Running head: IMPLICIT MOTIVES

Implicit motives

Oliver C. Schultheiss

University of Michigan, Ann Arbor, Michigan

Appeared as: Schultheiss, O. C. (2008). Implicit motives. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3 ed., pp. 603-633). New York: Guilford.

Acknowledgment:

I would like to thank Kent Berridge and Barbara Woike for their helpful comments on an earlier draft of this chapter. Parts of the research summarized in this chapter were supported by Deutsche Forschungsmeinschaft grants SCHU 1210/1_2, 1-3, and 2-2, NIMH grant 1 R03 MH63069-01, and NSF grant BCS 0444301.

Implicit motives

Implicit motives are motivational dispositions that operate outside of a person's conscious awareness and t are aimed at the attainment of specific classes of incentives and the avoidance of specific classes of disincentives. In this chapter, I will review the affective, cognitive, physiological and behavioral functions of implicit motives, the assessment of motive dispositions, and the role of implicit motives in political, economic and societal phenomena. I will also outline a conceptual model to account for some key differences between implicit motives and conscious modes of goal striving.

1. Profiles of implicit motives

Over the past 50 years, most implicit motive research has focused on the power motive, the achievement motive, and the affiliation motive. Individuals with a strong power motive derive pleasure from having an impact on and dominating others; individuals with a strong affiliation motive experience close, harmonious contact with other people as satisfying; and individuals with a strong achievement motive get a kick out of doing something well or improving on a task (e.g., McClelland, 1987; Winter, 1996). In the following sections, I will provide short profiles of these three motives and discuss the issue of hope and fear aspects of implicit motives. A systematic overview of these motives and their correlates is given in Table 1.

1.1 The achievement motive

The psychological kernel of the achievement motive is *the capacity to derive satisfaction from the autonomous mastery of challenging tasks* (McClelland, Atkinson, Clark, & Lowell, 1953; Schultheiss & Brunstein, 2005). Achievement-motivated individuals prefer to work on tasks of medium difficulty, on which the chances of success are neither too high nor too low and that demand their full concentration and effort (McClelland, 1987). If they can not choose and solve such tasks on their own terms, but are given explicit advice and direction on how to do it, they are likely to leave the field and invest no effort into the task (Spangler, 1992). Individuals low in

achievement, in contrast, typically avoid medium-difficulty tasks, because they require effort, and success is neither likely to come quickly nor guaranteed in the first place. So why do achievement-motivated people like to solve challenging tasks and why are they so fiercely independent-minded about it?

A look at the developmental precursors of achievement motivation, identified in longitudinal and observational studies, provides some important clues. Parents of high-achievement children are more likely to reward their children warmly for independent mastery of developmental hurdles such as toilet training, but are also more likely to punish them for not mastering challenging tasks on their own, and generally set their demands slightly above what the child is already able to master (Heckhausen & Heckhausen, in press; McClelland & Pilon, 1983; Rosen & D'Andrade, 1959; Winterbottom, 1958). In other words, children who later have a strong achievement motive have been trained to associate the encounter of challenges and the effort their mastery requires with a positive feeling occurring after they have surmounted the challenge. They have also learned that lack of independent mastery is associated with negative consequences – hence their preference for solving challenges independently (Schultheiss & Brunstein, 2005).

Later in life, achievement-motivated individuals not only prefer moderately challenging tasks that they are allowed to master on their own terms, they also prefer tasks and work settings in which they can obtain frequent feedback on how well they are currently doing in order to optimize their performance (e.g., Brunstein & Schmitt, 2004). But not any kind of feedback will do. As recent studies by Brunstein and Hoyer (2002) and Brunstein and Maier (2005) have documented, achievement-motivated individuals prefer feedback with reference to an individual norm that tells them how well they are doing now relative to how well they did previously. They remain generally uninterested in how well they are doing relative to a social norm, that is, relative to other people's performance, except under certain, very specific circumstances (cf. Brunstein & Meier, 2005; see also Veroff, 1969).

The developmental precursors and core characteristics of achievement motivation help explain why high-achievement individuals excel at some tasks in life, but fail in others. High levels of achievement motivation are an asset in job contexts in which people can have full control over goal setting and implementation and also have access to frequent feedback on how they are doing. For this reason, high-achievement individuals succeed in business and many kinds of entrepreneurial activity, as long as they have full control over how the business is run and can see how well it is doing by, for instance, checking the daily cashflow (McClelland, 1961, 1965; McClelland & Franz, 1992; Wainer & Rubin, 1969). Achievement-motivated individuals' performance fizzles, however, when they work in jobs that require managerial or "people" skills (Andrews, 1967; Jacobs & McClelland, 1994; McClelland & Boyatzis, 1982). The focus in such jobs is no longer on what the achievement-motivated person may perceive as the best possible goal, the best possible way to achieve it, and having full control over the process. Rather, managerial positions require the delegation of work to others, finding compromises between conflicting views and interests, and making personnel decisions, none of which has any strong appeal for achievement-motivated individuals.

This may also explain why achievement-motivated individuals perform so dismally at the very highest levels of "management". Among US presidents, as Winter (1991) has shown by content-coding presidential inauguration speeches, high levels of achievement motivation are associated with a strong sense of idealism, but also with what historians judge to be an active-negative leadership style, that is, a flurry of political activity that fails to deliver (e.g., presidents Wilson, Hoover, Nixon and Carter). According to Winter (1996), achievement-motivated presidents start out with idealistic, "best-possible-outcome" goals. But because in politics they have to compromise and negotiate and can not retain full control over goal setting and implementation, they soon become frustrated. They may also try to compensate by rigidly clinging to their idealistic goals and, unwilling to compromise, achieve comparatively little in the end.

1.2 The affiliation motive

At the core of the affiliation motive is *a capacity to derive satisfaction from establishing, maintaining, and restoring positive relationships with others* (Atkinson, Heyns, & Veroff, 1958). Individuals high in this need respond with approach behavior to nonverbal signals of affiliation, such as facial expressions of joy, and with vigilance and avoidance behavior to nonverbal signals of rejection and hostility, such as facial expressions of anger (e.g., Schultheiss & Hale, in press; Schultheiss, Pang, et al, 2005). In other words, they want to be with individuals who are friendly and accepting and distance themselves from people who are not.

In their interpersonal behavior affiliation-motivated individuals are prone to engage both in warm, friendly behavior towards those they like (cf. Winter, 1996). For instance, high-affiliation individuals, relative to low-affiliation individuals, interact more with others whom they perceive to be friendly or similar to themselves (e.g., Lansing & Heyns, 1959), like others more who express opinions similar to their own (e.g., Byrne, 1962), are more willing to make concessions to others whose good-will is important to them (e.g., Langner & Winter, 2001), make more eye contact with others in non-competitive situations (e.g., Exline, 1963), and are more willing to take others' needs into consideration in their own actions (e.g., Hardy, 1957).

Because individuals high in affiliation motivation can not bear discord with others, however, they are also prone to distancing themselves from those they perceive as rejecting. Relative to low-affiliation individuals, they dislike others more who express disagreeing opinions (e.g., Byrne, 1961), they further augment such differences by changing their own opinions away from disagreeing others (Burdick & Burnes, 1958), they avoid eye contact with others who they perceive to be antagonistic (e.g., Exline, 1963), and they are less likely to accept as a work partner someone whose opinions are too dissimilar to their own (Byrne, 1961).

Comparatively little is known about the developmental precursors of the affiliation motive. In a longitudinal study, high levels of affiliation motivation in adulthood could be traced back to more parental use of praise as a socialization technique, but also to the mother's being

less responsive to the child's crying (McClelland & Pilon, 1983; see also Lundy & Potts, 1987). These findings suggest that the affiliation motive may be rooted at least partly in early separation anxiety or an avoidant attachment, but unfortunately the link between affiliation motivation and patterns of early attachment is largely unexplored.

Outside of the laboratory, high-affiliation individuals are more likely than low-affiliation individuals to experience high emotional and physical well-being, particularly if they are high in intimacy motivation, a facet of affiliation motivation that is oriented towards love and transcendence (e.g., McAdams & Vaillant, 1982; McClelland, 1989; Zeldow, Daugherty, & McAdams, 1988). In achievement contexts, affiliation-motivated individuals excel at tasks that require cooperation with other individuals (Atkinson & O'Connor, 1966; French, 1958) or bring them social approval (Atkinson & O'Connor, 1966), but show inferior performance on competitive tasks (Koestner & McClelland, 1992). Although high-affiliation individuals rarely make it to management positions in strongly hierarchical business organizations, presumably because their need for harmonious relationships with others clashes with the ruthless kind of leadership expected of top managers (McClelland, 1987), they shine as managers in companies with "flat" hierarchies, in which managers are expected to aid the integration of task groups (e.g., Litwin & Siebrecht, 1967).

Among U.S. presidents a strong need for affiliation is associated with a greater likelihood of scandal and the resignation of a member of the cabinet or the White House staff as a consequence. Winter (1991) speculates that high-affiliation presidents are more likely than others to be influenced by the suggestions of close friends, who may not always be the best advisors. On the positive side, affiliation-motivated presidents are more likely to sign arms limitation treaties and thus to contribute to peaceful relationships with other nations. Similar peace-promoting effects of affiliation motivation have also been found in motivational analyses of Soviet politburo members (Hermann, 1980).

1.3 The power motive

Individuals high in power motivation have *a capacity to derive pleasure from having physical, mental, or emotional impact on other individuals or groups of individuals and to experience the impact of others on themselves as aversive* (Schultheiss, Wirth, Torges, Pang, Villacorta & Welsh, 2005; Veroff & Veroff, 1972; Winter, 1973). This double-facedness of the power motive is aptly illustrated in Figure 1, which shows that power-motivated individuals are quick to pick up and retain behaviors that helped them dominate others, but equally quick to inhibit behaviors that in the past have been associated with their being defeated by others. Note also that while the ultimate goal of the power motive may be having dominance over others, the canonical definition of the power motive focuses on an intermediate step towards dominance, namely, having impact on others, which is *not* synonymous with being dominant.

This is an important distinction, because it is often assumed that the drive for power manifests itself as an in-your-face kind of aggressive and domineering behavior. Yet, this type of behavior is rarely a successful strategy to attain dominance among many mammalian species, particularly primates (cf. de Waal, 1998), and it is not what typically characterizes individuals high in power motivation. Although they can be aggressive and irresponsible (cf. Dutton & Strachan, 1987; Winter, 1988), they have more often been found to be very clever and intelligent in their quest for impact experiences (McClelland, 1975, 1987). For instance, in a study by Schultheiss and Brunstein (2002), participants were videotaped while they were presenting their view on the ethics of experimentation with animals to another person. When judges later viewed the videotapes they did not rate participants high in implicit power motivation as more assertive or less friendly than other participants. But they did rate them as more persuasive and competent. The impression of higher competence in power-motivated individuals was not mediated by what participants actually said, but by how they said it: compared to low-power individuals, high-power participants used more gesturing, were more likely to raise their eyebrows to emphasize the importance of what they said, and spoke more fluently. Thus, power-motivated individuals often employ behavioral strategies that allow them to have lasting and socially acceptable impact

on others (e.g., by influencing their beliefs and opinions) rather than resorting to directly aggressive and coercive behaviors that are likely to backfire in many social contexts and relationships (e.g., Ridgeway, 1987).

Perhaps as a consequence of their considerable interpersonal intelligence, power-motivated individuals are more likely to ascend to the highest levels of management in hierarchically organized corporations (McClelland & Boyatzis, 1982; McClelland & Burnham, 1976) and, more generally, to have productive and successful careers (McClelland & Franz, 1992; Peterson & Stewart, 1993). However, when working in leadership positions, power-motivated individuals become vulnerable to ingratiating behavior by subordinates (Fodor & Farrow, 1979) and favor an autocratic style of decision making that leaves little room for subordinates' input (Fodor & Smith, 1982). Another way for power-motivated individuals to have impact is to "make a splash", to do something that will increase their social visibility by attracting others' attention. For instance, high-power individuals are more likely than low-power individuals to make risky bets in gambling to get attention (McClelland & Watson, 1973; McClelland & Teague, 1975). For the same reason, they are also more likely to purchase extravagant cars and consumer goods (Winter, 1973). Finally, the implicit power motive is also involved in various forms of generativity (e.g., Peterson & Stewart, 1996). For instance, McClelland (1975) found the power motive to be positively correlated with sharing and giving in mature individuals, and power-motivated individuals are attracted to jobs that allow them to teach others (Winter, 1973). In women, high levels of power motivation are correlated with having more children and being more involved in parenting (Peterson & Stewart, 1993).

In the political arena, high levels of power motivation are associated with the proactive initiation of armed conflicts, as has been observed in U.S. presidents and South African leaders during the Apartheid regime (Winter, 1980; 1991). U.S. presidents high in the need for power have higher risk of being assassinated (e.g., Kennedy, Lincoln), but are also held in greater esteem by historians than low-power presidents (Winter, 1991).

In many studies (e.g., Schultheiss & Brunstein, 2002; McClelland & Boyatzis, 1982), the effects of power motivation on behavior depend on individuals' level of activity inhibition, a measure of their propensity to engage right-hemispheric functions under stressful and challenging conditions (Schultheiss, Riebel, & Jones, 2006). In general, high-power individuals show more sophisticated power behavior when they are high in activity inhibition and more blunt and aggressive manifestations of their need for impact when they are low in this variable.

Developmentally, the power motive is rooted in parental permissiveness for sexual and aggressive behavior before the age of 5 (McClelland & Pilon, 1983), which may explain why some high-power adults express their need for impact in the form of aggression, drinking, and frequent sex, often with changing partners (e.g., McClelland, 1975; McClelland, Davis, Kalin, & Wanner, 1972; Schultheiss, Dargel, & Rohde, 2003a; Winter, 1988). However, growing up with younger siblings appears to transform the power motive into more responsible forms of impact seeking, such as holding office or becoming politically active (Winter, 1988). Also, the presence and involvement of a father in the child's parenting appears to facilitate the development of a "socially intelligent" power motive (McClelland, 1987; McClelland & Pilon, 1983).

1.4 Hope and fear components of implicit motives

Almost from the start of implicit motive research more than 50 years ago, researchers realized that a given motive may not be a unitary construct, but represent two complementary motivational orientations, one directed towards attaining a motive-specific incentive (approach or hope motivation) and one directed towards avoiding a motive-specific disincentive (avoidance or fear motivation) (e.g., McClelland et al., 1953). In each motivational domain, these orientations may give rise to similar types of behaviors, despite their different aims. For instance, in the domain of achievement motivation, Heckhausen (1963) differentiates a hope for success from a fear of failure motive. Individuals high predominantly in hope for success want to do well on tasks because they associate pleasure with successful mastery of challenges, whereas individuals high predominantly in fear of failure want to do well on tasks to avoid the negative outcomes

associated with the failure to master challenges independently (e.g., parental punishment). Similarly, Veroff and Veroff (1972) argued that the power motive bifurcates into a hope of power and a fear of weakness component, with individuals high in hope of power seeking to have impact for the pleasure of the impact experience and individuals high in fear of weakness seeking to have impact to avoid becoming someone else's target of impact. Finally, Boyatzis (1973) pointed out that in many empirical studies the affiliation motive seems to be characterized by a strong fear of rejection component, which propels individuals to seek contact with others to avoid loneliness and isolation. He suggested that this fear component of affiliation motivation is complemented by a hope-for-closeness component, a motivational orientation towards the positive incentive of love. This idea later gave rise, in part, to the development of a measure of implicit intimacy motivation, which aimed a capturing the love aspect of affiliation motivation (McAdams, 1992).

