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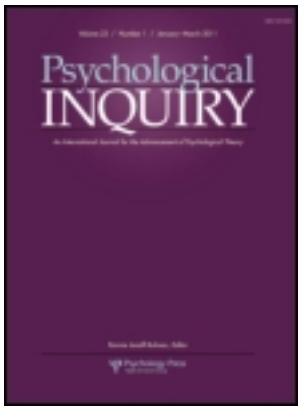

Psychological Inquiry: An International Journal for the Advancement of Psychological Theory
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hpli20

The Five "A"s of Meaning Maintenance: Finding Meaning in the Theories of Sense-Making

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Version of record first published: 04 Dec 2012.

To cite this article: Travis Proulx & Michael Inzlicht (2012): The Five "A"s of Meaning Maintenance: Finding Meaning in the Theories of Sense-Making, Psychological Inquiry: An International Journal for the Advancement of Psychological Theory, 23:4, 317-335

To link to this article: http://dx.doi.org/10.1080/1047840X.2012.702372

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Psychological Inquiry, 23: 317–335, 2012
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ISSN: 1047-840X print / 1532-7965 online
DOI: 10.1080/1047840X.2012.702372

Psychology Press
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TARGET ARTICLE

The Five "A"s of Meaning Maintenance: Finding Meaning in the Theories of Sense-Making

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Across eras and literatures, multiple theories have converged on a broad psychological phenomenon: the common compensation behaviors that follow from violations of our committed understandings. The meaning maintenance model (MMM) offers an integrated account of these behaviors, as well as the overlapping perspectives that address specific aspects of this inconsistency compensation process. According to the MMM, all meaning violations may bottleneck at neurocognitive and psychophysiological systems that detect and react to the experience of inconsistency, which in turn motivates compensatory behaviors. From this perspective, compensation behaviors are understood as palliative efforts to relieve the aversive arousal that follows from any experience that is inconsistent with expected relationships—whether the meaning violation involves a perceptual anomaly or an awareness of a finite human existence. In what follows, we summarize these efforts, the assimilation*,* accommodation*,* affirmation*,* abstraction *and* assembly *behaviors that variously manifest in every corner of our discipline, and academics, more generally.*

Albert Camus was a French Existentialist. He wrote novels and plays, and in his only philosophical essay he argued that people naturally organize their experiences into systems of relationships. When these systems are undermined by contradictory experiences, he believed that a corresponding *feeling of absurdity* motivates efforts to make sense of experiences in other ways (Camus, 1942/2004). However, it is unlikely that any of what Camus had to say made an impression on Thomas Kuhn—an American historian of science—who argued that scientists naturally organize their observations into paradigms (Kuhn, 1962/1996). When these paradigms are violated by anomalous observations, Kuhn believed that the corresponding *anxiety* motivates efforts to make sense of the observations in other ways. And we can be fairly certain that Jean Piaget had never heard of Kuhn when, years earlier, he built his theory of cognitive development around the notion of schemata—organized representations of reality that are constructed from experience, and often fail to match our subsequent experiences. When we experience these schemata/experience inconsistencies, Piaget believed that the corresponding *disequilibrium* motivates us to find other ways to make these experiences make sense. And it would be equally unlikely that Freud was familiar with any of these notions when he described the unfamiliar familiar, and the sense of *uncanniness* that arises from unusual experiences in settings where we least expect them (Freud, 1919/1990).

Nevertheless, it is very likely Heine, Proulx, and Vohs (2006) were familiar with all of these theorists when they put together the first overview of the meaning maintenance model (MMM). Since then, the model have been expanded, though the core conceit remains the same: All of these theorists (and many others) are describing psychological phenomena that can actually be understood as a singular phenomenon—the manner in which people respond to violations of their committed meaning frameworks, and restore a sense of *familiarity* to their experiences.

At its core, meaning is the expected relationships that allow us to make sense of our experiences. Whether these relations organize our understanding of playing cards or particle physics, they form the basis for our expectations about subsequent experiences with either, and when these expectations are violated by experiences that do not cohere with prior relations, we *feel* something—a common network of neurocognitive

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activation and sympathetic nervous system arousal that may follow from a black four of hearts or neutrinos moving faster than light.[1] We feel the same way when we find ourselves in situations where we behave in ways that do not match up with our attitudes (Festinger, 1957), learn that bad things sometimes happen to good people (Lerner, 1980), or see the word *red* printed in green (Hoshikawa & Yamamoto, 1997). Reading something written by Franz Kafka produces the same result (Proulx, Heine, & Vohs, 2010). And whether this uncertain feeling is called disequilibrium (Piaget, 1937/1954) or dissonance (Festinger, 1957) or uncertainty (Van den Bos, 2001), it evokes a common pallet of palliative efforts to regain a sense of lost meaning. Across eras and academic disciplines and subdisciplines in the field of psychology, theorists have traced overlapping elements of this phenomenon. In fact, they have been doing this for so long, and so well, that a general outline has emerged that spans the various manifestations of what we take to be a core psychological motivation. Tracing this outline, we believe, will add a new coherence to much of what we do in the field of psychology, and allow us to make sense of sense-making from a broader perspective.

To accomplish this, our initial goal with the MMM is to acknowledge and describe the theoretical through-line that has emerged from these differing eras and disciplines. It is by identifying this through-line that the MMM—or any useful scientific theory—becomes more than the sum of its descriptive parts. We understand the MMM as a set of core theoretical assumptions that account for empirical findings that cannot be adequately understood from other perspectives—especially those perspectives that address only specific aspects of the common phenomenon (often because of a reluctance to acknowledge the existence of a common phenomenon).

In what follows, we summarize the MMM by tracing the outline of meaning maintenance behaviors. We begin by providing a broad definition of *meaning*: the mental representations that allow us to understand our experiences, whatever they may be, and however they may come to be understood. We then outline the nature of *meaning violations*—those experiences that are inconsistent with the expectations that follow from our understandings. In what follows, we explore the feeling of *meaninglessness* that accompanies these violated expectations—in particular, the biologically based syndrome of aversive arousal that may follow from any given meaning violation and that motivates subsequent compensation efforts. We then summarize these compensation efforts—the *assimilation*, *accommodation*, *affirmation*, *abstraction* and *assembly* efforts that appear in every corner of the psychological literature, albeit under different guises and nomenclatures in different fields following from different theoretical frameworks.

We go on to argue that these five "A"s of meaning maintenance serve a common compensatory function, regardless of the content of the meaning framework that is violated, or the content of meaning frameworks that are recruited in meaning maintenance efforts. From this perspective, all experiences that violate expected relations (a) evoke a common, biologically based syndrome of aversive arousal, which in turn (b) motivates compensation efforts to relieve this arousal (c) where the meaning frameworks recruited in these efforts may share no content whatsoever with the violated relations. This final supposition is the core, novel theoretical conceit of the MMM: the fluid compensation hypothesis that understands meaning frameworks as radically substitutable with one another in meaning maintenance efforts. Meaning maintenance efforts are understood as *palliative* behaviors—they are aimed at preventing or diminishing an aversive sense of meaninglessness, rather than resolving meaning violations, per se. Finally, we speculate on the future directions of this integrative account—with future research converging on the central *distinctions* that can be made within the core motivational phenomenon.

What Is Meaning?

A couple of millennia back, Socrates would ask scholars of ethics to define *virtue*; these experts would reply with a litany of examples of manifestly virtuous actions—though they were generally hard-pressed to explain why it was that each of these actions exemplified virtue, per se (Plato, trans. 1997). Nevertheless, the ability of scholars—or anyone, for that matter—to easily generate commonly accepted examples of virtue implies that most people maintain some implicit conceptualization of what virtue *is*. In turn, this conceptualization allows them to judge actions as manifesting virtue, whether it is an example of aiding a friend, telling the truth, or completing a difficult task. So it may be with *meaning*, where it appears much easier to generate examples of meaning than it is to generate a concrete definition. Nevertheless, if we are going to embark on a discussion of meaning maintenance, we should begin with a rough-and-ready definition of what meaning actually *is*. Meaning, of course, is what any given word refers to (Lewis, 1975), or the significance of a life event (Kray et al., 2010). It is the reason why something happened to us (Park, 2010), or the reason why anything happens at all (Peterson, 1999). It is handed down from an absolute, external context (Kierkegaard, 1843/1997b), or made up by people through a gradual, pragmatic consensus (Nietzsche, 1887/1994). And after we consider all of these

[1]or the fact that earth-shattering findings can be based on loose computer cables.

