

University of Potsdam
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How do implicit and explicit motives differ?

**The role of non-verbal versus verbal stimulus and
non-declarative versus declarative response formats**

Diploma thesis written by
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To all those people who supported me while I was working on this thesis
To my parents Dorothee and Frieder

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LIST OF ABBREVIATIONS

FEEs	Pictures of facial expressions of emotion
HPDIs	Highest Posterior Density Intervals
IAS-R	Revised Interpersonal Adjective Scales (Wiggins, Trapnell, & Phillips, 1988)
<i>n</i>	Need; label for implicit motives (e.g., <i>n</i> Affiliation and <i>n</i> Power)
PRF	Personality Research Form (Jackson, 1974)
PSE	Picture Story Exercise
r.c.	Referential competence
ref.comp.	Referential competence
RT	Response time
<i>san</i>	Self-attributed need; label for explicit motives (e.g., <i>san</i> Affiliation and <i>san</i> Power)
TAT	Thematic Apperception Test

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1 INTRODUCTION

A hundred years ago Freud came to an insight which has deeply influenced our culture and the way we see ourselves: the idea that parts of our behavior are significantly influenced by unconscious motivation, cognition, and emotion. Over the last years, an increasing interest in research on implicit or unconscious (contrasted with explicit or conscious) motivation, cognition, and emotion has arisen among quantitatively oriented psychologists and neuroscientists. For a long time, this area of human experience and behavior had been difficult to access, but now new research possibilities to investigate these issues have been developed.

For example, psychologists have investigated unconscious memory (e.g., Jacoby, Yonelinas, & Jennings, 1997), implicit learning (e.g., Reed & Johnson, 1994), implicit cognition (Anthony G. Greenwald & Banaji, 1995; A. G. Greenwald, McGhee, & Schwartz, 1998), implicit attitudes (e.g., Wilson, Lindsey, & Schooler, 2000), and reflective versus reflexive processes (e.g., Strack & Deutsch, 2004). In addition, researchers have argued for the existence of unconscious emotions (Berridge & Winkielman, 2003) and unconscious motivation (e.g., Bargh & Ferguson, 2000) and have investigated these phenomena more closely. Other research projects that might serve as a valuable foundation for tackling questions about implicit and explicit motives are the work on verbal versus nonverbal representations (Epstein, 1982; Paivio, 1986) and translation processes between them (Bucci, 1984).

Neuroscientists have investigated the neural substrates that underlie dissociations between emotional and cognitive processing (e.g., Bechara, Tranel, Damasio, & Adolphs, 1995), between experiential, observational, and instructed learning (Phelps, 2005), between reflective versus reflexive processing (e.g., Lieberman, Jarcho, & Satpute, 2004), and functional dissociations between the right and the left hemisphere (cf. Gazzaniga, 1985). They have argued for the existence of unconscious emotional and motivational learning (Bechara, Damasio, Tranel, & Damasio, 1997; LeDoux, 1996) and investigated the brain structures that are involved in unconscious emotion (Morris, Ohman, & Dolan, 1998; Whalen et al., 1998) and motivation (Pessiglione et al., in preparation).

This revived interest might also provide a new theoretical basis for an old instrument that had originally been developed to make unconscious motives as they had been understood in psychoanalysis accessible to empirical research: the Thematic Apperception Test (TAT, Murray, 1938). McClelland and colleagues later developed a research version of the TAT, the Picture Story Exercise (PSE, e.g., McClelland, Koestner, & Weinberger, 1989), which relies on standardized testing and empirically derived coding manuals. For a long time, researchers did not quite understand what the PSE actually measures. They had little interest or little possibilities to understand the processes underlying these motives. McClelland, Atkinson, Clark, and Lowell's (1953) original model described implicit motives as based on associative networks and on learning via classical conditioning, but no further theoretical specifications were made. A basic theoretical account that could have differentiated

between different motivational systems and would have thus integrated puzzling findings about questionnaire- and fantasy-based motive measures was missing. The specific processes that are associated with each measure – answers to questions like what arouses these motives and how they influence what kinds of behavior – were poorly understood, and thus precise predictions about when these measures should predict behavior were difficult to make. Instead, researchers mainly concentrated on investigating interesting real-life phenomena like entrepreneurial success (e.g., McClelland & Boyatzis, 1982), life outcomes (e.g., Winter, John, Stewart, Klohnen, & Duncan, 1998), or the behavior of political leaders (e.g., Winter, 1982). However, the lack of understanding of how implicit and explicit motives work led to many failures of researchers to find significant effects of the PSE and, thus, many of them turned away from research about unconscious motivation in frustration (cf. Schultheiss, 2001).

In the meanwhile, however, this situation has changed. Motive researchers have developed more elaborate and more specific theoretical accounts of how implicit and explicit motives differ (McClelland, 1980; McClelland et al., 1989; Schultheiss, 2001, , in press) and the afore-mentioned developments in other areas of psychology provide supporting and convergent evidence concerning the existence of implicit or unconscious processes. In addition, these fields offer knowledge and theoretical conceptions as well as experimental paradigms that can be used to gain a better understanding of what implicit and explicit motives actually are.

On the theoretical side, a stronger interest has developed among motivational psychologists in what implicit and explicit motives are and how they differ. McClelland et al. (1989) provided a first comprehensive theoretical model about different motivational systems, how they are implemented in the brain, and how they differ with respect to the kinds of incentives that they respond to and the kinds of behavior that they influence. Their work has been fruitful in that it has inspired empirical investigations (e.g., Biernat, 1989; Brunstein & Maier, 2005; Koestner, Weinberger, & McClelland, 1991). However, Schultheiss (2001) has criticized the main distinctions made by McClelland and colleagues. He proposed a new model that describes implicit and explicit motives as belonging to two distinct motivational systems (Schultheiss, 2001, in press) and details conditions under which both influence behavior. One important progress of this work is the notion that implicit motives, unlike previously expected, do respond to identifiable stimuli that can be used to reliably arouse implicit motives in experimental settings. Recent evidence has strongly supported this theoretical prediction (e.g., Schultheiss et al., 2005). The availability of clear theoretical conceptions now enables the formulation of hypotheses that can be tested and challenged in experimental work. Only such a theoretical approach can shift the research question from demonstrating the existence of the phenomenon of interest to the far more interesting investigation of how the observed phenomena work and in how they can be explained.

The second development has already started to greatly contribute to research on implicit and explicit motives. New instruments that have been developed in cognitive and in social psychology can

and have started to be adapted to investigate questions about implicit and explicit motives more rigorously than could previously be accomplished. That implicit motives respond to identifiable stimuli which can be used to reliably arouse implicit motives in experimental settings has been a prerequisite for this development and has clearly been demonstrated in recent studies (e.g., Schultheiss & Hale, in press; Schultheiss et al., 2005). Thus, the future is open for the use of paradigms that have been developed in cognitive and social psychology to investigate the processes associated with implicit and explicit motives and their sub-components.

Most importantly, previous assumptions about implicit motives can now be studied with more rigor. For example, the central hypothesis that implicit motives moderate the reward value of stimuli can now be tested directly by assessing the impact of single and well controllable stimuli that signal the availability of a reward. Also, assumptions about the basic functions of implicit motives that have been defined as orienting, selecting, and energizing behavior (McClelland, 1987), can be tested using paradigms from cognitive psychology. Lastly, these developments can be used to differentiate implicit and explicit motivational systems more finely by determining the precise conditions under which each influence behavior. In order to understand this, it will be necessary to investigate the mechanisms through which both translate into overt behavior. In addition, processes that relate implicit and explicit motivational systems can be studied with more precision. Lastly, neuroimaging methods can connect implicit motive research to findings from affective and motivational neuroscience and thus lend further support to the differential validity of implicit and explicit motive measures and can inform their theoretical conceptualization. Using such strategies, new answers to the old question of why we are so bad in reporting our own implicit motives can be found.

The present research is testing the most recent theoretical account by Schultheiss (2001, in press) that is trying to explain how implicit and explicit motives differ. The model is based on the assumption that implicit and explicit motives are based on distinct brain systems that represent information in a nonverbal versus a verbal format. This study tests the assumption that implicit and explicit systems differ with respect to the kinds of stimuli they respond to and to the kinds of behavior that they influence. More specifically, implicit motives are expected to respond to nonverbal stimuli to influence non-declarative responses. Explicit motives, on the other hand, are predicted to respond to verbal stimuli to influence declarative behavior. In addition, the present study investigates how information transfer takes place between the two motivational systems.

This thesis begins with a description of previous theories and findings about motives. Particularly, a brief introduction is given in how motives have been conceptualized in psychological research and two ways that have been used to assess motives are named: the picture story exercise (PSE) and questionnaires. Starting from the finding of a lack of correlation between these measures, a theoretical distinction between implicit and explicit motivational systems by McClelland and colleagues (1989) is introduced and critics by Schultheiss (2001) are summarized. The next two chapters present Schultheiss' (2001; , in press) information processing account for the arousal of

implicit motives and outline four hypotheses that can be derived from the theory (which will be referred to as 1st level hypotheses). Next, the empirical support that these hypotheses have received in previous research is reviewed and the aspects of the theory that demand (additional) empirical support are detailed. The next section outlines the approach that was taken in the present study to test these hypotheses. The measures, stimuli, and the tasks that were used are described, and the more specific hypotheses in this context are specified (they will be referred to as 2nd level of Hypotheses). Finally, a summary of the predictions for the current study is given. The following parts of this thesis are dedicated to the detailed description of the methods that were used, the results that were found, and to a discussion of these results.