The issue became even more complex when some scholars suggested that sometimes people may actually *fear* the very incentive at the core of a given motive, thereby adding a third variant to the manifestations of some motives. Thus, Horner (1972) argued for the existence of a fear-of-success motive, and that people characterized by it avoid doing well on achievement tasks because they fear the social repercussions of standing out academically. In support of this notion, subsequent research showed that individuals high in fear of success scored low on measures of the implicit achievement motive (Karabenick, 1977). And Winter (1973) suggested that some people are uncomfortable with having power or impact over others and therefore avoid it. This idea has gained considerable support recently with the discovery that individuals very low in implicit power motivation do not seem to be indifferent to the impact incentive, but actually respond to impact experiences as if they were aversive and stressful for them (cf. Schultheiss, Wirth, et al., 2005; Wirth, Welsh, & Schultheiss, 2006; see also Fig. 1). It also seems plausible that individuals with very low affiliation motivation scores may avoid closeness to others, similar

to individuals with an avoidant attachment style, but to date there is little evidence to support this claim (cf. McAdams, Lester, Brand, McNamara, & Lensky, 1988).

In their discussion of the hope and fear components of achievement motivation, Schultheiss and Brunstein (2005) recently presented a framework derived from basic instrumental learning principles that is extended here to provide an integrated account of the various hope and fear components of all three major implicit motives studied so far (see Table 2). The framework distinguishes between whether instrumental behavior to attain an incentive is executed or not and whether incentive attainment is associated with reward or punishment, derived either from the incentive itself or from its social consequences. This 2 x 2 framework describes three fundamental modes of motivation based on predominant learning experiences:

(1) In *active approach*, instrumental behavior aimed at incentive attainment has been rewarded, thus increasing the likelihood of future occurrences of the behavior for the sake of gaining pleasure. Hope of success, hope of power, and hope of intimacy are the components associated with this motivational mode in the motive domains of achievement, power, and affiliation, respectively. (2) In the *active avoidance* mode, lack of (effective) instrumental behavior is punished, which also leads to an increase of instrumental behavior in the future, although primarily for the sake of gaining relief. Fear of failure, fear of weakness, and fear of rejection represent the manifestations of this motivational focus for the three motive domains. (3) In contrast to the active approach and active avoidance modes, which are both associated with high levels of motivated behavior and can therefore coexist in a person, the *passive avoidance* mode represents an anti-motive, because here active attainment of the incentive is followed by punishment, which leads to the inhibition of behavior aimed at the incentive. As a consequence, the person with a strong fear or success shows a conspicuous absence of achievement-related behavior, particularly in the presence of achievement cues, which now act as a warning sign for the punishment associated with incentive attainment. Similarly, the person with a strong fear-of-power motive suppresses behavioral impulses aimed at impact, because having impact has

become associated with punishment; and the person with a fear-of-intimacy motive avoids getting too involved with others, because intimate closeness has had aversive consequences in this person's learning history.

Whereas active approach and active avoidance components of a given implicit motive are not mutually exclusive and can actually co-occur within the same person (cf. Heckhausen, 1967; Winter, 1973), the relationship between these active motivational modes and the passive-avoidance anti-motive is by functional necessity an inverse one. This may also explain why, as previously described, individuals scoring very low on measures of implicit motives show signs of behavioral inhibition and avoidance in response to motive-specific incentives.

The 2 x 2 framework also yields a fourth mode, termed here passive approach. Because the very lack of active, instrumental effort is being rewarded here (akin to learned helplessness induced by reward that is not contingent on performance; cf. Eisenberger & Cameron, 1996), this mode is not assumed to play a role in motivation proper and will not be discussed further.

1.5 Other motives

While the implicit needs for achievement, power, and affiliation have each generated voluminous bodies of research, other implicit motives have also been proposed and examined. A study on the measurement of implicit hunger motivation (Atkinson & McClelland, 1948) in fact represents the opening salvo to McClelland and Atkinson's large-scale research programs on implicit motives. In addition, implicit motive measures have been developed for the assessment of curiosity (e.g., Maddi, Probst, & Feldinger, 1965), sexual motivation (Clark, 1952), and fear (Walker et al., 1958). Although these motives represent fundamental needs with distinct and well-described physiological substrates (e.g., Panksepp, 1998), implicit motive research has so far failed to systematically explore them. Implicit motive measures for aggression have also been developed (Feshbach, 1955; Kornadt, 1987), but they overlap substantially with implicit power motivation. Moreover, the status of aggression as a motivational need in its own right is debatable (cf. Panksepp, 1998; Schultheiss & Wirth, in press).

2. Measurement of implicit motives

A detailed discussion of the measurement of implicit motives has recently been provided by Schultheiss and Pang (2007) in the *Handbook of Research Methods in Personality Psychology*. In brief, the most frequently used method of assessing implicit motives is the Picture Story Exercise (PSE; McClelland et al., 1989). The PSE requires research participants to write imaginative stories about 4 to 8 photographs or drawings showing people in various social situations (e.g., a captain talking to a passenger, two women working in a laboratory). These stories are then scored with empirically derived and validated content coding systems (cf. Schultheiss & Pang, 2007, for further details). Higher scores resulting from the coding of PSE stories for a given motive are seen as a reflection of a stronger motivational need disposition.

Coding systems for the assessment of power, affiliation, and achievement motivation from PSE stories have been revised and refined considerably over time, and a compilation of most existing coding systems for implicit motives was most recently published by Smith (1992). Winter (1991, 1994) developed an integrated coding system that allows to code all three major motives simultaneously and can be applied to PSE stories, but also other types of verbal material (e.g., political speeches, diaries, etc.).

Reliability of PSE-based implicit motive measures is sufficient for research purposes. Inter-rater reliability between two independent coders scoring the same stories is typically higher than 80%, reflecting a high degree of objectivity of the coding rules. Schultheiss and Pang (2007) reported the following meta-analytically derived retest stability coefficients: .71 after one day, .60 after one week, .52 after one month, and .37 after one year. Internal consistency estimates (e.g., Cronbach's alpha) are not suitable for the assessment of the PSE's reliability (for discussions of this issue, see Atkinson, 1981; Reuman, 1982; Schultheiss & Pang, 2007).

Recent years have seen a resurgence of interest in the assessment of implicit motives. This has led to new or revised content coding measures (e.g., Pang, 2006; Siegel & Weinberger, 1998), a better description of the picture cues used in the PSE (Schultheiss & Brunstein, 2001;

Pang & Schultheiss, 2005), more rigorous evaluations of the suitability of various picture cues for motive measurement (Blankenship et al., 2006; Hofer & Chasiotis, 2004), and the introduction of computer-based PSE administration (Blankenship & Zoota, 1998; Pang & Schultheiss, 2005). It has also led to attempts to measure implicit motives by means other than the PSE, such as the Operant Motive Test (OMT; Kuhl, Scheffer, & Eichstaedt, 2003), the Multi-Motive Grid (MMG; Sokolowski, Schmalt, Langens, & Puca, 2000; see also Johnston, 1957), and an adaptation of the Implicit Associations Test (IAT; Brunstein & Schmitt, 2004). However, convergent measurement validity (i.e., does the new measure correlate with the PSE?) and convergent criterion validity (i.e., does the new measure predict the same criteria as the PSE?) of these new instruments with existing PSE motive measures still needs to be clearly established.

3. How implicit motives differ from self-attributed needs and goals

One of the most striking and pervasive findings emerging from more than 50 years of research on implicit motives is the observation that the correlation between PSE measures and self-reports of need strength in a given motivational domain is typically close to zero. For instance, correlations between PSE and questionnaire measures of achievement motivation were .06 in a study with 195 German students (Schultheiss & Brunstein, 2001) and .02 in a sample of 323 American college students (Pang & Schultheiss, 2005). Similarly, a meta-analysis reported by Spangler (1992) yielded an average variance overlap of less than 1% between PSE and questionnaire measures of achievement motivation. Negligibly low correlations between the PSE and questionnaires are not unique to the domain of achievement, but have also been consistently reported for the domains of power and affiliation (e.g., King, 1995; Pang & Schultheiss, 2005; Schroth, 1985). The lack of variance overlap between PSE and self-report measures of motivation extends even to the goals people choose and pursue in their daily lives. For instance, individuals high in implicit affiliation motivation are not more or less committed to affiliation and relationship goals than individuals low in implicit affiliation motivation (King, 1995; Schultheiss, Jones, Davis, & Kley, 2006). What the stubborn lack of substantial between-

measures correlations suggests, then, is that *in general people do not have conscious access to the strength of their motives as assessed with the PSE and that the motivational needs and goals they ascribe to themselves can not be interpreted as valid indicators of their underlying motive dispositions*. For this reason, McClelland et al (1989) labeled motivational constructs assessed with the PSE *implicit motives* and motivational constructs assessed through self-report methods *self-attributed* or *explicit motives*.

3.1 Implicit and explicit motives predict different types of behavior

Perhaps even more important than the finding that implicit and explicit motives do not overlap is the observation that the two types of constructs respond to different types of stimuli and predict different kinds of validity criteria. In an early study of the differences between implicit and explicit achievement motivation, deCharms, Morrison, Reitman, and McClelland (1955) found that high scores on an achievement motive questionnaire, but not high scores on the achievement motive PSE, predicted research participants' likelihood of adjusting their judgments of artwork to those of a proclaimed expert and also to rate a target person described as unsuccessful in more negative terms. On the other hand, high scores on the PSE achievement motive measure, but not high scores on the achievement motive questionnaire, predicted good recall of facts from a story and superior performance on a scrambled-word test. Consistent with these early observations, Biernat (1989) found that implicit achievement motivation (PSE) predicted good performance on an arithmetic task, but not the likelihood of volunteering for a task group leadership position, whereas explicit achievement motivation did not predict arithmetic task performance, but predicted participants' inclination to be task group leader. Similarly, Brunstein and Hoyer (2002; see also Brunstein & Maier, 2005) reported that the implicit achievement motive predicts good performance on an attention task, particularly after negative individual-norm feedback, but not participants' choice of whether to continue with the task or do something else, whereas a measure of explicit achievement motivation positively

predicted the choice to continue, particularly after participants were led to believe that they had done worse than others, but not the actual performance on the task.

Such differences between implicit and explicit measures of motivation have also been reported for other motives (e.g., Craig, Koestner, & Zuroff, 1994; Koestner, Weinberger, & McClelland, 1991). For instance, Schultheiss and Brunstein (1999) found that the implicit power motive, but not the explicit need for dominance, predicted performance on a computer game which allowed players to enter a high-score ranking list and thereby obliterate the entries of previous players. Notably, in the same study, the explicit need for dominance, but not the implicit power motive, was a positive predictor of participants' stated commitment to reach the highest rank on the high-score list ($r = .30$, $p < .05$; Schultheiss, 1996). However, the explicit need for dominance did not predict actual performance in the game.

Taken together, these studies suggest a double dissociation between implicit and explicit motives and their behavioral correlates, such that implicit motives are more likely to predict performance measures than choices and judgments, and explicit motives are more likely to predict choices and judgments than performance (cf. Bornstein, 2002). This characterization of the differences in predictive validity between implicit and explicit motives is probably too coarse to apply across the board (see, for instance, Brunstein & Maier, 2005, for an illustration of some specific circumstances under which implicit and explicit achievement motives conjointly influence performance). But it is consistent with meta-analytic findings (Spangler, 1992) and can serve as a useful heuristic for predicting which type of measure will perform well for which types of outcomes in the laboratory and in the field.

3.2 Implicit and explicit motives respond to different types of cues

While the distinction between measures of performance and measures of judgments and choices characterizes critical differences between implicit and explicit motives at the behavioral-output end, the two types of motives also respond to different types of information at the input stage of information processing. Specifically, a growing body of evidence suggests that implicit

motives are more likely to become engaged by nonverbal cues than by verbal cues. Klinger (1967) observed that individuals responded with increases in affiliation or achievement motivation expressed in the PSE to watching an affiliation-oriented or achievement-oriented experimenter, even when they could not hear his verbal instructions. Schultheiss and Brunstein (1999; 2002) demonstrated that experimenters who verbally described a power-related goal to their participants failed to arouse participants' power motive. Only after participants had had an opportunity to translate the assigned goal into an experiential format through a goal imagery exercise did their power motive predict goal commitment and task performance. Finally, recent research indicates that facial expressions of emotion are particularly salient nonverbal cues for implicit motives. Facial signals of friendliness and hostility interact with individuals' implicit affiliation motive and facial signals of dominance and submission interact with individuals' implicit power motive to shape attentional orienting and instrumental learning (Schultheiss & Hale, in press; Schultheiss, Pang, et al, 2005).

Explicit motives, in contrast, respond preferentially to verbal cues. The aforementioned findings by deCharms et al (1955) provide a good illustration of this point. Individuals high in explicit achievement motivation were sensitive to an alleged expert's verbal judgments about works of art and over time changed their own judgments towards the expert's position. But they were not influenced by the cues inherent in the achievement tasks (story recall, scrambled-word test) that individuals with a strong implicit motive responded to. In his meta-analysis of the range and conditions of predictive validity of implicit and explicit achievement motives measures, Spangler (1992) also found strong support of the notion that explicit motives respond to different cues than implicit motives. Across studies, high scores on questionnaire measures of achievement predict achievement-related behaviors particularly well in the presence of achievement-focused instructions (e.g., "Today you are going to play a ring toss game. […] We want to see how good you are at this"; Atkinson & Litwin, 1960, p. 54). But they did not predict behavior well in the

absence of such verbal cues or in the presence of strong task-intrinsic cues, such as task-based feedback about one's performance increases or decreases.

3.3 An information-processing model of implicit and explicit motives

Schultheiss (2001; see also Schultheiss, 2007; Schultheiss & Pang, 2007) has presented an information-processing account of implicit and explicit motives that draws on these sets of findings as well as on earlier conceptual work on the differences between implicit and explicit motives (Cantor & Blanton, 1996; McClelland, 1980; McClelland et al., 1989; Weinberger & McClelland, 1990) and on distinctions between implicit and explicit aspects of cognition and emotion proposed by social, cognitive, and biopsychologists (e.g., Gazzaniga, 1985; LeDoux, 2002; Nisbett & Wilson, 1977; Paivio, 1986; Rolls, 1999; Squire & Zola, 1996; Wilson, 2002; Zajonc, 1980). A schematic overview of the model is presented in Figure 2.

According to the model, implicit motives preferentially respond to *nonverbal cues and incentives* and, after arousal, are particularly likely to have an impact on *non-declarative measures of motivation*, that is, measures of behaviors and processes that are not accessible to, or controlled by, a person's self-concept or verbally represented intentions. Non-declarative measures include physiological responses aimed at promoting biologically rooted needs (e.g., changes in blood pressure and heart rate, hormone release, muscle tone), acquisition of new stimulus-stimulus associations and goal-directed behaviors through processes of Pavlovian and instrumental learning, and utilization of such learned stimulus connections and behaviors in the appropriate contexts. Explicit motives, on the other hand, preferentially respond to *verbal-symbolic cues* and influence *declarative measures of motivation*, that is, measures that tap into a person's verbally represented sense of self and the attitudes, judgments, decisions, and goals associated with it. Valence judgments, choice behavior, assessments of self-regulatory control, and personal goal listings are all examples of declarative measures of motivation (cf. Schultheiss, in press, for further discussion of the significance of the declarative/non-declarative distinction for the conceptualization and assessment of personality).