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examples of meaning, it becomes clear that meaning is, well, perhaps it is not so clear after all.

Nevertheless, it should be noted that most people would agree that all of the aforementioned examples of meaning are just that—examples of meaningful events and meaningful behaviors that people might generate if you ask them to define *meaning*. As is the case with *virtue*, it seems that people have a general notion of what meaning is, though they would be hard-pressed to provide an explicit definition. However, unlike the ethical "experts" that Socrates queried about virtue, many psychological theorists who study meaning can readily offer up a rough-and-ready conceptualization. Generally speaking, this notion of meaning understands it as whatever it is that allows us to make sense of our experiences (e.g., Park, 2010). Fundamentally, it is this *sense-making* function of meaning that seems to underlie the endless examples anyone may generate, whether it is the meaning of a word or the meaning of life; meaning is what allows us to understand our experiences (or at least feel like we do).

What Meaning Does: The What and the Why

In the broadest sense, this understanding comes in two forms: a sense of *what* is going on, and a sense of *why* it should be so. The *what* involves an epistemological understanding of the world, a sense of what things are made of, how they are similar or different from other things, and how they interact in space and time (Peterson, 1999). For example, as infants we may come equipped with an implicit sense of object permanence (Baillargeon & DeVos, 1991); as adults, we can learn the scientific perspectives that account for how this could be so (Kuhn, 1962/1996). From naive physics to Newtonian physics, people of all ages and eras have tracked the apparent regularities in their environment and derived a sense of stability and order. They have also imposed these understandings back on their environment, tidying up the "buzzing, blooming confusion" (James, 1890/1981, p. 462) of their realities, which in turn allows them to predict and control future events and outcomes (or at least feel like they do).

Often, a second form of understanding is used as a means of predictability and control—a *why* of reality that provides a teleological account of our experiences, most often by understanding reality as a means to some end, as shaped by a purpose determined by some or other intentional entity. Whether it be God, Fate, or Nature (or their own self), people of all ages and eras make sense of experiences in terms of some purpose they may serve—often in terms of some anthropomorphized *will* that they can comprehend or supplicate (Freud, 1927/1989). These teleological accounts may be (mis)applied to tragic life event (Davis, Wortman, Lehman, & Silver, 2000) or the shape of mountainous rock formations (Keleman, 1999), and appear to come quite naturally—a likely outcome for social animals who are cued to the wants and needs of those around them, in addition to their own (Peterson, 1999).

Which brings us to the function of functional understandings that is perhaps most essential: meaning as a guide for action (Peterson, 1999). This is the other *why* that tells us what it is that we should want and provides a context that tells us how good we are at getting it. This is the intentional framework that defines the goals of individuals and provides the validating context that determines our value in relation to these goals—just as we determine the value of others in relation to our own intentions. If there is one form of understanding that tells us *what* is, this is the understanding of *why* it should be so, and that allows us to judge the right and wrong in terms of this construal. These are our morals and ethics, and we may believe they are grounded in social consensus or pragmatic necessity or cold logic or divine dictate or some or other combination. They may speak to our sense of obligation or our striving toward an ideal (Higgins, 1997), though in either case these understandings perform the same basic function: They tell us what to do.

What Meaning Is: Expected Relationships

So far, this has been a very functionalist account of meaning. Meaning is understood in terms of what it *does*: Either by means of *what* or *why*, it allows us to feel like we understand our experiences. These understandings in turn serve a variety of functions, mainly in terms of predicting and controlling ourselves and our environment, and giving us reasons to predict and control either or both. Nevertheless, having an account of what meaning *does* is not the same as telling us what meaning *is*; a horse and an automobile may be called upon to serve the same function, but no one would confuse a mustang with a Ford Mustang. So what kind of a *thing* is meaning? Perhaps the answer is as simple as what has been offered up before in the field of psychology: meaning is relationships (Baumeister, 1991). This definition would certainly cohere well with the other terms that we have for relationships that allow us to understand our experiences: schema (Bartlett, 1932), schemata (Piaget, 1937/1954), paradigm (Bruner & Postman, 1949), prototype (Rosch, 1973), script (Nelson, 1981), narrative (McAdams, 1997), assumptive world (Janoff-Bulman, 1992), or worldview (Thompson & Janigan, 1988), among many others. All of these terms refer to relationships between propositions and may be used to describe the relational understanding of the *what* or the *why* or both. "Schema," in particular, is a word that we have used to refer to relationships that organize anything we aim to understand. Be they a moral schema (Piaget, 1937/1954) or self-schema (Markus, 1977) or perceptual schema (Intraub,

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Gottesman, & Bills, 1998), the use of the word *schema* can be construed as a tacit acknowledgment of the common thing that underlies these notions: organized relationships between implicit and explicit propositions, which are in turn overlaid on subsequent experiences.

This acknowledgment has not always been tacit, as Piaget's now ubiquitous model of schema construction and maintenance offers the same account for understanding objects, minds and morals; the content of these schemata may vary, but the thing that they *are* does not: relationships between implicit and explicit propositions that are abstracted from our experiences, and that allow us to feel as though we understand our subsequent experiences. By "meaning," we mean only a little more than that. Meaning is not just relationships (and really, neither are schemata). Meaning is *expected* relationships. We do not merely associate snow with cold and positive events with good people. We *expect* snow to be cold, and we *expect* good things to happen to good people. Once meaning is abstracted, it is overlayed on subsequent experiences with the expectation that they conform to prior relationships. It is expectation that allows us to feel as though we predict and control our environment, as well as actually allow us to do so. Expectation also underlies our sense of what should follow from intention, whether these intentions follow from our societies or our gods or ourselves. It is expected relationships that underlie both modes of understanding, whether a given meaning framework imposes a *what* or a *why* on our experiences.

Ultimately, these expected relations allow us to feel that our experiences are *familiar* (Camus, 1942/2004). Whether we find meaning in our scientific knowledge, our ethics, values and purpose, or even our own self—these *what*s and *why*s provide an ultimate sense that the world is understandable, and as such, familiar. (This is true even when the *what*s as *why*s are fictions, as "A world that can be explained even with bad reasons is a familiar world."; Camus, 1942/2004, p. 454). When the world contradicts our expected relations, this experience feels *unfamiliar*: We have experienced a meaning violation.

What Is a Meaning Violation?

All too often, these relational understandings fail to explain our experiences. Perhaps, like Job, we cannot understand why God would seemingly punish our lifelong and steadfast obedience (Kierkegaard, 1843/1997b). Perhaps we are scientists who have had our model of the universe falsified again and again (Kuhn, 1962/1996). Perhaps we are looking at a surrealist painting that is composed of familiar elements arranged in unfamiliar ways (Freud, 1919/1990), or perhaps we are confronted with "our own most nonrelational potentiality of being not to be bypassed" (i.e., death; Heidegger, 1956/1996, p. 251). In each of these instances, our expectations are violated, or we do not know what to expect. And following any of these experiences, we share the same initial feeling that our understanding has been *undermined*. Moreover, this feeling can be aroused in the absence of externally generated experiences that violate our expected relations—merely contemplating the contradictions that pervade these relational structures can be enough to bring them crashing to the ground; as Camus (1942/2004) stated it, "Beginning to think is beginning to be undermined" (p. 442). Amid the rubble of these fallen meaning frameworks—of these *what* or *why* understandings—there arises a "feeling of absurdity" (p. 442): an aversive state of arousal that replaces the sense that our experiences are comprehensible and familiar feeling.

Over the course of the past century (give or take), psychologists have offered substantial empirical support for this essential notion: Violations of how people understand their experiences arouse a common psychological discomfort. They have done so by exposing us to an ever-expanding array of experiences that violate every conceivable set of expected relationships. These experiences begin in early infancy, when developmental psychologists expose us to solid objects that appear to move through one another (Baillargeon, & DeVos, 1991). Or subtly alter complex statistical patterns that we have just learned (Saffran & Wilson, 2003). Or present us with seemingly sentient beings that behave in ways that no sentient being should behave (Gergely & Csibra, 2003). And no sooner have we begun to learn our first words but these same psychologists begin to violate our understanding of how these words are used, and what it is that (we thought) they refer to (Shwe & Markman, 1997). Sometimes these psychologists will pour liquid from a short, fat container into a taller, skinnier one; it appears as if there is more water in the second container—though no water was added or taken away (Piaget, 2000). As we grow older, these same psychologists will expose us to more troubling experiences: Apparently, people can see the same events that we see but take away fundamentally different interpretations of these events (Carpendale & Chandler, 1996). This may be especially true in the moral domain, where similar others value dissimilar things, often not playing by the interpersonal rules that we assumed were universal (even though we had to rework them after the last time they were violated; Gibbs, 2010).

