, however, who would normally carefully deliberate before acting, would experience some level of conflict between the assessment regulatory mode orientation and the choice imposed by the locomotor to eat at the first available restaurant. Highly boredom-prone individuals may subjectively report that they prefer to adopt an assessment mode of goal pursuit (Fig. 6.2) but may chronically behave at odds with this stated preference. That is, regulatory non-fit conflicts may arise more commonly in the highly boredom prone.

The authors have preliminary evidence to support this notion of regulatory non-fit as a potential component driving increased boredom proneness. For a larger study, examining the genetic correlates of regulatory mode and boredom proneness, people performed a virtual foraging task (Struk, Mugon, Scholer, Sokolowski, & Danckert, in preparation; Fig. 6.3). Using a touch screen, people navigated through a virtual environment of berries (red circles of varying sizes distributed evenly on a green “grasslike” background). They were instructed to pick, simply by tapping the screen, as many “berries” as they could within a 5-min time window (a counter indicating how many berries they had collected and a clock counting down the time were present in the upper right corner). The study examined associations between preferred regulatory mode and distinct behaviors in our foraging environment. To do so, a composite variable was created to capture preferences for exploring the environment vs. exploiting the “resources” of the berry patch: the former was captured by the number of moves an individual made and the latter by the number of berries picked (a score of zero suggests no bias for either exploration or exploitation). One might assume that a locomotor would maximize berry picking by moving around the environment quickly gathering the immediately and easily accessible berries, but moving on from a patch of berries before all were picked (i.e., exploring the environment). In contrast, an assessor might be expected to maximize berry picking by making sure to collect *all* the berries in a patch before moving on to a new patch (i.e., exploiting the environment). Regulatory non-fit would be evident in an individual espousing a preference for the assessment regulatory mode while exhibiting an action preference for movement over berry picking (and vice versa). Indeed, assessors tended to pick more berries, and locomotors tended to move on before all berries were picked. Interestingly, individuals reporting a preference for the assessment regulatory mode who nevertheless engaged in exploration (i.e., moving on from a patch of berries before all were picked) were most prone to boredom (Fig. 6.3).

The assessor typically behaves in a manner that minimizes the “risk” of leaving berries behind. The locomotor has higher risk tolerance and typically wants to simply move on to a new patch of berries that might have greater riches (i.e., more berries). However, individuals who report preferring an assessment regulatory mode but actually engage in behaviors normally adopted by locomotors are essentially at odds with themselves. This disconnect between stated values and actual behavior may reflect dysfunctional or disorganized self-regulation and thus be especially related to the tendency to experience boredom (Fig. 6.3).