A key aspect of the information-processing model of motivation as sketched out in Figure 2 is the proposition of a mechanism by which verbal cues can interact with implicit motives to influence both declarative and non-declarative measures of motivation. The mechanism is *referential processing*, the process through which verbal labels are retrieved and assigned to nonverbal percepts and, conversely, mental images are generated in response to words (Paivio, 1986). Referential processing represents an active effort to connect the verbal and nonverbal domains of experience: it takes additional time and effort, however slight, to name an object as opposed to only perceive it; likewise, a word is more quickly read than the object it refers to is conjured up as a mental image. Based on work by Bucci (1984, 1985, 1997), Weinberger and McClelland (1990) have speculated that implicit and explicit motivational systems can become better aligned through referential processing. Schultheiss and Brunstein (1999; 2002) recently obtained evidence in support of this notion. In a series of studies, participants were assigned power- or affiliation-related goals and then either had an opportunity to translate these verbally represented goals into an experiential, nonverbal format through guided goal imagery procedures (goal imagery group) or not (control group). Schultheiss and Brunstein found that declarative (e.g., goal commitment, self-reported activation) and non-declarative (e.g., task performance, expressive behavior) measures of motivation were contingent on participants' implicit motives (assessed with a PSE) in the goal imagery groups, but were independent of their implicit motives in the control groups. These findings indicate that an active effort to translate verbal goal representations into nonverbal representations allows implicit motives to "understand" and respond to verbal stimuli, which would otherwise be incapable of engaging them.

While alignment between implicit and explicit motivation may often depend on having the opportunity in a given situation to engage in referential processing, as in the Schultheiss and Brunstein (1999, 2002) studies, implicit-explicit alignment may also be the result of stable interindividual differences in people's referential processing ability, that is, it may reflect the degree of their general *referential competence*. In support of this idea, Schultheiss and Schad

(2006) found that in individuals with high referential competence, as measured by their response speed on a color-naming task (cf. Bucci, 1984), higher levels of implicit affiliation motivation significantly predicted more negative ratings of words expressing hostile emotions (e.g., furious, mad, angry), whereas the affiliation motive did not predict such ratings among individuals low in referential competence. Taken together, these findings suggest that referential processing can help make individuals' self-attributed needs and explicit goals more similar to, and perhaps also more integrated with, their implicit motives in the long run.

Other moderators of the relationship between implicit and explicit motives have also been proposed. These include methodological factors in the assessment of motives (Thrash, Elliot, & Schultheiss, in press), self-determination (Thrash & Elliot, 2002), the ability to quickly down-regulate negative affect (Baumann, Kaschel, & Kuhl, 2005; Brunstein, 2001), and private body consciousness, self-monitoring, and preference for consistency (Thrash et al., in press). More research is needed to determine whether these moderators replicably influence the alignment between implicit and explicit motives and how they relate to each other as well as to the referential processing mechanism proposed by Schultheiss (2001).

4. Physiological and health correlates of implicit motives

It does not take much to recognize in the implicit needs for affiliation and power the human manifestations of fundamental motivational systems present in nearly all mammals and many non-mammalian species, too. Most socially living animals are propelled by the need to form durable attachments to their parents, offspring, or kin to ensure safety and protection (affiliation) and by the need to rise in the social hierarchy to secure and control scarce resources (dominance; cf. Wilson, 1980). As a consequence, mammalian and non-mammalian species share many physiological and brain systems that facilitate affiliative and dominant behavior (cf. Schultheiss & Wirth, in press). For instance, the gonadal steroid hormone testosterone promotes dominant behavior across various species (Monaghan & Glickman, 1992), and the same is true of the peptide hormone oxytocin in the context of affiliation and attachment (Insel & Young, 2001).

The case for a universal motivational need for achievement is harder to make, and perhaps this motive is either a species-specific adaptation in humans or represents a secondary, derived motive that is rooted in a need to maintain an intact relationship with one's caregivers (cf. Elliot & Thrash, 2004; Rosen & D'Andrade, 1959). On the other hand, some primates and other mammals are also known to take an interest in, and perhaps derive pleasure from, exploring and mastering their non-social environment (e.g., Boesch-Achermann & Boesch, 1993; McClelland, 1987), which may point to the existence of phylogenetic roots of the achievement motive.

In the following, I will review evidence for the involvement of specific endocrine and physiological systems in implicit power, affiliation, and achievement motivation and also highlight some of the health correlates associated with implicit motivational needs.

4.1 Physiological and health correlates of the power motive

Arousal of power motivation in laboratory and field experiments leads to clear-cut increases in sympathetic nervous system activation, and this effect is more pronounced in individuals with a strong dispositional power motive (McClelland, 1982). Power-motivated individuals respond to power arousal or dominance challenges with increases in saliva and urine levels of the sympathetic catecholamines epinephrine, norepinephrine, and their metabolites (McClelland, Davidson, & Saron, 1985; McClelland, Floor, Davidson, & Saron, 1980; McClelland, Ross, & Patel, 1985; Steele, 1973, reported in McClelland, 1987), increased blood pressure (Fontana, Rosenberg, Marcus, & Kerns, 1987), and increased muscle tone (Fodor, 1985). Perhaps as an outcome of frequent or stressful power arousal experiences, power-motivated individuals are more likely to have chronically elevated blood pressure (McClelland, 1979). It should be noted that many of these findings emerge more strongly if high levels of power motivation co-occur with high levels of activity inhibition, an index of relative right-hemispheric activation during stress (Schultheiss, Riebel, & Jones, 2006; the right hemisphere controls sympathetic activation and stress responses, cf. Wittling, 1995).

Implicit power motivation has also been linked to salivary testosterone levels. Across several studies, slight positive correlations between basal testosterone levels and implicit power motives scores have been observed in men (e.g., Dabbs, Hopper, & Jurkovic, 1990; Schultheiss, Campbell, & McClelland, 1999; Schultheiss, Wirth, et al., 2005). More importantly, anticipation of a successful outcome of a dominance challenge (Schultheiss, Campbell, & McClelland, 1999) and actual success in one-on-one dominance contests leads to transient testosterone increases in power-motivated men (Schultheiss, Campbell, & McClelland, 1999, Schultheiss & Rohde, 2002; Schultheiss, Wirth, et al, 2005), which appear to have reinforcing effects on instrumental behavior (Schultheiss & Rohde, 2002; Schultheiss, Wirth, et al., 2005). In power-motivated women, dominance contests lead to a general transient testosterone increase, regardless of contest outcome, and testosterone does not appear to be related to instrumental learning (Schultheiss, Wirth, et al., 2005). Some evidence also suggests that power-motivated women respond with sustained estradiol increases to a dominance success and estradiol reductions to a defeat (Stanton & Schultheiss, 2007). Defeat during a dominance contest leads to increases of the stress hormone cortisol in both men and women (Wirth, Welsh, & Schultheiss, 2006) and to testosterone decreases in men (Schultheiss, Campbell, & McClelland, 1999; Schultheiss & Rohde, 2002; Schultheiss, Wirth, et al., 2005).

The observed changes in sympathetic catecholamines, testosterone and cortisol in response to power arousal and dominance outcomes in men represent the operation of a functionally integrated neurendocrine mechanism that subserves male dominance motivation (Sapolsky, 1987; Schultheiss, 2007). Sympathetic catecholamines are typically released in situations in which the individual can actively cope with a challenge, such as beating an opponent in a contest, and they have fast, stimulating effects on testosterone release from the gonads (Sapolsky, 1987). Testosterone further aids active coping with dominance challenges by increasing energy supply to the muscles and lowering the threshold for aggressive behavior through its actions on the brain. In contrast to challenges that are perceived to be manageable,

cortisol is released in situations in which the individual is exposed to an uncontrollable stressor, such as being defeated and subjected to another's dominance. Cortisol inhibits testosterone release from the gonads (Sapolsky, 1987), thereby lowering the individual's inclination to engage in further, potentially costly and fruitless dominance battles. According to this model, testosterone increases in power-motivated male winners of a dominance contest represent the net effect of relatively greater sympathetic catecholamine release throughout the challenge, whereas testosterone decreases in male power-motivated losers represent the net effect of relatively greater cortisol release during and after the challenge. Although testosterone is known to facilitate dominant and aggressive behavior in females, too (e.g., Dabbs, Ruback, Frady, Hopper, & Sgoutas, 1988; van Honk et al., 2001), the exact causal mechanisms and functional roles of the fast, contest-induced testosterone increases and the differential estradiol changes observed in power-motivated women remain to be explored.

In several studies, stressed power motivation has also been linked to compromised immune system functioning and impaired health (Jemmott, 1987; McClelland, 1989). During exam periods, high-power students, relative to low-power students, show elevated and prolonged sympathetic stress responses and suppressed levels of secretory immunoglobulin A (sIgA), the immune system's first line of defense against pathogens in the mucosal tissues of the body (Jemmott et al., 1983; McClelland, Alexander, & Marks, 1982; McClelland, Ross, & Patel, 1985). Stressed power motivation is also associated with decreased natural killer cell activity (Jemmott et al., 1990). As a consequence of compromised immune system functions, high-power individuals who experience frequent or severe power stress are more likely than low-power individuals to become ill (McClelland & Jemmott, 1980; McClelland et al., 1980; 1982; 1985). Although it has not been explored in greater detail why stressed power motivation translates into impaired immune system functioning, the immunosuppressive effects of strongly or chronically elevated cortisol levels appear to be a plausible mechanism (cf. Wirth et al., 2006). Notably, high levels of power motivation in combination with low power stress and success in power-related

endeavors have been found to predict low levels of physical symptoms and overall good health (McClelland, 1989), which suggests that the implicit power motive is not a general vulnerability for impaired health.

4.2 Physiological and health correlates of the affiliation motive

High levels of implicit affiliation motivation are associated with symptoms of parasympathetic nervous system (PNS) activity (Jemmott, 1987; McClelland, 1989). Compared to low-affiliation individuals, individuals high in affiliation at age 30 have lower blood pressure at age 50 (McClelland, 1979). They also maintain better immune system functions during stress, as evidenced by enhanced release of sIgA during exam periods (Jemmott et al., 1983; McClelland et al., 1985). In the absence of stressors, individuals with a strong implicit affiliation motive show better immunocompetence than individuals with a weak affiliation motive (Jemmott et al., 1990), and they also respond with greater sIgA increases to positive affiliation arousal (e.g., watching a documentary about Mother Teresa; McClelland & Kirshnit, 1988). Experimental arousal of affiliation motivation leads to increases in peripheral dopamine release (McClelland, Patel, Stier, & Brown, 1987), which is involved in blood pressure down-regulation and other PNS-related functions (e.g., Duncker et al., 1997). Likely as a consequence of enhanced PNS activity and the high level of immune system functioning associated with it, high-affiliation individuals are overall less likely to become ill than others (Jemmott, 1987; McClelland, 1989; McClelland & Jemmott, 1980), particularly if they experience low levels of stress or have low levels of activity inhibition, indicating left-hemispheric engagement during stress (Schultheiss et al., 2006; the left hemisphere is associated with PNS activation; cf. Wittling, 1995). The one blemish on the affiliation motive's "health record" is the finding that diabetics are more likely than non-diabetics to be characterized by high levels of affiliation motivation and low levels of activity inhibition (McClelland, Brown, Patel, & Kelner, 1988; cited in McClelland, 1989). Although a causal role of affiliation motivation in diabetes remains to be established, McClelland (1989) has speculated

that the affiliation motive may predispose individuals for diabetes through greater food intake and higher blood sugar levels via the effects of peripheral dopamine on the liver.

Another line of research points to a link between implicit affiliation motivation and the steroid hormone progesterone. Women who take oral contraceptives (which contain progesterone) have higher levels of affiliation motivation than women not taking "the pill" or men (Schultheiss, Dargel, & Rohde, 2003b). Also, higher levels of affiliation motivation are preceded by greater increases of progesterone in the course of women's menstrual cycle (Schultheiss et al., 2003b), and a recent laboratory study found increases in progesterone to be associated with increases in affiliation motivation (Wirth & Schultheiss, 2006). Finally, Schultheiss, Wirth, and Stanton (2004) found that movie-induced arousal of affiliation motivation, but not of power motivation, leads to fast progesterone increases in both women and men. Schultheiss et al (2004) speculated that the observed changes in progesterone may reflect the ovarian action of oxytocin, a hormone involved in affiliative behavior in animals and humans (Insel & Young, 2001). Wirth and Schultheiss (2006) offered an alternative explanation: progesterone exerts anxiolytic effects in the brain and may thereby help down-regulate fight-flight stress responses and promote tend-and-befriend (Taylor et al., 2000) affiliative behavior. This interpretation is consistent with high-affiliation individuals' better stress resistance (McClelland, 1989) and with the observation that affiliative behavior increases during threat (Gump & Kulik, 1997; Schachter, 1959). Thus, Wirth and Schultheiss (2006) argue for a bi-directional relationship between affiliation motivation and progesterone, in which a strong affiliation motive leads to increased progesterone release, particularly during stress, and high levels of progesterone in turn facilitate affiliation motivation.

4.3 Physiological and health correlates of the achievement motive

The biological correlates of the achievement motive have received the least attention so far, despite the fact that intriguing clues to the existence of such correlates emerged almost from the beginning of achievement motivation research. For instance, Mücher and Heckhausen (1962) found in a study with 33 male participants that higher levels of achievement motivation

correlated .65 with leg muscle tone during rest. Mueller and Beimann (1969; see also Mueller, Kasl, Brooks, & Cobb, 1970) reported that men with high levels of uric acid, a risk factor for gout, have higher levels of hope for success and lower levels of fear of failure than men with normal uric acid levels. Finally, Bäumler (1975; cf. Schultheiss & Brunstein, 2005) showed that administration of a drug that increases central dopaminergic transmission leads to increases in hope for success, whereas administration of a drug that decreases dopaminergic transmission leads to decreases in both hope for success and fear of failure. Unfortunately, none of these reported correlates of achievement motivation have been studied more systematically so far.

A more consistent picture emerged from research on achievement motivation and urine excretion. After observing in two previous studies that high implicit achievement motivation was associated with low-volume urine samples collected by research participants (McClelland et al., 1980; 1985; reported in McClelland, 1995), McClelland (1995) experimentally tested the notion that high levels of achievement motivation lead to low urine excretion. He found that participants' baseline implicit achievement motive predicted low urine sample volume after achievement arousal, but not in a neutral control condition. Moreover, in the arousal condition the achievement motive predicted better recall for achievement-related material on a memory test, and better recall was negatively correlated with urine-sample volume. McClelland (1995) attributed these effects to the release of the peptide hormone arginine-vasopressin (AVP), which promotes water retention in the body and episodic memory processes in the brain (cf. Beckwith, Petros, Bergloff, & Staebler, 1987; Stricker & Verbalis, 2002). However, the achievement motive/AVP hypothesis has not been tested directly yet.

5. Core motivational functions of implicit motives

Most theories of motivation agree that motivation *directs* behavior, in time and space, towards desired goals (incentives) and away from aversive "anti-goals" (disincentives) and that it *energizes* behavior directed at such outcomes (e.g., Carver & Scheier, 1998; Pfaff, 1999; Toates, 1986). Because the orientation of attention towards incentive cues and the selective learning of

cues, contexts, and behaviors that are associated with goal attainment are seen as specific, critical aspects of motivation by many theorists (e.g., Craig, 1918; Epstein, 1982; Lang, Bradley, & Cuthbert, 1997; Teitelbaum, 1966), McClelland (1987) has differentiated the directing function of motivation into an orienting function and a selecting function. Ultimately, the orienting, selecting, and energizing functions of motivation follow from the central feature of motivated behavior, namely, that it is aimed at hedonically charged goals (e.g., Berridge & Robinson, 2003; Bindra, 1978; Cabanac, 1979; Epstein, 1982; Toates, 1986). Epstein (1982) argued that behavior is only then truly motivated if there is a hedonic response (behavioral, autonomic, or endocrine) to goal attainment. Similarly, Berridge (2004) has proposed that it is hedonic pleasure experienced in commerce with an object that makes the object desirable, or wanted. Without this attribution of pleasure to an object (termed *incentive salience;* cf. Berridge & Robinson, 1998) the individual would not be motivated to approach it. In the following I will review the evidence for a role of implicit motives in hedonic responses to incentives, learning of cues, contexts, and behaviors associated with incentive attainment, orienting of attention toward incentive cues, and energization of behavior aimed at incentive attainment. Figure 3 provides an overview of how these functions of implicit motives act in concert.