Our situation does not improve when we reach college age. Our classes are full of people who do not share the values that we thought everyone shared, and the ideas we study in these classes often do not cohere with our own values and beliefs (Perry, 1970). Even more troubling, there are more psychologists who appear determined to violate whatever expectations we

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have left. They flash us playing cards where the colors have been reversed (Bruner & Postman, 1949). They switch out the person we are talking to while we are distracted (Proulx & Heine, 2008) or flash us pairs of words that should not go together (Randles, Proulx, & Heine, 2011) or make us read stories that end in ways that stories should not end (Proulx et al., 2010). Maybe our experimenter is Asian but speaks with an Alabama accent (Mendes, Blascovich, Hunter, Lickel, & Jost, 2007). Maybe we learn that our safe, cozy bed is alive with dust mites (Burris & Rempel, 2004). Maybe we read about people who are spared a tragic outcome by mere chance (Markman, Karadogan, Lindberg, & Zell, 2009) or are asked to describe a significant event in our own life by highlighting how easily it could have turned out differently (Kray et al., 2010). These latter examples may challenge our expectation that events follow in an orderly manner that can be predicted and controlled. It is also likely that these experiences have implications for our sense of self, and as it turns out, social psychologists are particularly fond of violating self-relevant understandings. No doubt this is because we are especially committed to our sense of self, and violating the self is uniquely reliable in producing behavioral effects.

For example, social psychologists may challenge the expectation that we have control over our environment (Kay, Whitson, Gaucher, & Galinsky, 2009). They may present us with tasks that we expect to complete, though we are set up to fail (McGregor, Nash, Mann, & Phills, 2010). We may believe that we are likeable enough, though other people suddenly do not want to associate with us (Williams & Nida, 2011). We may have certain firm beliefs about how the world should be, though we find ourselves suddenly behaving in ways that defy those beliefs (Festinger, 1957). Or we may find ourselves behaving in ways that directly contradict the kind of person we think we are (Steele & Liu, 1983). More generally, we may have our belief that we are a competent and valuable person violated (Tesser, 2000). Or we may have our belief that we are *in*competent and *less* valuable violated—if that happens to be our self-understanding (Swann, Stein-Seroussi, & Giesler, 1992). Even news of our growth and improvement may be an aversive violation if it is inconsistent with what we believe about ourselves (Plaks & Stecher, 2007). Then there is the ultimate violation—a reminder of death: our potential annihilation (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). This experience challenges our most profound *what*s and *why*s simultaneously: an event for which we cannot know what to expect (other than it will occur) and which threatens our expectations regarding the ultimate purpose of our existence (despite our best efforts, all paths lead to the grave).

Often, we define these ultimate *what*s and *why*s in terms of broader cultural worldviews, where our own self-understandings are closely integrated into these foundational assumptions. Social psychologists are equally adept at violating these broader meaning frameworks—in particular, our most fundamental expectation about the world and our relation to it: the just world hypothesis (Lerner, 1980). In general, we believe that good fortune befalls good people and bad things happen to the bad people who deserve it. It is therefore unnerving when psychologists inform us this is not always the case (Van den Bos & Lind, 2010). Sometimes, psychologists will even present situations where we are the ones benefitting when we do not deserve it, which also violates our sense that the world is just (van den Bos et al., 2011).

When social psychologists tell us that unjust discrimination is rampant, or when we are unjustly discriminated against, this may violate our belief in a just world. If we are among that minority that is convinced that the world is *un*just, and we believe that discrimination is rampant, then learning from a psychologist that discrimination is rare will violate this alternate understanding (Major, Kaiser, O'Brien, & McCoy, 2007). In fact, situations involving "attributional ambiguity" are commonly presented in the psychology lab: We expect to be discriminated against or otherwise treated poorly and cannot understand it if we are instead treated fairly and with respect (Mendes, Major, McCoy, & Blascovich, 2008). However, most of us remain committed to a belief that the world is fundamentally just. So committed, in fact, that we may "reverse engineer" reality such that it conforms with our just world beliefs: If the world is fundamentally just, then however it is that rewards and punishments are actually distributed, this arrangement must therefore be fair—even if we are the ones who are losing out (Jost, Banaji, & Nosek, 2004).

Of course, we are being facetious when we imply that psychologists are solely responsible for experiences that violate our committed meaning frameworks; reality itself conspires to violate the manner in which we come to understand it. Many of these meaning violations are trivial in their implications, or so subtle that they operate below a threshold of conscious awareness. Although we may be firmly committed to a belief that playing cards appear in a certain way (Bruner & Postman, 1949), the violation of this particular *what* has no profound impact on how we conduct our lives (or even our ability to play poker). Other expectancy violations have a concrete, pragmatic impact on our lives, in addition to their implication for how we understand the world. Often, these more dramatic meaning violations involve instances of profound tragedy, personal loss, and grief. Much of the clinical and coping literatures deal with how people react to these experiences—often with what has been termed a "double dose of anxiety" (Janoff-Bulman, 1992, p. 64). The first of these "doses" follows from the personal threat or hardship that follows from traumatic experiences. However, these

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same experiences—be they the loss of a child, a cancer diagnosis, or sexual assault (Park, 2010)—may also evoke a second "dose" of anxiety that arises insofar as the experience constitutes a meaning violation. In fact, it may be difficult to imagine a tragic event that does not shake the foundations of what we thought we understood—in terms of both *what* and *why* (Davis, Nolen-Hoeksema, & Larson, 1998)—almost by definition. Most often, these "shattered assumptions" rest upon the same just world hypothesis that underlies many of our broader worldviews. As it was for Job (and Frankl, 1946), it is not the pain of these events that hurt so much as the perceived injustice: what did we do to deserve this hardship? Why us, and not someone else? If we are spared a tragedy when others succumb, we may find ourselves burdened by the anxiety of survivor's guilt (Niederland, 1968): What did we do to deserve being spared this tragedy? Why someone else, and not us?

We believe that this psychological discomfort stems from a common state of aversive arousal, regardless of the expected associations that are threatened. More broadly, this common psychological discomfort likely follows from experiences that violate how we understand either the *what* or the *why* of experience, regardless of the differential consequences of these violations, and regardless of the specific propositional content of the expected associations that are violated. Across all of these different psychological disciplines, the state that is thought to arise from these experiences has been variably termed *disequilibrium* (Piaget, 2000), *imbalance* (Heider, 1958), *dissonance* (Festinger, 1957), *uncertainty* (van den Bos, 2001), *anxiety* (Janoff-Bulman, 1992), and *anxious uncertainty* (McGregor et al., 2010). It is a central tenant of the MMM that all of these terms refer to essentially the same syndrome of autonomic physiological arousal and neurocognitive activation. In turn, we suggest that this syndrome of arousal underlies the different compensation efforts we engage in, where these behaviors are understood as palliative efforts to make this arousal go away. Viewed from this perspective, any given meaning violation bottlenecks at the same syndrome of aversive arousal, which in turn motivates any given meaning maintenance effort—all efforts to recapture a lost sense of the familiar.

What Is the Feeling of Meaninglessness?

When describing the feeling that follows from a meaning violation, an existentialist might use the term *feeling of absurdity* (Camus, 1942/2004). As psychologists, we have our own array of terms for this feeling, a kind of *disanxiousuncertlibrium* that motivates a variety of meaning maintenance efforts. When we describe this feeling, it is likely that we are introducing a concept with which most people are already generally familiar. If it is experienced consciously, it may register as a vague sense that something is not quite right in our environment, or we have felt undermined and unnerved by an experience that sharply contradicts our understanding of reality—something that just feels *wrong*—whether it involves an absurdist story (Kafka, 1915/1996), a visual anomaly (Bruner & Postman, 1949), or an example of profound injustice (Lerner, 1980). It may have been experienced as a vague sense of unease (Heidegger, 1996/1956) or an acute, persistent sense of anxiety (Kierkegaard, 1844/1997a, b). And yet, in spite of the anecdotal accessibility of this feeling, the conscious reporting of this feeling has been remarkably elusive in a laboratory setting (Baumeister, Vohs, DeWall, & Zhang, 2007).

