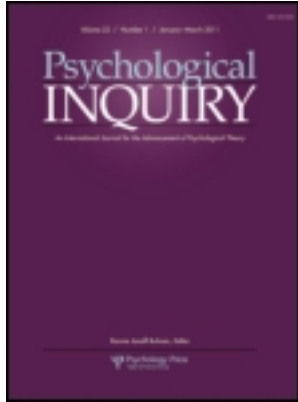


This article was downloaded by: [University of Toronto Libraries]

On: 04 December 2012, At: 07:56

Publisher: Psychology Press

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Psychological Inquiry: An International Journal for the Advancement of Psychological Theory

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/hpli20>

### Pragmatic Perspectives on the Psychology of Meaning

Jacob B. Hirsh<sup>a</sup>

<sup>a</sup> Rotman School of Management, University of Toronto, Toronto, Ontario, Canada

Version of record first published: 04 Dec 2012.

To cite this article: Jacob B. Hirsh (2012): Pragmatic Perspectives on the Psychology of Meaning, *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 23:4, 354-360

To link to this article: <http://dx.doi.org/10.1080/1047840X.2012.720830>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## Pragmatic Perspectives on the Psychology of Meaning

Jacob B. Hirsh

*Rotman School of Management, University of Toronto, Toronto, Ontario, Canada*

Travis Proulx and Michael Inzlicht (this issue) propose that meaning threats, defined as expectancy violations, lead to an aversive psychological state that motivates a variety of compensatory behaviors meant to restore a sense of familiarity. In this commentary, I highlight the advantages of adopting a pragmatic perspective on meaning, rather than the structuralist one that forms the core of the authors' theoretical framework. Building upon this pragmatic approach, I describe the role of the behavioral inhibition system in producing the experience of conflict-related anxiety. Finally, I examine the implications of this pragmatic framework for understanding the five types of compensatory behavior proposed in the target article.

### Meaning Is Pragmatic

The meaning maintenance model (MMM) defines meaning as “the expected relationships that allow us to make sense of our experiences” (p. 317) or as “mental representations of expected associations” (Heine, Proulx, & Vohs, 2006; Proulx & Heine, 2010). This suggests that meaning can be understood as the expected pattern of statistical relations between phenomena, as predicted by the structure of an individual's associative knowledge network. In line with the broader structuralist approach (Piaget, 1970), the meaning of an event is thus equated with the mental representations that are associated with that event, and events are more meaningful to the extent that they are associated with a broader variety of knowledge structures (Baumeister, 1991). According to this formulation, any disruption of a person's existing knowledge base will constitute a “meaning threat,” in which unexpected associations emerge, or expected associations fail to emerge. Such a broad definition of meaning has the advantage of “assimilating” a variety of empirical phenomena within a single framework, but it also runs the risk of being so broad and all-encompassing as to limit its conceptual precision and utility. All forms of associative learning, for example, involve the revision of one's existing system of expected relationships, whether through the creation of new (previously unexpected) connections or the pruning of old (previously expected) ones; should associative learning thus be considered a form of meaning threat (and with it the entire canon of behaviorist learning theory)?

An alternative definition of meaning is briefly hinted at in the target article but deserves further elaboration for its potential to provide additional theoretical clarity for the psychology of meaning. In particular, the *pragmatic* definition of meaning states that the meaning of an object or event is the action tendency that it affords in the perceiver (James, 1907; Mead, 1934; Peirce, 1878). In contrast to the structuralist definition of meaning as “expected relationships,” the pragmatic meaning of an event or piece of information is the behavioral response (whether covert or overt) that it elicits from the individual.

