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Implicit motives, affect, and the development of competencies:

A virtuous-circle model of motive-driven learning

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Implicit motives, affect, and the development of competencies:

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This chapter provides a conceptual framework for understanding how implicit motives, that is, nonconsciously operating motivational dispositions for the attainment of certain classes of incentives and the avoidance of certain classes of disincentives (Schultheiss, 2008), influence successful goal pursuit and positive life outcomes through their effects on learning and memory. After a brief introduction to theory and measurement of implicit motives, we will review evidence that documents motives' critical involvement in affective responses to incentives and disincentives. We will argue that motive-dependent affect drives learning of stimuli, behaviors, and contexts associated with the affective experience and thus the development of integrated competencies across non-declarative and declarative domains of knowledge. In doing so, we will also provide a brief review of the neurobiological substrates of the types of learning and memory influenced by motives and how these substrates interact with each other. Building on the literature on implicit motives and learning and memory, we will propose a virtuous-circle model of motive-driven learning according to which satisfaction of an implicit motive through incentive contact facilitates the acquisition of integrated competencies, which in turn promote successful pursuit of personal goals. Successful goal striving then translates into frequent opportunities for implicit motive satisfaction and closes the circle. We will review evidence in support of this model and, in closing, discuss its implications for educational settings.

Implicit Motives: A Brief Introduction

Research on implicit motives in the past 60 years has focused on three motive dispositions, the needs for achievement, power, and affiliation, often abbreviated as n Achievement, n Power, n Affiliation (Schultheiss, 2008). Although the existence of other implicit motives, like the needs for sex, food, or novelty, has also been

postulated (see McClelland, 1987), much less is known about these dispositions within the research tradition we review here. We suggest that the processes, models, and conclusions presented in this chapter may also extend to these motives, but will not discuss them further in the following.

n Achievement

The achievement motive comprises a capacity for deriving satisfaction from autonomous mastery of moderately challenging tasks, but also for dissatisfaction from failing to master such tasks (McClelland, 1987; see also Schultheiss, 2008), and the need to do well compared to a standard of excellence (Schultheiss & Pang, 2007). A strong achievement motive is the result of parents setting age-appropriate, yet challenging demands for their child and rewarding the child warmly for independent mastery of challenging goals, but punishing her or him for failing to do so (for an overview, see Schultheiss & Brunstein, 2005). Over the years, effortful mastery of challenges becomes associated with the anticipation of positive feelings after success, while not succeeding on one´s own becomes associated with aversive punishment. According to Schultheiss and Brunstein (2005), this is is the dual root of n Achievement: it can be driven either by the prospect of satisfaction gained from mastery, or by the relief from punishment associated with it, or both (see Gray & McNaughton, 2000, for a discussion of the functional equivalence of approach and active avoidance in reward). Individuals high in n Achievement prefer tasks of medium difficulty (Atkinson, 1957), but not easy or extremely difficult tasks, and seek feedback on their current performance vis-à-vis their past performance to gauge how much they are improving on a task (Brunstein & Schmitt, 2004). In doing so, they generally prefer an individual reference norm, comparing their current performance to their own past performance, as opposed to a social reference norm

which would require them to compare their performance to that of others (Brunstein & Maier, 2005).

n Power

The power motive represents a capacity for deriving pleasure from impact on others, be it physical, mental or emotional, and an aversion to the impact of other people on oneself (Schultheiss, 2008). It has its roots in parents' permissiveness for sexual and socially aggressive behavior in early childhood – behaviors that presumably represent prototypical rewards for n Power (McClelland & Pilon, 1983). In adulthood, the need for attaining impact can manifest itself in a wide variety of phenomena, ranging from blunt aggression or dominance behavior to socially acceptable behaviors like persuasive communication, impressing others, or eliciting strong emotions in others, such as when comedians make audiences scream with laughter or coaches inspire their protégées to superior performances (Schultheiss, 2008). Socially tamed power motivation is therefore associated with good management and leadership skills (McClelland & Boyatzis, 1982; Winter, 1991), whereas untamed power is associated with impulsive, egoistical, or profligate behavior (Winter, 1988).

n Affiliation

The affiliation motive is characterized by a concern for and a capacity for deriving satisfaction from establishing, maintaining, and restoring positive relationships with others (Atkinson, Heyns, & Veroff, 1958). Consistent with the observation that individuals high in this need tend to be clingy and show signs of rejection sensitivity (see Boyatzis, 1973; Winter, 1996), it appears to have its roots in childhood experiences of parents' lacking sensitivity for the child's needs (McClelland & Pilon, 1983) and thus perhaps to be associated with insecure attachment (see Schultheiss, 2008). However, few firm conclusions about its

developmental precursors can be drawn so far. Individuals high in n Affiliation spend more time in contact with others, or wishing they had contact with others, and tend to alter their behavior in such a way that it makes them more similar to liked others. However, if others are perceived as too dissimilar or rejecting, affiliation-motivated individuals can also distance themselves and reject others (for a summary, see Winter, 1996).

Assessment

Because implicit motives are assumed to operate at the nonconscious level, they are most frequently assessed with a descendant of Morgan and Murray's (1935) Thematic Apperception Test, the Picture Story Exercise (PSE; McClelland, Koestner, & Weinberger, 1989). In the PSE, testees are shown pictures of persons in social situations, like a captain speaking to a passenger or persons seated on a park bench, and are instructed to write an imaginative story about each picture (Schultheiss, 2008; Schultheiss & Pang, 2007). Stories are later scored with content-coding systems (e. g., Smith, 1992; Winter, 1994) and the scores are interpreted as indicators of the strength of people's implicit motives (Schultheiss, 2008). Derivation and validation of these systems was accomplished empirically in experiments in which a given motivational need had been aroused in one group, but not in a control group, and themes that differed between these groups were identified and included in the coding systems (Winter, 1998). According to the validity concept proposed by Borsboom, Mellenbergh and van Heerden (2004), a test is a valid measure if (a) the attribute it is supposed to assess actually exists and if (b) experimental manipulations of the attribute causally lead to variations in the measurement (see also McClelland, 1958, for a much earlier, almost identical argument). According to this criterion of validity, PSE content coding measures represent valid assessments of motives.