Looking back to 1949, Bruner and Postman were flashing their participants anomalous playing cards, and they reported—albeit anecdotally—that some of these participants experienced "acute personal distress" (Kuhn, 1962/1996, p. 213). A few years later, cognitive dissonance researchers began exposing participants to robust discrepancies between their attitudes and behaviors, and they reported that these participants experienced . . . not much anxiety at all. In fact, so few of these studies produced measurable feelings of dissonance that people began to question whether such feelings were actually motivating subsequent "dissonance reduction efforts" (Zanna & Cooper, 1974). Similarly, many of the meaning violations that follow from contemporary paradigms are inconsistent (to say the least) in their ability to evoke any kind of felt aversive arousal—in spite of provoking very reliable compensation behaviors. For example, violating a sense that we have control over outcomes does not appear to provoke any conscious affect (Kay, Moscovitch, & Laurin, 2010). In our own work, we have never recorded conscious negative affect following any of the meaning violations we employ, whether they involve perceptual anomalies (Proulx & Heine, 2008), self-concept violations (Proulx & Heine, 2009), or subliminal nonsense words (Randles et al., 2011). Perhaps most striking, lab manipulations that remind individuals of their own mortality do not appear to provoke any kind of conscious negative arousal (Pyszczynski, Greenberg, & Solomon, 1999). As such, terror management theorists have proposed that the compensatory efforts that follow from "mortality salience primes" are motivated by efforts to avoid "potential terror," rather than address actual anxiety.

Meaninglessness as Physiological Arousal

Nevertheless, it has long been understood that there is a weak intercorrelation between the subjective experience of affect, changes in physiological arousal, and associated behavioral outcomes (Lang, 1968). As well,

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measurable affective states may occur in the absence of conscious experience (Winkielman & Berridge, 2004). In keeping with these findings, social psychophysiologists have consistently recorded a common syndrome of anxious arousal in response to experiences that violate expected relationships—often in the absence of any conscious, subjective awareness of the arousal (for a review, see Townsend, Eliezer, & Major, in press) As it is generally understood, this syndrome begins with the release of epinephrine, and often cortisol (Dickerson & Kemeny, 2004). What follows is a "physiological threat response": increased skin conductance, constriction of the blood vessels, and a marked variability in cardiac activity (Blascovish, 2000).

Over the past 60 years, a substantial literature in psychology has presented measurements of one or the other of these arousal markers, as they follow from one or another situation that violates or thwarts efforts to make sense of experiences. At the outset, situations that defy our attempts to form expected relations are associated with markers of physiological threat (e.g., increased heart rate: Epstein & Roupenian, 1970; Jennings, Averill, Opton, & Lazarus, 1970). More common are studies that demonstrate arousal markers following experiences that violate our established meaning frameworks, in one way or another. For example, many studies demonstrate physiological arousal following a variety of manipulations designed to evoke cognitive dissonance. Perhaps the earliest of these experimental procedures involved a "postdecisional dissonance" paradigm: If people are forced to choose between similar alternatives, they will often derogate the one not chosen, presumably to reduce any dissonance that may arise from having chosen the less desirable alternative. Nevertheless, being forced to choose between similar alternatives is enough to induce constriction of the blood vessels (Gerard, 1967). Similarly, a typical "counterattitudinal dissonance" manipulation—whereby people are induced to write an essay that conflicts with their beliefs—will demonstrate elevated galvanic skin response (Croyle & Cooper, 1983). Elevated galvanic skin response is also present following dissonance manipulations in which people are induced to produce facial expressions that conflict with the emotions they are currently experiencing (Robinson & Demaree, 2007).

More generally, it appears that any violation of expected associations produces these markers of arousal. For example, interacting with an Asian experimenter who has a southern U.S. accent will elicit the same vascular constriction and cardiac variability that is associated with profound worldview violations (Mendes et al., 2007). Even positive experiences will evoke these markers if they also violate one's understanding of their own self and its relation to the environment. For example, minority group members who believe that discrimination is rampant will experience elevated blood pressure if they interact with someone who is *not* prejudiced (Townsend et al., 2010).

Following from these psychophysiological measures, it is clear that aversive arousal arises from any number of expectancy violations, or from situations that do not easily allow us to form expectations at the outset. According to the MMM, this aversive arousal motivates all meaning maintenance behaviors (Proulx, Inzlicht, & Harmon-Jones, 2012; Townsend et al., in press), though the best evidence for this causal relation derives from an indirect source—studies that follow from a "misattribution of arousal" paradigm (i.e., inducing people to attribute their arousal to something other than its original source). In terms of the MMM account, the relevant aspect of misattributed arousal is what happens after arousal is consciously misattributed—all subsequent compensation efforts are extinguished. For example, Zanna and Cooper (1974) were able to demonstrate a typical "dissonance reduction" effect if students were encouraged to behave in a way that violated their attitudes; after presenting arguments that were in *favor* of a tuition increase, students resolved this dissonant behavior by deciding that perhaps they were in favor of having their tuition raised after all. However, if the students were also given a placebo pill that they were told could arouse anxiety, they no longer engaged in dissonance reduction efforts. Presumably, any arousal following from the dissonant behavior (i.e., arguing in favor of something they should not want) could now be understood in terms of the pill, which rendered further dissonance reduction efforts unnecessary.

In a similar vein, Kay and his colleagues (2010) have shown that people will compensate for a violated sense of predictability and control by heightening their commitment to controlling entities elsewhere in their environment—whether it be a government or a God. However, following from Zanna and Cooper (1974), Kay and colleagues were able to demonstrate that these compensation efforts were extinguished by the same "misattribution of arousal" manipulation—having people eat a placebo pill that they were told could arouse anxiety. In one of our own studies, participants were exposed to a visual anomaly that they did not consciously detect but which nevertheless prompted them to engage in compensatory efforts (Proulx & Heine, 2008); also following from Zanna and Cooper (1974), we were able to extinguish these compensatory efforts following the same "misattribution of arousal" manipulation.

Meaninglessness as Neurocognitive Activation

In sum, an analogous state of physiological arousal follows from a wide array of experiences that violate expected relationships. These expectations may be

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relevant to one's self understanding (e.g., Major et al., 2007), or entirely unrelated to the self (e.g., Mendes et al., 2008). They may be expectations for positive events or negative events (e.g., Plaks & Stecher, 2007). They may be explicit expectations for conscious experiences (e.g., Zanna & Cooper, 1974) or tacit expectations for unconscious perceptions (e.g., Proulx & Heine, 2008). They may be expectations for the way reality is (e.g., Mendes et al., 2008), expectations for the way reality should be (e.g., Townsend et al., 2010), or expectations for our own ability to bring about a desired state of reality (e.g., McGregor et al., 2010). More broadly, these expected relationships may organize either the *what* or the *why* of our experiences, and regardless of what they organize, violations of these meaning frameworks evoke a common physiological state that we refer to as aversive arousal (Proulx et al., 2012). If it is the case that any of these violations of expected relationships bottleneck at the same aversive physiological arousal state, then it stands to reason that this feeling may stem from the same basic mechanism for detecting any given expectancy violation—following from any understanding that organizes any given experience.

In the contemporary cognitive neuroscience literature, there is growing evidence that common brain processes are involved in (a) the *detection* of any given violation, (b) the *aversive reaction* that may follow from any given violation, and (c) the *palliative compensation* efforts that follow from this arousal. In terms of detecting meaning violations, it has been shown that the anterior cingulate cortex (ACC) plays a central role in detecting and reacting to inconsistencies between our experiences and our expectations. In particular, research following from the reward prediction error hypothesis (Montague, Dayan, & Sejnowski, 1996) has shown that "prediction errors"—which can be thought of as inconsistencies between what is expected and what actually occurs—produce a phasic change in midbrain dopamine levels, including in the ACC (Holroyd & Coles, 2002), with drops in dopamine when an event is worse than expected and rises in dopamine when it is better than expected. Especially relevant to our meaning maintenance perspective, there is growing evidence that the detection of any given type of inconsistency may bottleneck at the ACC—whether it implicates the self or not, whether the outcome is positive or negative in valence, and regardless of the content that is violated.