5.1 Motives amplify affective responses to incentives

Atkinson (1957) has argued that a capacity to have a strong affective response to motive-specific incentives and disincentives is at the core of an implicit motive. In other words, motives act as *affect amplifiers*, making incentive attainment more rewarding, and encounters with disincentives more aversive. The reward- and punishment-augmenting effects of implicit motives have been documented most clearly in studies of affect and instrumental learning.

Evidence for an affect-amplifying function of implicit motives comes from studies of facial expressions, which in humans and other mammals represent a prime indicator of the hedonic impact of goal attainment (cf. Berridge, 2000). In humans, spontaneous smiles reflect a positive hedonic response, and frowns reflect a negative hedonic response, to a wide variety of

stimuli and situations (Cacioppo, Petty, Losch, & Kim, 1986; Dimberg, 1997), and there is evidence that facial hedonic responses to motive-specific stimuli are more pronounced in high-motive as compared to low-motive individuals. For instance, relative to individuals low in power motivation, power-motivated people frown more intensively when faced with a dominant-acting person, but do not show this expression when encountering a submissive-acting person (Fodor, Wick, & Hartsen, 2006). Individuals with a strong affiliation motive respond with smiling to friendly encounters with other people (McAdams, Jackson, & Kirshnit, 1984), but with frowns to an interaction partner who they expect to oppose their views (Schultheiss, 1996). Individuals with a weak affiliation motive do not show these responses to affiliation incentives and disincentives.

The affect-amplifying function of motives can also be observed at the level of endocrine responses. As previously described, power-motivated winners of a dominance contest show a post-contest increase in gonadal steroid hormones, which, through their actions on the brain, contribute to reinforcement, decreased anxiety, and increased aggression (Schultheiss, 2007; Schultheiss, Wirth, et al., 2005). Power-motivated losers, on the other hand, registered a contest-induced decrease in gonadal steroid levels. These effects were not observed in winners and losers low in power motivation.

Research on the implicit achievement motive shows that motives also influence the expectation of affective reward associated with incentive attainment, another critical feature of motivational processes (cf. Berridge, 2004; Dickinson & Balleine, 1994; Epstein, 1982). Halisch and Heckhausen (1989) and Brunstein and Maier (2005) observed that high-achievement individuals expect to get more pleasure out of mastering a challenging task, and less pleasure out of mastering an easy task, than low-achievement individuals do.

Finally, the affect-augmenting function of motives can also manifest itself in subjective feeling states under specific circumstances (see Schultheiss, Wirth, et al., 2005, for further discussion of the boundary conditions of this effect). McAdams and Constantian (1983) observed in an experience-sampling study that individuals high in implicit intimacy motivation, compared

to those low in this variable, experience more positive affect during interactions with others in their everyday lives. Brunstein, Schultheiss, and Grässmann (1998) and Schultheiss, Jones, Davis, and Kley (2007) found that success and failure in goal pursuits -- such as getting a good grade, finding a romantic partner, or spending more time with one's friends -- affect individuals' well-being only to the extent that such pursuits are backed up by strong implicit motives. Participants whose goals were supported by strong implicit motives experienced feelings of happiness and an absence of depressive symptoms when they had success in their goal pursuits, but suffered from impaired mood and depressive symptoms when they encountered setbacks and failure en route to their goals. For goals that were not supported by strong implicit motives, on the other hand, variations in goal progress were not directly related to emotional well-being and depressive symptoms.

5.2 Motives shape incentive-driven learning processes

Through their hedonic impact on the individual, rewards and punishments influence the learning, retention, and utilization of the stimuli and behaviors they were preceded by and the contexts in which they occurred. Therefore, implicit motives, in interaction with the encounter of motive-specific incentives and disincentives, should scale the degree to which individuals show evidence of (a) Pavlovian conditioning in response to incentive cues, (b) learning of behavior that is instrumental for incentive attainment (including inhibition of behavior that precedes an encounter with a disincentive), and (c) memory for the episodic context in which a (dis-) incentive occurs. Research supports a role of implicit motives in learning on all three accounts.

Pavlovian-conditioning mechanisms have been assumed to be at the core of implicit motives from the outset. McClelland et al (1953) theorized that the implicit achievement motive is aroused by cues that have become associated with, and thus predict, successful mastery of challenging tasks, similar to Ivan Pavlov's canine subjects whose appetite was aroused by the sound of a bell that predicted the arrival of food. Recent research shows that Pavlovian conditioning does in fact play a role in implicit motives. Stanton, Wirth, and Schultheiss (2006)

found that power-motivated individuals show attentional avoidance of salient abstract cues that have been conditioned to high-dominance facial expressions of emotion (joy, anger), a finding that parallels high-power individuals' attentional avoidance of high-dominance faces (Schultheiss & Hale, in press; see below). Although research on the role of implicit motives in Pavlovian conditioning is still in the early stages, these findings corroborate a central assumption of McClelland et al's (1953) account of motive arousal and are also consistent with research that shows Pavlovian conditioning to be at the core of many non-declarative emotional and motivational processes (e.g., LeDoux, 2002).

Evidence for a role of instrumental learning in implicit motives has grown substantially over the past couple of years. Using implicit-learning tasks developed by cognitive psychologists (e.g., Curran, 1997; Nissen & Bullemer, 1987), Schultheiss and colleagues (Schultheiss & Rohde, 2002; Schultheiss, Wirth, et al., 2005) found replicable evidence across several experimental studies that high-power individuals show superior performance on visuomotor sequences whose execution has become associated with winning a dominance contest, but impaired performance on sequences whose execution was followed by a defeat (cf. Figure 1).

In another line of research, Schultheiss, Pang et al (2005) have shown that the implicit needs for power and affiliation influence instrumental learning in response to nonverbal dominance and affiliation signals. For instance, relative to individuals low in power motivation, high-power individuals showed enhanced learning of a visuomotor sequence whose execution was "rewarded" by the presentation of an emotional expression signaling the sender's low dominance.

More recently, Pang (2006) has provided evidence that implicit instrumental learning can also be shaped by the implicit achievement motive. Both hope-for-success and fear-of-failure components of this motive predicted generally enhanced performance on visuomotor sequences participants had worked on during an achievement arousal phase of the experiment. Hope for success was a particularly good predictor of sequence execution when participants had received

intermittent positive or negative achievement feedback during the arousal phase, but not when feedback was given continuously.

Evidence for a role of implicit motives in episodic memory, including autobiographical memory, is strong. Research on the achievement motive uncovered early on that individuals high in achievement motivation have better recall of unfinished tasks than individuals low in achievement motivation, who in turn have better recall of completed tasks (Atkinson, 1953; Weiner, 1965; see also Kazen & Kuhl, 2005). Later, research on the relationship between the implicit needs for power and intimacy and autobiographical memory showed that power-motivated individuals were particularly likely to recall power-related peak experiences from their lives, whereas intimacy-motivated individuals had superior memory for intimacy-related peak experiences (McAdams, 1982; McAdams, Hoffmann, Mansfield, & Day, 1996). Similar findings emerged from research by Woike and colleagues, who studied the effects of agentic (achievement and power) and communal (affiliation and intimacy) motives on individuals' memory for agentic and communal episodes in their lives (Woike, 1994, 1995; Woike, Gershkovich, Piorkowski, & Polo, 1999; Woike & Polo, 2001). Across studies, participants high in agentic motivation recalled more agentic episodes and participants high in communal motivation recalled more communal episodes. Woike (1995) and Woike, Mcleod and Goggin (2003) further differentiated this motive-congruent memory effect by showing that it emerges only for emotional or specific, but not for non-emotional or generalized autobiographical memories.

Another approach that has been used to study motive effects on memory involves the presentation of stories featuring vivid motive-related episodes. Studies based on this paradigm indicate that high levels of a given motive, measured before story presentation, predict better recall of motive-congruent story elements (e.g., deCharms et al., 1955; McClelland, 1995; McClelland, Maddocks, & McAdams, 1985; see also McClelland, Scioli, & Weaver, 1998).

In summary, there is substantial evidence for a selecting function of implicit motives, and this selecting function is particularly strong in conjunction with emotionally arousing material,

that is, encounters with motive-specific incentives and disincentives. Thus, high levels of an implicit motive influence learning of cues that predict an emotionally charged motive-specific incentive or disincentive (Pavlovian conditioning), behaviors that result in incentive consummation or frustration (instrumental conditioning), and the unique spatial and temporal context in which the (dis-)incentive was encountered (episodic learning). From a neuropsychological perspective, an involvement of the amygdala in motives' selecting functions appears very likely, since this brain structure plays a key role in the processing of emotional stimuli, is critically involved in Pavlovian conditioning, and provides emotional modulation of learning in other memory systems, such as implicit learning (striatum) and episodic memory (hippocampus; cf. Cahill, 2000; Eichenbaum & Cohen, 2001; LeDoux, 2002).

5.3 Motives direct attention towards incentive cues

According to McClelland (1987), implicit motives make a person sensitive for cues that predict motive-specific incentives and disincentives. Such cues represent particularly salient stimuli that automatically attract the person's attention. Early evidence for an attention-directing function of implicit motives came from a study of the effects of affiliation motivation on signal detection (Atkinson & Walker, 1958). When presented with slides that depicted social (human faces) and non-social (furniture) information in random locations, at low illumination, and in quick succession, high-affiliation individuals were more likely than low-affiliation individuals to detect the faces. More recently, Schultheiss and Hale (in press) used a dot-probe task to assess effects of implicit motives on attentional orienting to facial expressions in two studies. They predicted that the power motive should influence attentional orienting to faces signaling low or high dominance and the affiliation motive should influence attentional orienting to faces signaling affiliation or rejection. In support of these predictions, they found that high-power individuals, compared to low-power individuals, oriented their attention towards surprised faces (low dominance), but away from happy or angry faces (both high dominance; cf. Hess, Blairy, & Kleck, 2000; Knutson, 1996). Individuals high in affiliation motivation, relative to those low in

this motive, oriented their attention towards happy faces, a highly affiliative signal, but also towards hostile anger faces, perhaps reflecting the heightened sensitivity for rejection signals observed in many earlier studies on affiliation motivation (cf. Boyatzis, 1973).

The studies by Atkinson and Walker (1958) and Schultheiss and Hale (in press) provide evidence for the alerting and orienting aspects of attention, respectively (cf. Posner, 1995). It remains an open question whether implicit motive modulation of attention can also be documented for the executive control of attention, that is, for individuals' ability to focus attention on one task and ignore interfering information (e.g., motivational incentive cues).

5.4 Motives energize behavior aimed at incentive attainment

After a motive has become aroused by the presence of cues signaling a possible encounter with an incentive or disincentive, behavior directed at attaining the incentive or avoiding the disincentive becomes highly energized, as reflected by the recruitment of physiological systems supporting behavioral engagement with the environment (e.g., sympathetic activation) and quicker onset as well as more effective (e.g., faster, more frequent, more forceful) execution of instrumental behavior (e.g., Ikemoto & Panksepp, 1999; McClelland, 1987; Wright & Brehm, 1989). Evidence for an energizing function has been obtained for all three major motives.

As already noted, high-achievement individuals were found to have higher muscle tone than low-achievement individuals, and this difference was particularly pronounced when participants were working on challenging tasks, compared to a rest condition (Mücher & Heckhausen, 1962). Another measure of sympathetic activation, galvanic skin response, is also increased in high-achievement individuals in anticipation of a challenge, indicating greater energization (Raphelson, 1957). Bäumler's (1975) previously mentioned finding that dopamine agonists increase, and antagonists decrease, achievement motivation expressed in the PSE suggests that this motivational need may engage the mesolimbic dopamine system, which is directly involved in response invigoration (Ikemoto & Panksepp, 1999).

Beyond these physiological indicators of an energizing function of the achievement motive, behavioral studies using simple measures of response speed, persistence, and performance output also strongly suggest that the achievement motive energizes behavior aimed at the mastery of challenges. In contrast to low-achievement individuals, high-achievement individuals show shorter response latencies on mental concentration tasks, particularly in response to negative feedback (Brunstein & Hoyer, 2002; Brunstein & Maier, 2005), persist longer on challenging anagram (Feather, 1966) and mental arithmetic tasks (Wendt, 1955), and solve more items on anagram (deCharms et al., 1955), arithmetic (Biernat, 1989; Schroth, 1987; Wendt, 1955) and digit-letter substitution tasks (French, 1958) in a fixed amount of time.

Similar to achievement-motivated individuals, people high in implicit power motivation also show signs of increased physiological preparedness for effort expenditure. In a study by Steele (1973; also described in McClelland, 1987), high-power individuals responded with increased physiological activation to power-arousing speeches, as reflected in strongly elevated urinary catecholamine metabolites after power arousal, compared to a neutral control condition and an achievement arousal condition. In another study, Steele (1977) found that power-arousing speeches also lead to greater subjective activation in high-power individuals as compared to low power-individuals or high-power individuals in a neutral-speech control condition. Similar results were reported by Schultheiss and Brunstein (1999), who found that power-motivated individuals felt more activated while playing a computer game that allowed them to ascend in a high-score list. This same study also provided evidence for power-motive-driven energization of performance: high-power individuals scored more points than low-power individuals, but only after their implicit power motive had been aroused properly (cf. section 3.2).

Finally, individuals high in affiliation motivation also show signs that they do more frequently or intensively whatever allows them to connect to other people in positive, friendly ways. Individuals high in intimacy motivation smile and laugh more and use more “we” references when interacting with others than individuals low in this motive (McAdams, Jackson,

& Kirshnit, 1984; McAdams & Powers, 1981). They are also more likely to think about their friends and relatives and to talk to them during the course of the day (Craig et al., 1994; McAdams & Constantian, 1983). Similar findings have also been obtained for the original measure of implicit affiliation motivation (Lansing & Heyns, 1959; McAdams & Constantian, 1983). If the incentives are right, a direct effect of affiliation motivation on energization as reflected in performance on a simple achievement task can also be observed: In two separate studies designed to examine the effects of achievement motivation on performance, high-affiliation participants unexpectedly performed particularly well on a challenging digit-letter substitution task (Atkinson & O'Connor, 1966; French, 1958). These findings have been explained by the fact that in both studies all participants were male and were supervised by a female experimenter (French, 1958; McClelland, 1987).

6. The bigger picture: Implicit motives in economy, society, and history

One of the most remarkable aspects of the implicit motive construct is the fact that it can be used to predict an incredibly broad array of phenomena, ranging from basic physiological processes (such as hormone release) to fundamental cognitive functions (such as attention and learning) to long-term trends in individuals' everyday experience and behavior. But implicit motive measures can be taken even further and used to describe and explain political, economic, societal, and historic processes. In the following, I will illustrate this with research on the role of achievement motivation in economic growth and the significance of power and affiliation motivation in war and peace. Further examples and details can be found in McClelland (1975, 1987) and Winter (1996).

6.1 Achievement motivation and economic growth

The first and perhaps most well-developed effort to link implicit motives to societal phenomena was made by McClelland (1961) in the book "The achieving society". Drawing on Max Weber's (1905) influential ideas on the contribution of the Protestant work ethic to the rise of capitalism, McClelland argued that a Protestant upbringing is more likely than a non-Protestant

upbringing to foster in children the independent mastery of challenges, thus sowing the seeds of a strong achievement motive. As adults, these children are more likely than others to engage in entrepreneurial activities and develop technological innovations, thereby contributing to a nation's economic wellfare. In support of these ideas, McClelland (1961) reported evidence that school children from Protestant families had higher achievement motive scores on the PSE than children from Catholic families. The previously described research on the effects of parental demands for independent mastery of age-appropriate tasks on children's achievement motivation is also consistent with the idea that Protestant values of independent accomplishment provide the matrix for the development of a strong need for achievement (cf. McClelland & Pilon, 1983; Rosen & D'Andrade, 1959; Winterbottom, 1958).