Reliability and Validity

The PSE demonstrates high interrater- and a remarkable amount of retest-reliability (Schultheiss & Pang, 2007; Schultheiss, Liening, & Schad, 2008) and its predictive and criterion validity are well documented (see McClelland, 1987; Schultheiss, 2008; and Winter, 1996). At the biological level, implicit motives have been shown to be linked to hormone changes (Schultheiss, in press), immune system functioning (McClelland, 1989) and activation of brain areas involved in motivation (Schultheiss, Wirth, Waugh, Stanton, Meier, & Reuter-Lorenz, 2008). At the individual level, implicit motive measures predict motivational phenomena in the laboratory, such as attentional orienting to incentive cues (Schultheiss & Hale, 2007; Wang, Liu, & Zheng, 2011), learning (see "Implicit Motives and Learning" below), task performance (Brunstein & Maier, 2005; Schultheiss & Brunstein, 1999, Study 2), and social behavior (e.g., McAdams & Powers, 1981; Schultheiss & Brunstein, 2002). They also predict life outcomes such as career success (Jenkins, 1987, 1994; McClelland & Franz, 1992), sexual behavior (Hofer, Busch, Bond, Campos, Li, & Law, 2010; Zurbriggen, 2011), parental status (Peterson & Stewart, 1993), and mental and physical health (McAdams & Bryant, 1987; McClelland, 1979). At the societal level, implicit motive measures have been found to be valid predictors or correlates of economic growth (Engeser, Rheinberg, & Möller, 2009; McClelland, 1961), the behavior of political leaders (Winter, 2003) and the development and outcomes of international crises (Winter, 1993, 2010).

Implicit Motives are Fundamentally Distinct From Explicit Motives

While work on the validity of the PSE/content-coding approach to motive assessment has amassed an impressive array of findings, many researchers have attempted to replace this comparatively labor-intensive measurement approach with other methods, frequently based on self-report, claiming that these assess the same motive dispositions as the PSE. In most instances, however, this claim has either

never been tested thoroughly or was not supported by the data (see Schultheiss, submitted). This practice has led to a Babylonian confusion of terms and concepts in the field of motivation research and particularly in its application in educational contexts. For instance, the term n Achievement, which was originally associated with the PSE measure of the implicit achievement motive (McClelland, Atkinson, Clark, & Lowell, 1953) is frequently used by researchers who use questionnaire measures of the self-attributed achievement motive (see, for instance, Steinmayr & Spinath, 2008). And the term "achievement motive" as viewed from the perspective of the PSE and its specific validity describes and explains phenomena that can be quite different from those that researchers using questionnaire measures are concerned with. We mention this because psychologists and educational researchers should be aware of the fact that quite different phenomena are frequently presented under the guise of the same labels. McClelland et al (1989) succinctly described the problem: "[…] psychologists should not call by the same name two measures that do not correlate with one another" (p. 691). As we will show next, there is no justification for equating implicit motive measures with explicit motive measures, given the substantial differences between the measures of motive dispositions and their validities.

PSE motive measures typically show no or only slight correlations with questionnaire motive measures of the same domain (e.g. Pang & Schultheiss, 2005; Schultheiss & Brunstein, 2001). This result has been confirmed by two recent meta-analyses, one on n Achievement (Spangler, 1992) and one including all three motives (Köllner & Schultheiss, in preparation). These findings confirm the original premise of research using the PSE approach, namely, that motives may not be accessible to introspection, and suggest that there are two kinds of motives, implicit ones that can be measured with the PSE and explicit or self-attributed ones that can be measured with various kinds of self-reports (McClelland et al., 1989).

These two types of motives respond to different kinds of incentives or cues (Schultheiss, 2008; Stanton, Hall, & Schultheiss, 2010). While implicit motives are particularly likely to respond to nonverbal cues, such as facial expressions of emotions, explicit motives are more likely to respond to verbal cues, like instructions, demands, and suggestions (McClelland et al., 1989). As Spangler's (1992) meta-analysis shows, the implicit achievement motive is a particularly good predictor of behavior when combined with the right (i.e., nonverbal) incentive cues. However, in the presence of the wrong incentives (i.e., verbal-social), validity coefficients of n Achievement become zero or even negative. This may explain why students high in this motive generally do not perform better, and sometimes even worse, than low-motive students (e.g., McKeachie, Isaacson, Milholland, & Lin, 1968): they are not motivated by structured classroom situations in which teachers verbally communicate incentives to do well (see also ”Application to Educational Settings” below).

Implicit and explicit motives also influence different types of behavior (Schultheiss, 2008). Research documents a double dissociation in their predictive validity, with implicit motives influencing non-declarative measures, such as task performance, attentional orienting, and physiological changes, but not declarative measures, such as choices, attitudes, and judgments, and with the reverse being true for explicit motives. An early study by DeCharms, Morrison, Reitman, and McClelland (1955) exemplifies this dissociation. High n Achievement predicted recall and scrambled-word task performance, whereas a questionnaire measure of achievement motivation predicted the extent to which participants adjusted their judgments of artworks in the direction of a purported expert and negative attitudes towards an unsuccessful individual (see also Spangler, 1992, for a meta-analytical corroboration of these observations).

Summary

Implicit motives such as the needs for achievement, power, and affiliation can be assessed through content-coding of imaginative stories, but not via self-report, respond preferentially to nonverbal incentives, and predict non-declarative outcome measures. They thus represent constructs that are distinct from the explicit beliefs that people hold about their motivational needs, which do not substantially correlate with implicit motive measures, respond preferentially to verbal incentives, and predict declarative criteria.

Motives and Emotions: Implicit Motives as Affect Amplifiers

To truly understand how implicit motives operate and why they predict a vast array of physiological and behavioral phenomena, it is critical to examine the role of affect in implicit motivational processes. According to current theories of motivation based on biopsychology, affect is the defining feature of motivation, signaling the utility and survival value of certain types of stimuli and events for an organism (Berridge, 2004; Buck, 1999; Cabanac, 1992; Panksepp, 1998; Toates, 1986). It endows the stimuli an individual encounters with rewarding or punishing qualities and thus turns them into attractive or aversive stimuli. (Note that behavior can also be regulated without or against hedonically charged endpoints, but this does not represent motivation proper, but self-regulation; see, for instance, Muraven & Baumeister, 2000)

The central role of affect has been acknowledged in implicit motive research from the very beginning. McClelland et al (1953) made the expectation of a pleasant experience a core ingredient of their definition of n Achievement. Atkinson (1957) probably put it most succinctly, stating that "a motive is conceived as a disposition to strive for a certain kind of satisfaction, as a capacity for satisfaction in the attainment of a certain class of incentives" (p. 360). The definitions for the three major motives we gave in the preceding section represent specific instantiations of this fundamental

principle. Thus, for instance, a person high in n Achievement is someone who is able to experience the mastery of a challenging task as particularly satisfying, whereas a person low in n Achievement is not -- the difference in the affective response constitutes the difference in motive levels.

Given the centrality of the role of affect in motivation and individual differences in the capacity for affective responses in the concept of implicit motives, what evidence is there that implicit motives are associated with affective responses to incentives? Two lines of research document the affect-amplifying nature of implicit motives most clearly: Studies on emotional well-being and research on facial expressions of affect.