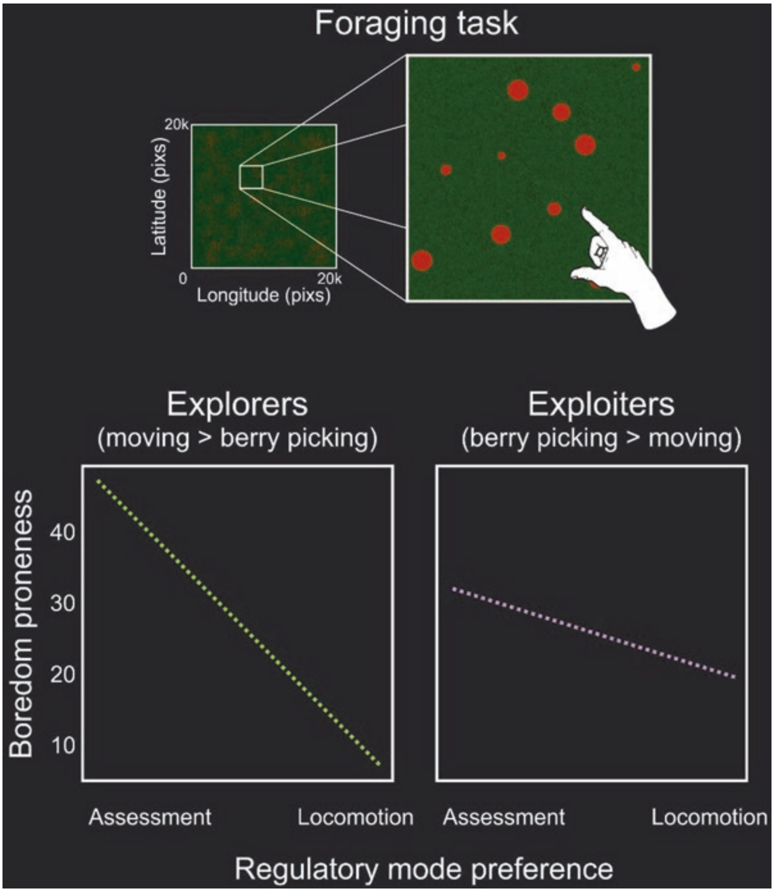

Fig. 6.3 Upper panel is a schematic of the foraging task. Participants began in the center of a touch screen. The environment spanned 20,000 × 20,000 pixels, and to move around it, they simply swiped their finger across the touch screen. Berries, which differed in size, were "picked" by tapping the screen and in this case were uniformly distributed throughout the environment. Lower panel shows boredom proneness as a function of regulatory mode preference and behavior on a composite measure of foraging which indicates preference for either moving (explorers – left panel) or berry picking (exploiters – right panel). Regulatory non-fit occurs when assessors exhibit a bias for exploring (and vice versa). Those with a preference for an assessment regulatory mode were generally higher in boredom proneness but were highest if they exhibited nonregulatory fit, that is, adopting an explorer strategy (left panel; Struk et al., in preparation)

What Causes Boredom?

Many situational causes for boredom spring easily to mind: from the drudgery of particular topics of conversation (e.g., "Politics bores me!") to the absurdity of minimally changing activities/events (e.g., "It was like watching paint dry/grass grow."). While the list of potential environmental causes for boredom may seem endless, two factors have been prominently touted as critical to the experience – monotony (i.e., nothing to do) and constraint (i.e., having to do something we do not want to do; although see Daschmann, Goetz, & Stupnisky, 2011, for an eight-factor account of the causes of boredom within an educational setting; Thackray, 1981; Tze, Klassen, & Daniels, 2014; van Tilburg & Igou, 2011). That is, circumstances that are monotonous or are in some sense inescapable cause us to feel bored. But are these factors sufficient and direct causes of boredom? Is it possible to establish objective situational factors that reliably cause boredom? This chapter argues that the answer is no.

Boredom is the disagreeable feeling that arises when our mental capacities are not being optimally utilized – when our mind is unengaged. Like an idling car, our engine is revved up and we are itching to go, but we can't. We do not have anything we want to do, but we want to have *something we want* to do. You might be thinking at this point, "Hold on a minute, that doesn't make sense. I know exactly what I want to do when I am stuck in a monotonous situation – and therefore bored out of my skull. I want to be at home reading a novel (or anything else that you *know* will engage you). Reading would engage and use my cognitive resources and, presto, I won't be bored anymore." Indeed, situational factors are important *indirect* determinants of boredom. Some situations force us to do something we do not want to do, and others offer up very few desirable options for things to do. The point, however, is that *given the reality of the situation in which we find ourselves*, there is nothing that we want to do. However, we would not be bored if we could just find some reason to commit ourselves to the task at hand. Moreover, we would not be bored if we were forced to do something that we already wanted to do anyway. Thus, situational factors like constraint and monotony powerfully increase the chances of boredom, but they are not, in and of themselves, sufficient. Our inability to *formulate an object of our desire for engagement* is itself the sufficient and direct cause of boredom. Hence, as Tolstoy said, boredom is the desire for desires.

Monotony is perhaps the most common situational factor thought to cause boredom. First discussed by human factors researchers in the early part of the twentieth century (e.g., Vernon, 1926; see also Smith, 1981; Thackray, Bailey, & Touchstone, 1977), monotony however is far from a straightforward causal factor of boredom. It is possible to avoid boredom during a monotonous task if some reason for doing the task (or some other parallel engagement in the midst of the task) can be found that engenders something of value to do in the situation. The dedicated philatelist who spends hours arranging stamps by country of origin, decade of issue, and quality could be said to be engaged in a fairly monotonous task. But most passionate devotees of this hobby would not describe the experience as even remotely boring. Csikszentmihalyi (1990) describes a factory worker with an incredibly monotonous task on an assembly line, coping by trying to beat his own "personal best" times in each hour of work. The task for the worker has not changed and on its own has little to no meaning. But imbued with a challenge the individual sees as worthwhile, it is no longer boring. The worker cannot change the task but can control the way in which he/she frames it.