One advantage of the pragmatic perspective on meaning is that it is more closely aligned with the adaptive challenges that are faced by organisms across the entire phylogenetic spectrum. Specifically, it is the task of any nervous system to interpret the functional significance of incoming sensory information by identifying the most adaptive behavioral response to unfolding events (Swanson, 2003). An animal may, for example, categorize the world into a number of basic functional categories such as “something to eat,” “something to play with,” or “something to defend against.” These core functional categories provide constraints on the possible meanings that an animal is able to experience (and, in simpler nervous systems, may be reduced to the basic distinction between “something to approach” and “something to avoid”; Hirsh, in press). The critical adaptive importance of this functional categorization (or pragmatically defined “meaning-making”) should be immediately clear, as misjudging the functional significance of an object can jeopardize an individual's likelihood of survival (e.g., by mistakenly interpreting a predator as a source of nurturance).

According to the pragmatic view of meaning, there is no sharp distinction between the process of meaning-making for humans and nonhuman animals. In both cases, the meaning of an object is defined as its functional relevance (and is expressed in the behavioral response that it evokes). An important difference, however, is that humans have considerably more cognitive flexibility, allowing us to interpret the same object in terms of any number of different functional categories (Barsalou, 1983). This heightened cognitive flexibility appears to result from our expanded prefrontal cortices, which allow us to situate basic biological goals within higher order goal structures that flexibly modulate our behavioral responses to sensory input (E. K. Miller,

2000). Although humans thus have a much broader range of behavioral flexibility (and therefore a broader range of possible meanings), the meaning of an event is still defined in relation to our goal structures (Emmons, 1986; Hirsh, 2010; Peterson, 1999). Even as our goals change from one moment to the next, sensory information is interpreted functionally in terms of its implications for our currently active goals. It is these goal structures that define the behavioral affordances that we perceive in our environment, and thus constrain the meanings that we are able to derive from our experiences (Hirsh, 2010, in press; Hirsh, Mar, & Peterson, 2012).

### Conflict, Uncertainty, and Anxiety

If the meaning of an event is understood as the behavioral affordances that it evokes within the perceiver, how then can we understand meaning threat from a pragmatic perspective? In the structuralist account outlined within the MMM, meaning threat is defined as the violation of expected relationships between phenomena. Within a pragmatic framework, meaning threat is more appropriately understood as “meaning conflict,” where multiple conflicting behavioral affordances are activated simultaneously.

In any given situation, the brain is always trying to compute the optimal behavioral response, based upon the currently perceived state of the world, the desired state of the world, and beliefs about how to turn the latter into the former (Peterson, 1999; Todorov, 2004). In our Entropy Model of Uncertainty (EMU), we conceptualize the range of possible actions that can be brought to bear on a given situation as a probability distribution (Hirsh et al., 2012). An action gains a greater probability of execution when it is more strongly activated by salient sensory information and an individual’s goal-directed selective attention. Critically, the shape of this probability distribution varies from one situation to the next and can be quantified in terms of Shannon’s entropy formula as derived from information theory (Shannon, 1948). In some situations, the optimal response is fairly evident, and only a single behavioral affordance is activated. Such situations are characterized by familiarity and deeply routinized behavioral patterns and a low entropy distribution where only a single dominant response is highly activated. Individuals in this state are relatively disinhibited, focusing only on the most salient response option (Hirsh, Galinsky, & Zhong, 2011). Conversely, other situations are characterized by the simultaneous activation of competing action tendencies, such as when we are unsure whether we should approach or avoid an unfamiliar situation (Lewin, 1935; N. E. Miller, 1944). These situations are characterized by uncertainty about the appropriate response, expressed as a high entropy distribution

of potential actions where many competing behaviors receive similar levels of activation (Hirsh et al., 2012).