Emotional Well-Being

Research on the role of implicit motives in emotional well-being, as assessed by self-report scales of hedonic feelings in everyday life (such as the hedonic tone scale by Matthews, Jones & Chamberlain, 1990, featuring items such as *happy, satisfied, contented*), consistently shows that higher levels of implicit motives predict higher well-being to the extent that people make good progress towards personal goals that match their motives and provide them with opportunities to harvest motive-specific incentives (e.g., think of an affiliation-motivated student succeeding with the goal of keeping in touch with his old friends at home; Brunstein, Lautenschlager, Nawroth, Pöhlmann, & Schultheiss, 1995; Brunstein, Schultheiss, & Grässmann, 1998; Schultheiss, Jones, Davis, & Kley, 2008; see Brunstein, 2010, for a review). In contrast, the successful pursuit of goals that are not supported by, or congruent with, a person's implicit motives appears to be hedonically irrelevant or even associated with negative mood (e.g., think of a person low in n Affiliation keeping contact with friends at home or a high-affiliation student who pursues the power goal of becoming more independent of friends and family at home). Because of the striking differences

in how the effect of progress on personal goals affects emotional well-being in individuals with different implicit motive levels, Schultheiss et al (2008) have suggested that the pursuit of goals that are supported by a person's implicit motives represents a *hot* (i.e., affectively engaging) mode of goal striving, whereas the pursuit of goals that are not supported by a person's implicit motives represents a *cold* (i.e., affectively neutral) mode.

Analogous results for implicit motives influencing well-being come from studies examining motive-goal congruence and indicators of distress. Studies by Schultheiss et al (2008) and Pueschel, Schulte and Michalak (2011) show that people who succeed at goals that match their motives have fewer depressive symptoms than people who fail at such goals. In contrast, success or failure at motive-incongruent goals had no or even paradoxical effects (see Pueschel et al., 2011) on depressive symptoms.

Finally, cross-cultural research by Hofer and colleagues consistently shows that implicit motives are associated with higher life satisfaction, provided that individuals consciously endorse values and motivational orientations that match their implicit motives (e.g., Hofer & Chasiotis, 2003; Hofer, Chasiotis, & Campos, 2006). Why does holding a belief about oneself that matches one's motives promote well-being? Hofer, Busch, Bond, Li and Law (2010) provide an answer: the endorsement of motive-congruent values (e.g., "Leading others is important to me") facilitates the derivation and pursuit of similarly motive-congruent goals (e.g., "I want to teach a section in this course"), which in turn provide opportunities for satisfying one's implicit motives.

Facial Affect

Whereas research focusing on emotional well-being relies heavily on subjective self-reports of affective states and thus depends critically on an accurate

translation of a non-declarative affective process into a declarative representation (see Schultheiss & Strasser, 2012), affect can also be assessed objectively by examining, via electromyography (EMG), facial muscle activity that is associated with positive and negative affective responses to stimuli and events (see Larsen, Norris, & Cacioppo, 2003). Here, too, reliable and consistent evidence for a critical role of implicit motives in affective responses to incentives can be found. Using EMG recordings of the corrugator muscle, which indexes negative affect by activation and positive affect by deactivation (see Larsen et al., 2003), Fodor and colleagues observed across several studies that individuals high in n Power respond with greater corrugator activation to power disincentives (e.g., watching a dominant job candidate), and less activation to power incentives (e.g., watching a submissive job candidate), whereas individuals low in n Power do not show these differences (e.g., Fodor & Wick, 2009; Fodor, Wick, & Hartsen, 2006). Similarly, Kordik, Eska, and Schultheiss (2012) found that individuals high in n Affiliation respond with corrugator activation to encountering an unsmiling experimenter and with corrugators deactivation to a smiling experimenter; individuals low in n Affiliation did not show this difference. A study by Kordik and Schultheiss (submitted) reveals that individuals high in n Achievement respond to failure feedback with stronger initial activation and subsequent dampening of corrugator activity than individuals low in n Achievement, a finding that is in line with conceptions of n Achievement as a capacity to master challenges (see Kuhl, 2000; McClelland et al., 1953).

Implications

Thus, although empirical work documenting the long-postulated affect-amplifying property of implicit motives has only been executed in the past 20 years, it consistently shows that Atkinson (1957) was right when he hypothesized that implicit motives represent capacities to derive satisfaction from incentives. Differences in how

people experience incentives and disincentives at an affective level are prone to result in differences in how they deal behaviorally with such stimuli. McClelland (1987), in line with other theorists of motivation (e.g., Pfaff, 1999; Toates, 1986), specified two functions of affectively charged incentives for behavior: first, behavior is *oriented* preferentially towards such incentives and the cues that predict them and, second, it is *energized* so that an incentive can be quickly reached and consummated (or a disincentive avoided). He also postulated a third function, which is of particular interest for the present discussion, namely that the attainment of hedonically charged incentives *selects* behavior that was instrumental in attaining them and the stimuli that predicted them. In other words, motives influence learning, and this is the function that we will examine next in more detail.

Implicit Motives and Learning

A central position that we take in this chapter is that because implicit motives determine how much pleasure can be gained from contact with incentives (i.e., reward) or displeasure from contact with disincentives (i.e., punishment), motives also influence how well people learn stimuli, behaviors, and contexts associated with reward and punishment and thus how they develop integrated behavioral competencies for the further pursuit of incentives. To allow the reader to better digest the significance and meaning of research findings related to implicit motives and learning, however, we will first provide a brief foray into the functional neurobiology of learning and memory (see Figure 1 for an overview).

The Neurobiology of Learning and Memory

Although virtually the entire brain can be altered through experience and is thus capable of learning, research has identified three specific brain areas most closely related to learning and memory in the context of motivation: the amygdala for Pavlovian learning of the emotional meaning of stimuli; the striatum for instrumental

learning based on reward and punishment; and the hippocampus for declarative learning of facts and events (for overviews, see Eichenbaum & Cohen, 2001; Squire, 2004).

Amygdala. The amygdala forges connections between stimuli endowed with unconditional affective properties, that is, "natural born" rewards and punishers such as food or injury, and the stimuli that reliably predict them (i.e., conditioned stimuli). Due to LeDoux's (1996) seminal studies on fear conditioning, the amygdala has become primarily known for its ability to trigger stress responses when cued with conditioned stimuli predicting punishment. But it also mediates learning about stimuli that reliably predict reward (Baxter, 2002). The amygdala drives *emotional reactions* to stimuli via outputs to other brain areas, most notably the hypothalamus and the brainstem. But it can also trigger *motivated actions* by its output to the striatum (LeDoux, 2002).