For example, it has long been shown that the ACC responds to implicitly detected, "low-level" response conflicts on the classic Stroop task (i.e., inconsistencies between the colors and content of words, e.g., the word *red* colored green; Carter et al., 1998). The Stroop task is said to evoke response conflict because of the competition between what one wants to do (i.e., read the word *red*) and what one ought to do (i.e., name the color green). It is important to note, however, that the ACC responds not only to the low-level conflict between competing response tendencies (Botvinick, Braver, Barch, Carter, & Cohen, 2001; Yeung, Botvinick, & Cohen, 2004) but also to the low-level conflict between how one actually responds and how one wanted to respond (Falkenstein, Hohnsbein, & Hoormann, 1990; Gehring, Goss, Coles, & Meyer, 1993). That is, it responds to the inconsistency between how one expected to behave and how one actually behaved, for example, when people make errors. More recently, it has been shown that the ACC has the same response to explicitly detected "high-level" behavior/attitude inconsistencies that are used in "cognitive dissonance" manipulations (van Veen, Krug, Schooler, & Carter, 2009). Furthermore, the ACC responds to "negative" expectancy violations—when outcomes are worse than expected—in the same general manner as "positive" expectancy violations—when outcomes are better than expected (Oliveira, McDonald, & Goodman, 2007). Moreover, all of this occurs regardless of whether the violations are relevant to the self (Oliveira et al., 2007) or not (Gentsch, Ullsperger, & Ullsperger, 2009).

In terms of the aversive arousal that follows from meaning violations, the ACC is involved not only in the detection of cognitive inconsistencies but also in the affective reaction to such inconsistencies. The ACC, in other words, is involved in both cognition and emotion (Bush, Luu, & Posner, 2000; Shackman et al., 2011) and is associated with sympathetic nervous system activation that follows the detection of inconsistencies between experience and expectation, in the same manner as this arousal manifests in the social psychological and psychophysiological literature just summarized. ACC correlates include measures of skin conductance (Hajcak, McDonald, & Simons, 2003), heart rate, pupil dilation (Critchley et al., 2003; Elkin & Leippe, 1996; Hajcak et al., 2003), and the startle eyeblink response (Hajcak & Foti, 2008). Also mirroring the social psychological literature, "misattribution of arousal" manipulations have been shown to diminish ACC activation following "low-level" implicit conflicts (Inzlicht & Al-Khindi, in press), and this activation is also diminished if people are given the opportunity engage in the affirmation of explicit, "high-level" values such as religious beliefs (Inzlicht & Tullett, 2010; but see Legault, Al-Khindi, & Inzlicht, in press).

Ultimately, we believe that the compensation efforts that pervade the social psychological literature can be understood as palliative attempts to reduce the state of aversive affect that is aroused by expectancy violations. As has been put forth by McGregor and his colleagues (McGregor et al., 2010), many of the compensatory behaviors that follow meaning violations can be construed as heightened approach motivation following the ACC-implemented detection and reaction to expectancy violations. Much research has

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shown that the left-frontal region of the brain is involved in approach motivational processes (movement toward goals). This is exemplified by electroencephalographic findings that greater left-frontal cortical activity is associated with state and trait approach motivation (Harmon-Jones, 2004; Harmon-Jones, Gable, & Peterson, 2010; Sutton & Davidson, 1997), with source localization of these EEG signals implicating the left dorsalateral prefrontal cortex (Pizzagalli, Sherwood, Henriques, & Davidson, 2005). Such approach motivated states are thought to reduce distress associated with the detection of inconsistency either by *accommodating* inconsistent experiences and thus facilitating effective action (Harmon-Jones, Amodio, & Harmon-Jones, 2009) or by *affirming* consistent but unrelated commitments (McGregor et al., 2010). Evidence for this includes findings that the left dorsalateral prefrontal cortex is reciprocally related to ACC activity (Nash, Inzlicht, & McGregor, 2012), is thought to be responsible for reducing dissonance in reaction to ACC-detected conflicts (Harmon-Jones et al., 2009), and is involved in resolving other "high-level" threats as well (McGregor, Nash, & Inzlicht, 2009). From this general perspective, meaning maintenance behaviors are understood as approach-motivated behaviors that act as palliative responses to the detection of any violation of expected associations.

How Do We Maintain Meaning? The Five "A"s

So far, the story (and the MMM) goes something like this: People maintain expected relations—meaning frameworks—that organize their experiences. When these meaning frameworks are violated by unexpected experiences (whether they threaten a *what* or a *why* understanding), a core array of neurocognitive structures detect the expectation/experience inconsistency and initiate a common syndrome of physiological arousal. What follows are a series of behaviors that are in turn initiated by this arousal–palliative efforts to reduce this generally aversive physiological state. So what are those behaviors? For the most part, these behaviors constitute a good deal of what psychologists measure and describe in a variety of disciplines and subdisciplines, across many different eras of psychological research. We suggest that these compensatory behaviors fall into five broad classes—*assimilation*, *accommodation*, *affirmation*, *abstraction*, and *assembly*.

As we go on to describe, these behaviors may differ from one another in important respects. For example, we may respond to a given meaning violation by altering a relevant meaning framework to account for the violation; in the case of these *accommodation* behaviors, an effort is made to resolve the expectation/experience inconsistency. Conversely, we may respond to the same meaning violation by heightening our commitment to an entirely unrelated meaning framework; in the case of these *affirmation* behaviors, the source of the expectation/experience inconsistency may be avoided altogether. As well, these meaning maintenance behaviors may differ in their implicit or explicit activation; the *affirmation* of an unrelated meaning framework likely takes place in the absence of any conscious decision to engage in the relevant behaviors. Conversely, efforts to *accommodate* a meaning framework to a glaring inconsistency will often involve some degree of conscious effort.

Despite these differences, we understand all of these behaviors as instantiations of the same, general meaning maintenance phenomena—efforts to eliminate the aversive arousal that follows from the violation of expected relations. According to the MMM (Proulx & Heine, 2006), efforts that compensate for these expectancy violations can be construed as making recourse to the *familiar*: retaining a sense of the familiar (assimilation), restoring a sense of the familiar (accommodation), returning to the familiar (affirmation), identifying the familiar (abstraction), and creating the familiar (assembly).

Assimilation and Accommodation

The fundamentally *palliative* dimension of meaning maintenance is readily apparent in the most common "violation-compensation" accounts—*assimilation* and *accommodation* models. Across eras and disciplines, psychologists have presented a series of overlapping accounts that (a) begin with an inconsistency (b) followed by a state of aversive arousal (c) followed by either a reinterpretation of the event (such that it is consistent with our familiar understanding) or a revision of our familiar understanding (such that it is consistent with the event). In his theory of cognitive development, Piaget introduced this now-familiar account: Experiences that are inconsistent with our schemata will arouse a sense of *disequilibrium*, which in turn motivates an *assimilation* of the experience so that it matches our schemata, or an *accommodation* of our schemata so that they account for the experience. In terms of cognitive development, these accommodation efforts are understood as more adaptive in the longer term, though they require more cognitive capacity than we may possess at a given stage of childhood—in addition to requiring a good deal more *effort* than simply assimilating the inconsistency (Piaget, 2000).

Similarly, the MAID model of attitudinal ambivalence (van Harreveld, van der Pligt, & de Liver, 2009) outlines the ways in which people respond to attitudinal ambivalence, that is, holding inconsistent attitudes about one and the same thing. What follows is a sense of *uncertainty*, which in turn motivates behaviors that are understood as "coping" efforts: a "less

effortful" mode of coping involves the wilful biasing of our cognitive processing so that that one or the other attitude is wholly validated—thereby *assimilating* our perceptions into a single understanding. Conversely, a relatively effortful mode of compensation involves the processing of both conflicting attitudes, and the conscious altering of one or the other to resolve the inconsistency—thereby *accommodating* the understanding to account for the perception.

If we shift across more disciplinary boundaries, there are numerous models in the clinical literature that offer analogous accounts of how people cope with traumatic life events (e.g., Janoff-Bulman, 1992; Park, 2010; Thomson & Janigan, 1988). According to these perspectives, people may experience a state of intense *anxiety* when their core assumptions about themselves and their world are violated by a traumatic event. In the wake of this anxiety, people typically engage in either of two coping behaviors: They may work to assimilate the event such that it agrees with their prior assumptions (e.g., the loss of our child must have served some purpose; Davis & Nolen-Hoeksema, 2001) or accommodate their assumptions to account for the event (e.g., sometimes tragedies strike us when we do not deserve them; Frankl, 1946). In fact, survivors often move back and forth between these processes as they engage in the difficult task of rebuilding a viable assumptive world.