As just outlined, situations of meaning conflict (pragmatically defined as behavioral uncertainty) should rightfully be experienced as aversive, because they signal an inability to identify the most adaptive behavioral response to an event. As it turns out, the mammalian brain has evolved a dedicated neural system for dealing with this type of conflict: the behavioral inhibition system (BIS). The BIS is a neurobehavioral system that responds to goal-conflict (Gray & McNaughton, 2000). Specifically, whenever two conflicting behavioral responses are simultaneously activated (e.g., the simultaneous desire to approach and avoid an object), the BIS is responsible for slowing ongoing behavior and promoting information gathering to discern the most appropriate response. Part of this process involves the recursive amplification of the negative associations of each potential response until one action is clearly identified as more desirable than the other. The BIS is instantiated by the septo-hippocampal system, with extensions into the Anterior Cingulate Cortex (Amodio, Master, Yee, & Taylor, 2008), producing heightened arousal through noradrenaline release whenever conflict is detected. Critically, the BIS has been identified as the target of anxiolytic drugs, and the seat of anxiety in the brain (Gray, 1982; Gray & McNaughton, 2000). Individual differences in the BIS, which are reflected in the personality trait of Neuroticism, likewise predict the extent to which uncertainty is anxiety provoking (Hirsh & Inzlicht, 2008). When examined mechanistically in relation to the BIS, it becomes clear that uncertainty = anxiety = behavioral conflict = (pragmatically defined) meaning conflict. What is at the core of each of these psychological constructs is the BIS activation that supports them. The five strategies for reducing meaning threats described by Proulx and Inzlicht should thus perhaps more precisely be described as strategies for reducing BIS activation in response to conflicting behavioral affordances (Hirsh et al., 2012).

Identifying the BIS as the seat of uncertainty-related anxiety further highlights the value of adopting a pragmatic definition of meaning over a structuralist one. If the structuralist definition of meaning is appropriate for understanding meaning threats, then BIS-related anxiety (and subsequent compensatory efforts) should be triggered by *any* violation of expected relationships within an individual’s associative knowledge base. From a pragmatic perspective, however, and consistent with research on the BIS, anxiety should be triggered only by the subset of expectancy violations that result in behavioral uncertainty. Support for this notion comes from research demonstrating that uncertainty inductions produce compensatory responses only when the uncertainty prime is relevant to a currently active goal (Nash, McGregor, & Prentice, 2011). In the pragmatic tradition, cognitive discrepancies (i.e., expectancy

violations) that have no practical bearing on one's choice of action can be safely ignored (James, 1907). Often times, however, violated expectations do indeed have a destabilizing effect on our appraisal of the situation and our understanding of the most appropriate behavioral response. This state of uncertainty can last a few moments or a few years, but it is specifically the inability to identify the most appropriate response that produces BIS activation and the experience of anxiety.

In recognition of the fact that experiences of uncertainty can be chronic or fleeting, the EMU framework also considers the level of an individual's personal goal-hierarchy (Carver & Scheier, 1998; Powers, 1973) as a critical moderating variable in determining the intensity of BIS-instantiated anxiety in response to behavioral conflict (Hirsh et al., 2012). In particular, uncertainty about high-level goals will have much broader implications for an individual's actions across a large time span, making it difficult to choose the most appropriate response in many different situations. High-level interpretive conflicts (e.g., "Am I a good person?" "What is my purpose in life?" "Is there justice in the world?") should thus produce a great deal more anxiety than low-level conflicts (e.g., "Should I bring an umbrella to work?") because they introduce much more behavioral uncertainty into a person's life (cf. Emmons & King, 1988). Expectancy violations that disrupt high-level goals should accordingly produce more anxiety than those that disrupt low-level goals or fail to disrupt any goals at all. Maintaining the integrity of one's high-level goals and narratives is therefore a key adaptive priority, as they are critical in helping us to identify the optimal course of action across a large number of situations (Hirsh, Mar, & Peterson, in press, 2012; Peterson, 1999). Although the MMM does allow that compensatory reactions should be stronger for more personally salient meaning domains (Heine et al., 2006), a pragmatic framework rooted in the operation of the BIS parsimoniously relates the intensity of these reactions to the amount of behavioral uncertainty that is experienced.