Similarly, constraint or lack of autonomy is often thought to cause boredom (e.g., Fisher, 1993; Troutwine & O'Neal, 1981). However, it is easy to imagine being forced to do something that you want to do at the outset. In such circumstances, the fact of being forced to do the task would not be sufficient to cause boredom. Moreover, even if you do not initially want to do a task, if the task is imbued with some semblance of meaning, then boredom can be averted. For example, Sansone, Weir, Harpster, and Morgan (1992) found that a task was perceived as more engaging and hence less boring, if people believed that it had some inherent health benefits. This capacity to reframe a forced situation to have more meaning or to be more engaging is also prominent in the educational literature (see Mugon, Danckert, & Eastwood, in press). Those who can reappraise a circumstance or task to be meaningful in some way experience less boredom and attain higher levels of achievement (Daniels, Tze, & Goetz, 2015; Nett, Goetz, & Daniels, 2010; Nett et al., 2011). Such reappraisals are within the control of the individual – in other words, they are independent of the external constraint itself. Finally, sitting down to do your taxes is something we all have to do – the government dictates this activity relieving us of autonomous control. While most of us may not like the task for other reasons and may even say we are bored by it, the mere fact that we are compelled to do it by some external agent (i.e., the government) does not itself *make the task boring*.

The relation between meaningless situations and boredom is somewhat nuanced; but again it does not appear that meaningless activities necessarily *cause* boredom. There appears to be an asymmetrical relationship between meaninglessness and boredom. In sum, if a person is bored, then the activity will be seen as meaningless; but if the activity is meaningless, a person will not necessarily feel bored. Let us unpack that claim. If a person is bored, then they will undoubtedly say the situation they find themselves in is meaningless. This kind of lack of situational meaning is perhaps best cast as a *key part* of the experience of boredom rather than a cause. (This does not obviate the possibility that a more general sense that life itself is meaningless – something akin to nihilism – may operate as a cause of boredom.) The in-the-moment experience of boredom is in part constituted by the absence of subjective value and meaning. However, the converse does not follow. A person can find an activity meaningless but not feel bored while they engage in it. Consider, for example, coming home from a hard day's work and binge-watching the Kardashians on television. This could hardly be considered a meaningful activity to engage in, but it might hold our attention and occupy our mental faculties; and if so, we would not experience boredom.

To conclude, situational factors powerfully increase our chances of experiencing boredom. But they are not sufficient or direct causes of boredom. When situational factors do cause boredom, they do so indirectly by preventing us from being able to articulate and sustain an actionable desire. What is common to monotony, lack of meaning, and a loss of autonomy is the notion that each may reflect the calculation of opportunity costs (Kurzban, Duckworth, Kable, & Myers, 2013). That is, at any given moment we could choose to engage in numerous goals or activities. The need to choose one activity over all others necessarily involves some calculation of reward or value. Opportunity costs refer to the potential loss of reward/value from failing to pursue something different than our current task (Kurzban et al., 2013; see also Gomez-Ramirez & Costa, 2017, for a computational model of boredom that takes into account opportunity costs). The notion of opportunity costs is best highlighted by foraging behavior in animals. When foraging for food, the animal must balance the need to *exploit* current resources (e.g., berries in a bush) with the costs of failing to *explore* the environment for potentially better resources (e.g., a more full bush of berries around the corner; Charnov, 1976). The decision to move on to a new patch of berries reflects some calculation of diminishing rewards obtained from the current patch (Gallistel, 1990). By analogy, when a task becomes monotonous, this could be cast in the context of other potentially more varied avenues for engagement. An activity we deem meaningless, by definition, hints at other things we could be doing that would be more meaningful. Finally, when we feel we have diminished control over the outcome, the reward value of that task diminishes as we consider other things we could be doing that would afford higher levels of autonomy. In each instance, monotony, meaninglessness, and lack of control represent not causes of boredom but sources of opportunity costs signaled by the experience of boredom. In other words, opportunity costs are essentially the boredom signal, telling us to move on (Bench & Lench, 2013; Elpidorou, 2014). This is not to suggest that boredom directly *calculates what it is about our current activity* that is boring or, for that matter, evaluates the likelihood of other activities to satisfy our needs. Instead, boredom signals the fact that opportunity costs have risen above some threshold for engagement, pushing the organism to act. In other words, rather than asking specifically what situations or personal factors cause boredom, we should be asking what does boredom signal? One plausible answer is that boredom signals rising opportunity costs (Gomez-Ramirez & Costa, 2017; Kurzban et al., 2013).

Can Boredom Help?