If we jump across still more disciplinary boundaries, we find ourselves with the most ubiquitous perspective in social psychology: cognitive dissonance theory. According to Festinger (1957), experiences that violate our understanding of reality will arouse an aversive psychological state—a sense of *dissonance* between our expectations and experiences (e.g., walking out into the rain and not getting wet). In an experimental setting, dissonance is most commonly aroused by situations where people's behaviors are inconsistent with their attitudes (e.g., a student arguing in favor of a tuition increase). The most common response: accommodating one's attitudes so that they account for the dissonant experience (e.g., increasing one's support for a tuition increase).

Affirmation

Fluid compensation. As it turns out, *assimilation* and *accommodation* are not the only compensatory responses to dissonant experiences. If students are induced to argue in favor of a tuition increase, they will also affirm other values that they are committed to, such as moral and political beliefs (Steele & Liu, 1983). More generally, social psychologists have spent the better part of 30 years demonstrating the compensatory *affirmation* of familiar values and beliefs when other values and beliefs are violated by inconsistent experiences; we refer to these studies, collectively, as the fluid compensation literature. For example, research following from compensatory control theory finds that violations of control evoke the affirmation of control elsewhere (Kay et al., 2009)—as motivated by aversive arousal (Kay et al., 2010). Following from a Compensatory conviction perspective, the violation of personal goals evokes the affirmation of personal values (McGregor, 2006)—as motivated by anxious uncertainty (McGregor, 2007). Research following from system justification theory shows how people may respond to violations of their social justice beliefs—often by affirming the very systems that institutionalize injustice (Jost et al., 2004), so as to avoid any threat or uncertainty that would follow from ruptures in their belief in a just world (Jost et al., 2007).

Similarly, worldview verification theory provides evidence that people will affirm any violated social justice worldviews to which they are committed, even if these worldviews present a bleak picture of reality; presumably, people will remain committed to a belief in an "unjust" world rather than face the anxiety that follows from having their committed worldviews violated (Major et al., 2007). And speaking of anxiety—there is no more reliable source of "potential terror" than reminders of our own mortality. As demonstrated by (hundreds of) studies following from terror management theory (Pyszczynski et al., 1999) people are strongly affected by reminders of their eventual death, along with everything that death implies for their current existence: the potential pointlessness of their efforts, and the hard limits of what they will be able to understand and experience. Following reminders of this unavoidable, incomprehensible event, people will affirm elements of their cultural worldview to which they are committed—so reliably, in fact, that "cultural worldview defense" following a mortality salience prime is one of the most replicated experimental effects in the psychological literature (Burke, Martens, & Faucher, 2010).

Is it ego-defense? Given that these different fluid compensation effects appear to be roughly analogous—so analogous that they can be reasonably construed as composing a cohesive literature (Proulx & Heine, 2010)—it would appear likely that some common cause underlies this ubiquitous psychological process. Most commonly, efforts to determine a psychological prime mover have involved attempts to find some common *content* that is threatened by any given violation experience, whether it involves a lack of personal control (Kay et al., 2009), or a realization that our social systems are often unjust (Jost et al., 2004). Perhaps, it has been suggested, we can reduce these different violations to some fundamental breach, where a gulf is opened at the heart of our sense of *selfhood*—both in terms of our self-concept and our sense of efficacy in achieving our personal goals. This

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"self"-oriented understanding of "violation-compensation" has the longest history in social psychology, beginning in the late 1960s when cognitive dissonance theory began its gradual transformation into a theory of "ego-defense" (Greenwald & Ronis, 1978).

Although Festinger originally construed dissonance as following from a failure to achieve "consistency among cognitions," it became clear that the most reliable means of achieving compensatory *accommodation* involved inconsistencies that were especially relevant to the self, either in terms of "self-concept" (Aronson, 1969) or "self-image" (Steele & Liu, 1983) or "self-evaluation" (Tesser, 1988). More recently, theorists have concluded that *affirmation* efforts also derive from violations of one's sense of "self," arousing a sense of subjective (Hogg, Adelman, & Blagg, 2010) or personal (Van den Bos, 2001) uncertainty, which in turn evokes efforts to affirm values that restore the "self." From this broader perspective, a reminder of one's mortality, a feeling of social exclusion, or a violation of a social justice worldview can be reasonably construed as having general implications for our sense of self, in addition to experiences that directly threaten our self-concept or self-esteem—and that all of these violations evoke fluid compensation efforts aimed at indirectly addressing the self-threat (Tesser, 2000).

However, from our own perspective, this broader perspective is not broad enough. From a meaning maintenance perspective, "fluid compensation" is not about the restoration of the specific content of what was violated—be they commitments relevant to control, belongingness, social justice, or mortality. Nor are these efforts aimed at restoring some superordinate content category, such as one's self-concept, self-esteem, or self-understanding, more generally. Rather, these efforts are aimed at affirming meaning frameworks when other meaning frameworks are violated—specifically, they are *palliative* efforts at reducing or avoiding the aversive arousal that follows from having *any* meaning framework violated, whatever the content or context. In all of these instances, meaning frameworks are affirmed that may share no common content—nevertheless, these efforts allow us to retreat to committed meaning frameworks, which represent familiar understandings.

Content-general fluid compensation. In recent years, direct evidence for "content-general" fluid compensation has emerged, where meaning frameworks are affirmed following the violation of meaning frameworks that share no common content and that themselves are unrelated to the "self," or any other specific concept, need, or value. For example, it has already been shown that having students argue in favor of a tuition increase will evoke efforts to "affirm the self" by heightening a commitment to moral beliefs (Steele & Liu, 1983). Similarly, it has been shown that reminding people of their own mortality will evoke "cultural worldview defense" efforts that manifest as heightened commitment to moral beliefs. And although either of these behaviors can be explained in terms of different social psychological theories—self-affirmation (Steele, 1988) or terror management (Pyszczynski et al., 2004) or some more general "ego-defense" perspective (Van den Bos, 2009)—none of these perspectives would explain why we show the same heightened moral commitment when the person we are speaking to is secretly switched with an entirely different person (Proulx & Heine, 2008).

When Bruner and Postman (1949) showed people reverse-colored playing cards, people would typically *assimilate* the violation into their familiar playing card paradigm (e.g., "see" a black heart as a spade). This rapid assimilation of unexpected visual perceptions (i.e., change-blindness; Simons & Rensink, 2005) means that we often have no explicit awareness of the violation. Nevertheless, it may still be possible that the aversive arousal that follows these inconsistencies survives the immediate assimilation of the anomalous perception, which may in turn motivate additional compensation efforts. To test this hypothesis, we conducted an experiment where participants greeted an experimenter who was later switched with a different person who was wearing the same clothes. As we expected, the vast majority of participants did not consciously notice the experimenter switch—immediately assimilating their perceptions of the dramatically altered experimenter. However, these participants also engaged in the compensatory *affirmation* of their moral beliefs by punishing a criminal more harshly than those in a control condition. Notably, this compensatory affirmation is of the same kind and degree as what follows from a reminder of one's mortality, an absurd joke (Proulx et al., 2010), or subliminally presented nonsense word pairs (Randles et al., 2011).

Taken together, a survey of these findings may prompt one to wonder: What do reverse-colored playing cards have to do with punishing criminals, and what do either have to do with nonsense words or human mortality? The answer, of course, is nothing whatsoever—in terms of *content*, self-relevant or otherwise. Rather, these experiences represent violations of our meaning frameworks, and ways of restoring a sense that our experiences are comprehensible and familiar feeling. Specifically, these experiences represent expectancy violations that trigger aversive arousal, and palliative affirmation efforts to diminish this sensation. More generally, these studies test the true boundaries of fluid compensation—implicit inconsistencies provoke explicit compensation, violations of propositional *what*s provoke the affirmation of moral *why*s, with mortality and other nonsense provoking the affirmation of something else that makes

sense. In sum, the true boundaries of fluid compensation are not defined by content, but by *meaning*. Ultimately, fluid compensation is *meaning* lost–*meaning* restored.