McClelland (1961) also provided evidence that high-achievement individuals are more likely to engage in small-business and innovative enterprises, a frequently replicated finding (e.g., Langens, 2001; McClelland, 1965; Singh & Gupta, 1977; Wainer & Rubin, 1969). To support his claim that a societal concern with independent achievement has a causal effect on economic growth, McClelland scored children's readers and school books from different nations for achievement imagery at two different times (1925 and 1950) and related the scores to concurrent and subsequent levels of national energy consumption as a measure of economic output. Across both assessments, McClelland found evidence that collective levels of achievement motivation were mostly independent of concurrent energy consumption, but positively predicted energy consumption increases in the subsequent 25-year time period. This suggests that high levels of endemic achievement motivation preceded, and perhaps caused, subsequent economic growth as a generation of children who had been reared to master challenges independently became adults and entered the workforce. Findings in support of McClelland's theory of achievement motivation and economic growth were also reported by others. deCharms and Moeller (1962) found that during a period from 1810 to 1950, increases of achievement imagery in US American children's readers strongly predicted increases in the US patent index, a measure of the nation's

technological innovation rate and positively related to economic growth, with a time lag of 20 years. Bradburn and Berlew (1961) compared achievement motive imagery assessed in samples from English literary works written between 1550 to 1800 with energy consumption in London (gains in coal imports) across the same time span and found that increases in energy consumption closely followed increases in collective achievement motivation with a time lag of 30 to 50 years.

McClelland and Winter (1971) put the theory of achievement motivation and economic growth to the test by selecting two Indian cities with similar initial levels of employment and then training small-business owners in one of them to think and behave like high-achievement individuals (e.g., set moderately challenging goals, take personal responsibility, seek feedback, write PSE stories with a high degree of achievement imagery). Two years after the training, employment in the city where the training had taken place had increased much more than in the "control" city, where no trainings had been conducted. However, the real test of the effectiveness of the achievement training came, quite unexpectedly, one year later, when an economic depression hit the country. Employment rates in both cities dropped, but they dropped more in the "control" city than in the "training" city. Three years after the depression, employment rates in the "training" city were on the rebound and actually exceeded pre-depression levels, whereas employment rates in the "control" city showed no sign of recovering. In combination with the previously described studies on energy consumption and patent index changes, McClelland and Winter's (1971) study thus provides considerable evidence for the validity of McClelland's (1961) model of achievement motivation and economic growth.

6.2 Power and affiliation, war and peace

Comparing the occurrence of war and peace in English and US American history with changes in power and affiliation motive levels assessed by coding popular books, plays, and songs from both countries and across different historic periods, McClelland (1975) observed the following dynamic relationship between motivational variables and the a country's belligerence versus peacefulness:

Stage 1: High levels of both affiliation and power precede the passing of social reforms, leading to a drop in collective affiliation motivation due to satisfaction of this need.

Stage 2: Power motivation continues to be high, but affiliation motivation is low; the nation becomes more aggressive and wages war against other countries.

Stage 3: As a consequence of the satisfaction of power needs through war, collective levels of power motivation drop, and in response to the threat caused by war, collective levels affiliation motivation rise, triggering a period of peace. Power motivation levels subsequently rebound, thus bringing the pattern full-circle back to stage 1.

Winter (1993) confirmed several key features of this model providing three different lines of evidence. For a time span from 1603 to 1988 in British history, he compared motive patterns scored from the Sovereign's Speeches, written by members of the government and presented by the King or Queen of England at the beginning of each session of the Parliament, in years in which Britain went to war with motive patterns in years in which Britain did not go to war. In each case Winter also looked at motive patterns one to five years before the crucial comparison year. He found that, as predicted by the McClelland model, a clear predominance of power motivation over affiliation motivation preceded Britain's entry into war with a lead time of one year. Conversely, power motive levels in the Sovereign's Speech were significantly lower in years in which Britain ended a war than in years in which it was at war and did not end the war. Power motive levels also tended to decline further for a couple of years after a war ended.

In a second study, Winter (1993) analyzed motive patterns in British and German government-to-government communications before the outbreak of World War I. In the early phase of the crisis triggered by the assassination of Archduke Franz Ferdinand in Sarajevo, both governments used significantly more affiliation imagery than power imagery in their communications. However, this pattern reversed in the late phase of the crisis, with power imagery outweighing affiliation imagery, and the outcome of the escalation was the beginning of World War I.

In a third study, Winter (1993) demonstrated that a reduction in power motivation can also lead to a peaceful outcome of a crisis. Coding the government-to-government communications exchanged by the Kennedy administration and the Khrushchev politburo during the Cuban missile crisis in 1962 for motive imagery, Winter observed that the dialogue between the governments of the USA and the USSR was initially characterized by a clear predominance of power motive imagery. However, in the late stage of the crisis, communications became more saturated with affiliation imagery and power imagery decreased. The outcome of this shift from a concern with having impact on the other party to having friendly relationships with it was a peaceful resolution of the crisis.

In later studies, Winter (e.g., Langner & Winter, 2001) not only replicated the basic finding that a relative preponderance of power motivation over affiliation motivation in the communications between conflict parties precedes the beginning of an armed conflict. He also demonstrated in archival analyses of real crises and in laboratory studies of conflict behavior that one side's power motivation fuels the conflict through the endorsement of negative concessions (i.e., opposing the other side's concessions and suggestions for conflict solution; taking unilateral assertive action), thus escalating the conflict. In contrast, if one party is high in affiliation motivation, it is more likely to make positive concessions during negotiations (e.g., suggesting ways to facilitate dialogue and conflict resolution; accepting the other side's concessions), thus helping to de-escalate the conflict.

One might wonder what motivational imagery scored from political documents or the popular literature actually represents. Is there any methodological or conceptual continuity with the implicit motives measured with the PSE in individuals? Methodologically, the same coding systems that have been developed for and used with the PSE can be used, without substantial modifications, with any other text document based on verbal or written language (e.g., McClelland, 1961, 1975; Winter, 1991). Thus, although the scored texts may originate from different intentions and contexts (writing imaginative stories in the case of the PSE;

communicating with audiences or adversaries in the case of political texts; expressing current concerns, needs, and conflicts within a given culture and historic time in the case of popular literature), the same types of images that are coded in research participants' PSEs are also scored from political documents and popular literature. Commenting on the issue of conceptual continuity, McClelland (1987) argued that the behavioral correlates of motives measured at the collective level (e.g., from the popular literature) closely resemble those of motives assessed in the individual. For instance, much as individuals with a strong achievement motive are likely to be successful in business, societies with high collective achievement motivation levels tend to thrive economically. Similarly, individuals with a strong power motive tend to be assertive, and political entities and societies with high power motivation levels behave more assertively in the international arena, too. According to McClelland, this suggests that collective motive levels represent to some extent the average motive levels of the individuals living in a particular society at a given historic time and supports the idea that there is continuity in the construct validity of motives measured at the individual and at the collective level.

7. Conclusion

The study of implicit motives remains an active field of research in personality psychology. In recent years, interdisciplinary approaches to motive research have brought new discoveries and enhanced rigor to the field. This re-invigoration is in part due to methodological and conceptual advances in other disciplines and increased cross-talk between scientific disciplines. For instance, methods developed and fine-honed by cognitive psychologists and endocrinologists are now used to study the effects of motives on attention, implicit learning, episodic memory, and hormone changes. Advances in functional neuroimaging now even allow researchers to explore how implicit motives are "embrained" (Schultheiss, Wirth, Waugh, Stanton, Meier, & Reuter-Lorenz, 2007). Today, dissociations between conscious and nonconscious forms of goal striving can be better understood conceptually on the basis of sophisticated models of

information processing and learning (e.g., Paivio, 1986; Schultheiss, in press) and the interplay of brain systems in the generation and regulation of behavior (e.g., Rolls, 1999).

Another reason for the continuing interest in implicit motives may lie in this field's emphasis on the observation and measurement of actual behavioral phenomena rather than on self-report measures of personality and behavior. As personality psychology, and psychology in general, has grown more aware of the limits of humans' introspective access to the real causes of their behavior (e.g., Gazzaniga, 1984; Kagan, 1994, 2002; Wilson, 2002), many researchers now strive to develop measures that tap into the nonconscious reaches of the human mind. The rapidly growing number of personality measures based on the Implicit Association Test is testament to this development. From the very start more than 50 years ago, research on implicit motives was based *exactly* on the premise that humans lack direct insight into many important well-springs of their behavior (McClelland, 1984) and that therefore both the motivational needs that drive behavior as well as the effects of these dispositions on behavior need to be assessed with indirect methods (which, ironically, are often more direct than asking people what they *believe* they are doing, or what they believe causes their behavior). For a long time, this insistence on non-declarative measurement of personality and motivation made implicit motive research the "odd one out" in personality psychology (cf. McClelland, 1996). But implicit motive researchers have used this relative separation from the mainstream of personality psychology to advance conceptual and empirical work on motives (cf. McClelland et al., 1989), to connect to other disciplines (e.g., endocrinology, immunology; cf. McClelland, 1989), and to build a strong case for the validity of implicit motives. As a consequence, the implicit motive construct today offers a well-developed, far-reaching, and fascinating approach for scholars who are interested in using methods not relying on self-reports to study personality, motivation, and behavior.

References

Andrews, J. D. W. (1967). The achievement motive and advancement in two types of organization. *Journal of Personality and Social Psychology, 6*, 163-168.

Atkinson, J. W. (1953). The achievement motive and recall of interrupted and completed tasks. *Journal of Experimental Psychology, 46*, 381-390.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review, 64*, 359-372.

Atkinson, J. W. (1981). Studying personality in the context of an advanced motivational psychology. *American Psychologist, 36*, 117-128.

Atkinson, J. W., Heyns, R. W., & Veroff, J. (1958). The effect of experimental arousal of the affiliation motive on thematic apperception. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society: A method of assessment and study* (pp. 95-104). Princeton NJ: Van Nostrand.

Atkinson, J. W., & Litwin, G. H. (1960). Achievement motive and test anxiety conceived as motive to approach success and motive to avoid failure. *Journal of Abnormal and Social Psychology, 60*, 52-63.

Atkinson, J. W., & McClelland, D. C. (1948). The effects of different intensities of the hunger drive on thematic apperception. *Journal of Experimental Psychology, 28*, 643-658.

Atkinson, J. W., & O'Connor, P. (1966). Neglected factors in studies of achievement-oriented performance: Social approval as an incentive and performance decrement. In J. W. Atkinson & N. T. Feather (Eds.), *A theory of achievement motivation* (pp. 299-326). New York: Wiley.

Atkinson, J. W., & Walker, E. L. (1958). The affiliation motive and perceptual sensitivity to faces. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society: A method of assessment and study* (pp. 360-366). Princeton NJ: Van Nostrand.

Baumann, N., Kaschel, R., & Kuhl, J. (2005). Striving for unwanted goals: Stress-dependent discrepancies between explicit and implicit achievement motives reduce subjective well-being and increase psychosomatic symptoms. *Journal of Personality and Social Psychology, 89*, 781-799.

Bäumler, G. (1975). Beeinflussung der Leistungsmotivation durch Psychopharmaka: I. Die 4 bildthematischen Hauptvariablen [The effects of psychoactive drugs on achievement motivation: I. The four motivation scales]. *Zeitschrift für experimentelle und angewandte Psychologie, 22*, 1-14.

Beckwith, B. E., Petros, T. V., Bergloff, P. J., & Staebler, R. J. (1987). Vasopressin analogue (DDAVP) facilitates recall of narrative prose. *Behavioral Neuroscience, 101*(3), 429-432.

Berridge, K. C. (2000). Measuring hedonic impact in animals and infants: microstructure of affective taste reactivity patterns. *Neuroscience and Biobehavioral Reviews, 24*(2), 173-198.

Berridge, K. C. (2004). Motivation concepts in behavioral neuroscience. *Physiology and Behavior, 81*(2), 179-209.

Berridge, K. C., & Robinson, T. E. (1998). What is the role of dopamine in reward: hedonic impact, reward learning, or incentive salience? *Brain Research Reviews, 28*(3), 309-369.

Berridge, K. C., & Robinson, T. E. (2003). Parsing reward. *Trends Neurosci, 26*(9), 507-513.

Biernat, M. (1989). Motives and values to achieve: Different constructs with different effects. *Journal of Personality, 57*, 69-95.

Bindra, D. (1978). How adaptive behavior is produced: a perceptual-motivational alternative to response-reinforcement. *Behavioral and Brain Sciences, 1*, 41-91.

Blankenship, V., Vega, C. M., Ramos, E., Romero, K., Warren, K., Keenan, K., et al. (2006). Using the Multifaceted Rasch Model to Improve the TAT/PSE Measure of Need for Achievement. *Journal of Personality Assessment, 86*(1), 100-114.

Blankenship, V., & Zoota, A. L. (1998). Comparing power imagery in TATs written by hand or on the computer. *Behavior Research Methods, Instruments, & Computers, 30*, 441-448.

Boesch-Achermann, H., & Boesch, C. (1993). Tool use in wild chimpanzees: New light from dark forests. *Current Directions in Psychological Science, 2*, 18-21.

Bornstein, R. F. (2002). A process dissociation approach to objective–projective test score interrelationships. *Journal of Personality Assessment, 78*, 47–68.

Boyatzis, R. E. (1973). Affiliation motivation. In D. C. McClelland & R. S. Steele (Eds.), *Human motivation -- a book of readings* (pp. 252-276). Morristown, NJ: General Learning Corporation.

Bradburn, N. M., & Berlew, D. E. (1961). Need for achievement and English industrial growth. *Economic Development and Cultural Change, 10*, 8-20.

Brunstein, J. C. (2001). Persönliche Ziele und Handlungs- versus Lageorientierung: Wer bindet sich an realistische und bedürfniskongruente Ziele? [Personal Goals and Action Versus State Orientation: Who Builds a Commitment to Realistic and Need-Congruent Goals?]. *Zeitschrift für Differentielle und Diagnostische Psychologie, 22*, 1-12.

Brunstein, J. C., & Hoyer, S. (2002). Implizites und explizites Leistungsstreben: Befunde zur Unabhängigkeit zweier Motivationssysteme [Implicit versus explicit achievement

strivings: Empirical evidence of the independence of two motivational systems]. *Zeitschrift für Pädagogische Psychologie, 16*, 51-62.

Brunstein, J. C., & Maier, G. W. (2005). Implicit and self-attributed motives to achieve: two separate but interacting needs. *Journal of Personality and Social Psychology, 89*(2), 205-222.

Brunstein, J. C., & Schmitt, C. H. (2004). Assessing individual differences in achievement motivation with the Implicit Association Test. *Journal of Research in Personality, 38*(6), 536-555.

Brunstein, J. C., Schultheiss, O. C., & Grässmann, R. (1998). Personal goals and emotional well-being: The moderating role of motive dispositions. *Journal of Personality and Social Psychology, 75*(2), 494-508.

Bucci, W. (1984). Linking words and things: Basic processes and individual variation. *Cognition, 17*, 137-153.

Bucci, W. (1985). Dual coding: A cognitive model for psychoanalytic research. *Journal of the American Psychoanalytic Association, 33*, 571-607.

Bucci, W. (1997). *Psychoanalysis and cognitive science: A multiple code theory*. New York: Guilford.

Burdick, H. A., & Burnes, A. J. (1958). A test of "strain toward symmetry" theories. *Journal of Abnormal and Social Psychology, 57*, 367-370.

Byrne, D. (1961). Interpersonal attraction as a function of affiliation need and attitude similarity. *Human Relations, 14*, 283-289.

Byrne, D. (1962). Response to attitude similarity-dissimilarity as a function of affiliation need. *Journal of Personality, 30*, 164-177.