I trust that a more theoretically guided research approach combined with more rigorous testing can lead to better and empirically founded answers to the questions that were first asked by Freud about conscious and unconscious wishes and desires, about how unconscious motives can become conscious, and about what prevents them from becoming conscious in many cases. These answers may open the way for better informed research in the future and lay a foundation for an empirically based view of humankind.

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2 THEORY

2.1 Implicit and explicit motives

2.1.1 A Short Introduction: What Are Motives?

Everyone knows how it feels to be motivated to do something. And many people might think that they thus understand what drives their actions. In everyday life, we have many ways of talking about motivation as striving, wanting, wishing, hoping. We feel drawn, or driven towards, or attracted by various things. This rich vocabulary is very useful in everyday communication and can be beautifully used in the literature. However, our lay theories about motivation do not provide a precise scientific description and understanding of the involved phenomena.

A scientific investigation of motivated behavior needs to explain why and how organisms are motivated to strive for certain hedonically charged goals. Such goals can lie in the attainment of a positive or the avoidance of a negative hedonic state. So called incentives are the objects that motivate behavior. What makes an object an incentive is its ability to be experienced as rewarding and hedonically pleasant. The attribution of this hedonic experience to an object was termed *incentive salience* (Berridge & Robinson, 1998).

As there are billions of different specific stimuli that can motivate behavior, motivational psychology faces the task of finding general classes of incentives that are common to many different concrete stimuli that can be investigated in a reasonable manner. Motive-research in the tradition of McClelland and Atkinson has mainly focused on three of these classes of human motivation: the motivation to have close interpersonal relationships, which is referred to as affiliation motivation, the need to have impact on others or the world at large, which has been termed power motivation, and achievement motivation, that is the motivation to do something in a good way according to a standard of excellence (e.g., McClelland, 1987).

However, people differ in how much they generally strive for certain kinds of incentives. Some individuals might make use of every minute to spend time with others and to have friendly relationships while others might enjoy dominating and influencing other people most of the time. Thus, motives describe relatively stable inter-individual differences in the ability of certain kinds of incentives to motivate behavior. The ability to experience a certain class of incentives as rewarding (e.g., the feeling of being close to others, of having impact on others, or to be good at something) is at the core of the definition of motives. As individual dispositions, motives are aroused by situational cues that predict the availability of an incentive. For example, passing by a bar or a club might tell some people that here is a possibility to spend friendly time with others and might arouse a motivation in them to do so. The motivation will particularly be aroused if the individual generally enjoys being close to others, that is, if the individual has a strong affiliation motive. If the affiliation motive is weak

within that person, the sign might not have any meaning to him or it might have a different meaning in that it might predict the availability of another incentive like alcohol for example. Conceptualizing motives in this way means to understand behavior as resulting from an interaction between person (motive) and environment (cues and incentives, cf. Lewin, 1936)¹.

Motivational psychology has also dealt with the question of how motives influence behavior. Building on earlier theoretical work, McClelland (1987) described motive as orienting, selecting, and energizing behavior. All these three core motivational functions are designed to either bring the individual closer to a desired state or avoid entering an aversive state.

2.1.2 Two Ways of Measuring Motives

Researchers have undertaken many efforts to measure motivational dispositions. Over many years of research, they have come up with mainly two ways of doing so. The Picture Story Exercise (PSE, McClelland et al., 1989) serves as one tool for measuring motives. It is designed to capture spontaneous motive imagery in fantasy stories. Participants write imaginative stories about pictures showing people in social situations. These pictures are thought to elicit motive imagery in individuals high in motives for which the social situation that is depicted on them might signal the potential availability of an incentive. The content of these stories is scored using coding systems that have been empirically derived (Schultheiss & Pang, in press; Winter, 1973). A greater number of motivational themes emerging in stories written under neutral conditions (e.g., in an experiment) is thought to reflect a higher motive in a participant.

The second method that was extensively used by researcher to assess a person's motive dispositions were questionnaires. These questionnaires generally list self-descriptive items (e.g., "Often I would rather be alone than with a group of friends." from the personality research form, PRF, Jackson, 1974, for assessment of the affiliation motive), and individuals can indicate whether this item applies to them ("agree") or not ("don't agree").

Many attempts have been made to construct questionnaires that capture the same motives that are assessed using the PSE (e.g., Jackson, 1974; Mehrabian, 1970; Raven, Molloy, & Corcoran, 1972). Despite these efforts of many researchers, it has been found repeatedly that the correlation between the PSE and questionnaire measures of motivation is close to zero. For example, Schultheiss and Brunstein (2001) found a correlation between the PSE and the PRF of .04 for the power and .13 for the affiliation motive in a study including 195 German students. Similarly, analyzing a sample of 323 American students, Pang and Schultheiss (2005) reported correlations of -.01 for the power and .12 for the affiliation motive as measured using the PSE and the PRF. For the achievement motive, Spangler

¹ Note that this view differs from other conceptualizations of motives and needs in that it emphasizes that motivated behavior is pulled towards an incentive. Psychoanalysis, for example, has put more emphasis on the pushing force of motivational needs.

(1992) found an average variance overlap of the two kinds of measures of less than 1% in a meta-analysis.

For a long time, researchers could not come to grips with why two measures that supposedly measure the same construct (inter-individual differences in motive dispositions) repeatedly did not correlate with one another. One common reaction was to attribute the dissociation to a failure of the PSE to measure anything motivational at all (e.g., Entwisle, 1972; Fineman, 1977; Klinger, 1966). However, the criticisms directed at the reliability of the PSE could be shown to be unfounded (for a rejection of criticisms concerning methodological factors see e.g., Lundy, 1985; Winter & Stewart, 1977, and for a theoretical debate about the application of classical test theory see e.g., Atkinson, 1981; Atkinson & Birch, 1970; McClelland, 1980). But more and more researchers also doubted the validity of the PSE. As Klinger (1966) mentioned in a literature review about the achievement motive, half of the studies that employed the PSE found theoretically meaningful results but the other half did not. This disappointing finding combined with the dissociation between questionnaire measures and the PSE lead many researchers to abandon the PSE from the range of valid scientific instruments.

2.1.3 Implicit and Explicit Motive Systems – A Model by McClelland and Colleagues

However, it has been argued that questionnaires and the PSE do not correlate with each other because they tap into two different motivational systems and measure two different kinds of motives that have different developmental origins and thus should not be expected to correlate with one another (e.g., McClelland et al., 1953; McClelland et al., 1989; Schultheiss, 2001). From this perspective, the fact that many researchers did not find meaningful relations between the PSE measure of motives and behavioral motive measures is not a problem for the validity of the PSE, but can rather be seen as evidence that motive researchers did not understand the ways in which these two systems work and under which conditions each system influences which kinds of behavior. Following this argument, it was the lack of understanding and the inability to predict when to expect effects for the two measures that led many researchers to turn away from research on motivation using the PSE. Consequently, understanding these conditions precisely is a central task for research.

McClelland et al. (1989) named the motives that are measured by the PSE “implicit motives” or “needs” (labeled *n* for need, e.g., *n* Affiliation or *n* Power) and the motives that are assessed using questionnaires “explicit motives” or “self-attributed needs” (labeled *san* for self-attributed need, e.g., *san* Power or *san* Affiliation). Implicit motives are implicit in the sense that a person is not explicitly describing him or herself as having the need. The lack of correlation with questionnaire measures suggests that “*in general people do not have conscious access to the strength of their motives as assessed with the PSE*” (Schultheiss, in press, p. 15). To the contrary, explicit motives are consciously accessible as individuals explicitly describe themselves as having the need.

McClelland and colleagues (McClelland, 1980; McClelland et al., 1989) also suggested two ways in which implicit and explicit motives dissociate functionally. First, they hypothesized the two kinds of motives to influence different classes of behavior (McClelland, 1980). Adopting a distinction from behaviorism (Skinner, 1938), they described implicit motives to influence operant behavior that occurs spontaneously without any identifiable eliciting stimulus. These motivational dispositions should thus become mainly visible when measuring the frequency of motive-relevant behavior in unstructured situations over time. Explicit motives on the other hand were thought to influence respondent behavior, that is, behavior in response to identifiable stimuli. Secondly, McClelland et al. (1989) hypothesized implicit and explicit motives to respond to two different kinds of incentives. They expected implicit motives to respond to task-intrinsic incentives that are inherent in an activity (e.g., the feeling of doing well on a challenging task can serve as an incentive for *n* Achievement). Explicit motives on the other hand were described as responding to salient social-extrinsic incentives like an explicit instruction to do well on the task. McClelland et al. (1989) based their analysis for functional dissociations between motivational systems on a qualitative literature review. Further support for the distinction was found in a meta-analysis by Spangler (1992) and in several studies that have been conducted since then (e.g., Brunstein & Maier, 2005).