Abstraction

Compensatory affirmation is not the only way in which we can fluidly compensate for a meaning violation—sometimes we will *find* meaning when unrelated understandings are threatened. If we are looking to our environment to identify something—anything—that can be rendered familiar, the kinds of expected associations that we will draw or *abstract* may push the limits of fluid compensation even further. In much the same way as compensatory affirmation efforts, initial examples of compensatory abstraction appeared to involve pulling patterns out of the environment that could be construed as sharing content with the expected associations that were violated. For example, Whitson and Galinsky (2008) demonstrated that violations of control would enhance the motivation to see patterns within events that are not inherently related—ranging from simple causal attributions to grand conspiracy theories. Within the domain of personal control, it could be reasonably argued that these fluid compensation efforts were relatively distal attempts at regaining a sense of predictability and control in other domains. However, other research has suggested that different meaning violations will both motivate and enhance efforts to see "signals in the noise"—where these signals share no content with the violated meaning framework. For example, an unpublished study cited by Dechesne and Kruglanski (2004) suggests that reminders of one's mortality can improve the implicit learning of complex patterns in (seemingly) random letter strings.

In our own research (Proulx & Heine, 2009), we have built upon these earlier findings to demonstrate enhanced pattern abstraction following a variety of meaning violations—both implicit and explicit, trivial or self-relevant. Across these different experiments, we have used the same dependent measure—a variation of Reber's (1967) original implicit associative learning task. During the "learning" phase of this task, participants are asked to copy out series of letter strings verbatim (e.g., XVTTRM) without being told why they are doing so. During the subsequent "test" phase, participants are told that the previous letter strings contained a complex pattern and are asked to guess which of a newly presented series of strings appears to follow the same pattern. Even though participants feel as though they are guessing at random, they are not, as they pick out the pattern-congruent strings at a frequency that is above chance—a remarkable feat, given that they have *abstracted* these patterns at an entirely unconscious level, without making an explicit effort to learn anything, or even an awareness that they were indeed learning.

Following from our own meaning maintenance perspective, we expected something perhaps more remarkable—an enhanced ability to abstract the hidden patterns following unrelated meaning violations. As it turns out, the ability to implicitly abstract these complex probabilities is significantly enhanced following meaning violations, whether they follow from a threat to one's identity, or a Franz Kafka short story. More recently, we demonstrated enhanced implicit pattern learning following a meaning violation that is itself entirely implicit—the subliminal presentation of anomalous word pairs (e.g., quickly blueberry; Randles et al., 2011) –where this violation also evokes the same compensatory *affirmation* efforts as mortality reminders or secretly switched experimenters (Proulx & Heine, 2008).

Taken together, these studies demonstrate fluid compensation in a manner that is perhaps more radically content general than compensatory *affirmation* efforts—the enhanced implicit learning of statistical patterns following violations that share no common content, are implicit or explicitly perceived, and are self-relevant or entirely trivial. Ultimately, these effects can also be construed as *meaning* lost–*meaning* restored, where meaning is reduced to its most essential form: expected relations.

Assembly

Assimilation and *accommodation* behaviors can be construed as indirectly or directly addressing the meaning violation—either by masking it or resolving it. In the case of *affirmation* and *abstraction*, we look for meaning elsewhere—either in our existing worldviews or external environment. However, another term that often arises in the meaning literature is "meaning making" (e.g., Park, 2010), which would suggest the wholesale *assembly* of meaning frameworks in response to a given violation—in a sense, creating a new way to make our experiences feel familiar. Most commonly, examples of newly assembled meaning frameworks involve understandings that serve the same function as the old; in these cases, the meaning that is assembled shares considerable content with the understandings that are replaced (e.g., constructing a more "powerful" moral theory to replace a more primitive sense of right and wrong; Piaget, 1932). These new meaning frameworks may aid us in making sense of our own lives—organizing events into coherent narratives (McAdams, 1997), which may be especially important when we are making sense of negative experiences.

When writing about art and artists, many have noted a related mode of assembly in the face of meaning

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violation—the increased production of creative works. Indeed, many periods of cultural upheaval have been associated with enhanced artistic output, from Hellenistic Greece (Burn, 2005) to New York City in the 1970s (Biskind, 1998), and there are many examples of artists who were most productive following periods of acute personal uncertainty, from Dostoevsky (Frank, 1996) to Dylan (Shelton, 2011). In noting this phenomenon, early psychological theorists generally understood creative efforts as an attempt to make sense out of senselessness (e.g., Freud, 1919/1990); in the contemporary "art therapy" literature, it is often the case that artistic efforts directly address the uncertainties that motivated their construction (Rubin, 2011). However, if we imagine these assembly efforts as generally palliative responses to fluidly compensate following any given meaning violation, then it should also be the case that what is assembled may share no content with what was undermined, in the same way that abstracted meaning may share no content with the meaning framework that was initially violated. Although some assembled meaning frameworks may render our experiences familiar feeling, there may be some assembled meaning that we *create to feel familiar*—in the wake of uncertainty, we *make* something that makes sense to us.

Of all modes of compensation following meaning violations, the potential for heightened creativity following unrelated inconsistencies is the least developed in the experimental literature—insofar as it is the least explored. However, a number of recent studies suggest that meaning violations do indeed enhance our general creative capacity, along with the quality of unrelated creative works. For example, if people are reminded of the disorienting cultural transition of living abroad, they demonstrate improved performance on common measures of abstract thinking and creative problem solving (Maddux, Adam, & Galinsky, 2010). These same measures also register heightened performance following an unrelated meaning violation—counterfactual thinking manipulations that require participants to imagine how events could have turned out differently (Galinsky & Moskowitz, 2000). Furthermore, there is emerging evidence that meaning violations enhance the quantity and quality of unrelated creative work. For example, counterfactual thinking manipulations have also been shown to heighten creative generation of unique category items (Markman, Lindberg, Kray, & Galinsky, 2007), and T-shirt designs drawn by those reminded of their own mortality are judged to be of higher artistic quality (Routledge & Juhl, in press). In the coming years, we expect this mode of meaning maintenance to be extensively explored, with *assembly* currently situated at the bleeding edge of the content-general fluid compensation literature.

Making Sense of Sense-Making

Putting It All Together . . .

Over a century ago, Nietzsche (1882/1982a) depicted the death of God as the death of certainty: "Whither are we moving now? Away from all suns? Are we not perpetually falling? Backward, sideward, forward, in all directions? Is there any up or down left? Are we not straying as through an infinite nothing?" (p. 95). As did other existentialist theorists, Nietzsche described himself as a psychologist, and placed *disorientation* at the core of his worldview. As for the *real* psychologists—well, they seem to have come up with some very similar ideas: While Camus wrote of "systems of relations," we have written about *schemata* (Piaget, 1937/1954), *paradigms* (Bruner & Postman, 1949), *narratives* (McAdams, 1997), and *worldviews* (Major et al, 2007). Where Camus posited a "nostalgia for unity," we have posited a *unity principle* (Epstein, 1981), *need for coherence* (Antonovsky, 1979), *need for cognitive closure* (Kruglanski & Webster, 1996) or *need for structure* (Neuberg & Newsom, 1993). Where Kierkegaard (1844/1997a, b) obsessed over the Concept of Anxiety, we saturate our theories in *disequilibrium* (Piaget, 1972), *dissonance* (Festinger, 1957), *imbalance* (Heider, 1958), *uncertainty* (Van den Bos, 2001), *anxious uncertainty* (McGregor et al., 2010)—and sometimes, plain old *anxiety* (Janoff-Bulman, 1992).

Even the existentialist account of dampening this anxiety echo the palliative efforts that psychologists report: the "covering over" of anomalies (Heidegger, 1956/1996; *assimilation*), the reinterpretation of our understandings (Frankl, 1946; *accommodation*), the return to what is understood (Kierkegaard, 1843/1997c; *affirmation*), along with the seeking out and creating of new understandings (Nietzsche, 1891/1982b) (*abstraction* and *assembly*). To a remarkable extent, existentialist theorists gathered up these different conceptual elements and put them together into coherent conceptual framework—and to a remarkable extent, psychological researchers have echoed and validated each of these conceptual elements. Which makes the following all the more remarkable: *No psychological theory has gathered up each of these different conceptual elements and put them together into a coherent conceptual framework.*

In the areas of developmental and social psychology, Piaget and Festinger came very close. Both accounts begin with a content-general understanding of expected relationships, and both accounts posit an aversive arousal when these relations are violated. As well, both accounts understand subsequent compensation efforts as motivated by this aversive arousal, rather than as efforts to resolve inconsistencies per se. However, both of these theorists

understood compensation as sharing content with the experienced violations—*disequilibrium* or *dissonance* are reduced by accommodating a relevant understanding. This does not cohere with the contemporary "violation-compensation" literature, which demonstrates a broader pallet of compensation behaviors that need not share any content with the inconsistent experience. In a sense, neither Piaget nor Festinger appreciated the true "polymorphous perversity" of meaning maintenance efforts, where the motivation to reduce *disanxiousuncertlibrium* may call upon any alternative source of meaning, regardless of content.