Cabanac, M. (1979). Sensory pleasure. *Quarterly Review of Biology, 54*(1), 1-29.

Cacioppo, J. T., Petty, R. E., Losch, M. E., & Kim, H. S. (1986). Electromyographic activity over facial muscle regions can differentiate the valence and intensity of affective reactions. *Journal of Personality and Social Psychology, 50*(2), 260-268.

Cahill, L. (2000). Modulation of long-term memory in humans by emotional arousal: adrenergic activation and the amygdala. In J. P. Aggleton (Ed.), *The amygdala. A functional analysis* (pp. 425-446). New York: Oxford University Press.

Cantor, N., & Blanton, H. (1996). Effortful pursuit of personal goals in daily life. In J. A. Bargh & P. M. Gollwitzer (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 338-359). New York: Guilford.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.

Clark, R. A. (1952). The projective measurement of experimentally induced levels of sexual motivation. *Journal of Experimental Psychology, 44*, 391-399.

Craig, J. A., Koestner, R., & Zuroff, D. C. (1994). Implicit and self-attributed intimacy motivation. *Journal of Social and Personal Relationships, 11*, 491-507.

Craig, W. (1918). Appetites and aversions as constituents of instincts. *Biological Bulletin of Woods Hole, 34*, 91-107.

Curran, T. (1997). Higher-order associative learning in amnesia: Evidence from the serial reaction time task. *Journal of Cognitive Neuroscience, 9*, 522-533.

Dabbs, J. M., Hopper, C. H., & Jurkovic, G. J. (1990). Testosterone and personality among college students and military veterans. *Personality and Individual Differences, 11*, 1263-1269.

Dabbs, J. M., Ruback, R. B., Frady, R. L., Hopper, C. H., & Sgoutas, D. S. (1988). Saliva testosterone and criminal violence among women. *Personality and Individual Differences, 9*, 269-275.

de Waal, F. B. (1998). *Chimpanzee politics: Power and sex among apes* (rev. ed.). Baltimore, MD: Johns Hopkins University Press.

deCharms, R., & Moeller, G. H. (1962). Values expressed in American children's readers. *Journal of Abnormal and Social Psychology, 64*, 136-142.

deCharms, R., Morrison, H. W., Reitman, W., & McClelland, D. C. (1955). Behavioral correlates of directly and indirectly measured achievement motivation. In D. C. McClelland (Ed.), *Studies in motivation* (pp. 414-423). New York: Appleton-Century-Crofts.

Dickinson, A., & Balleine, B. (1994). Motivational control of goal-directed action. *Animal Learning & Behavior, 22*, 1-18.

Dimberg, U. (1997). Psychophysiological reactions to facial expressions. In U. Segerstrale & P. Molnar (Eds.), *Nonverbal communication: Where nature meets culture* (pp. 47-60). Mahwah, NJ: Lawrence Erlbaum Associates.

Duncker, D. J., Haitsma, D. B., van der Geest, I. E., Stubenitsky, R., van Meegen, J. R., Man in't Veld, A. J., et al. (1997). Systemic, pulmonary and coronary haemodynamic actions of the novel dopamine receptor agonist in awake pigs at rest and during treadmill exercise Z1046. *Br J Pharmacol, 120*(6), 1101-1113.

Dutton, D. G., & Strachan, C. E. (1987). Motivational needs for power and spouse-specific assertiveness in assaultive and nonassaultive men. *Violence and Victims, 2*(3), 145-156.

Eichenbaum, H., & Cohen, N. J. (2001). *From conditioning to conscious recollection: Memory systems of the brain*. New York: Oxford University Press.

Eisenberger, R., & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *American Psychologist, 51*, 1153-1166.

Elliot, A. J., & Thrash, T. M. (2004). The intergenerational transmission of fear of failure. *Personality and Social Psychology Bulletin, 30*(8), 957-971.

Epstein, A. N. (1982). The physiology of thirst. In D. W. Pfaff (Ed.), *Physiological mechanisms of motivation* (pp. 25-55). New York: Springer.

Exline, R. V. (1963). Explorations in the process of person perception: Visual interaction in relation to competition, sex, and need for affiliation. *Journal of Personality, 31*, 1-20.

Feather, N. T. (1966). The relationship of persistence at a task to expectation of success and achievement-related motives. In J. W. Atkinson & N. T. Feather (Eds.), *A theory of achievement motivation* (pp. 117-133). New York: Wiley.

Feshbach, S. (1955). The drive-reducing function of fantasy behavior. *Journal of Abnormal and Social Psychology, 50*, 3-11.

Fodor, E. M. (1985). The power motive, group conflict, and physiological arousal. *Journal of Personality and Social Psychology, 49*, 1408-1415.

Fodor, E. M., & Farrow, D. L. (1979). The power motive as an influence on use of power. *Journal of Personality and Social Psychology, 37*(11), 2091-2097.

Fodor, E. M., & Smith, T. (1982). The power motive as an influence on group decision making. *Journal of Personality and Social Psychology, 42*, 178-185.

Fodor, E. M., Wick, D. P., & Hartsen, K. M. (2006). The power motive and affective response to assertiveness. *Journal of Research in Personality, 40*, 598-610.

Fontana, A. F., Rosenberg, R. L., Marcus, J. L., & Kerns, R. D. (1987). Type A behavior pattern, inhibited power motivation, and activity inhibition. *Journal of Personality and Social Psychology, 52*, 177-183.

French, E. G. (1958). Some characteristics of achievement motivation. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society* (pp. 270-277). Princeton, NJ: Van Nostrand.

Gump, B. B., & Kulik, J. A. (1997). Stress, affiliation, and emotional contagion. *Journal of Personality and Social Psychology, 72*(2), 305-319.

Halisch, F., & Heckhausen, H. (1989). Motive-dependent versus ability-dependent valence functions for success and failure. In F. Halisch, J. H. L. van den Bercken & S. Hazlett (Eds.), *International perspectives on achievement and task motivation* (pp. 51-67). Amsterdam (Netherlands): Swets & Zeitlinger.

Hardy, K. R. (1957). Determinants of conformity and attitude change. *Journal of Abnormal and Social Psychology, 54*, 289-294.

Heckhausen, H. (1963). *Hoffnung und Furcht in der Leistungsmotivation [Hope and fear components of achievement motivation]*. Meisenheim am Glan: Anton Hain.

Heckhausen, H., & Heckhausen, J. (in press). *Motivation and action* (2 ed.). New York: Cambridge University Press.

Hermann, M. G. (1980). Assessing the personalities of Soviet Politburo members. *Personality and Social Psychology Bulletin, 6*, 332-352.

Hess, U., Blairy, S., & Kleck, R. E. (2000). The influence of facial emotion displays, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior, 24*, 265-283.

Hofer, J., & Chasiotis, A. (2004). Methodological Considerations of Applying a TAT-Type Picture-Story Test in Cross-Cultural Research: A Comparison of German and Zambian Adolescents. *Journal of Cross-Cultural Psychology, 35*(2), 224-241.

Horner, M. S. (1972). Toward an understanding of achievement-related conflicts in women. *Journal of Social Issues, 28*, 157-175.

Ikemoto, S., & Panksepp, J. (1999). The role of nucleus accumbens dopamine in motivated behavior: a unifying interpretation with special reference to reward-seeking. *Brain Research Reviews, 31*(1), 6-41.

Insel, T. R., & Young, L. J. (2001). The neurobiology of attachment. *Nature Reviews: Neuroscience, 2*(2), 129-136.

Jacobs, R. L., & McClelland, D. C. (1994). Moving up the corporate ladder: A longitudinal study of the leadership motive pattern and managerial success in women and men. *Consulting Psychology Journal Practice and Research, 46*, 32-41.

Jemmott, J. B. (1987). Social motives and susceptibility to disease: Stalking individual differences in health risks. *Journal of Personality, 55*, 267-298.

Jemmott, J. B., Borysenko, J. Z., Borysenko, M., McClelland, D. C., Chapman, R., Meyer, D., et al. (1983). Academic stress, power motivation, and decrease in secretion rate of salivary secretory immunoglobulin A. *Lancet, 8339*, 1400-1402.

Jemmott, J. B., Hellman, C., McClelland, D. C., Locke, S. E., Kraus, L., Williams, R. M., et al. (1990). Motivational syndromes associated with natural killer cell activity. *Journal of Behavioral Medicine, 13*, 53-73.

Johnston, R. A. (1957). A methodological analysis of several revised forms of the Iowa Picture Interpretation Test. *Journal of Personality, 25*, 283-293.

Kagan, J. (1994). *Galen's prophecy*. New York: Westview Press.

Kagan, J. (2002). *Surprise, uncertainty, and mental structures*. Cambridge, MA: Harvard University Press.

Karabenick, S. A. (1977). Fear of success, achievement and affiliation dispositions, and the performance of men and women under individual and competitive conditions. *Journal of Personality, 45*, 117-149.

Kazen, M., & Kuhl, J. (2005). Intention memory and achievement motivation: Volitional facilitation and inhibition as a function of affective contents of need-related stimuli. *Journal of Personality and Social Psychology, 89*(3), 426-448.

King, L. A. (1995). Wishes, motives, goals, and personal memories: Relations of measures of human motivation. *Journal of Personality, 63*, 985-1007.

Klinger, E. (1967). Modeling effects on achievement imagery. *Journal of Personality and Social Psychology, 7*, 49-62.

Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behavior, 20*, 165-182.

Koestner, R., & McClelland, D. C. (1992). The affiliation motive. In C. P. Smith (Ed.), *Motivation and personality: Handbook of thematic content analysis* (pp. 205-210). New York: Cambridge University Press.

Koestner, R., Weinberger, J., & McClelland, D. C. (1991). Task-intrinsic and social-extrinsic sources of arousal for motives assessed in fantasy and self-report. *Journal of Personality, 59*, 57-82.

Kornadt, H.-J. (1987). The aggression motive and personality development: Japan and Germany. In F. Halisch & J. Kuhl (Eds.), *Motivation, intention and volition* (pp. 115-140). Berlin: Springer.

Kuhl, J., Scheffer, D., & Eichstaedt, J. (2003). Der Operante Motiv-Test (OMT): Ein neuer Ansatz zur Messung impliziter Motive [The Operant Motive Test (OMT): A new approach to implicit motive assessment]. In F. Rheinberg & J. Stiensmeier-Pelster (Eds.), *Diagnostik von Motivation und Selbstkonzept* (pp. 129-150). Göttingen (Germany): Hogrefe.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1997). Motivated attention: Affect, activation, and action. In P. J. Lang, R. F. Simons & M. T. Balaban (Eds.), *Attention and orienting: Sensory and motivational processes* (pp. 97-135). Mahwah, NJ: Lawrence Erlbaum Associates.

Langens, T. A. (2001). Predicting behavior change in indian businessmen from a combination of need for achievement and self-discrepancy. *Journal of Research in Personality, 35*, 1-14.

Langner, C. A., & Winter, D. G. (2001). The motivational basis of concessions and compromise: Archival and laboratory studies. *Journal of Personality and Social Psychology, 81*, 711-727.

Lansing, J. B., & Heyns, R. W. (1959). Need affiliation and frequency of four types of communication. *Journal of Abnormal and Social Psychology, 58*, 365-372.

LeDoux, J. E. (2002). *The synaptic self*. New York, NY: Viking.

Litwin, G. H., & Siebrecht, A. (1967). Integrators and entrepreneurs; their motivation and effect on management. *Hosp Prog, 48*(9), 67-71.

Lundy, A., & Potts, T. (1987). Recollection of a transitional object and needs for intimacy and affiliation in adolescents. *Psychological Reports, 60*, 767-773.

Maddi, S. R., Propst, B. S., & Feldinger, I. (1965). Three expressions of the need for variety. *Journal of Personality, 33*, 82-98.

McAdams, D. P. (1982). Experiences of intimacy and power: Relationships between social motives and autobiographical memory. *Journal of Personality and Social Psychology, 42*, 292-302.

McAdams, D. P. (1992). The intimacy motive. In C. P. Smith (Ed.), *Motivation and personality: Handbook of thematic content analysis* (pp. 224-228). New York: Cambridge University Press.

McAdams, D. P., & Constantian, C. A. (1983). Intimacy and affiliation motives in daily living: An experience sampling analysis. *Journal of Personality and Social Psychology, 45*, 851-861.

McAdams, D. P., Hoffmann, B. J., Mansfield, E. D., & Day, R. (1996). Themes of agency and communion in significant autobiographical scenes. *Journal of Personality, 64*, 339-377.

McAdams, D. P., Jackson, J., & Kirshnit, C. (1984). Looking, laughing, and smiling in dyads as a function of intimacy motivation and reciprocity. *Journal of Personality, 52*, 261-273.

McAdams, D. P., Lester, R. M., Brand, P. A., McNamara, W. J., & Lensky, D. B. (1988). Sex and the TAT: Are women more intimate than men? Do men fear intimacy? *Journal of Personality Assessment, 52*, 397-409.

McAdams, D. P., & Powers, J. (1981). Themes of intimacy in behavior and thought. *Journal of Personality and Social Psychology, 40*, 573-587.

McAdams, D. P., & Vaillant, G. E. (1982). Intimacy motivation and psychosocial adjustment: A longitudinal study. *Journal of Personality Assessment, 46*, 586-593.

McClelland, D. C. (1961). *The achieving society*. New York: Free Press.

McClelland, D. C. (1965). N Achievement and entrepreneurship: A longitudinal study. *Journal of Personality and Social Psychology, 1*, 389-392.

McClelland, D. C. (1975). *Power: The inner experience*. New York: Irvington Publishers.

McClelland, D. C. (1979). Inhibited power motivation and high blood pressure in men. *Journal of Abnormal Psychology, 88,* 182-190.

McClelland, D. C. (1980). Motive dispositions. The merits of operant and respondent measures. In L. Wheeler (Ed.), *Review of personality and social psychology* (Vol. 1, pp. 10-41). Beverly Hills, CA: Sage.

McClelland, D. C. (1982). The need for power, sympathetic activation, and illness. *Motivation and Emotion, 6*, 31-41.

McClelland, D. C. (1984). *Motives, personality, and society. Selected papers*. New York: Praeger.

McClelland, D. C. (1987). *Human motivation*. New York: Cambridge University Press.

McClelland, D. C. (1989). Motivational factors in health and disease. *American Psychologist, 44*, 675-683.

McClelland, D. C. (1995). Achievement motivation in relation to achievement-related recall, performance, and urine flow, a marker associated with release of vasopressin. *Motivation and Emotion, 19*, 59-76.

McClelland, D. C. (1996). Does the field of personality have a future? *Journal of Research in Personality, 30*, 429-434.

McClelland, D. C., Alexander, C., & Marks, E. (1982). The need for power, stress, immune function, and illness among male prisoners. *Journal of Abnormal Psychology, 91*, 61-70.

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). *The achievement motive*. New York: Appleton-Century-Crofts.

McClelland, D. C., & Boyatzis, R. E. (1982). Leadership motive pattern and long-term success in management. *Journal of Applied Psychology, 67*, 737-743.

McClelland, D. C., Brown, D., Patel, V., & Kelner, S. P. (1988). *Affiliation motivation and eating behavior in adult insulin dependent diabetics.* Unpublished manuscript, Boston University, Department of Psychology, Boston, MA.

McClelland, D. C., & Burnham, D. H. (1976). Power is the great motivator. *Harvard Business Review, 54*, 100-110.

McClelland, D. C., Davidson, R. J., & Saron, C. (1985). Stressed power motivation, sympathetic activation, immune function, and illness. *Advances, 2*, 42-52.

McClelland, D. C., Davis, W. N., Kalin, R., & Wanner, E. (1972). *The drinking man*. New York: Free Press.