McClelland et al. (1989) also suggested several implications about the two motivational systems on which explicit and implicit motives are based. One of their implications was that implicit motives develop without symbolic conceptualization as they are based on affective experiences with primary incentives (i.e., objects that have innate meaning to organisms as they are necessary for their evolutionary fitness), while explicit motives rely on linguistic conceptualizations and abstract ideas about values. This goes along with a foundation in different brain structures and differential relations to physiological changes (e.g., hormone system). McClelland et al. also refer to Buck (1983) who distinguishes between analytic cognition (described as knowledge by acquaintance) and syncretic cognition (knowledge by description). In general, they hypothesize explicit motives to function as described by cognitive information-processing models that include conscious needs, plans, and goals, while they expect implicit motives to lead to activities directed towards incentive attainment without any conscious wishing, wanting, or goal.

2.1.4 Criticisms of the McClelland-Model

However, McClelland et al.'s (1989) theoretical distinctions remained imprecise and tentative (cf. Schultheiss, 2001). The assumption that implicit motives influence operant behavior and are not aroused by an identifiable stimulus is questionable, because it is inconsistent with most other conceptions and with most research on implicit motives. This was already clear back in 1989 as implicit motives were known to selectively respond to different PSE-picture cues and as laboratory research relied on manipulation of implicit motive-arousing cues. Schultheiss (2001) concluded that

there consequently must be stimuli that influence the arousal of implicit motives and that the problem lies in identifying and describing them more precisely.

In their second hypothesis, McClelland and colleagues stated that implicit motives are aroused by task-intrinsic activity incentives while explicit motives respond to explicit, social-extrinsic incentives. Although this distinction has served as a useful heuristic tool and produced interesting empirical findings (e.g., Biernat, 1989; Brunstein & Hoyer, 2002; Koestner et al., 1991), this view is problematic because it does not specify the critical motive-arousing features that are “inherent” in the task (cf. Schultheiss, 2001). This leads to uncertainty about the precise conditions under which effects of implicit motives can be expected when testing the model and operationalizing the hypotheses. In addition, while the distinction between task-intrinsic and social-extrinsic incentives seems reasonable for the relatively non-social achievement motive, it is not so clear whether it is also the best description for the social affiliation and power motives.

Thus, after reviewing McClelland et al.’s suggestions for differences between implicit and explicit motives, Schultheiss (2001, p. 3), came to the conclusion that “despite over 50 years of research on implicit motives, the exact nature of motive-arousing cues is still not understood very well.”

2.2 An Information Processing Account of Implicit Motive Arousal

Based on the conceptual work by McClelland et al. (1989), empirical research about implicit and explicit motives (see section 2.3), and further differences between implicit and explicit aspects of affect, motivation, and cognition (Gazzaniga, 1985; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 2002; LeDoux, 1996; Nisbett & Wilson, 1977; Paivio, 1986; Rolls, 1999; Squire & Zola, 1996; Zajonc, 1980) Schultheiss (2001, in press; Schultheiss & Pang, in press) presented a theoretical conception of two independent information processing systems, the experiential and the verbal-symbolic system, on which implicit and explicit motives are based. He described these two systems with respect to (a) the way they represent and process information, (b) the kinds of stimuli they respond to, (c) the learning mechanisms that are at work, (d) the kinds of measures of motivation that they influence, (e) the brain substrates on which they are based, (f) the role that consciousness plays for processing of information, (g) the evolutionary functions that they fulfill, and he hypothesizes that (h) information transfer between the two systems can occur, a process called referential processing.

a) Two systems and the ways they represent and process information

Following other theoretical conceptions (e.g., Epstein, 1994; Paivio, 1986), Schultheiss (2001) suggested that human beings process incoming information in two fundamentally different ways employing two separate systems. The experiential system (ES) is thought to represent information

from the “physical world” in a perception-like way (e.g., the direct experience of the taste of a strawberry). In the verbal-symbolic system (VSS), information is represented in the form of symbols and linguistic concepts and categories, a very abstract way to represent information (e.g., categorizing the taste as being that of a strawberry). Implicit motives are thought to be part of the experiential system (ES) and explicit motives are represented in the verbal-symbolic system (VSS).

b) The systems respond to different kinds of stimuli

According to Schultheiss (2001; in press), the experiential system primarily responds to experiential, *nonverbal stimuli*, while the verbal-symbolic system preferentially responds to *verbal stimuli*. Experiential stimuli are those that “we perceive and experience [...] immediately and directly, without the necessity to convert them into a different representational format” (Schultheiss, 2001, p. 6). Examples for experiential stimuli are the sight of a smiling face, the beautiful redness of a rose, the sound of a person shouting, the exhilarating smell of fresh thyme, or the pleasant sensation of a father stroking his child. Some of these stimuli, so called primary incentives, have innate meaning to organisms as they are necessary for their evolutionary fitness (to ensure or strive for feeding, exploration, dominance, sexual procreation, social bonding, parental care, or harm avoidance for example). Encountering such primary incentives arouses emotional-motivational states in an organism which, in turn, can either signal the potential or actual attainment of an incentive.

The verbal-symbolic system should primarily respond to stimuli from verbal language, that is, to written or spoken words. In addition, nonverbal stimuli can be translated into a verbal-symbolic format by naming them (see below). Symbols can be flexibly used to make references to objects that are not physically present or to abstract concepts that do not even correspond to physical objects (e.g., “philosophy”). A few simple symbols can refer to very rich experiences and complex situations full of various physical objects and perceptions (e.g., “I visited New York.“).

c) Learning mechanisms

The experiential system can learn through the mechanisms of classical and instrumental conditioning, observational learning, and implicit learning. In classical conditioning, primary incentives (the unconditioned stimuli) are associated with other environmental stimuli which can thus obtain the power to elicit the same emotional-motivational states as the primary incentives (cf. Berridge, 2001). If a certain behavior repeatedly leads to the attainment of incentives, the behavior-incentive association is learned through instrumental conditioning. Besides instrumental conditioning, also observational learning and imitation were hypothesized to be mediated by the experiential system and thus to underlie influences from implicit motive dispositions (Schultheiss, 2001). For learning to occur in the ES, the involved stimuli do not have to be emotionally significant. In the case of implicit learning, for example, covariations of neutral stimuli in the environment are learned (Schultheiss et al., 2005; Schultheiss & Rohde, 2002).

In the verbal symbolic system, the covariation and the survival value of stimuli is not critical for learning. Instead, learning depends on whether new information can be meaningfully encoded and included in the existing knowledge. Learning does not depend on the actual encounter with the objects that knowledge is acquired about. In addition, learning is not restricted to whatever information is delivered by the outside world (be it directly experienced or reported). Instead, using declarative memory enables new ways of combining known concepts in an unlimited way (i.e., multiple possibilities of language production) and to predict events within completely new and unprecedented situations.

d) The systems influence different classes of behavior

Schultheiss (in press) hypothesized that the experiential system preferentially influences *non-declarative measures of motivation* while the verbal-symbolic system influences *declarative measures of motivation*. He defines *non-declarative measures of motivation* as “measures of behaviors and processes that are not accessible to, or controlled by, a person’s self-concept or verbally represented intentions” (p. 18 f.). Corresponding to the learning mechanisms that are at work, the experiential system predicts the occurrence of neutral or emotional-motivationally relevant stimuli. This prediction influences automated behavior and, in the case of the prediction of incentives, triggers emotional-motivational impulses and associated psycho-physiological responses (like hormone release, sweat gland activity, immune system response, and changes in heart rate and blood pressure). According to Schultheiss (2001, p. 7) these are outputs of an “evolutionarily old ‘command’ system [that] makes very strong ‘suggestions’ as to which general course of action should be taken best or what feels ‘natural’ to do.”

Due to its symbolic form of representation, the verbal-symbolic system represents explicit expectations of incentives. These are often learned from the verbal reports of others without personal experience and consist of theories about the value of different goals and attitudes. Thus, it is more likely to influence *declarative measures of motivation* which are defined as “measures that tap into a person’s verbally represented sense of self and the beliefs, attitudes, judgments, decisions, and goals associated with it” (Schultheiss, in press, p. 19). Examples for declarative measures of motivation are valence judgments (i.e., answers to questions like “do you like ...?”), choices and decisions about immediate, future, or potential actions, listings of personal goals, and assessments of self-regulatory control. Also, non-automated behavior (e.g., executing new complex behavioral sequences) is controlled by this system.

e) Brain substrates

Schultheiss (2001) locates the experiential system in the “nonverbal brain” and the verbal-symbolic system in the “verbal brain”. The verbal brain consists of those structures that process language and symbolic thinking which are particularly located in the left hemisphere. The experiential

system is rooted in evolutionarily old structures like the brain stem (explaining its close connection to psycho-physiological responses), the paleo-mammalian, and the reptilian brain. In addition, more detailed processing is done in the neocortex. Here, processing of the experiential system seems to be lateralized to the right hemisphere. Despite having old evolutionary roots, the systems involved in nonverbal processing have reached a high level of complexity. Ontogenetically, they develop early in childhood before the development of language and declarative memory systems. Thus, early nonverbal experiences that can not be comprehended in a verbal-symbolic way can still yield their influence on adult behavior through the early-developed learning mechanisms of the experiential system (cf. McClelland & Pilon, 1983).

f) Consciousness

According to Schultheiss (2001) conscious awareness is not a crucial prerequisite for the functioning of the experiential system – a notion that is supported by various lines of research. The experiential system has been shown to respond to emotional and motivationally relevant stimuli (e.g., facial expressions of emotions = FEEs, monetary reward) that are presented subliminally (i.e., without an individual being aware of them, e.g., Dimberg, Thunberg, & Elmehed, 2000; Morris, Ohman, & Dolan, 1998b; Pessiglione et al., in preparation; Schultheiss & Hale, in press). Moreover, subliminally presented stimuli can influence learning by functioning as neutral or unconditioned stimuli in non-conscious behavioral conditioning (e.g., Corr, Pickering, & Gray, 1995; Gupta & Shukla, 1989; Schultheiss et al., 2005; Stanton, Wirth, & Schultheiss, 2006).