Striatum. The striatum is sensitive to probabilistic contingencies between stimuli or events and their relation to the individual's own motor behavior (Delgado, 2007). It is critical for the nonconscious, procedural acquisition and execution of behavior sequences exploiting such predictable patterns, a process that has been termed implicit learning. Striatum-based implicit learning is boosted and turned into instrumental learning by salient affective consequences of behavior, such as pleasure associated with reward and pain associated with punishment. However, once a behavior has been learned well with the aid of reward and punishment, it turns into a habit that persists long after the affective consequences that have facilitated its acquisition have ceased to occur. Lieberman (2000) proposed that striatal learning of contingencies between social cues and appropriate behavioral responses is at the core of social intuition, that is, the fast, nonconscious learning and utilization of socially relevant information for socially adaptive behavior. Lieberman supported his

hypothesis by evidence showing that individuals with damage to the striatum are not only impaired in their ability for implicit learning, they are also likely to show socially inappropriate behavior.

Hippocampus. The hippocampus integrates perceptual information about the individual's current situational context and the complex relationships between the stimuli constituting it and thus provides the cognitive basis for conscious awareness of the situation in its entirety. In fact, conscious awareness of the association between stimuli critically depends on the hippocampus, as does memory for facts and events. Loss of the hippocampus leads to loss of the ability to learn new facts (i.e., anterograde amnesia) and consciously commit new information to memory. Although not dependent on emotion for fulfilling its learning functions, the hippocampus interacts with emotional learning in the amygdala in two important ways. First, it constrains the acquisition of Pavlovian-conditioned cues by contributing information about the situational context in which a learned cue is valid and in which it is not. Second, emotional responses triggered by amygdala responses to unconditioned or learned cues enhance memory encoding in the hippocampus, giving rise to stable and accessible emotional memories.

Interactions. Affective responses as elicited by reward and punishment play a critical role for learning in the striatum (particularly the anterior part, which includes the nucleus accumbens) and in the amygdala (LeDoux, 1996, 2002). In fact, Pavlovian learning in the amygdala crucially depends on the presence of stimuli that have immediate significance for survival and are therefore endowed with unconditional affective meaning (e.g., pain, food, sex) and would not occur in the absence of affectively charged stimuli. Although the striatum is able to learn stimulus-response contingencies in the absence of overt reward and punishment, as the phenomenon of implicit learning strongly suggests, learning is greatly enhanced by

reinforcers. In contrast, the hippocampus represents a learning system that can operate efficiently without affective arousal, too, as, for instance, the ability to learn words in a new language illustrates.

How Implicit Motives Affect Learning and Memory

Because implicit motives determine which stimuli and events are affectively hot and which are not, they should be closely associated with Pavlovian conditioning of stimulus-stimulus associations that are forged in the amygdala and instrumental learning of complex stimulus-response associations mediated by the striatum (see Schultheiss, 2007; Schultheiss & Schiepe-Tiska, submitted). Take, for instance, a person with a strong need for power. Because this person is highly sensitive to dominance signaled by others (which may threaten his or her own claim to dominance), he or she should have a strong negative response to angry facial expressions, a social dominance signal (see Hess, Blairy, & Kleck, 2000), and therefore more readily learn stimuli that predict the occurrence of an angry face (amygdala-mediated Pavlovian conditioning) and learn to inhibit the execution of behavior that elicits anger in others (striatum-mediated instrumental avoidance learning). A person with a low need for power will not show these learning outcomes, because angry faces do not have the same, strong affective meaning for that person. This is, in fact, what can be observed. Stanton, Wirth and Schultheiss (2006) conducted a study in which participants learned to associate the spatial occurrence of angry faces on the computer screen with a predictive cue stimulus (a geometrical shape). As their performance on a dot-probe task of attention towards cues that during training preceded anger versus cues that during training preceded neutral expressions revealed, individuals high in n Power had become sensitive to anger-predicting cues, whereas individuals low in n Power had not. Although Stanton et al (2006) did not measure amygdala activity during learning in this study, other studies with humans

show that the amygdala is critically involved in similar learning experiments (e.g., Armony & Dolan, 2002). And Hall, Stanton and Schultheiss (2010) report findings from a brain-imaging study that show that higher levels of n Power are associated with greater amygdala response to angry faces, an observation that is consistent with the interpretation of Stanton et al's (2006) findings being dependent on the amygdala..

In another study, Schultheiss, Pang, Torges, Wirth and Treynor (2005) made the presentation of angry faces contingent on the execution of a visuomotor sequence in an implicit-learning paradigm. Individuals high in n Power showed impaired learning when the sequence was followed by an angry face, but not when it was followed by a surprised face, which, as the authors argued, signals low dominance and thus does not represent a threat to power-motivated individuals. Individuals low in n Power did not show these differences in learning and were not expected to, because angry and surprised faces should not have strong affective value for them. Schultheiss, Pang, et al (2005) did not directly assess striatal involvement in learning in their study. But it is very well established that both implicit learning and reinforcement of instrumental behavior depend on an intact striatum (Delgado, 2007; Lieberman, 2000). Moreover, Schultheiss et al (2008) later showed that n Power is positively associated with striatal activation in response to anger faces, a finding that might suggest that affectively charged motive-specific incentives not only reinforce, but also trigger instrumental behavior aimed at dealing with the incentive.

In another line of research, Schultheiss and colleagues have obtained replicable evidence across three independent studies for enhanced implicit learning of visuomotor sequences during one-on-one competition among power-motivated winners and impaired implicit learning among power-motivated losers (Schiepe-Tiska, in preparation; Schultheiss & Rohde, 2002; Schultheiss, Wirth, Torges, Pang, Villacorta, & Welsh, 2005). Together with the study by Schultheiss, Pang, et al (2005)

on reinforcing effects of facial expressions of emotion on motive-dependent implicit learning, these studies provide robust support for an involvement of striatal learning processes in the way that implicit motives shape behavior. Although presently evidence for such learning is strongest for the need for power, the study by Schultheiss, Pang et al (2005) also suggests a role of n Affiliation in implicit learning. The role of n Achievement in implicit learning remains to be explored. Based on previous research by Brunstein and colleagues (e.g., Brunstein & Maier, 2005; Brunstein & Hoyer, 2002), we would expect n Achievement to predict implicit learning gains particularly well under conditions in which feedback is provided with reference to one's previous performance and that indicates that one's performance is deteriorating.

Finally, implicit motives also influence explicit memory and thus hippocampus-dependent learning. As McAdams (e.g., McAdams, 1982; McAdams, Hoffmann, Mansfield, & Day, 1996) and later Woike (see Woike, 2008, for a summary) have consistently shown, people are better at remembering affectively charged episodes and events in lab and life that correspond to their implicit motives than at remembering unrelated content. Thus, for instance, McClelland (1995) reported that achievement-motivated individuals are particularly likely to recall achievement-related content, but not other types of content, from a story they had read.