### Varieties of Conflict Resolution

If the BIS is indeed considered to be at the heart of "meaning threats," underlying the core experiences of uncertainty and anxiety (Hirsh et al., 2012; Nash et al., 2011), then compensatory efforts can be understood as strategies for restoring a low-entropy distribution of response options. In other words, conflict-related BIS activity and the associated experience of anxiety will be reduced to the extent that a single dominant behavioral affordance can be identified. From the pragmatic perspective outlined in the EMU framework, the process of "meaning maintenance" is identical to the process of action selection (cf. Harmon-Jones & Harmon-Jones, 2008). Such a framework also suggests a different way

of organizing the taxonomy of compensatory behaviors following uncertainty. Given that goal-conflict is the antecedent of BIS activation (Gray & McNaughton, 2000), there are four broad strategies for reducing this conflict:

1. Increasing the relative activation of an existing behavioral option through selective attentional enhancement.
2. Decreasing the relative activation of competing behavioral options through attentional avoidance or suppression.
3. Identifying a new behavior that is more appropriate (and attains greater activation) than the alternatives.
4. Disengaging from the conflicting situation altogether and focusing on a different goal.

Each one of these will serve to reduce the entropy of the action distribution, allowing the individual to narrow in on a single pragmatic interpretation of the event and thereby reduce conflict-related BIS activity.

Although these strategies need not be mutually exclusive in any given situation, they help to shed some light on the specific mechanisms through which various compensation attempts may operate. Assimilation, for example, involves the strengthening of an existing cognitive-behavioral schema (Piaget, 1954), making it more likely to dominate the individual's interpretation of the situation. In contrast, accommodation, assembly, and abstraction are all examples of attempts to discover or create a new behavioral frame for interpreting the situation. Note that this framework does not sharply differentiate between these three types of compensatory strategies, as they are all examples of heightened learning in response to uncertainty; each one reflects an attempt to develop a novel response category that is appropriate to the ambiguous situation. There may, nonetheless, still be a worthwhile distinction in the degree to which these novel response categories are derived primarily from the structure of external sensory input (i.e., implicit pattern learning or "abstraction") versus the creative reconfiguration of internal representations (i.e., "assembly"). Both of these, however, reflect accommodation of an individual's cognitive-behavioral structure to ambiguous situations. Affirmation, finally, can reflect the selective enhancement of a prepotent response option (when it is related to the content of the conflict), or the complete disengagement from the conflicting situation in favor of another goal (when it is unrelated to the content of the conflict).

Although the five "A"s proposed by Proulx and Inzlicht cover three of these four broad strategies for reducing conflict-related BIS activity, they do not include any examples of the attempt to suppress alternative actions in order to bring behavioral clarity to the situation. In keeping with the theme of alliteration,

I propose the inclusion of *avoidance* as an additional strategy. Within the domain of avoidance would fall any attempt to reduce conflict-related uncertainty by avoiding, suppressing, or ignoring conflicting information. It is this willful ignorance of conflicting information that has been theorized to lie at the heart of self-deception, as when people persevere on a behavioral track despite accruing evidence of failure (Peterson et al., 2003; Shane & Peterson, 2004). This compensatory strategy appears to be a particularly dangerous one, as it can lead to behavioral rigidity and defensiveness (Peterson, 1999).

It is also worth pointing out that although the five “A”s proposed in the target article are all cognitive strategies for reducing conflict, there are also equivalent behavioral strategies. What distinguishes the latter is that they involve alteration of the sensory environment itself to reduce behavioral conflict, rather than altering one’s conceptual structure or attentional deployment. The behavioral equivalent of accommodation, for example, is the self-regulatory adjustment of one’s actions in response to error at a task, reducing the likelihood of future errors (Botvinick, Braver, Barch, Carter, & Cohen, 2001; Hirsh & Inzlicht, 2010). The salience of a given action can likewise be selectively enhanced with environmental cues associated with the desired behavior (Hirsh et al., 2011). Even physically walking away from a conflicting situation can be an effective behavioral strategy for disengaging from the accompanying experience of anxiety. When it comes to behavioral strategies for suppressing competing response options, an unfortunately common strategy has been to attack those who hold beliefs and values that conflict with one’s own, thereby eliminating reminders of alternative action frameworks (McGregor, Nash, Mann, & Phillips, 2010; Peterson & Flanders, 2002; Saucier, Akers, Shen-Miller, Knežević, & Stankov, 2009). It remains an important question as to how the more destructive forms of uncertainty reduction can be supplanted with more constructive forms.