McClelland, D. C., Floor, E., Davidson, R. J., & Saron, C. (1980). Stressed power motivation, sympathetic activation, immune function, and illness. *Journal of Human Stress, 6*, 11-19.

McClelland, D. C., & Franz, C. E. (1992). Motivational and other sources of work accomplishments in mid-life: A longitudinal study. *Journal of Personality, 60*, 679-707.

McClelland, D. C., & Jemmott, J. B. (1980). Power motivation, stress and physical illness. *Journal of Human Stress, 6*, 6-15.

McClelland, D. C., & Kirshnit, C. (1988). The effect of motivational arousal through films on salivary immunoglobulin A. *Psychology and Health, 2*, 31-52.

McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review, 96*, 690-702.

McClelland, D. C., Maddocks, J. A., & McAdams, D. P. (1985). The need for power, brain norepinephrine turnover, and memory. *Motivation and Emotion, 9*, 1-9.

McClelland, D. C., Patel, V., Stier, D., & Brown, D. (1987). The relationship of affiliative arousal to dopamine release. *Motivation and Emotion, 11*, 51-66.

McClelland, D. C., & Pilon, D. A. (1983). Sources of adult motives in patterns of parent behavior in early childhood. *Journal of Personality and Social Psychology, 44*, 564-574.

McClelland, D. C., Ross, G., & Patel, V. (1985). The effect of an academic examination on salivary norepinephrine and immunoglobulin levels. *Journal of Human Stress, 11*, 52-59.

McClelland, D. C., Scioli, A., & Weaver, S. (1998). The effect of implicit and explicit motivation on recall among old and young adults. *International Journal of Aging & Human Development, 46*, 1-20.

McClelland, D. C., & Teague, G. (1975). Predicting risk preferences among power related tasks. *Journal of Personality, 43*, 266-285.

McClelland, D. C., & Watson, R. I. (1973). Power motivation and risk-taking behavior. *Journal of Personality, 41*, 121-139.

McClelland, D. C., & Winter, D. G. (1971). *Motivating economic achievement: Accelerating economic development through psychological training*. New York: Free Press.

Monaghan, E. P., & Glickman, S. E. (1992). Hormones and aggressive behavior. In J. B. Becker, S. M. Breedlove & D. Crews (Eds.), *Behavioral endocrinology* (pp. 261-285). Cambridge MA: MIT Press.

Mücher, H. P., & Heckhausen, H. (1962). Influence of mental activity and achievement motivation on skeletal muscle tonus. *Percept Mot Skills, 14*, 217-218.

Mueller, E. F., & Beimann, M. (1969). Die Beziehung der Harnsäure zu Testwerten der nach Heckhausen gemessenen Leistungsmotivation [Relationship between uric acid and Heckhausen's measure of achievement motivation]. *Zeitschrift für Experimentelle und Angewandte Psychologie, 16*(2), 295-306.

Mueller, E. F., Kasl, S. V., Brooks, G. W., & Cobb, S. (1970). Psychosocial correlates of serum urate levels. *Psychological Bulletin, 73*(4), 238-257.

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84*, 231-259.

Nissen, M. J., & Bullemer, P. (1987). Attentional requirements of learning: Evidence from performance measures. *Cognitive Psychology, 19*, 1-32.

Paivio, A. (1986). *Mental representations. A dual coding approach*. New York: Oxford University Press.

Pang, J. S. (2006). *Hope of success and fear of failure.* Unpublished Dissertation, University of Michigan, Ann Arbor.

Pang, J. S., & Schultheiss, O. C. (2005). Assessing implicit motives in U.S. College students: Effects of picture type and position, gender and ethnicity, and cross-cultural comparisons. *Journal of Personality Assessment, 85*(3), 280-294.

Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. New York, NY: Oxford University Press.

Peterson, B. E., & Stewart, A. J. (1993). Generativity and social motives in young adults. *Journal of Personality and Social Psychology, 65*, 186-198.

Peterson, B. E., & Stewart, A. J. (1996). Antecedents and contexts of generativity motivation at midlife. *Psychology and Aging, 11*, 21-33.

Pfaff, D. W. (1999). *Drive: Neurobiological and Molecular Mechanisms of Sexual Motivation*. Cambridge, MA: MIT Press.

Posner, M. I. (1995). Attention in cognitive neuroscience: An overview. In M. S. Gazzaniga (Ed.), *The cognitive neurosciences* (pp. 615-624). Cambridge, MA: Bradford/MIT Press.

Raphelson, A. C. (1957). The relationships among imaginative, direct verbal, and physiological measures of anxiety in an achievement situation. *Journal of Abnormal and Social Psychology, 54*, 13-18.

Reuman, D. A. (1982). Ipsative behavioral variability and the quality of thematic apperceptive measurement of the achievement motive. *Journal of Personality and Social Psychology, 43*(5), 1098-1110.

Ridgeway, C. L. (1987). Nonverbal behavior, dominance, and the basis of status in task groups. *American Sociological Review, 52*, 683-694.

Rolls, E. T. (1999). *The brain and emotion*. Oxford (GB): Oxford University Press.

Rosen, B. C., & D'Andrade, R. (1959). The psychological origins of the achievement motive. *Sociometry, 22*, 185-218.

Sapolsky, R. M. (1987). Stress, social status, and reproductive physiology in free-living baboons. In D. Crews (Ed.), *Psychobiology and reproductive behavior: An evolutionary perspective* (pp. 291-322). Englewood Cliffs, NJ: Prentice-Hall.

Schachter, S. (1959). *The psychology of affiliation*. Stanford, CA: Stanford University Press.

Schroth, M. L. (1985). The effect of differing measuring methods on the relationship of motives. *Journal of Psychology, 119*, 213-218.

Schroth, M. L. (1987). Relationships between achievement-related motives, extrinsic conditions, and task performance. *Journal of Social Psychology, 127*, 39-48.

Schultheiss, O. (1996). *Imagination, Motivation und Verhalten [Imagination, motivation, and behavior]*. Unpublished dissertation thesis, Friedrich-Alexander-Universität, Erlangen, Germany.

Schultheiss, O. C. (2001). An information processing account of implicit motive arousal. In M. L. Maehr & P. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 12: New directions in measures and methods, pp. 1-41). Greenwich, CT: JAI Press.

Schultheiss, O. C. (2007). A biobehavioral model of implicit power motivation arousal, reward and frustration. In E. Harmon-Jones & P. Winkielman (Eds.), *Social neuroscience: Integrating biological and psychological explanations of social behavior* (pp. 176-196). New York: Guilford.

Schultheiss, O. C. (in press). A memory-systems approach to the classification of personality tests: Comment on Meyer and Kurtz (2006). *Journal of Personality Assessment*.

Schultheiss, O. C., & Brunstein, J. C. (1999). Goal imagery: Bridging the gap between implicit motives and explicit goals. *Journal of Personality, 67*, 1-38.

Schultheiss, O. C., & Brunstein, J. C. (2001). Assessing implicit motives with a research version of the TAT: Picture profiles, gender differences, and relations to other personality measures. *Journal of Personality Assessment, 77*(1), 71-86.

Schultheiss, O. C., & Brunstein, J. C. (2002). Inhibited power motivation and persuasive communication: A lens model analysis. *Journal of Personality, 70*, 553-582.

Schultheiss, O. C., & Brunstein, J. C. (2005). An implicit motive perspective on competence. In A. J. Elliot & C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 31-51). New York: Guilford.

Schultheiss, O. C., Campbell, K. L., & McClelland, D. C. (1999). Implicit power motivation moderates men's testosterone responses to imagined and real dominance success. *Hormones and Behavior, 36*(3), 234-241.

Schultheiss, O. C., Dargel, A., & Rohde, W. (2003 a). Implicit motives and sexual motivation and behavior. *Journal of Research in Personality, 37*, 224-230.

Schultheiss, O. C., Dargel, A., & Rohde, W. (2003 b). Implicit motives and gonadal steroid hormones: Effects of menstrual cycle phase, oral contraceptive use, and relationship status. *Hormones and Behavior, 43*, 293-301.

Schultheiss, O. C., & Hale, J. A. (in press). Implicit motives modulate attentional orienting to perceived facial expressions of emotion. *Motivation and Emotion*.

Schultheiss, O. C., Jones, N. M., Davis, A. Q., & Kley, C. (2006). *The role of implicit motivation in hot and cold goal pursuit: Effects on goal progress, goal rumination, and depressive symptoms*. Manuscript submitted for publication.

Schultheiss, O. C., & Pang, J. S. (2007). Measuring implicit motives. In R. W. Robins, R. C. Fraley & R. Krueger (Eds.), *Handbook of Research Methods in Personality Psychology* (pp. xx-xx). New York: Guilford.

Schultheiss, O. C., Pang, J. S., Torges, C. M., Wirth, M. M., & Treynor, W. (2005). Perceived facial expressions of emotion as motivational incentives: Evidence from a differential implicit learning paradigm. *Emotion, 5*(1), 41-54.

Schultheiss, O. C., Riebel, K., & Jones, N. M. (2006). *Activity inhibition: A predictor of lateralized brain function during stress?* Manuscript submitted for publication.

Schultheiss, O. C., & Rohde, W. (2002). Implicit power motivation predicts men's testosterone changes and implicit learning in a contest situation. *Hormones and Behavior, 41*, 195-202.

Schultheiss, O. C., & Schad, D. (2006). *Referential competence as a moderator of the effects of implicit motives on declarative measures of emotion*. Unpublished data set.

Schultheiss, O. C., & Wirth, M. M. (in press). Biopsychological aspects of motivation. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action*. New York: Cambridge University Press.

Schultheiss, O. C., Wirth, M. M., & Stanton, S. J. (2004). Effects of affiliation and power motivation arousal on salivary progesterone and testosterone. *Hormones and Behavior, 46*(5), 592-599.

Schultheiss, O. C., Wirth, M. M., Torges, C. M., Pang, J. S., Villacorta, M. A., & Welsh, K. M. (2005). Effects of implicit power motivation on men's and women's implicit learning and testosterone changes after social victory or defeat. *Journal of Personality and Social Psychology, 88*(1), 174–188.

Schultheiss, O. C., Wirth, M. M., Waugh, C. E., Stanton, S., Meier, E., & Reuter-Lorenz, P. (2006). *Exploring the motivational brain: Effects of implicit power motivation on brain activation in response to facial expressions of emotion*. Manuscript submitted for publication.

Siegel, P., & Weinberger, J. (1997). *Capturing the MOMMY AND I ARE ONE merger fantasy: The oneness motive.* Paper presented at the Poster presented at the 105th Annual Convention of the American Psychological Association in Chicago, August 15-19.

Singh, S., & Gupta, B. S. (1977). Motives and agricultural growth. *British Journal of Social and Clinical Psychology, 16*, 189-190.

Smith, C. P. (Ed.). (1992). *Motivation and personality: Handbook of thematic content analysis*. New York: Cambridge University Press.

Sokolowski, K., Schmalt, H. D., Langens, T. A., & Puca, R. M. (2000). Assessing achievement, affiliation, and power motives all at once: the Multi-Motive Grid (MMG). *Journal of Personality Assessment, 74*(1), 126-145.

Spangler, W. D. (1992). Validity of questionnaire and TAT measures of need for achievement: Two meta-analyses. *Psychological Bulletin, 112*, 140-154.

Squire, Larry R., & Zola, Stuart M. (1996). Structure and function of declarative and nondeclarative memory systems. *Proceedings of the National Academy of Sciences, 93*(24), 13515-13522.

Stanton, S., & Schultheiss, O. C. (2007). *Differential associations between implicit power motivation and gonadal steroids in women*. Manuscript submitted for publication.

Stanton, S. J., Wirth, M. M., & Schultheiss, O. C. (2006). *Effects of perceivers' implicit power motivation on attentional orienting to Pavlovian-conditioned cues of anger and joy.* Paper presented at the Society for Personality and Social Psychology, Palm Springs, CA.

Steele, R. S. (1973). *The physiological concomitants of psychogenic motive arousal in college males.* Unpublished dissertation thesis, Harvard University, Boston, MA.

Steele, R. S. (1977). Power motivation, activation, and inspirational speeches. *Journal of Personality, 45*, 53-64.

Stricker, E. M., & Verbalis, J. G. (2002). Hormones and ingestive behaviors. In J. B. Becker, S. M. Breedlove & D. Crews (Eds.), *Behavioral endocrinology* (2 ed., pp. 451-473). Cambridge MA: MIT Press.

Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: tend-and-befriend, not fight-or-flight. *Psychological Review, 107*(3), 411-429.

Teitelbaum, P. (1966). The use of operant methods in the assessment and control of motivational states. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 565-608). New York: Appleton-Century-Crofts.

Thrash, T., & Elliot, A. J. (2002). Implicit and self-attributed achievement motives: Concordance and predictive validity. *Journal of Personality*, *70*, 729-756.

Thrash, T. M., Elliot, A. J., & Schultheiss, O. C. (in press). Methodological and dispositional predictors of congruence between implicit and explicit need for achievement. *Personality and Social Psychology Bulletin*.

Toates, F. (1986). *Motivational systems*. Cambridge (GB): Cambridge University Press.

van Honk, J., Tuiten, A., Hermans, E., Putman, P., Koppeschaar, H., Thijssen, J., et al. (2001). A single administration of testosterone induces cardiac accelerative responses to angry faces in healthy young women. *Behavioral Neuroscience, 115*(1), 238-242.

Veroff, J. (1969). Social comparison and the development of achievement motivation. In C. P. Smith (Ed.), *Achievement-related motives in children* (pp. 46-101). New York: Russell Sage Foundation.

Veroff, J., & Veroff, J. B. (1972). Reconsideration of a measure of power motivation. *Psychological Bulletin, 78*, 279-291.

Wainer, H. A., & Rubin, I. M. (1969). Motivation of research and development entrepreneurs: Determinants of company success. *Journal of Applied Psychology, 53*, 178-184.

Walker, E. L., Atkinson, J. W., Veroff, J., Birney, R. C., Dember, W., & Moulton, R. W. (1958). The expression of fear-related motivation in thematic apperception as a function of the proximity to an atomic explosion. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society: A method of assessment and study* (pp. 143-159). Princeton NJ: Van Nostrand.

Weber, M. (1905). Die protestantische Ethik und der Geist des Kapitalismus. I. Das Problem [The Protestant ethic and the spirit of capitalism. I. The problem]. *Archiv für Sozialwissenschaft und Sozialpolitik, 20*, 1-54.

Weinberger, J., & McClelland, D. C. (1990). Cognitive versus traditional motivational models: Irreconcilable or complementary? In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook*

of motivation and cognition: Foundations of social behavior (Vol. 2, pp. 562-597). New York: Guilford Press.

Weiner, B. (1965). Need achievement and the resumption of incompleted tasks. *Journal of Personality and Social Psychology, 1*, 165-168.

Wendt, H.-W. (1955). Motivation, effort, and performance. In D. C. McClelland (Ed.), *Studies in motivation* (pp. 448-459). New York: Appleton-Century-Crofts.

Wilson, E. O. (1980). *Sociobiology: The abridged edition*. Cambridge, MA: Belknap/Harvard.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Belknap Press.

Winter, D. G. (1973). *The power motive*. New York: Free Press.

Winter, D. G. (1980). An exploratory study of the motives of Southern African political leaders measured at a distance. *Political Psychology, 2*, 75-85.

Winter, D. G. (1988). The power motive in women--and men. *Journal of Personality and Social Psychology, 54*, 510-519.

Winter, D. G. (1991). Measuring personality at a distance: Development of an integrated system for scoring motives in running text. In D. J. Ozer, J. M. Healy & A. J. Stewart (Eds.), *Perspectives in personality* (Vol. 3, pp. 59-89). London: Jessica Kingsley.

Winter, D. G. (1993). Power, affiliation, and war: Three tests of a motivational model. *Journal of Personality and Social Psychology, 65*, 532-545.