In addition, a series of studies done by Berridge and Winkielman (e.g., 2003) shows that an emotion elicited by subliminally presented stimuli can remain truly unconscious. Winkielman, Berridge, and Wilbarger (2000, as reported in Berridge & Winkielman, 2003) presented pictures of happy, angry, and neutral facial expressions subliminally to their participants and assessed participants' thirst. Individuals were asked to rate their current mood and arousal. They found that, among thirsty participants, these ratings were not altered by the prime condition. Thus, the subliminal presentation of emotional or neutral faces did not influence subjective affective experience. However, subliminal presentation of a smile increased and the subliminal presentation of a frown decreased the amount of beverage that was poured and consumed by individuals. This indicates that the affective primes caused an unconscious basic affect or emotion.

At present, however, it is unclear whether and in how far the immediate emotional responses to stimuli (i.e., liking or disliking) that are moderated by the experiential system are consciously accessible and reportable. Summarizing previous findings, Schultheiss (2001) stated that the input-stimuli and the elicited emotions can but do not need to stay unconscious to influence behavior and learning. In addition, the role of conscious awareness for the verbal-symbolic system (see e.g., Bargh & Ferguson, 2000) as well as interactions between the two systems were not specified in the

information processing account. However, it has been predicted likely that interactions between systems depend on conscious awareness (cf. Morsella, 2005).

g) Evolutionary functions

The experiential system developed to ensure that behaviors that are crucial for survival (e.g., food intake, sex, living in a social group) are enacted by an organism. Despite its old evolutionary basis, the experiential system has reached a high level of complexity and it is able to use the learned associations in the appropriate contexts. Its evolutionary heritage is visible in the cross-cultural universality and the limited number of needs which it contains.

Through the development of language, the verbal-symbolic system offered great evolutionary advantages. It helped to regulate behavior of others and oneself by enabling the formulation of general rules, the communication of expectations, and the establishment of social norms. One main improvement was the possibility for self-instruction to override impulsive responses from the experiential system and thus to channel their expression into behavior that is in accordance with the standards of the explicit system. The process of acquiring the ability for such self-instruction can be observed in children. Talking to themselves (Vygotsky, 1986) helps children to delay immediate gratification in order to receive a bigger reward in the future (cf. Mischel, 1996). This process sets the foundation for the development, representation, and pursuit of long-term goals, in which the emotionally rewarding state is expected to occur in the far future. However, Schultheiss (2001) suggests that this ability to represent incentives in abstract symbols in order to delay gratification and pursue long term goals also contains a risk. A symbolic representation of reward is not as emotionally arousing as an actual reward. Thus, individuals learn to pursue goals without a direct emotional-motivational support and expect to receive the reward later. But as the experiential system does not respond to the symbolic representation of the incentive, goals might be pursued that are not emotionally rewarding when they are actually attained. Thus, “the development of gratification delay through symbolization not only enables [individuals] to pursue long-term goals, but may also make them more vulnerable to adopt and pursue goals that may not be emotionally rewarding in the end” (Schultheiss, 2001, p. 10). This thinking leads to Schultheiss’ main hypothesis that the symbolic representation of incentives is not “readable” for implicit motives and the experiential system.

h) Referential processing and referential competence

Schultheiss (in press, see also Schultheiss, 2001; Schultheiss & Brunstein, 1999, 2002) proposed a mechanism by which verbal stimuli in the environment can be processed by the experiential system by translating them into an experiential format (i.e., by performing mental imagery). Likewise, nonverbal stimuli can be translated into a verbal-symbolic format and consequently be processed by the verbal-symbolic system. Borrowing from Paivio (1986) and Bucci (1984, 1985), Schultheiss (in press, p. 19) termed this mechanism *referential processing* and defined it as “the process through which verbal

labels are retrieved and assigned to nonverbal percepts and, conversely, mental images are generated in response to words". After a verbal label is retrieved and assigned to a nonverbal percept, this verbal representation can function like any other verbal label by contributing to learning, triggering explicit motives, and influencing declarative behavior. Likewise, a mental image created from verbal input can be very similar to real perception in many ways. It has the potential to arouse strong emotional responses, to thus trigger learning in the experiential system, and to influence non-declarative measures of motivation. According to Schultheiss, implicit motives only get the chance to respond to incentives associated with a verbally coded goal through and after mental imagery of these incentives. On the other hand, if the goal is not translated from a verbal into an experiential format, implicit motives do not get the chance to react to the incentives associated with the goal.

Schultheiss (in press) proposed that compared to processing of a stimulus in the corresponding system (a verbal stimulus in the verbal-symbolic system and a nonverbal stimulus in the experiential system), translating the stimulus into a different format takes additional time and effort. Thus, referential processing is an active process which becomes apparent in the additional time and effort it takes to (a) name an object as opposed to perceiving it and to (b) create a mental image of an object described in a word as opposed to simply reading the word. Such processes depend on the situational opportunity to engage in them. In addition, people might differ in how good they generally are in performing referential processing. Schultheiss (in press, p. 20) defined such stable inter-individual differences in *referential competence*, as differences in the "ability to quickly name nonverbal percepts or generate images in response to words". Individuals with a high referential competence might be better at reading out their affective states from the experiential system, implement their explicit motives in the experiential system, and thus be more efficient in pursuing goals. Referential processing might also be one mechanism to make implicit and explicit motivational systems more congruent and thereby enable better adapted behavior (cf. Weinberger & McClelland, 1990).

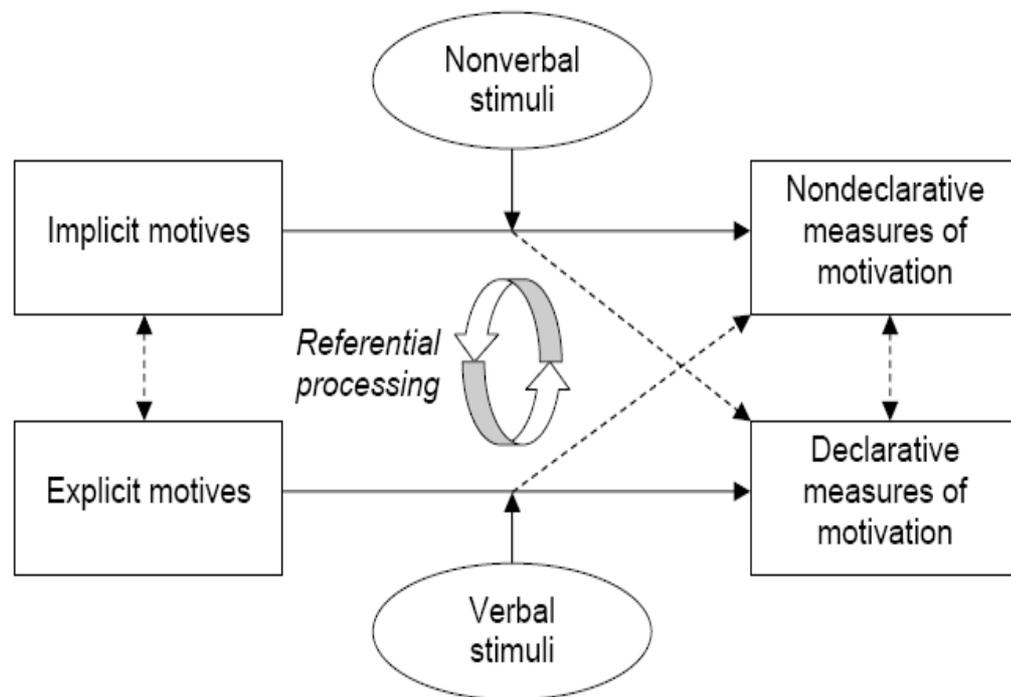
i) Summarizing the model:

The information processing model by Schultheiss describes implicit and explicit motives as parts of two independent systems that represent and process information in two fundamentally different ways. They respond to different kinds of stimuli, learn using different learning mechanisms, influence different classes of behavior, are based on different brain structures, function without conscious awareness of stimuli, and serve different evolutionary functions. Referential processing describes the process of translating information from one system into the other and referential competence refers to stable inter-individual differences in these processes.

The central aspects of Schultheiss' model are summarized in Figure 2-1 (adapted from Schultheiss, in press, Figure 2). According to the model, implicit motives respond to nonverbal stimuli to influence non-declarative measures of motivation as they are part of the experiential system. Explicit motives on the other hand, home in the verbal-symbolic system, respond to verbal stimuli to

influence declarative measures of motivation. Through referential processing, verbal stimuli have a chance to arouse implicit motives which can then influence non-declarative and declarative motive measures. Equivalently, nonverbal stimuli can be translated into a verbal-symbolic format through referential processing, to then interact with explicit motives and to influence both classes of motivational measures.