### **Are Compensation Efforts Palliative or Pragmatic?**

A key tenet of the MMM is that the five “A”s are palliative attempts to reduce the experience of anxiety brought about by meaning threats. Although it is certainly true that anxiety is an aversive state that people are motivated to avoid, it may be misleading to describe any compensation efforts as “palliative.” The *Oxford English Dictionary* defines “palliative” as something “that relieves the symptoms of a disease or condition without dealing with the underlying cause” (Palliative, 2005). Such a formulation casts conflict-reduction strategies as entirely superficial in their attempts to reduce our discomfort. When adopting a

pragmatic definition of meaning, however, the nature of these compensatory efforts is cast in a very different light. In particular, as outlined in the EMU framework, the resolution of behavioral uncertainty is a critical adaptive challenge with very real consequences (Hirsh et al., 2012). Animals who are not able to identify the appropriate pragmatic response to a situation will not survive, nor will those who reduce their anxiety without addressing the underlying problem. The underlying problem, from a pragmatic perspective, is the fundamental existential question of “What should I do?” Failure to answer this question is equivalent to a failure to act (and therefore a failure to move toward one’s goals). As an adaptive system, the BIS is meant to facilitate the resolution of behavioral conflicts by boosting arousal, deploying attentional resources, and promoting the gathering of sensory information (Gray & McNaughton, 2000). Artificially silencing the BIS will not facilitate behavioral adaptation to a complex and changing environment (except when an overactive BIS is hindering adaptive function, as occurs among those suffering from anxiety disorders; Marks & Nesse, 1994). In the case of affirmation of personal values and goals unrelated to the precipitating conflict, this will certainly decrease anxiety in the short term, but the conflict is likely to reemerge if no changes are made to the individual’s cognitive-behavioral system.

From a pragmatic perspective, meaning threats pose very real adaptive challenges, and attempts to address them are more appropriately understood as attempts to sustain adaptive behavior in the face of an uncertain environment rather than as merely palliative efforts (Peterson, 1999). More generally, anxiety serves a critical adaptive function; alleviating anxiety should be understood in terms of the resolution of the underlying behavioral conflict.

### **Abstraction as Arousal-Induced Learning**

The MMM also emphasizes that each of the five “A”s is a motivated attempt to reduce the aversive arousal associated with the disruption of expected relations (what the EMU model defines mechanistically as BIS activation in response to behavioral conflict and uncertainty). As previously described, such efforts are likely to be successful in reducing discomfort to the extent that a single behavioral frame comes to dominate the situation (thereby silencing conflict-related BIS activity and the accompanying experience of anxiety). An important consequence of BIS activation is the mobilization of attentional resources to facilitate the identification of the most appropriate course of action in uncertain situations (Gray & McNaughton, 2000). This appears to occur through the release of noradrenaline, boosting attentional arousal throughout the brain, and the engagement of cognitive control

mechanisms in the dorsolateral prefrontal cortex, to help analyze the situation (Kerns et al., 2004; Yoshida & Ishii, 2006).