Winter, D. G. (1994). *Manual for scoring motive imagery in running text* (4 ed.). Department of Psychology, University of Michigan, Ann Arbor: Unpublished manuscript.

Winter, D. G. (1996). *Personality: Analysis and interpretation of lives*. New York: McGraw-Hill.

Winterbottom, M. R. (1958). The relation of need for achievement to learning experiences in independence and mastery. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society: A method of assessment and study* (pp. 453-478). Princeton NJ: Van Nostrand.

Wirth, M. M., & Schultheiss, O. C. (2006). Effects of affiliation arousal (hope of closeness) and affiliation stress (fear of rejection) on progesterone and cortisol. *Hormones and Behavior, 50*, 786-795.

Wirth, M. M., Welsh, K. M., & Schultheiss, O. C. (2006). Salivary cortisol changes in humans after winning or losing a dominance contest depend on implicit power motivation. *Hormones and Behavior, 49*(3), 346-352.

Wittling, W. (1995). Brain asymmetry in the control of autonomic-physiologic activity. In R. J. Davidson & K. Hugdahl (Eds.), *Brain asymmetry* (pp. 305-357). Cambridge, MA: MIT Press.

Woike, B., Gershkovich, I., Piorkowski, R., & Polo, M. (1999). The role of motives in the content and structure of autobiographical memory. *Journal of Personality and Social Psychology, 76*(4), 600-612.

Woike, B., McLeod, S., & Goggin, M. (2003). Implicit and explicit motives influence accessibility to different autobiographical knowledge. *Personality and Social Psychology Bulletin, 29*(8), 1046-1055.

Woike, B., & Polo, M. (2001). Motive-related memories: content, structure, and affect. *Journal of Personality, 69*(3), 391-415.

Woike, B. A. (1994). Vivid recollection as a technique to arouse implicit motive-related affect. *Motivation and Emotion, 18*, 335-349.

Woike, B. A. (1995). Most-memorable experiences: Evidence for a link between implicit and explicit motives and social cognitive processes in everyday life. *Journal of Personality and Social Psychology, 68*, 1081-1091.

Wright, R. A., & Brehm, J. W. (1989). Energization and goal attractiveness. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 169-210). Hillsdale NJ: Lawrence Erlbaum.

Zajonc, R. B. (1980). Feeling and thinking. Preferences need no inferences. *American Psychologist, 35*, 151-175.

Zeldow, P. B., Daugherty, S. R., & McAdams, D. P. (1988). Intimacy, power, and psychological well-being in medical students. *Journal of Nervous and Mental Disease, 176*, 182-187.

Table 1

Incentives and correlates of major implicit motives

	Motive		
	Achievement	*Affiliation*	*Power*
Incentive	autonomous mastery of challenging tasks	social closeness with others	having impact on others, dominating others
Disincentive	failure to master a challenging task on one's own	discord, rejection, loneliness	defeat, another's dominance
Physiological correlates	release of arginine-vasopressin (?)	release of progesterone, oxytocin (?) enhanced immune system function	sympathetic nervous system activation, release of testosterone (impact) and cortisol (defeat), compromised immune system function, cardiovascular activation/disease
Socialization	early, age-appropriate demands	moderate lack of parental	parental permissiveness for

origins	for independence	responsiveness to infant	sex and aggression
Behavioral correlates	entrepreneurial success, innovativeness	more liking of and agreement, interaction with similar others, but also more disliking of dissimilar others	managerial and career success, sex and aggression, seeks visibility and prestige
Societal, economic, and historical correlates	economic growth, innovation, civil war, ineffective leadership	peace, disarmament, political scandal	war, arms increase, effective leadership

Table 2

A 2 x 2 framework for the description of hope and fear aspects of the implicit needs for power, achievement, and affiliation

	Reward follows	*Punishment follows*
Behavior is executed	**Active approach (hope) motive** Hope of power Hope of success Hope of intimacy	**Passive avoidance (anti-) motive** Fear of power Fear of success Fear of intimacy
Behavior is not executed	--	**Active avoidance (fear) motive** Fear of weakness Fear of failure Fear of rejection

Figure captions

Figure 1. Effects of victory and defeat in a dominance contest and implicit power motivation on implicit learning of instrumental behavior (visuomotor sequences). Adapted with permission from Schultheiss, Wirth, et al. (2005).

Figure 2. Information-processing model of implicit and explicit motivation. Based on Schultheiss (2001, 2005, 2007; Schultheiss & Pang, 2007).

Figure 3. Schematic overview of implicit motive effects on affect, learning, attention, and behavioral energization.

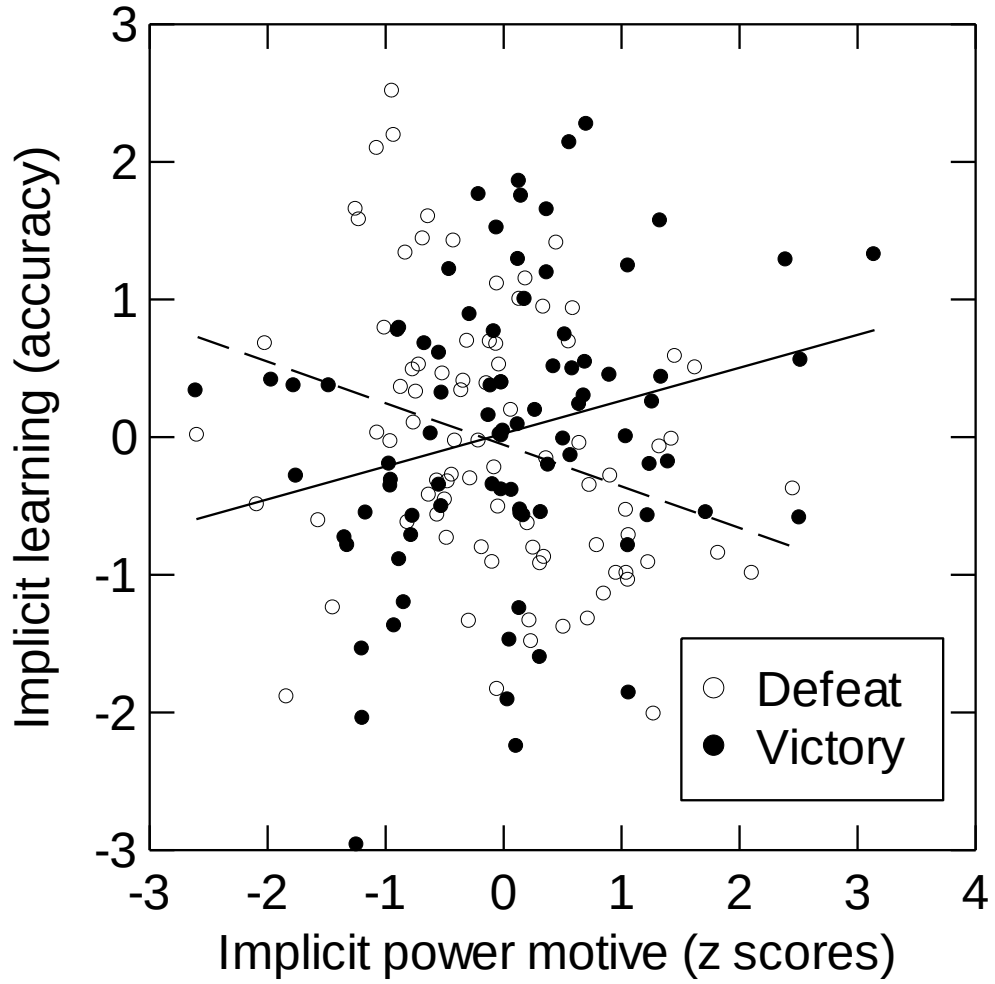
Implicit learning (accuracy)
Implicit power motive (z scores)
Defeat
Victory
3
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2
3
4

Figure 1

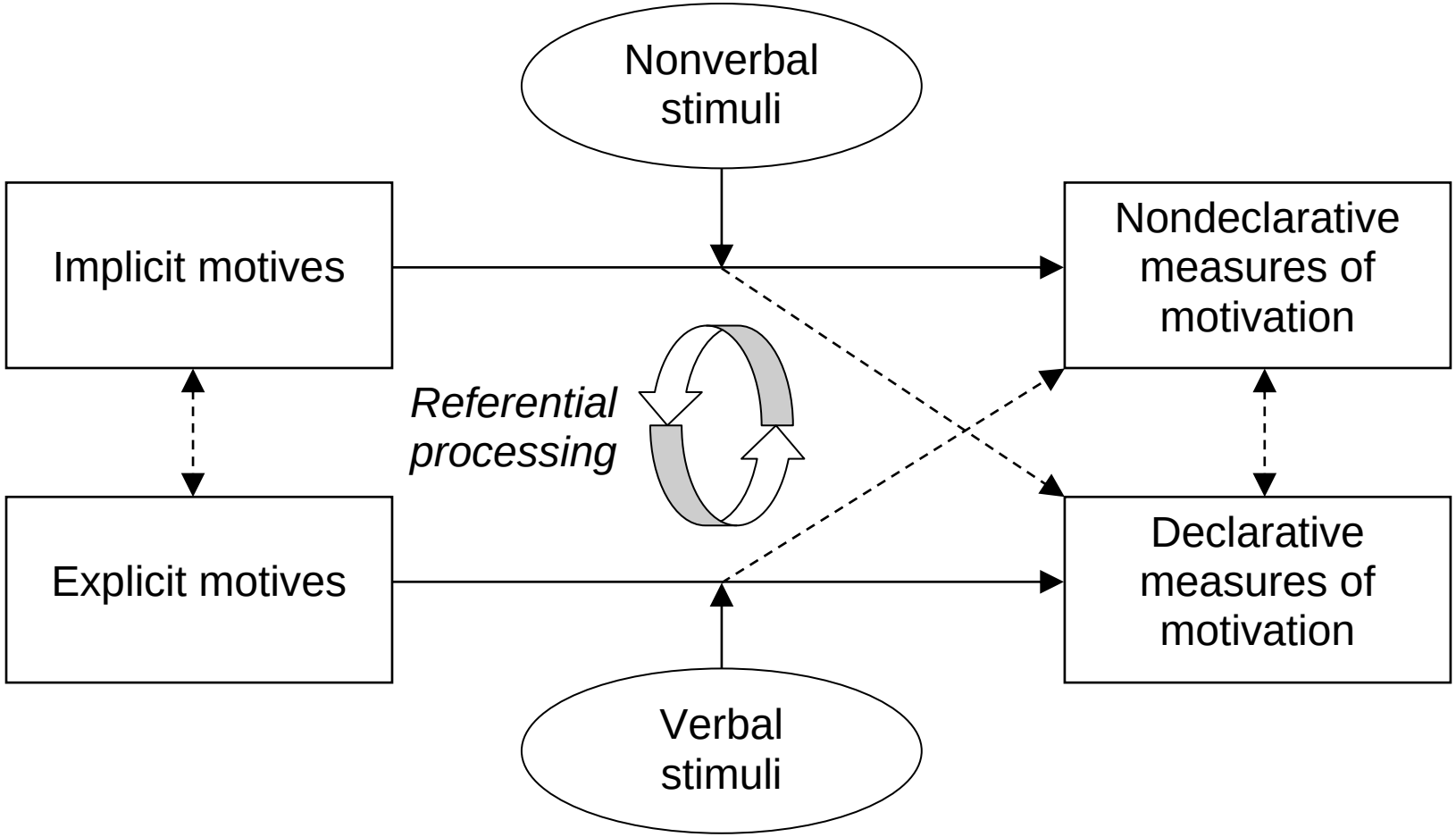
Nonverbal stimuli
Implicit motives
Nondeclarative measures of motivation
Referential processing
Explicit motives
Declarative measures of motivation
Verbal stimuli

Figure 2

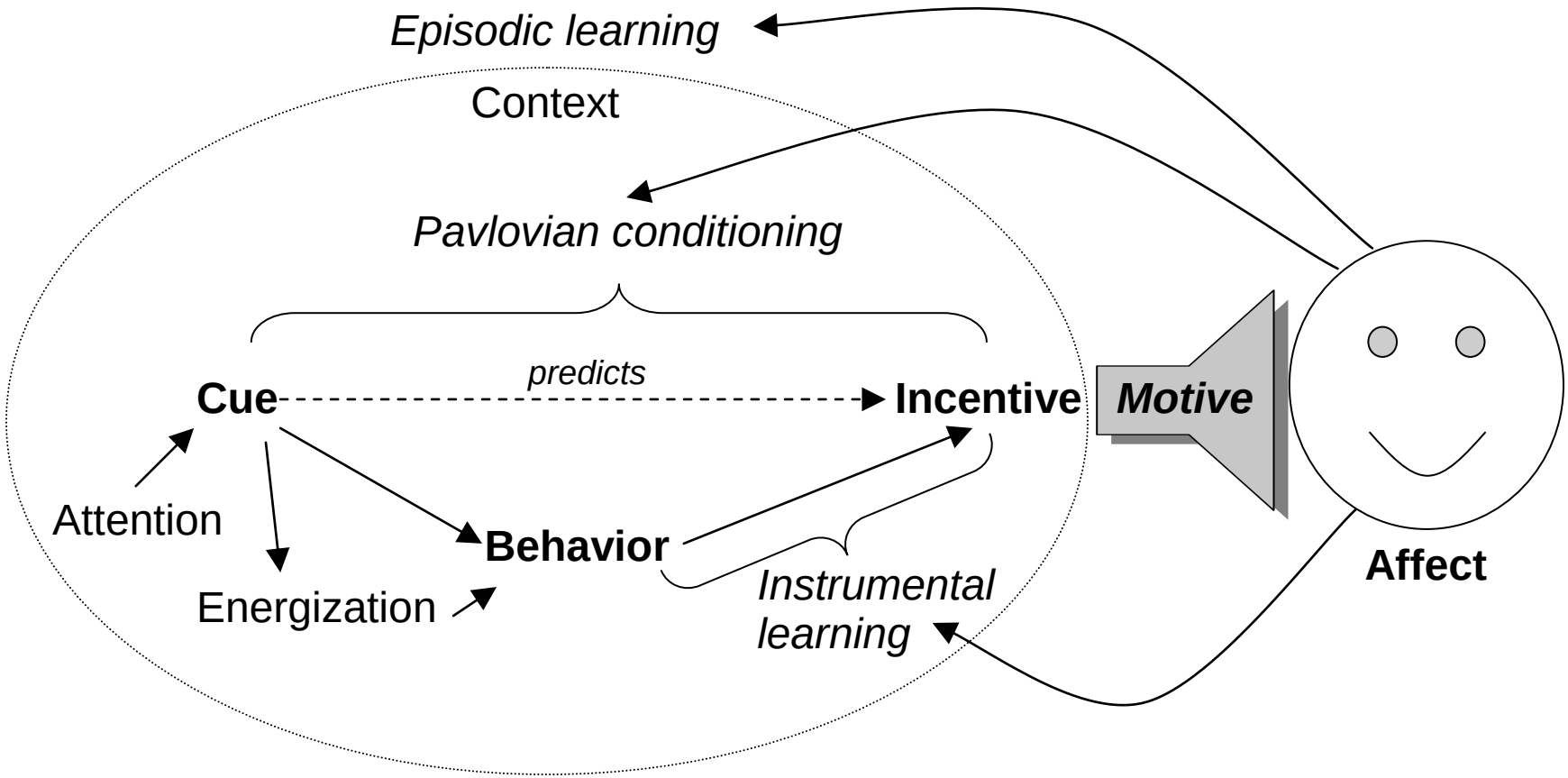
Episodic learning
Context
Pavlovian conditioning
predicts
Cue
Incentive
Motive
Attention
Behavior
Energization
Instrumental learning
Affect

Figure 3