McAdams (1982) as well as Woike (1994) reported that power-motivated individuals are particularly likely to recall autobiographical peak experiences related to power, but not other types of episodes from their lives. Note, however, that the critical feature of the memory processes examined in these studies is their *affective* character. Findings by Woike, McLeod and Goggin (2003) highlight this fact. These researchers asked participants to either report on emotionally charged experiences

from their daily lives or to report experiences that were in some way self-descriptive for them. Memory for emotionally charged events was predicted well by participants' implicit motives (achievement and affiliation), but not by their self-ascribed, explicit motives, whereas memory for self-descriptive events was predicted well by their explicit motives, but not as well by their implicit motives. Woike, Bender and Besner (2009) could show that implicit motive effects on emotional memories depend on motivational-affective arousal during encoding: higher n Achievement predicted better recall of achievement-related words participants had learned after vivid recollection of an achievement-related success (arousal condition), but not after recollection of a neutral life event (control condition). These findings suggest that explicit learning and memory are enhanced by implicit motives only when (a) the person has a strong motive and (b) the situation contains incentives for and thus arouses the motive. Although this was never directly tested, it appears very plausible that motive-dependent enhancement of memory for affective content is mediated by effects of the amygdala (affective arousal) on hippocampal learning (episodic encoding).

Implications

What can we conclude from this review of the role of implicit motives in learning and memory and the neurobiological substrates of learning? One conclusion is that implicit motives shape behavior through affect-based, nondeclarative learning of stimuli and particularly of instrumental responses, which, as Lieberman (2000) has argued, may be the basis of social intuition and thus of competent interpersonal behavior. Through emotional arousal associated with incentive stimuli, implicit motives also influence declarative learning about the situational context in which motivationally significant events (i.e., reward and punishment) occur.

However, a conclusion that should *not* be drawn from this discussion is that just because Pavlovian conditioning, instrumental conditioning, and declarative learning can be dissociated procedurally and neurobiologically, the effects of implicit motives on learning and memory are necessarily dissociated, too. Rather, we envision the effect of implicit motives on learning in naturally occurring situations as one in which all three types of learning go hand in hand, integrated by the affect-amplifying effect of a motive on all three, and thus enable the individual to respond emotionally and in a context-sensitive manner to learned stimuli, to intuitively recruit and execute instrumental behaviors, and to consciously recall and strategically seek out situational contexts in which motivational gratification has been obtained in the past (or avoid situations in which it has been forsaken). In interaction with situational incentives and demands, motives thus organize complex learning experiences that are only partly accessible to conscious awareness and that can generate complex know-how that operates at an intuitive level. It is this type of affect-based integration of learning across subsystems that we see as the basis of behavioral competence development and the kind of social intuitive know-how that Lieberman (2000) referred to. Viewed from this perspective, implicit motives may thus be the catalysts and accelerators for the development, over time and through repeated person-situation-transactions, of specific, integrated competencies (see Boyatzis & Kelner, 2010, for related arguments).

The Virtuous-Circle Model of Motive-Driven Learning and Goal Attainment

Pursuing the notion of implicit motives as catalysts of learning further, we propose a virtuous-circle model of motive-driven learning and successful goal pursuit (see Figure 2). The model starts with implicit motives' capacity to endow successful attainment of incentives with pleasure, thus turning the experience into one of reward. The pleasurable reward in turn provides a feedback signal to the parallel learning

systems reviewed above, resulting in an integrated learning experience that leads to the Pavlovian acquisition of reward-predictive cues that automatically grab attention and induce emotional arousal, to the acquisition and energization of behavior that has been instrumental for obtaining the reward, and to affectively charged memories for the situational context in which the reward experience occurred. Such integrated learning experiences in turn make it easier for individuals to recognize situational opportunities for advancing the goals they have set for themselves and to use intuitive behavioral strategies to realize them. Evidence in support of the link between learning and enactment of motive-congruent goals comes from studies that show that although implicit motives do not per se predict people's goal choices, they do promote efficient progress towards personal goals (see Brunstein et al., 1998; Schultheiss, Jones, et al., 2008), particularly when people do not try too hard to reach their goals but leave goal enactment to their intuition (Schultheiss, Jones, et al., 2008). Progress towards motive-congruent goals in turn entails successful attainment of motive-specific incentives. Each time this happens, the circle closes through the elicitation of a pleasure response, and if it happens often, because a person is making rapid progress towards a goal, frequent pleasure responses can add up to lasting emotional well-being and rapid growth of competencies.[1]

Punishment

The virtuous-circle model of motive-driven learning also applies to the case of punishment or aversive outcomes, because individuals with a strong implicit motive are not only sensitive to incentives but also to disincentives. Encounters with punishers lead to enhanced Pavlovian learning of predictive cues, too, and the emotional arousal associated with such cues then becomes a stress response that prepares the individual for dealing with the threat of punishment in the future. Such encounters also shape instrumental learning: they can lead to passive avoidance, the

suppression of behavior that has led to an encounter with the punisher, but also to active avoidance, that is, learning of behavior that helps to escape the impending punishment. Finally, an encounter with a disincentive also enhances memory for the situational context of the motive-specific stressor, marking similar situations in a person's memory as those that need to be avoided or in which one has to tread carefully and avoid certain behaviors that may lead to punishment. Intuitive knowledge of what not to do or how to avoid or escape aversive situations is also critical for the successful enactment of personal goals and thus fosters well-being by avoiding deeply frustrating and stressful outcomes.

Thus, just as the reward version of the virtuous-circle model posits that implicit motives predict the acquisition of behavioral strategies that enable successful goal pursuit, the punishment version of the virtuous-circle model predicts that implicit motives drive the development of adaptive behavior by helping a person to learn what not to do and when not to do it. Both types of learning work in parallel to efficiently adapt a person's behavior to the opportunities, affordances, and threats associated with various situational contexts and to foster efficient intuitive goal pursuit.

No Virtuous Circle Without a Motive

Due to a motive's strong hedonic response to motive-specific incentives, the virtuous circle is easy to start and maintain in the presence of a strong implicit motive (e.g., achievement, affiliation, or power) and leads to rapid further growth of skills and knowledge through the principles of cue generalization and discrimination, shaping, Pavlovian-instrumental transfer, second-order conditioning, etc. In the absence of a strong motive, however, the circle is difficult to start or maintain, because attaining a motive-specific incentive does not lead to pleasure (i.e., there is no reward) and encountering a motive-specific disincentive does not lead to displeasure (i.e., there is no punishment). As a consequence, learning of predictive cues through

Pavlovian conditioning is less likely, because there is no distinct, affectively charged unconditioned stimulus to begin with. For the same reason, the acquisition of instrumental behaviors is also hampered, because these behaviors do not lead to an affectively rewarding experience. And the lack of emotional arousal associated with the episode also makes memories of the situation less likely to develop or, if they do, more likely to be of a rather bland sort. In other words, a weak motive makes it difficult to learn and remember what stimuli, behaviors, and contexts would be conducive to a certain successful or unsuccessful outcome of a person-situation transaction, because the outcome itself has little or no affective charge. As a consequence, people with a weak motive in a given motivational domain can rely less on their intuition and need to explicitly develop and implement plans for action when pursuing goals in that domain (see Cantor & Blanton, 1996). This mode of goal pursuit requires effort, and success is not associated with the pleasure of a motive-driven hedonic response. Thus, the circle cannot be closed, little emotional well-being can be reaped, and the development of competencies is not supported in the domain of a weak motive. Of course, within the same person, lacking development of competencies in one domain due to a weak motive does not preclude substantial competency development in other domains with strong motives.