A number of studies have now demonstrated that meaning threats promote implicit pattern learning (Proulx & Heine, 2009; Randles, Proulx, & Heine, 2011), even when no such pattern actually exists in the stimulus (Whitson & Galinsky, 2008). This tendency toward “*abstraction*” following a meaning threat is thought to reflect a motivated desire to regain a sense of meaning, order, or control. An alternative possibility, outlined in the EMU framework, is that the heightened learning of patterns is a simple mechanistic consequence of tonic noradrenaline release in response to BIS activation (Hirsh et al., 2012). Noradrenaline has the effect of increasing the gain of a neural network, such that target neurons display increased responsiveness to their inputs (Aston-Jones & Cohen, 2005; Servan-Schreiber, Printz, & Cohen, 1990). When noradrenaline levels are heightened following conflict-related BIS activity, even relatively weak signals become amplified, thereby increasing their likelihood of producing a response. We have proposed that it is this heightened noradrenaline release following BIS activation that accounts for the increased chance of perceiving weak signals in a noisy channel during uncertainty (Hirsh et al., 2012). A related account is provided by attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007), which argues that anxiety shifts the control of attention away from top-down goals and expectations and toward bottom-up sensory processing, allowing previously ignored patterns to capture attention more effectively.

Although the adaptive function of heightened noradrenaline release and attentional arousal during uncertainty is indeed to facilitate the detection and learning of previously ignored sensory patterns, this appears to be a direct mechanistic consequence of BIS activation rather than reflecting a motivated drive for meaning or familiarity. As with other compensation efforts, increased abstraction will reduce the initial BIS activation only to the extent that the newly acquired information helps to identify the appropriate course of action. Consistent with this idea is the fact that none of the studies demonstrating postthreat facilitation of arbitrary pattern learning have demonstrated any subsequent reduction in anxiety; such anxiety reduction should occur only when the noradrenaline-induced facilitation of learning clarifies the appropriate course of action (i.e., helps to establish the pragmatic meaning of the ambiguous event). The broader point is that the link between a “meaning threat” and “compensatory abstraction” need not be mediated by the motive for meaning as proposed by the MMM; it can potentially be explained as a direct neurocognitive consequence of BIS-triggered noradrenaline release. Such a formulation also allows for greater phylogenetic consistency

in the function of the BIS as helping to detect and resolve behavioral conflicts through the heightening of attentional arousal (rather than forcing us to ponder the existential crises and desires for meaning that are faced by a rat).

## Conclusion

Proulx and Inzlicht have taken up the important task of integrating diverse research literatures into a taxonomy of psychological responses to meaning threat. This is certainly a critical step in advancing the modern psychology of meaning. There is still much work to be done, however. Although the current list of compensatory behaviors is presented as a descriptive taxonomy, an important goal of this enterprise will be to understand the full range of responses in terms of their underlying processes (i.e., exactly how it is that they reduce the aversive state that triggered them). I have proposed that understanding meaning threat from a pragmatic perspective in terms of conflict-related activity in the BIS can shed some light on the mechanisms that support the various compensatory behaviors. In particular, such behaviors should be understood in terms of how they serve to alleviate the simultaneous activation of equally salient but conflicting response options (Hirsh et al., 2012). Given that the BIS is the seat of anxiety in the brain (Gray & McNaughton, 2000), it may also be a worthwhile scientific goal to integrate the current framework with the classic literature on the various defense mechanisms that are deployed to reduce anxiety (Cramer, 2000; Freud, 1937).

An appropriate analogy for this taxonomic endeavor may be found in the history of chemistry. As new chemical elements were discovered throughout the 18th and 19th centuries, a variety of early classification attempts were formulated. It wasn't until the invention of the periodic table, however, that the elements were classified in terms of their underlying structure (i.e., atomic mass). An equivalent taxonomy within the psychology of meaning requires a precise formulation of the nature of anxiety and the processes by which compensatory strategies reduce that anxiety. Building upon the EMU framework (Hirsh et al., 2012), I suggest that a pragmatic approach centered on behavioral conflict and subsequent BIS activation may provide just such a perspective.