Figure 2-1 –Information-processing model of implicit and explicit motivation. Adapted from Schultheiss (in press).



Thus, what is new to Schultheiss' information processing account for the arousal of implicit motives are the notions that 1) nonverbal versus verbal stimuli (and not task-intrinsic versus social-extrinsic incentives, cf. McClelland et al., 1989), and 2) non-declarative versus declarative measures of motivation (and not operant versus respondent behavior, cf. McClelland et al., 1989) are critical for distinguishing between the two systems, and that 3) referential processing and referential competence moderate these distinctions.

Excursion: declarative measures of motivation and conscious awareness

According to Schultheiss (2006), the lack of implicit motive effects on declarative measures of motivation does not imply that the affective non-declarative responses that are driven by implicit motives occur in the absence of conscious awareness. Contrary to this idea, he suggests that the affective responses triggered by implicit motives – despite not reported in many cases – are conscious in some nonverbal, experiential way. However, considering a distinction made by Block (1995), only *access consciousness*, but not *phenomenal consciousness* has functional consequences and can thus be

an object of empirical investigation (see also Nagel, 1974). At the present state of knowledge, it is unclear what criteria should be used to attribute *access consciousness* for a stimulus or an emotion to an individual if the individual does not subjectively report being aware of that stimulus or emotion (Block, 1995; also see Rorty, 1993).

Clever paradigms have been developed to assess *access consciousness* behaviorally. One such way lies in giving subjects the task of behaving opposite to the way the information would normally impact behavior. This strategy was used by Jacoby, Yonelinas, and Jennings (1997) to demonstrate unconscious memory. However, this and all similar empirical approaches to detect consciousness using other criteria than subjective report share one problem: if no subjective report about the conscious experience of stimulus, memory, or emotion is given by an individual, it will be impossible to argue for the existence of conscious awareness. Thus, I argue that as long as individuals do not report conscious awareness of an emotional response, that is as long as no effects can be found on declarative measures, it is impossible to argue for the existence of *access consciousness*. Questions about *phenomenal consciousness*, on the other hand, can't be answered empirically at all (cf. Block, 1995; Nagel, 1974).

2.3 Data on the Theory: 1st Level of Hypotheses and their Empirical Support

2.3.1 Hypotheses and Existing Findings

The information processing account of implicit motive arousal implies several hypotheses concerning the conditions under which implicit and explicit motives are valid predictors of behavior. Some of these hypotheses have received empirical support, while others remain to be tested.

Hypothesis 0: Implicit and explicit motives dissociate statistically.

As already reported above (see section 2.1.2), this has been repeatedly demonstrated by empirical research.

Hypothesis 1: Implicit motives respond to nonverbal and explicit motives respond to verbal stimuli.

Many studies on implicit motives have neglected to control the stimulus format carefully (cf. Schultheiss, 2001). However, some studies exist that speak clearly to this issue.

Hypothesis 1a: Implicit motives respond to nonverbal stimuli.

It has been demonstrated in several studies that implicit motives respond to nonverbal stimuli. Klinger (1967) demonstrated that viewing the nonverbal behavior of an experimenter who is giving verbal instructions is enough to arouse implicit motives and that hearing the verbal-symbolic content

of the instructions is not necessary for this purpose. In Klinger's study, an actor played either an achievement-oriented, affiliation-oriented, or neutral experimenter. One group of participants was in the same room as the experimenter and could see and hear him while he was giving the instructions. Another group was sitting in a different room and could only watch the experimenter giving the instructions on a TV-monitor. This group of participants could not hear the instructions he was giving. After receiving the instructions, all participants were administered a PSE. The implicit achievement scores were elevated in both groups if the experimenter had acted in an achievement-oriented manner, but were not elevated if the actor had played an affiliation-oriented or a neutral experimenter. The implicit achievement motive was aroused not only after listening to instructions, but even in the group that could only watch the experimenter.

In many previous laboratory experiments on implicit motives, the experimenter presented instructions to the participants in a verbal way. However, given Klinger's (1967) findings, it is unclear whether those verbal instructions per se aroused implicit motives or whether it was only the nonverbal behavior of the experimenter that triggered the response (cf. Schultheiss, 2001). Thus, although a large number of studies were conducted to investigate the effects of motives on behavior, only relatively few studies speak to the issue of verbal versus nonverbal stimuli.

Schultheiss and colleagues (e.g., Schultheiss & Hale, in press; Schultheiss et al., 2005) have recently investigated more rigorously how nonverbal stimuli arouse implicit motives. Namely, they have presented pictures of facial expressions of emotions (FEEs) to participants and demonstrated that the emotion expressed interacts with the participants' implicit motives to predict various motive-relevant behavioral measures. Signals of friendliness (joyful expressions) and hostility (angry expressions) were shown to arouse *n* Affiliation, while *n* Power responded to signals of dominance (angry and joyful expressions) and submission (surprised expression; see section 2.4.2 for details).

In a first study, Schultheiss et al. (2005) demonstrated that FEEs interact with participant's implicit motives to influence learning in an implicit learning paradigm. In addition, Schultheiss and Hale (in press) provided evidence that implicit motives influence attentional orienting in response to FEEs. Using the dot probe task (Mogg & Bradley, 1999), they presented pictures of two faces – one emotional and one neutral facial expression – to the participants and found that individuals oriented attention towards or away from the emotional expressions depending on their implicit motives. Schultheiss and colleagues have recently been conducting further studies demonstrating that implicit motives moderate the incentive value of FEEs to influence classical conditioning of attentional orienting (Stanton et al., 2006) and the capture of attentional resources in the emotional Stroop task (Schultheiss, Liening, & Schad, 2006). They have also started to investigate brain substrates of implicit motives using neuroimaging techniques (Wirth, Stanton, Waugh, Reuter-Lorenz, & Schultheiss, 2006) and have found support for the hypothesis that the extent to which viewing FEEs causes increased activation (as measured by the BOLD-response) in brain areas that are processing reward is moderated by implicit motives.

Hypothesis 1b: Explicit motives do not respond to nonverbal stimuli.

In their studies on how implicit motives moderate the incentive value of FEEs, Schultheiss and colleagues have also tested effects of explicit motives. However, they failed to find explicit motive effects that could be interpreted in a meaningful way in the context of interpersonal theory (Schultheiss, personal communication, October 2005).

Hypothesis 1c: Implicit motives do not respond to verbal stimuli.

While there is plenty of evidence for implicit motive effects in response to nonverbal stimuli and some hints for a lack of explicit motive effects in response to these stimuli, only a few studies enable clear conclusions about the implicit motive responses to verbal stimuli. Many studies have been conducted that used verbal instructions to arouse implicit motives and although many of these studies found effects of implicit motives, a similar number of studies failed to find effects (cf. Klinger, 1966). This suggests that a factor that was not controlled for in these studies might have produced the results. One possibility is that it was the nonverbal behavior of the experimenter – that was not controlled for in these studies – and not the verbal instructions that aroused implicit motives in some of the experiments (cf. Schultheiss, 2001).

One recent study serves as an example of how verbal instructions alone failed to involve implicit motives to influence the pursuit of experimentally assigned goals. Schultheiss and Brunstein (1999, 2002) conducted a series of studies in which they instructed participants verbally to pursue a goal in the course of the experiment. Participants had to give advice in directive counseling (opportunity to influence and to help; incentive for power motive), try to win a computer game to enter the high-score list (opportunity for fame; incentive for power motive), or present their point of view to someone as convincingly as possible (opportunity to influence someone; incentive for power motive). In all of these tasks, implicit motives failed to predict various measures of participants' engagement in attaining the goal (e.g., performance on the tasks, ratings about affective involvement) as long as participants were not given the opportunity to engage in a goal imagery exercise (see below). Thus, the availability of the verbally represented information about the goals for itself was not sufficient to arouse implicit motives and to make the invested effort contingent on the implicit needs. However, factors other than the format of response might have been responsible for these null-effects. Thus, although some initial evidence exists, a clear-cut demonstration that purely verbal stimuli are unable to arouse implicit motives is missing.

Hypothesis 1d: Explicit motives respond to verbal stimuli.

Unlike implicit motives, explicit motives are assessed by collecting declarative responses towards verbal stimuli (questionnaire items). Thus the verbal nature of explicit motives is already evident in their measurement. In addition, many studies have found explicit motive effects in response to verbal instructions. DeCharms, Morrison, Reitman, and McClelland (1955), for example, reported that *san* but not *n* Achievement moderated whether people changed their views of the quality of

paintings after listening to an expert opinion about these paintings. Spangler (1992) found in a meta-analysis that explicit motives have higher predictive validity under conditions of explicit, social incentives. Thus, although, as for implicit motives, the verbal nature of incentives was not controlled for carefully in many studies, it is much more likely that explicit motives respond to verbal stimuli given their assessment.

Hypothesis 2: Implicit motives influence non-declarative and explicit motives influence declarative measures of motivation.