Broaden-and-Build Effects of Motive Satisfaction

While our presentation of the virtuous-circle model of motive-driven learning relies heavily on findings and insights derived from biopsychology and neuroscience, we would like to point out that the beneficial effects of motive-driven hedonic experiences on adaptive behavior may also stem from effects of positive emotions that are not specifically related to learning and memory. For instance, in her broaden-and-build model of positive emotions, Fredrickson (1998) has argued that specific positive emotions such as joy, contentment, interest, and love, which also occur in the context

of implicit motive satisfaction, broaden the scope of attention and enhance cognitive processes such as finding creative solutions to problems, help to build physical resources through enhanced health, and create enduring social alliances and resources. Evidence for the validity of the broaden-and-build model of positive emotions in the context of implicit motives comes from studies that show that positive feedback makes individuals high in n Power and n Achievement more creative than individuals low in these motives (Fodor & Carver, 2000; Fodor & Greenier, 1995). Evidence also comes from studies that show that satisfaction of implicit motives in everyday life is associated with enhanced immune system functions and health (summarized in McClelland, 1989). Thus, although there is considerably less research on the role of motive-dependent hedonic responses in broaden-and-build-type adaptations than there is on learning and memory, broaden-and-build effects of positive affect are also likely to contribute to the virtuous circle we have described.

Using the Model to Connect the Dots

The notion that implicit motives drive the acquisition of adaptive behavior and promote goal pursuit -- a proposition that, as we have laid out, draws on many studies that link motives to learning -- may help explain why individuals with strong motives tend to be successful in life. For instance, a large literature shows that individuals high in n Achievement excel as entrepreneurs in small-business contexts (see, for instance, Collins, Hanges, & Locke, 2004; McClelland, 1961). Other studies show that individuals high in n Power are successful as managers in business and political contexts (see McClelland & Burnham, 1976; Winter, 2010b). Furthermore, individuals characterized by high n Affiliation tend to be healthier than others (Jemmott, 1987; McClelland, 1989). However, these studies typically only measure motive dispositions and distal life outcomes such as business growth, career success, or health status, but not the mediating processes that produce these outcomes or, more

specifically, the behavioral adaptations that people have developed and the goals that they pursue en route to these outcomes.

A few studies do provide glimpses of the specific competencies that may link implicit motives to life success. For instance, the work on n Power and implicit learning in the context of dominance contests we have reviewed above suggests that power-motivated individuals quickly and intuitively learn to do whatever lets them dominate others and avoid whatever leads to a defeat (e.g., Schultheiss, Wirth, et al., 2005). Such a direct glimpse of the learning process helps explain how power-motivated individuals acquire strategies through which they can persuade and convince others without alienating them by coming across as particularly dominant or hostile: during discussions, they speak fluently, gesture a lot, and raise their eyebrows to underscore the importance of the arguments they are making (Schultheiss & Brunstein, 2002). It is reasonable to assume that power-motivated individuals have learned at some point to use these behaviors in the context of exchanging opinions because they had the desired effect of having an impact on others, which in turn was rewarding for the power-motivated individuals -- an example of the virtuous circle in action. Persuasion skills like the ones identified by Schultheiss and Brunstein (2002) are a component of managerial influence competencies that Boyatzis and Kelner (2010) attribute to n Power and that may explain why power-motivated individuals are particularly likely to rise to the highest levels of management (Jacobs & McClelland, 1994; McClelland & Boyatzis, 1982).

Another set of studies that sheds light on what may actually happen along the way from an implicit motive disposition to beneficial life outcomes was published by McAdams and colleagues (McAdams & Constantian, 1983; McAdams, Jackson, & Kirshnit, 1984; McAdams & Powers, 1981). These researchers found that individuals high in n Intimacy, a love-oriented facet of the need to affiliate, were more likely to

connect to others through smiling, the expression of positive affect, and relaxed chatting. These behavioral strategies may be critical for establishing and maintaining satisfying relationships with close others (Hagemeyer & Neyer, 2012) and more generally help build social resources and support, which are known to have beneficial effects on physical health (Uchino, 2004) and may explain the superior health of individuals high in the needs for affiliation and intimacy (McClelland, 1989). Thus, learning to connect to others through affiliative behavior is not only hedonically rewarding for affiliation-motivated individuals in the short term, but may also engender long-term health benefits.

Summary

To conclude, the virtuous-circle model we have proposed here may help to bridge the gap between "micro-level" learning and memory processes associated with implicit motives and "macro-level" outcomes, such as career success, relationship satisfaction, and health, by proposing that the competencies that motive-driven learning processes help to develop are instrumental for people to successfully realize their goals. Motive-supported goal implementation thus represents a critical mid-level process that connects motive-driven learning to motive-associated life outcomes.

Application to Educational Settings

What are some of the implications of the virtuous-circle model for educational psychology and educational research? The obvious first answer to this question is that learning and competence development will proceed rapidly and with strong affective support if it occurs in the context of a strong implicit motive. Learning environments that manage to engage students' implicit motives instill a sense of flow in the learner (e.g., Engeser & Rheinberg, 2008) and thus promote further motivation and learning in the classroom (see Shernoff, 2012). Such learning environments can also lead to superior academic outcomes.

McKeachie's (1961) Classic Study

A large-scale study by McKeachie (1961, see also McKeachie et al., 1968) shows that affiliation-motivated students achieve particularly good grades in classrooms in which the teacher fosters group work and other types of collaborative learning, that is, when affiliation incentives are provided. Power-motivated individuals benefit from teachers who provide power incentives by allowing them to have an impact on others through classroom discussion and opportunities to persuade others. Finally, achievement-motivated individuals do particularly well in classrooms in which the teacher does *not* attempt to set achievement incentives. This somewhat paradoxical outcome was corroborated meta-analytically: the presence of social-extrinsic cues for achievement can drive achievement-motivated individuals away from the superior performance they would show if no external incentives were given (Spangler, 1992).