## Note

Address correspondence to Jacob B. Hirsh, Rotman School of Management, University of Toronto, 105 St. George Street, Toronto, Ontario, Canada M5S 3E6. E-mail: jacob.hirsh@rotman.utoronto.ca

## References

- Amodio, D., Master, S. L., Yee, C. M., & Taylor, S. E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self-regulation. *Psychophysiology*, *45*, 11–19.
- Aston-Jones, G., & Cohen, J. (2005). An integrative theory of locus coeruleus-norepinephrine function: adaptive gain and optimal performance. *Annual Review of Neuroscience*, *28*, 403–450.
- Barsalou, L. (1983). Ad hoc categories. *Memory & Cognition*, *11*, 211–227.
- Baumeister, R. F. (1991). *Meanings of life*. New York, NY: Guilford.
- Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., & Cohen, J. D. (2001). Conflict monitoring and cognitive control. *Psychological Review*, *108*, 624–652.
- Carver, C. S., & Scheier, M. (1998). *On the self-regulation of behavior*. New York, NY: Cambridge University Press.
- Cramer, P. (2000). Defense mechanisms in psychology today: Further processes for adaptation. *American Psychologist*, *55*, 637–646.
- Emmons, R. A. (1986). Personal strivings: An approach to personality and subjective well-being. *Journal of Personality and Social Psychology*, *51*, 1058–1068.
- Emmons, R. A., & King, L. A. (1988). Conflict among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology*, *54*, 1040–1048.
- Eysenck, M., Derakshan, N., Santos, R., & Calvo, M. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*, 336–353.
- Freud, A. (1937). *The ego and the mechanisms of defence*. London, England: Hogarth Press.
- Gray, J. A. (1982). *The neuropsychology of anxiety*. New York, NY: Oxford University Press.
- Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. Oxford, England: Oxford University Press.
- Harmon-Jones, E., & Harmon-Jones, C. (2008). Action-based model of dissonance: a review of behavioral, anterior cingulate, and prefrontal cortical mechanisms. *Social and Personality Psychology Compass*, *2*, 1518–1538.
- Heine, S., Proulx, T., & Vohs, K. (2006). The meaning maintenance model: On the coherence of social motivations. *Personality and Social Psychology Review*, *10*, 88–110.
- Hirsh, J. B. (2010). The weight of being: Psychological perspectives on the existential moment. *New Ideas in Psychology*, *28*, 28–36.
- Hirsh, J. B. (in press). Meaning and the horizon of interpretation: How goals structure our experience of the world. In J. A. Hicks & C. Routledge (Eds.), *The experience of meaning in life: Classical perspectives, emerging themes, and controversies*. New York, NY: Singer Press.
- Hirsh, J. B., Galinsky, A. D., & Zhong, C. B. (2011). Drunk, powerful, and in the dark: How general processes of disinhibition produce both prosocial and antisocial behavior. *Perspectives on Psychological Science*, *6*, 415–427.
- Hirsh, J. B., & Inzlicht, M. (2008). The devil you know: Neuroticism predicts neural response to uncertainty. *Psychological Science*, *19*, 962–967.
- Hirsh, J. B., & Inzlicht, M. (2010). Error-related negativity predicts academic performance. *Psychophysiology*, *47*, 192–196.
- Hirsh, J. B., Mar, R. A., & Peterson, J. B. (in press). Personal narratives as the highest level of cognitive integration. *Behavioral and Brain Sciences*.
- Hirsh, J. B., Mar, R. A., & Peterson, J. B. (2012). Psychological entropy: A framework for understanding uncertainty-related anxiety. *Psychological Review*, *119*, 304–320.
- James, W. (1907). *Pragmatism: A new name for some old ways of thinking*. New York, NY: Longmans, Green & Co.
- Kerns, J., Cohen, J., MacDonald, A., Cho, R., Stenger, V., & Carter, C. (2004). Anterior cingulate conflict monitoring and adjustments in control. *Science*, *303*, 1023–1026.