Again, four specific hypotheses can be stated for the association of implicit and explicit motives with non-declarative and declarative measures of motivation.

Hypothesis 2a: Implicit motives influence non-declarative measures of motivation.

Hypothesis 2b: Explicit motives do not influence non-declarative measures of motivation.

Hypothesis 2c: Implicit motives do not influence declarative measures of motivation.

Hypothesis 2d: Explicit motives influence declarative measures of motivation.

Findings from many studies support these hypotheses. Already at the beginning of the work on the achievement motive, deCharms et al. (1955) found that individuals high in *san* Achievement but not those high in *n* Achievement were influenced by an expert opinion in their judgments about the quality of artworks and gave more negative ratings about a person that had been described as unsuccessful (Hypotheses 2c and 2d). The authors also reported evidence for the Hypotheses 2a and 2b. They had found that individuals high in *n* Achievement, but not those high in *san* Achievement, show increased performance on a scrambled-word test, and increased recall of facts from a story, relative to those low in the respective motive.

Brunstein and Hoyer (2002; see also Brunstein & Maier, 2005) reported a similar pattern of findings. In these studies, *n* but not *san* Achievement predicted the effort that students took on an attention task (task performance, Hypotheses 2a and 2b). The implicit motive-effect was particularly strong after participants were led to believe that their performance had decreased compared to their own previous performance. A declarative measure of motivation on the other hand – the choice to continue with the task or to do something else – was predicted by *san* but not *n* Achievement (Hypotheses 2c and 2d). This effect of explicit motives was particularly strong when participants received feedback indicating that their performance had been worse than that of others. Thus, for *n* Achievement, the hypotheses have been supported by findings of various researchers (also see Biernat, 1989) and are consistent with meta-analytic findings (Spangler, 1992).

Differences between implicit and explicit motive effects on non-declarative and declarative measures of motivation could also be found for the affiliation and power motive (see also Bornstein, 1998; Craig, Koestner, & Zuroff, 1994). For example, Koestner et al. (1991) found that *n* Power but not *san* Power predicted performance in a social perception task (a non-declarative measure of motivation), in which participants had to infer the status relationship between two people in a photo by

deciding “which one is the boss” (Hypotheses 2a + 2b). In addition, Schultheiss and Brunstein (1999, as reported in Schultheiss, in press) found that, after participants had engaged in a goal imagery task, *n* Power but not *san* Power positively predicted performance on a computer game (Hypotheses 2a + 2b), while *san* Power and not *n* Power predicted the commitment stated by the participants to reach the highest rank on a high-score list (Hypotheses 2c + 2d).

This pattern of findings suggests 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” (Schultheiss, in press, p. 16 f.).

Hypothesis 3: Implicit motives only show effects for nonverbal stimuli and non-declarative measures of motivation. Explicit motives only show effects for verbal stimuli and declarative measures of motivation.

No studies have so far investigated the effect of nonverbal versus verbal stimulus format and non-declarative versus response format simultaneously.

Hypothesis 4: After referential processing both motives respond to both kinds of stimuli and influence both kinds of measures of motivation.

Although this is not the case without referential processing, referential processing (due to an active effort or high referential competence) can enable

- *implicit motives to respond to verbal stimuli (Hypothesis 4a) and*
- *to influence declarative measures of motivation (Hypothesis 4b), and enable*
- *explicit motives to respond to nonverbal stimuli (Hypothesis 4c), and*
- *to influence non-declarative measures of motivation (Hypothesis 4d).*

The studies by Schultheiss and Brunstein (1999, 2002) reported above provided evidence in support of this hypothesis by demonstrating that goal imagery (i.e., referential processing) can trigger implicit motive effects in response to verbal stimuli. In these studies, after participants were assigned the affiliation- and power-related goals, some of them underwent a guided goal imagery procedure (imagery group). In this goal imagery exercise, participants had the opportunity to engage in referential processing by vividly imagining the goal and the incentives associated with it. Participants in the control group received purely verbal instructions and, in one study, could vividly imagine task performance without a particular focus on the incentives associated with it. As predicted by the notion of referential processing, implicit motives influenced declarative (e.g., goal commitment, self-reported activation) and non-declarative (e.g., task performance, expressive behavior) measures of motivation only after participants had done the goal imagery task. As had been found in many previous studies using purely verbal instructions, also Schultheiss and Brunstein found no implicit motive effects in the control groups. Thus, the opportunity to translate the verbal instructions into a nonverbal format enabled implicit motives to respond to the verbal stimuli and to influence non-declarative and

declarative measures of motivation (Hypotheses 4a and 4b). To my knowledge, the role of referential processing for explicit motives (hypotheses 4c and 4d) has not been investigated so far.

An additional approach to capturing referential processing lies in testing for interactions between implicit and explicit motives. If the two systems interact in influencing behavior, it is possible that some information exchange between them, and thus referential processing, has taken place. Brunstein and Maier (2005; also see Winter et al., 1998) reported an instance of such an interaction in a study about the differential validity of *n* and *san* Achievement in a concentration task. They predicted that as individuals high in *san* Achievement tend to have a high view of their own abilities, they should be able to recruit affective impulses from *n* Achievement for performance on the task when confronted with negative social comparison feedback in an ego-focused setting (i.e., in a situation of social comparison-stress). Individuals low in *san* Achievement, with a rather low view of their abilities, on the other hand, would not be able to do so. As predicted, they found that if participants were led to believe that they performed worse than others on the task in an ego-focused setting, *n* Achievement predicted task performance only in individuals high in *san* Achievement. Thus, the interaction can be interpreted as caused by a referential processes in which verbally represented information (believes about the own abilities) served as an input to the experiential system to determine the subjective task difficulty (Atkinson, 1957). However, whether such referential processing actually took place in this or other occasions of interactions between implicit and explicit motive is unclear, as these processes have not been studied directly.

2.3.2 Demand for (Additional) Empirical Support – Motivation for the Present Study

Hypothesis 0: statistical independence

Although reported in many previous studies, it is important to again confirm the hypothesis of statistical independence between implicit and explicit motives.

Hypothesis 1: nonverbal and verbal stimuli

To my knowledge, no studies have hitherto carefully controlled for the stimulus format and utilized both, verbal and nonverbal stimuli simultaneously. Particularly, whether implicit motives can be aroused by verbal stimuli (ruling out effects of nonverbal cues, Hypothesis 1c) is unclear (cf. Schultheiss, 2001)². Likewise, explicit motive responses toward nonverbal stimuli (while ruling out

² Schultheiss (2001) argues that the experiential system in which implicit motives are at home is different from the unconscious motivation described and investigated by John Bargh and colleagues. As Bargh and colleagues were using words as stimuli in their experiments the deep and nonverbal structures of the experiential system should not get involved. Thus, asking for implicit motive effects to purely verbal stimuli is also to ask for the possibility to investigate these systems by means that are widely spread in social psychological research. Likewise, whether the adaptation of the implicit association

the possibility that verbal stimuli have produced the effects, Hypothesis 1b) have not been reported in the literature.

Hypothesis 2: non-declarative and declarative measures of motivation

A number of studies have supported the dissociation between implicit and explicit motives with respect to the classes of behavior that they influence. However, many studies, particularly up to McClelland et al.'s (1989) argument for separate motivational systems, have not been designed to differentiate implicit and explicit motives. Consequently, investigators often did not measure the different kinds of behavior in one and the same situation (for exceptions see e.g., Biernat, 1989; Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; Koestner et al., 1991). Thus, only a few studies speak directly to the issue of whether implicit and explicit motives predict non-declarative and declarative measures of motivation selectively if assessed in the same context (cf. Brunstein & Maier, 2005), and to my knowledge, no studies have investigated such a dissociation using one set of affiliation- and power-related stimuli in two different tasks.

However, whether the description of the involved tasks as declarative and non-declarative measures of motivation is precise and valid, and whether this distinction yields a good prediction for implicit and explicit motive-effects on newly designed measures, remains to be tested. More specifically, while several studies have found no effects of implicit motives on declarative measures of motivation, most of these measures were not designed to capture spontaneous gut feelings in response to single simple stimuli that are motivationally relevant. Instead, declarative measures were often designed to assess judgments about highly complex stimuli (e.g., participants' ratings of the quality of artworks, deCharms et al., 1955), liking for episodes of stimuli (whether participants liked a movie, Wende, 2006), statements about future actions (e.g., stated task-commitment, Schultheiss & Brunstein, 1999), or the decision to continue on a task (Brunstein & Maier, 2005) that might have required some deliberate processing. Thus, the question whether valence ratings, according to Schultheiss' definition clearly an example of a declarative measure of motivation, are also not influenced by implicit motives if done for simple single stimuli (Hypothesis 2c) awaits clarification.

Lastly, to my knowledge, influences of implicit and explicit motives on declarative measures of motivation in response to nonverbal stimuli (ruling out effects of verbal cues) have not been tested so far.

Hypothesis 3: Interaction of stimulus and response format

The central prediction from the information processing account, that implicit motives respond to nonverbal stimuli to influence non-declarative measures of motivation and the explicit motive

test (IAT) for the measurement of implicit motives (Brunstein & Schmitt, 2004) actually assesses implicit motives as assessed with the PSE would have to be viewed critically if implicit motives should not respond to purely verbal stimuli.

respond to verbal stimuli to influence declarative measures of motivation, clearly demands empirical testing.