The not so subtle reference to the Edwin Starr song with the chorus “War, huh, what is it good for? Absolutely nothing.” in the title to this chapter might suggest that boredom is not good for much. On the contrary, this chapter argues that boredom is absolutely good for something. Boredom signals that our mental faculties are not engaged. Arguments about the desirability of “being engaged” hinge on the fact that conscious awareness is finite. We are only conscious of a small subset of possible stimuli at any given moment. Mentions of being “cognitively engaged” are referring to the processes needed to selectively engage with some stimuli or task and would further claim that such selective processing is essential to our survival. Persisting in a state of cognitive disengagement is, at best, a waste of time. Our time is better spent being cognitively engaged, and boredom will not let us rest comfortably in a state of being unengaged. Unfortunately, however, this does not mean that boredom is a reliable indicator that *what we are doing* in the moment is a waste of time or has no value. Nor does it necessarily mean that it is best to drop what we are doing and move on to something else. It might mean that we should “double down” and find a way to *become* engaged with what we are doing. The point here is that boredom is the feeling associated with the sense that we are not optimally utilizing our cognitive resources or realizing our goals. Like feelings of pain associated with tissue damage, boredom pushes us out of a state that is potentially harmful for our well-being. However, as mentioned above with respect to opportunity costs, the boredom signal does not arise from any kind of evaluation of the specific activity itself. Instead, it simply reflects the fact that we are not engaged with whatever that activity is. The current activity is not boring because it pales in comparison to some other potential activity. Boredom, simply, but very powerfully and helpfully, tells us that what we are currently doing is not engaging our cognitive resources *sufficiently*. We might want boredom to do more for us, but as a self-regulatory signal, it achieves the important goal of pushing the organism toward mental engagement without doing the hard work of specifying what that action might, or even ought to, be. In other words, boredom's job ends with the signaling of a problem.

The things boredom gets blamed for are obvious and do not need reiterating here. But the narrative will pause for a moment to examine one area where boredom gets too much credit – namely, as a creativity boosting force (Vodanovich, 2003b). There is certainly anecdotal evidence that some of the most creative people are spurred on by boredom. When Mike Bloomfield of The Paul Butterfield Blues Band, an eventual inductee into the Rock and Roll Hall of Fame, first heard Jimi Hendrix play he asked him after the show where he had been hiding. Hendrix replied "I been playin' the chitlin circuit and I got bored shitless. I didn't hear any guitar players doing anything new and I was bored out of my mind" (Tolinski & Di Perna, 2016, p. 218). Hendrix's assertion aside, actual demonstrations that state boredom leads to increased creativity are thin on the ground. There are only three studies that have directly examined whether being bored gets the creative juices flowing. Larson (1990) asked students to report their levels of boredom while working on an essay at four key points in time. After each boredom report, they handed in a draft of their work. Independent judges evaluated the originality, organization, and overall quality of the essays. The findings showed that higher levels of boredom were associated with lower quality essays. However, a big limitation of this study is that Larson (1990) did not experimentally make students feel more or less bored; thus, among other things, leaving open the possibility that the absence of creative ideas resulted in more boredom and not the other way around. Gasper and Middlewood (2014) actually made research participants feel bored, elated, distressed, or relaxed by asking them to watch different video clips. Boredom and elation were grouped together as examples of promotion-focused emotions, that is, motivated by the attempt to *obtain* something desirable, whereas, distress and relaxation were grouped together as examples of prevention-focused emotions, that is, motivated by the attempt to *avoid* something undesirable. The results showed that promotion-focused emotions were associated with more creativity than prevention-focused emotions. However, the study did not examine the creativity boosting ability of boredom specifically. Elation was always paired with boredom in the statistical analyses. Previous research has established that elation has a large and robust positive impact on creativity (e.g., Adaman & Blaney, 1995), and this particular emotion likely drove the positive effect for the class of promotion-focused emotions. Finally, Mann and Cadman (2014) made half of their participants bored by asking them to write out or read out numbers from a telephone book for 15 min before having them perform a task in which people are asked to think of as many alternate uses as they can for an everyday object (e.g., a paper cup, a brick; there are many variants of this kind of test – see Guilford, 1971; Mednick & Mednick, 1968; Wallach & Kogan, 1965). The other half of the participants completed the alternate uses task, an indirect measure of creativity, right away without undergoing a boredom manipulation. Mann and Cadman then zeroed in on the participants in the boredom condition who also reported daydreaming during the boredom induction. They did so because they proposed that daydreaming is a way of eliminating boredom and that daydreaming might, in turn, facilitate creativity. Indeed, they found that participants who were bored *and* who reported daydreaming demonstrated greater creativity compared to those who did not undergo an emotion manipulation. Unfortunately, however, the creativity level of the participants who remained bored after the manipulation is unknown (i.e., those that did not escape boredom by daydreaming). Nor is it clear if daydreaming while in a potentially boring situation is an indicator of a creative personality per se.