We explain the effects of implicit motives, in conjunction with suitable incentives in the classroom, on academic outcomes that McKeachie (1961) observed as follows: The presence of motive-specific incentives in the classroom allowed individuals with the fitting implicit motives to frequently experience strong affective responses to learning situations. Affective arousal leads to better encoding of, and memory for, facts and events (i.e., a hippocampus-based learning function; see Cahill & McGaugh, 1998; Packard & Cahill, 2001; for a discussion of the complexities in the relationship between affect and learning, see chapter 2). Better memory is a critical determinant of exam performance and thus helps to achieve better grades. But this is not the only type of learning facilitated by instruction techniques that provide motivational incentives. At a nondeclarative level, students may also benefit by learning how to use social cues from others that trigger emotional processes and by learning intuitive behavioral skills (e.g., patterns of verbal and nonverbal

communication) that help them succeed in the social context of the classroom. Thus, motive-driven learning in such a classroom is likely to go beyond mere academic achievement and to also entail the development of interpersonal skills. We believe that this is an important point if teachers aim not only to educate the minds, but also the hearts of their students.

From this perspective, then, instructional methods that alternate between different incentives for different motives, and thus for students with different patterns of implicit motives, can help to boost learning in a maximum number of students. To illustrate this based on McKeachie's (1961) work, teachers who alternatingly provide students with opportunities to collaborate with others, to influence others, and to follow their own inclinations will enable more students to experience affectively charged, motivating learning situations and thereby also engender better learning than teachers who use only one of these methods or none of them.

Teachers' Effects on Students' Motives

Applied educational research reviewed by Rheinberg and Engeser (2010) suggests that by setting suitable incentives, teachers may even change their students' implicit motives. Teachers who instruct students based on an individual reference norm orientation by providing performance feedback that compares the student's current performance with her or his previous performance, by adjusting instruction to the student's current performance level, and by attributing setbacks to inappropriate instruction (rather than to factors in the student) foster higher n Achievement in their students. In contrast, teachers who use a social reference norm by comparing a student's performance to that of others, by using a one-size-fits-all instructional style, and by attributing failures and successes to stable, internal factors in the student effectively prevent students from developing high n Achievement.

Implications for Students' Learning Strategies

Students can also actively boost their learning by setting goals and creating learning activities for themselves that engage their implicit motives. For instance, a person high in n Affiliation may benefit from meeting with other students to exercise their vocabulary in a second language, a student high in n Power may benefit by trying to explain and teach a difficult topic to another student, and a student high in n Achievement may get a boost from trying to find new, more creative or more efficient ways to learn about a topic. Such active, intelligent management of one's own learning requires, of course, a willingness to experiment by the student and a certain freedom and encouragement to experiment provided by the instructor. Students not only need to learn, they also need to learn *how* to learn, and the individual-difference perspective we take here from the vantage point of implicit motives suggests that one size won't fit all. Every learner needs to explore and find out which learning strategies, environments, and activities are most likely to be motivationally engaging and thus learning-promoting for her or him. Unfortunately, this is not usually a learning experience traditional schools encourage students to have. As a consequence, many students continue to learn in the only way they have learned to learn -- that is, alone and hunched over books -- and thus in a way that requires a lot of tiring effort and promises comparatively little gain in terms of affectively charged learning experiences.

From a pedagogical point of view, then, it becomes a critical goal for students not only to learn content matter, but also to learn to recognize, acknowledge, and use their affective responses to both the content matter of learning and the circumstances of learning, because these responses signal the arousal of implicit motivational needs that can facilitate learning. Heeding such affective signals can help them optimize their learning so that it becomes engaging, lasting, and rapid. Ignoring such affective signals can hamper learning not only by failing to develop better, affectively engaging

learning strategies, but also by requiring additional self-regulatory effort and thereby inducing fatigue (see Muraven & Baumeister, 2000). The result is slow learning progress and, perhaps worse, a tendency to avoid the subject matter in the future. Thus, the value of understanding and using one's immediate affective responses to learning situations and contents itself needs to be conveyed to students. Affect is not the enemy of cognition, as some philosophers have claimed; it is in fact its close ally, because it singles out experiences that are worth remembering, both at level of declarative memory and at the level of unconscious, procedural learning.

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Footnote

[1] This account of motive-driven acquisition of integrated competencies may apply more to informal, non-declarative learning of social skills than to the formal, declarative learning of rules and facts that dominates school contexts. Although work by Woike et al (2009), McClelland (1995), and others seems to suggest that motives can also facilitate the declarative acquisition of factual knowledge, motive effects on formal leaning typically emerge *only after appropriate situational arousal of the motive*. The mere presence of motive-related verbal material in instructional texts may therefore not be sufficient to engage learners' implicit motives. As research by McKeachie (1961, reviewed below) suggests, teachers need to provide suitable situational incentives that arouse students' motives and thus to provide the necessary affective support for learning and mastering declarative material.

Figures

Figure 1. Overview of the role of implicit motives in learning processes and competency development. In individuals high in an implicit motive, incentive contact is associated with an affective response that leads to better memory for the episodic context in which incentive contact happened (a learning function mediated by the hippocampus), conditioning of specific cues that predict the rewarding experience (mediated by the amygdala), and reinforcement of motor behavior that led to incentive contact (mediated by the striatum). Jointly, these learning processes foster the development of an integrated behavioral competency consisting of memory for the context, trigger stimuli, and appropriate behaviors for the attainment of an incentive.

Figure 2. Virtuous-circle model of motive driven learning and successful goal pursuit. Motive-dependent hedonic responses to incentives (lower left box) lead to enhanced learning and the development of competencies (lower right box), which in turn promotes intuitive goal pursuit strategies (upper box). Successful goal pursuit entails the attainment of motive-specific incentives, which closes the circle.