Hypothesis 4: referential processing

The idea of referential processing has as yet only been tested directly by Schultheiss and Brunstein (1999, 2002) using the goal imagery task. However, although translation of verbal instructions into a nonverbal representation of the goal (Hypothesis 4a) is one possible explanation for why implicit motives predicted non-declarative and declarative measures (Hypothesis 4b) after but not without goal imagery, it is clearly not the only one. In addition to the translation of a verbal into a nonverbal representation, the imagery conditions also differed from the control conditions in that participants in the imagery conditions were led to focus extensively on the incentives and disincentives associated with the goal (e.g., they imagined beating the opponent in a speed task: “And yes - now it's you who finishes first and cries stop. You hear the other guy grunting, but you are already eager for yet another test.”). Thus, not only the form of the representation differed between imagery and control participants, but also the content of the representations. As motivationally relevant aspects of the goal were strongly emphasized and elaborated in the script, these aspects were also represented, activated, and thus accessible when working on the tasks that were used to assess motivated behavior. Maybe other aspects associated with the imagery scripts (additional emphasis given to the incentives present in the situation; instruction, motivation, and opportunity to elaborate these incentives further and to relate them to personal experience), and not the verbal versus nonverbal form of representation, was decisive for the moderating effect on implicit motives.

To argue for the possibility that other mechanism might have contributed to the imagery effect is not to say that referential processing did not play a role to produce it. But it is to say that the existing evidence is not sufficient to support such a notion. Thus, new ways must be developed to test the hypothesis that referential processing moderates the effects of implicit and explicit motives for “non-fitting” classes of stimuli and responses. In addition, no evidence exists up to date that speaks to the role of referential processing for explicit motives (Hypotheses 4c and 4d).

To summarize: When designing the current study, I was particularly interested in whether the distinction between nonverbal and verbal stimuli or the one between non-declarative and declarative measures of motivation is more important for the effects of implicit and explicit motives on behavior, or whether both distinctions – for stimuli and for measures of motivation – are important in a similar fashion. In addition, I intended to measure dispositional referential competence in order to test – for the first time – whether it moderates motive effects in those conditions in which motives are otherwise not expected to have significant predictive power.

2.4 Overview of the Present Study and 2nd Level of Hypotheses

The aim of the present study was (1) to assess motive-responses to the same content represented in a nonverbal versus a verbal format, (2) to use non-declarative versus declarative measures of motivation involving the same stimuli, (3) to manipulate stimulus and response format simultaneously, (4) to assess stable individual differences in referential competence, and (5) to measure implicit and explicit motives within the same participants to compare their predictive validity over the various conditions.

2.4.1 Implicit and Explicit Motives

In testing these theoretical predictions, I concentrated on the affiliation and power motive as clear predictions concerning the responses of these motives to social stimuli signaling affiliation and dominance can be derived. Implicit and explicit motives from these two domains were investigated, yielding four measures of motivational dispositions: *n* Affiliation, *n* Power, *san* Affiliation, and *san* Power. The incentive for highly implicit or explicit affiliation motivated individuals it to be close to others, while the incentive for highly implicit or explicit power motivated individuals lies in influencing or dominating others.

2.4.2 Stimuli – Nonverbal and Verbal Formats (Hypothesis 1)

The basic hypothesis guiding the more specific predictions is that whether stimuli function as incentives or disincentives for an individual depends a) on whether the stimuli signal affiliation (versus hostility) and dominance (versus submission) and b) on the perceiver's affiliation and power motive.

Schultheiss and Hale (in press; see also Schultheiss et al., 2005) hypothesized that the incentive value of facial expressions of emotions (FEEs) is modulated by the perceivers implicit motives. I generalize this assumption and hypothesize that the incentive value of any stimulus that signals affiliation or dominance is modulated by the perceiver's implicit and explicit motives. More specifically, in individuals with a strong implicit or explicit affiliation motive, the incentive value of a stimulus should be *symmetrically* related to the affiliation that it signals. Thus, individuals with a strong implicit or reported need to affiliate should find stimuli signaling friendliness or interpersonal closeness rewarding, and should respond aversively to stimuli signaling hostility. For individuals with a strong implicit power motive, on the other hand, the incentive value of a stimulus is predicted to be *reciprocally* related to the dominance that is signaled by the stimulus. Stimuli signaling high dominance of another individual should, thus, have negative incentive value for individuals with a strong need to influence others, while stimuli signaling another individual's submission are expected to function as rewards for individuals with a high power motive.

As illustrated in Figure 2-2, affiliation and dominance of stimuli, and thus the incentive value of these stimuli for the affiliation and power motive, can be represented in a two-dimensional interpersonal circumplex. Social stimuli that signal friendliness versus hostility, and dominance versus submission, can now be mapped onto this two-dimensional space, providing an overview of the hypothesized effects of these stimuli for individuals with high needs to be close to and to influence others.

One main objective of this study was to compare the processing of stimuli presented in different formats (nonverbal versus verbal). Thus, my aim was to use stimuli from both domains that are maximally similar in all respects except for their verbal or nonverbal format. To achieve this goal, I employed stimuli from both formats that signal high or low affiliation or dominance and can thus be expected to be (dis-)incentives for the affiliation and power motive. For nonverbal stimuli I used pictures of facial expressions of emotions (FEEs), and for verbal stimuli I used words.

FEEs: signals for dominance and affiliation and (dis-)incentives for motives

FEEs are nonverbal social stimuli that signal dominance (or submission) and affiliation (or hostility). When asked to judge the interpersonal meaning of FEEs, individuals' answers can be represented on the two dimensions from the interpersonal circumplex, i.e. dominance and friendliness. Angry facial expressions have been rated as high in dominance and low in affiliation (i.e. as hostile), display of the emotion joy has been rated as conveying high dominance and high friendliness, and a surprised facial expression has been rated as low in dominance but as neutral with respect to affiliation or friendliness (Alvarado & Jameson, 1996; Conway, Di Fazio, & Mayman, 1999; Hess, Blairy, & Kleck, 2000; Knutson, 1996; Le Gal & Bruce, 2002; Tiedens, 2001). Furthermore, Schultheiss et al. (2005) suggested that surprise often signals higher power and more control over the interaction of the perceiver of a surprised FEE compared to its sender.

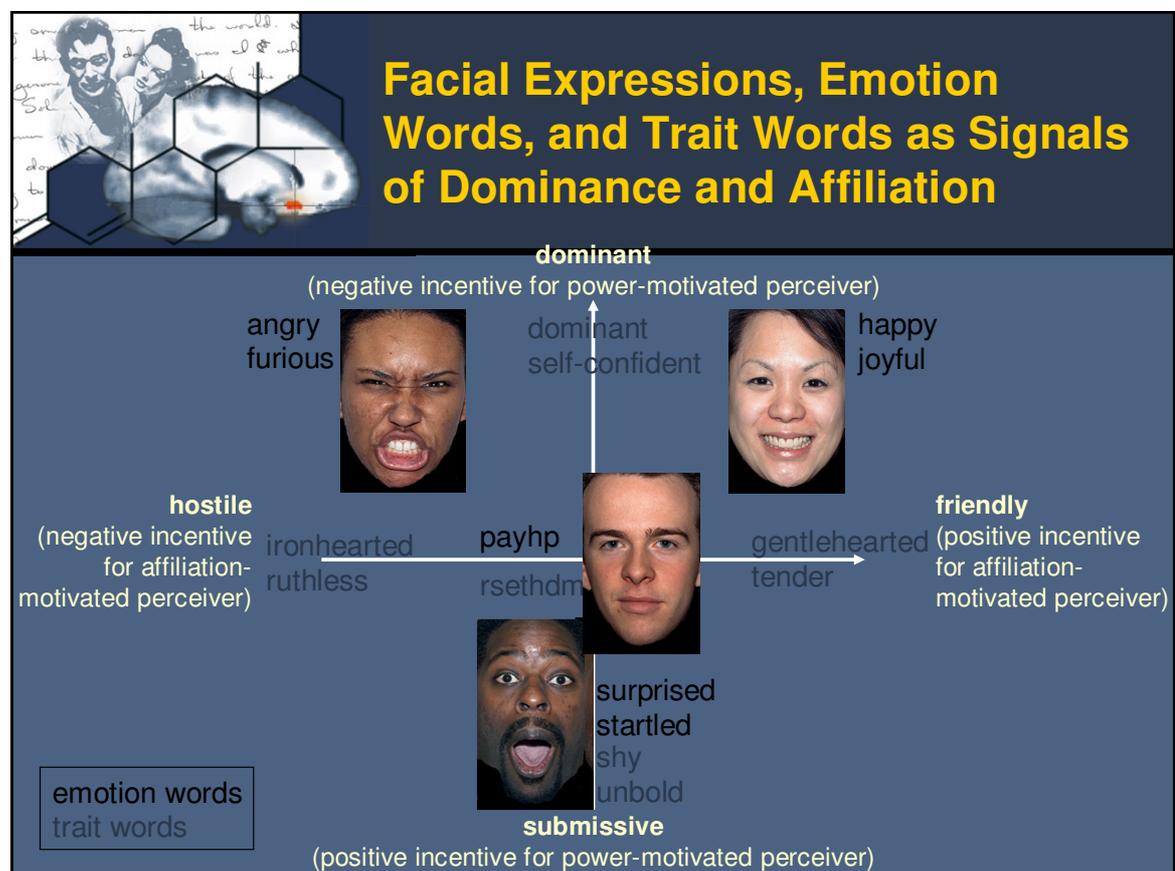
Given these findings, clear predictions about the incentive value of specific FEEs for the affiliation and the power motive can be derived. For individuals high in the affiliation motive, an angry FEE – as a signal of hostility and rejection – should be a disincentive, and the view of a joyful face – as a signal of friendliness – should be an incentive. Neutral and surprised expressions were not expected to have incentive value as they signal neither friendliness nor hostility. For individuals with a high power motive, expressions of anger and joy – as signals of dominance – were expected to be disincentives, and surprised FEEs were predicted to be incentives (as they signal dominance of the perceiver). Again, neutral facial expressions should not have incentive value for these individuals. As depicted in Figure 2-2, it is, thus, possible to position FEEs of these emotions on the interpersonal circumplex according to both the dominance and affiliation they convey, and to their incentive value for the affiliation and power motive.