Although an enticing idea, there is simply not yet any compelling evidence to suggest that actually being bored enhances creativity. However, perhaps it is not being bored in the moment that is the key driver of creativity. Rather, it may be that the drive to avoid potential boredom – coupled with successful evasion of boredom – is associated with higher levels of creativity. In retrospect, it is a bit odd to think that someone who is currently caught up in the throes of boredom would be more creative. Rather, the notion that creativity reflects the successful sidestepping of boredom seems to have more face validity to us. Thus, Hendrix might have been correct in his assertion that boredom played a role in his creativity. However, it is unlikely that he was bored at the moment of creating his masterpieces. Indeed, his innovation may have been borne out of previous episodes of boredom and a disdain for what others were doing at the time. There is a sense then in which our capacity for boredom is good for creativity.

Trait boredom, on the other hand, does indeed appear to be good for "absolutely nothing." This chapter defined trait boredom as essentially a chronic pattern of responding to the signal of boredom in an ineffectual manner. To return to the analogy of pain, it is like the boredom-prone person feels the pain of boredom but then cannot rectify the problem. Clearly, this conceptualization of trait boredom as a problem of self-control and action regulation needs considerable development and elaboration. However, even if this way of understanding trait boredom in terms of self-regulation proves unhelpful, it seems clear that trait boredom itself is utterly unhelpful. Trait boredom, as mentioned earlier, is correlated with a large range of psychosocial problems ranging from problem gambling (Blaszczynski et al., 1990) to impoverished life meaning (Fahlman, Mercer, Gaskovski, Eastwood, & Eastwood, 2009) to anxiety (Sommers & Vodanovich, 2000). Moreover, trait boredom has incremental validity (Mercer-Lynn, Hunter, & Eastwood, 2013). For example, trait boredom uniquely predicts depression and anger over and above several other trait variables including neuroticism, impulsivity, emotional awareness, inattention, behavioral inhibition, and activation. Thus, while the state of boredom may be an important signal that leads to adaptive behavior, to date there is no reason to celebrate trait boredom.

What Is Next for Boredom Research?

Thankfully, we are not at the seventh day of boredom research – there is still a great deal to learn. The dynamics of the state and its relation to our sense of autonomy and self-efficacy represent an important avenue to pursue further. It may be that those who report never experiencing the state simply have high levels of self-esteem and a strong sense of self-efficacy in the pursuit of goals. Although we know that boredom diminishes as the frontal cortex reaches full maturation levels in the early 20s, we know far less about boredom in the preschool and preteen years or, for that matter, at the other end of the age spectrum. How boredom manifests in the seventh and eighth decades of life and beyond is likely to be different than its expression in the first few decades of life. The relation between boredom and depression is a ground-zero research finding – but little else is known about it, beyond its existence. Do increased levels of boredom lead to depression? If symptoms of depression resolve more rapidly than does the experience of boredom, can treatments be augmented by focusing on better boredom coping strategies? Recent work using psychophysiological measures and neuroimaging hints at the possibility of developing a biological signature of state boredom. This could address the arousal conundrum directly and, when coupled with self-reports, may move the field forward in understanding the dynamics of both state and trait boredom proneness. This leads to an important goal of boredom research – to discover the most adaptive means of responding to the boredom signal. Although this chapter has characterized boredom as a unitary self-regulatory signal, this does not necessarily mean there will be a singular solution to coping with it. Any successful strategy will likely need to be tailored to the group or circumstance under consideration. For example, asking TBI patients who exhibit diminished attentional functioning to engage in mindfulness training to overcome boredom may be setting them up to fail. Counterintuitive solutions may help address the lack of fit between a preferred regulatory mode (e.g., assessment) and actual behavior (e.g., restlessness). For example, encouraging a highly boredom-prone individual to fidget more or doodle on scrap paper as a secondary task may in fact alleviate their boredom by simply providing an outlet for their pent-up energy and the sense that their capacities and skill set are currently underutilized. Finally, a deeper understanding of boredom has the potential to inform theories of motivated, goal-directed behavior more broadly (Gomez-Ramirez & Costa, 2017). In short, the boredom signal and how we respond to it has far-reaching consequences for the human condition that represent a fecund and fascinating path forward for researchers interested in goal-pursuit writ large.

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