- Lewin, K. (1935). *A dynamic theory of personality* (Vol. ix). New York, NY: McGraw-Hill.
- Marks, I. f.M., & Nesse, R. M. (1994). Fear and fitness: An evolutionary analysis of anxiety disorders. *Ethology and Sociobiology*, *15*, 247–261.
- McGregor, I., Nash, K., Mann, N., & Phills, C. E. (2010). Anxious uncertainty and reactive approach motivation (RAM). *Journal of Personality and Social Psychology*, *99*, 133–147.
- Mead, G. H. (1934). *Mind, self, and society*. Chicago, IL: University of Chicago Press.
- Miller, E. K. (2000). The prefrontal cortex and cognitive control. *Nature Reviews Neuroscience*, *1*, 59–65.
- Miller, N. E. (1944). Experimental studies of conflict. In *Personality and the behavior disorders* (pp. 431–465). Oxford, England: Ronald Press.
- Nash, K., McGregor, I., & Prentice, M. (2011). Threat and defense as goal regulation: From implicit goal conflict to anxious uncertainty, reactive approach motivation, and ideological extremism. *Journal of Personality and Social Psychology*, *101*, 1291–1301.
- Palliative. (2005). In *Oxford English Dictionary*. Retrieved from <http://www.oed.com>
- Peirce, C. S. (1878). How to make our ideas clear. *Popular Science Monthly*, pp. 286–302.
- Peterson, J. B. (1999). *Maps of meaning: The architecture of belief*. New York, NY: Routledge.
- Peterson, J. B., DeYoung, C. G., Driver-Linn, E., Séguin, J. R., Higgins, D. M., Arseneault, L., & Tremblay, R. E. (2003). Self-deception and failure to modulate responses despite accruing evidence of error. *Journal of Research in Personality*, *37*, 205–223.
- Peterson, J. B., & Flanders, J. (2002). Complexity management theory: Motivation for ideological rigidity and social conflict. *Cortex*, *38*, 429–458.
- Piaget, J. (1954). *The construction of reality in the child* (M. Cook, Trans.). New York, NY: Basic Books.
- Piaget, J. (1970). *Structuralism*. New York, NY: Basic Books.
- Powers, W. (1973). *Behavior: The control of perception*. Chicago, IL: Aldine.
- Proulx, T., & Heine, S. (2009). Connections from Kafka: Exposure to schema threats improves implicit learning of an artificial grammar. *Psychological Science*, *20*, 1125–1131.
- Proulx, T., & Heine, S. J. (2010). The frog in Kierkegaard's beer: Finding meaning in the threat-compensation literature. *Social and Personality Psychology Compass*, *4*, 889–905.
- Randles, D., Proulx, T., & Heine, S. J. (2011). Turn-frogs and careful-sweaters: Non-conscious perception of incongruous word pairings provokes fluid compensation. *Journal of Experimental Social Psychology*, *47*, 246–249.
- Saucier, G., Akers, L. G., Shen-Miller, S., Knežević, G., & Stankov, L. (2009). Patterns of Thinking in Militant Extremism. *Perspectives on Psychological Science*, *4*, 256–271.
- Servan-Schreiber, D., Printz, H., & Cohen, J. D. (1990). A network model of catecholamine effects: Gain, signal-to-noise ratio, and behavior. *Science*, *249*, 892–895.
- Shane, M. S., & Peterson, J. B. (2004). Defensive copers show a deficit in passive avoidance learning on Newman's go/no-go task: Implications for self-deception and socialization. *Journal of Personality*, *72*, 939–966.
- Shannon, C. E. (1948). A mathematical theory of communication. *Bell Systems Technical Journal*, *27*, 379–423, 623–656.

## COMMENTARIES

- Swanson, L. W. (2003). *Brain architecture: Understanding the basic plan*. New York, NY: Oxford University Press.
- Todorov, E. (2004). Optimality principles in sensorimotor control. *Nature Neuroscience*, 7, 907–915.

- Whitson, J., & Galinsky, A. (2008). Lacking control increases illusory pattern perception. *Science*, 322, 115–117.
- Yoshida, W., & Ishii, S. (2006). Resolution of uncertainty in prefrontal cortex. *Neuron*, 50, 781–789.