In the decades that followed Piaget and Festinger, it may have been expected that other theorists would "fill in the gaps" of a content-general meaning maintenance account—ultimately finishing the job begun by these seminal psychological theorists. More generally, one may have expected psychology to follow a typically Kuhnian trajectory toward "normal science" (Kuhn, 1962/1996): Bounded theories form around seemingly isolated phenomena, which eventually coalesce into a paradigm that represents a singular, underlying phenomenon (e.g., we do not need a separate theory of electromagnetism for everything that sparks). However—for reasons that may be best understood by future historians of psychological science—no such paradigmatic understanding of "violation-compensation" phenomena has appeared in the field of psychology, either within a given area or within a given literature. We hope that the MMM is the first step in nudging our discipline toward a "paradigmatic" understanding of these overlapping observations, in a way that is typical of other mature scientific disciplines. If Kuhn's depiction of scientific endeavor is correct, then the adoption of a "paradigm science" model should guide a dramatic increase in research relevant to this phenomenon, in contrast to the current model, where a new theoretical label is attached to every identified instantiation (where this is especially the case in the field of social psychology; Proulx et al., 2012). Ultimately, pulling together the different strands of this discipline-spanning phenomenon should lead to a superficially ironic outcome—serving as an ideal basis to begin making the required distinctions.

. . . so We Can Begin to Make Distinctions

Across these different eras and areas and literatures, psychologists have used different means of violating different meaning frameworks and have recorded the strikingly analogous compensation efforts that we have discussed. Nevertheless, there are five essential distinctions that must be made regarding how and whether these compensation efforts manifest. In the coming years, many of these distinctions will parse meaning maintenance effects in ways that conform to existing theoretical frameworks—for example, the many violation-compensation theories in social psychology (Proulx et al., 2012). We suspect, however, that many more of these distinctions will *not* map along the existing theoretical borders, which will tell us much more about this phenomenon than is currently understood by surveying existing accounts; the true distinctions will emerge from the contours of the phenomenon, rather than the current PsycINFO search terms.

When does content determine the mode of compensation? Findings following from the MMM have demonstrated that the same meaning violation may evoke different modes of meaning maintenance (e.g., anomalous word pairs will evoke compensatory *affirmation* or *abstraction*; Randles et al., 2011). In addition to palliative considerations, are there qualities of meaning violations that affect the likelihood we will engage in one compensation effort or another? For example, whether a meaning violation is experienced implicitly versus explicitly, is positive or negative in nature, is perceptual versus propositional, or is self-relevant or non-self-relevant are factors that should have a bearing on whether a given compensation effort is preferred or possible.

It may also be the case that certain modes of compensation are directly cued to one or another physiological response to meaning violation. As we have noted, there are several distinct neurocognitive and autonomic nervous system responses that are implicated in the detection and reaction to expectancy violation. The extent to which any of these physiological responses may be uniquely associated with a given mode of compensation—either individually or in combination—is not currently understood.

When does the content of the violation determine the content of compensation? According to the MMM, an affirmed meaning framework need not share any content with the meaning framework that was violated. Nevertheless, it is surely the case that content is relevant in determining *which* meaning framework we will affirm, if we are given a choice (and we are generally not given a choice in a typical psychological experiment). Indeed, recent research has shown that not all compensatory affirmation looks the same, and these differences are clearly related to the content of the violated meaning frameworks (Shepherd, Kay, Landau, & Keefer, 2011), such that people will prefer to affirm meaning frameworks that directly address the source of a meaning violation over those that do not (Tullett, Teper, & Inzlicht, 2011). In the longer term, "fluidly compensating" in such a way that the affirmed, abstracted, or assembled meaning framework addresses and restores the violated framework will have adaptive functional outcomes—fixing a violated meaning framework makes it less likely to break down in the future. However, are there short-term, *palliative*

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variations between content relevant and content irrelevant compensation efforts?

Perhaps it is the case that affirming, abstracting, or assembling content-relevant meaning frameworks is more effective in reducing the aversive arousal that follows from meaning violations. More generally, it may be the case that one or another mode of meaning maintenance is simply a more effective palliative—for example, is the *affirmation* of unrelated meaning frameworks better able to reduce aversive arousal than the *abstraction* of unrelated frameworks? To date, we do not have a clear impression of the relative effectiveness of these compensatory efforts, insofar as many prominent theories of violation-compensation diminish or preclude the palliative nature of meaning maintenance behaviors in their respective theoretical accounts (e.g., terror management theory; Pyszczynski et al., 2004). By placing this palliative function at the core of the MMM, we hope that research following from this perspective will increasingly address the fundamental role that compensation efforts play in the reduction of aversive arousal.

When does the content of the violation determine the effectiveness of compensation? As we have discussed, a variety of "high" and "low" level inconsistencies appear to bottleneck at the ACC. Simple stroop errors will evoke ACC activation, and activation is especially pronounced if these brain structures have been previously scalded by intense personal trauma (Shin et al., 2007). No one would suggest that the inconsistencies evoked by Stroop errors are equivalent to those that elicit PTSD, and the compensation efforts that follow from either of these experiences may be more or less effective relative to the magnitude of the violation. Simply accommodating an awareness of anomalous playing cards can be done with a shrug of the shoulders, or simply affirming an alternative meaning framework may be sufficient for reducing any unconscious anxiety. In contrast, violations of meaning frameworks to which we are most committed, and which are most essential in our everyday function, may not be dealt with so easily. In particular, domain general fluid compensation efforts toward affirmation, abstraction, or assembly may only act as a short-term palliative, whereas accommodation efforts uniquely prevent the anxious reexperiencing of a meaning violation. Of course, there are some meaning violations so complex and catastrophic that they resist accommodation efforts; the greatest minds of civilization have wrestled at one time or other with the matter of human mortality, and their ongoing efforts speak to difficulty of resolving this particular absrurdity.

When is it meaning compensation? Findings following from the MMM have demonstrated identical modes of compensation following from meaning violations that share no common content. As we have discussed, we understand these identical effects as deriving from a shared psychological phenomenon, which is grounded in the same psychophysiological mechanism. However, it is unlikely that all and any behavioral effects that would follow from these experiences will be the same, or that these experiences are psychologically equivalent in every respect. Mainly, this is because many of the experiences used by psychologists to generate behavioral outcomes can be understood as impacting us in many different, distinguishable ways—our experimental manipulations are more akin to shotgun blasts than sniper shots.

If we take the example of a mortality reminder, we can imagine that it evokes aversive uncertainty insofar as it violates our expectations for what we can know or achieve (Van den Bos, 2009), or is experienced as a source of personal threat (Jost et al., 2007), or that it acts as a sematic or goal prime (Förster, Liberman, & Friedman, 2009)—or likely does all of these things at the same time, which would explain the reliability of mortality salience primes in evoking hundreds of reported behavioral outcomes. Given the general convergence of these outcomes with those that follow from other experimental manipulations (Proulx et al., 2012), we expect that the overwhelming majority of these behaviors represent palliative efforts to reduce the aversive arousal that follows from any given meaning violation. Nevertheless, there are likely other behavioral outcomes that are uniquely evoked by other psychological processes that follow from these experiences. We believe that by first specifying what is *common* to these experiences—be they traumatic experiences, control threats, or reverse-colored playing cards—we will be better able to parse out what is truly unique.

Are there other modes of compensation? As we have suggested, the assembly of unrelated meaning frameworks lies at the bleeding edge of the fluid compensation literate. Put simply: Are there other modes of meaning maintenance that psychologists have yet to explore, or assign a disciplinary label?

Let's Start Talking

According to the meaning maintenance model, many different perspectives are describing the same general phenomenon, as it manifests differently in different areas and literatures of psychological research. It is our sincere hope that theorists and researchers will gain increasing awareness of the other overlapping perspectives that parse this psychological process, engaging in multidisciplinary discussions and collaborations that will dramatically facilitate our understanding of this core phenomenon.

Acknowledgments

We acknowledge support from the Netherlands Organization for Scientific Research, the Social Sciences and Humanities Research Council of Canada, and the Canadian Foundation for Innovation.

Note

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