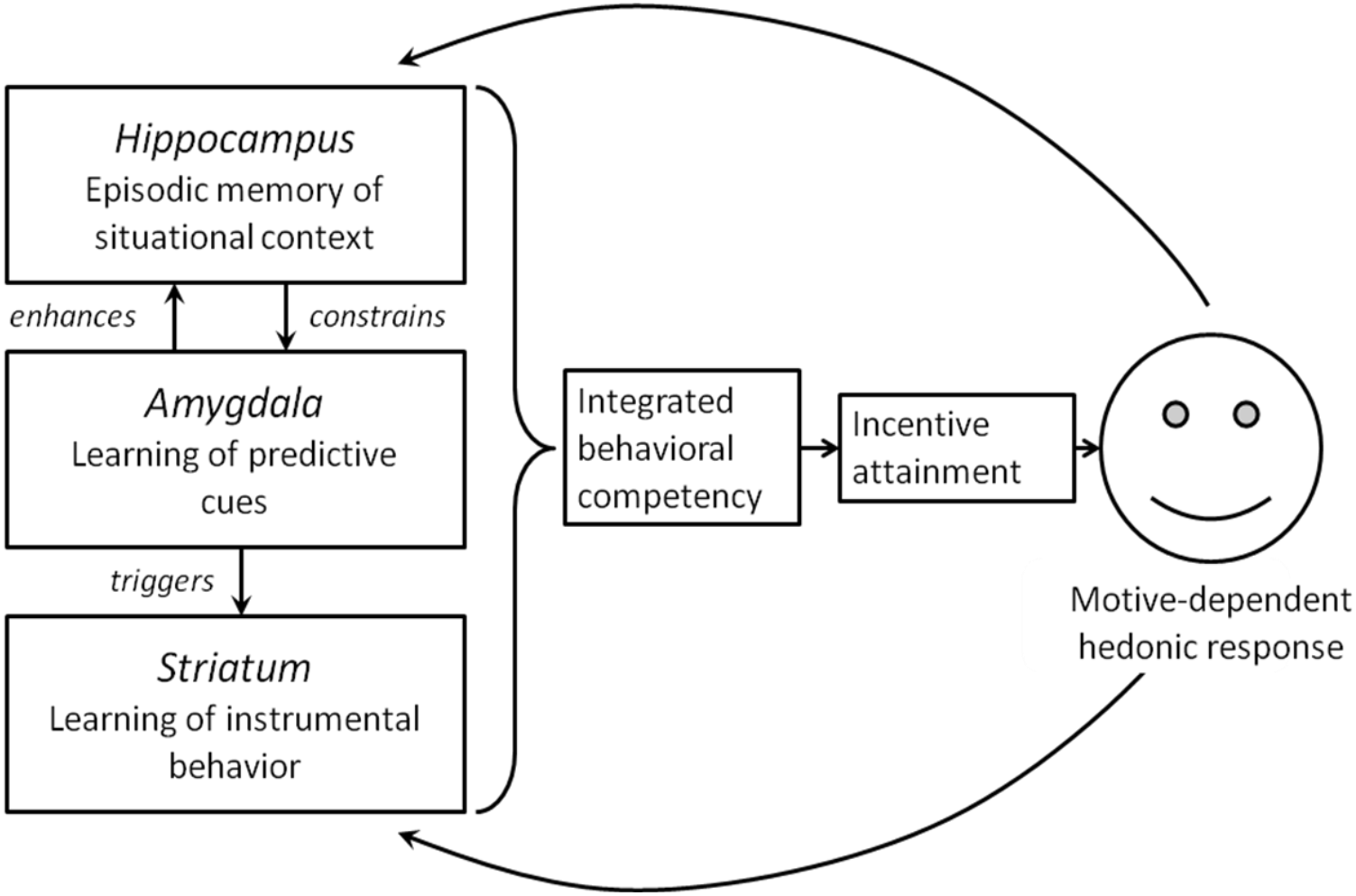
Hippocampus
Episodic memory of situational context
enhances
constrains
Amygdala
Learning of predictive cues
triggers
Striatum
Learning of instrumental behavior
Integrated behavioral competency
Incentive attainment
Motive-dependent hedonic response

Figure 1.

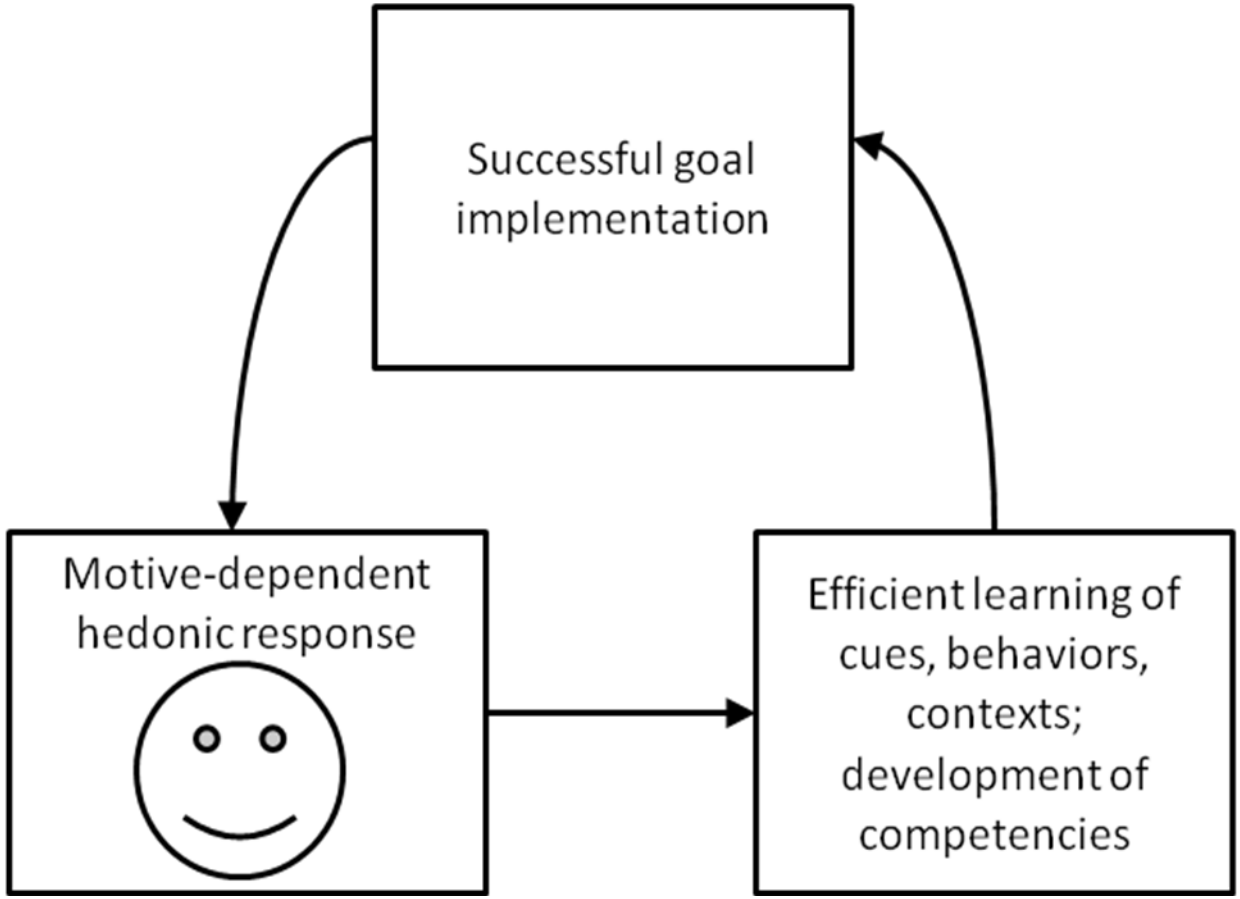
Successful goal implementation
Motive-dependent hedonic response
Efficient learning of cues, behaviors, contexts; development of competencies

Figure 2.