In addition to the main effects of motives, there are hints in the literature that the affiliation and the power motive interact in determining the incentive value of FEEs. Using an implicit learning

paradigm, Schultheiss et al. (2005) have found that *n* Affiliation only predicted implicit learning as triggered by the joy face in individuals with a high *n* Power. However, Schultheiss and colleagues did not investigate such interactions systematically. To explore this finding further, I tested interactions between the affiliation and the power motives with each domain (i.e., *n* Affiliation \times *n* Power and *san* Affiliation \times *san* Power).

I concentrated on the three emotions anger, joy, and surprise as they span all areas of the circumplex. In addition, FEEs displaying anger, joy, and surprise have previously been shown to function as (dis-)incentives for *n* Affiliation and *n* Power (Schultheiss & Hale, in press; Schultheiss et al., 2005).

Figure 2-2 – Circumplex for FEEs, Emotion Words, and Trait Words.



Previous evidence on motive responses to FEEs

Schultheiss and colleagues have reported support for these predictions in the domain of implicit motives. They used a dot-probe task to assess attentional orienting towards FEEs versus neutral facial expressions (Schultheiss & Hale, in press) and an instrumental conditioning paradigm to measure influences of emotional and neutral facial expressions on the performance in an implicit learning task (Schultheiss et al., 2005).

The authors found that, among highly implicit affiliation motivated individuals, angry FEEs triggered vigilance (with attentional orienting effects depending on stimulus intensity) and that

learning was impaired in their context³. These findings are compatible with the view that angry FEEs are disincentives for *n* Affiliation as they signal hostility. Also, for individuals high in *n* Affiliation, joyful FEEs drew attention to them which fits well with the view that they are incentives for *n* Affiliation as they signal friendliness. However, the evidence for this effect was weak and awaits further empirical support. The prediction that surprised and neutral facial expressions are neither rewarding nor punishing for individuals high in *n* Affiliation because they signal neither friendliness nor hostility, was also supported, as documented by the mostly lacking effects of *n* Affiliation on attentional orienting or implicit learning in the presence of these expressions (see above for an exception).

The findings by Schultheiss and colleagues also supported the view that the power motive responds to signals of dominance and submission. In line with the view that angry FEEs signal dominance and are thus disincentives for the power motive, individuals high in *n* Power were found to orient attention away from angry faces and to show a trend towards impaired learning in their presence. There was also some support for the notion that joyful FEEs signal dominance and are aversive for highly power motivated individuals, as these individuals tended to orient attention away from them and showed impaired learning in their presence (particularly if the faces were of the same gender as the perceiver). Surprised faces, on the other hand, attracted highly power motivated individuals' attention and enhanced their learning (for faces that had the same gender as the perceiver). This finding lends support to the hypothesis that surprised FEEs are incentives for the power motive because they signal submission of another individual and control of the perceiver.

Emotion Words

In order to manipulate only the format of the stimuli without changing their content, I used adjectives describing the same emotional states that were expressed by the faces. Thus, I used the words “angry”, “happy”, and “surprised” and additional five synonyms for each emotion. Furthermore, I created non-words which I used as a neutral condition. In the following, I will refer to all of these words as “emotion words”.

I expected the emotion words to signal affiliation and dominance in a similar way as the FEEs with words for the emotion anger being perceived high in dominance and low in affiliation (i.e. hostile), words for the emotion joy being perceived as high in dominance and high in affiliation, words for the emotion surprise being perceived as low in dominance but neither high nor low in affiliation, and non-words being perceived as neutral with respect to affiliation or dominance.

Hence, I expected motives to respond to these emotion words in a similar way as they respond to FEEs. However, as I am not aware of any studies that have investigated the incentive value of single

³ They found a negative effect of *n* Affiliation for neutral, but only in the presence of angry faces. However, learning in response to angry faces themselves was not impaired.

emotion words for motives, these predictions are rather exploratory and are based only on the expectation that their interpersonal meaning is equivalent to that of FEEs.

Trait Words: signals for dominance and affiliation and (dis-)incentives for motives

FEEs arouse motives because they signal friendliness (versus hostility) and dominance (versus submission) and they are thus incentives for the affiliation and power motives. But words are clearly different from FEEs in that they do not establish an interpersonal space in which affiliation or influence can be established. Instead, emotion words are an abstract representation of an emotion, which does not imply the necessity to attribute the named emotional state to another individual that is facing the perceiver. Hence, despite choosing words expressing the exact same emotions as expressed by the FEEs, these emotion words might not signal affiliation or dominance (i.e., maybe the word “happy” does not imply dominance for the reader as does a face smiling at him overtly). For this reason, I included an additional set of trait words in the experiment that contained traits that were directly describing individuals high or low in dominance or affiliation. These words were taken from the Revised Interpersonal Adjective Scales (IAS-R, Wiggins, Trapnell, & Phillips, 1988) and had previously been found to load high or low on the factors dominance or affiliation (the latter is called “Love” in the IAS-R; see Appendix A) for a list of the used words). Note that I chose trait words that are perceived as related either to affiliation or to dominance in order to yield maximum power and clear predictions and not, like the emotion stimuli, trait words that are related to both, affiliation and dominance.

The following predictions were made for motive-responses to trait words: words for traits that signal high affiliation (i.e., that had previously loaded highly positively on the factor affiliation) were predicted to be incentives for the affiliation motive, while words for traits that signal low or negative affiliation (i.e., those that had previously loaded strongly negatively on an affiliation factor) were predicted to be disincentives for the affiliation motive. The difference of the incentive value between trait words high versus low in affiliation (calculated by subtracting responses for trait words negative in affiliation, i.e., for hostile traits, from responses towards trait words positive in affiliation, i.e., friendly traits) should be positively influenced by the affiliation motive. Likewise, individuals with a strong power motive should dislike trait words that are highly positive in dominance and should like trait words that are very low in dominance (i.e. high in submission). Thus, the difference in the incentive value between words high versus low in dominance should be negatively predicted by the power motive. Like for the emotion stimuli, I will explore interactions of the affiliation and power motives (from the same domain) in predicting behavior.

As an additional benefit, including a set of trait words enabled me to directly test the assumption that motives respond to trait inferences that people make about FEEs. As research by Knutson (1996) has shown, individuals make inferences not only about the current situation when viewing a FEE. When asked to do so, they also rate the individual displaying an FEE as high and low

in traits of dominance and affiliation. Among others, this finding has been seen as an explanation of why the incentive value of FEEs is moderated by the affiliation and power motive. Whether these trait inferences occur spontaneously or only when asked to do so, and whether motives respond to the inferred traits or to other aspects of the FEEs is not clear so far. However, the trait word condition provides a test for the assumption that motives can respond to traits expressing high or low affiliation or dominance in principle.

2.4.3 Tasks – Non-Declarative and Declarative Measures of Motivation (Hypothesis 2)

As I had predicted differences in the influence of implicit and explicit motivational systems on non-declarative and declarative measures of motivation, my aim was to use two tasks that are maximally similar to each other, except for being non-declarative versus declarative measures of motivation. To achieve this goal, I implemented an emotional Stroop task (yielding a non-declarative measure of motivation) and a rating task (a declarative measure of motivation), using the same set of stimuli (see previous section for the stimuli used).

Behavioral orienting is a central function of implicit motives (cf. McClelland, 1987). Non-declarative measures of motivation can be derived by assessing spontaneous behavioral orienting in response to motivationally relevant stimuli. One such measure that I used in this experiment, is the emotional Stroop task (for a review, see Williams, Mathews, & MacLeod, 1996). Many researchers have found that emotional stimuli (especially for stimuli related to individual's psychopathologies) differ in the time it takes to name their color compared to neutral stimuli. Generally, color naming for emotional stimuli is slowed for compared to neutral stimuli. Emotional stimuli are, thus, said to "capture attentional resources" that would otherwise be available for the color naming task, thereby interfering with task execution.

The orienting function of implicit motives has only recently found empirical support. Schultheiss and Hale (in press) have used a dot probe task (Mogg & Bradley, 1999) to assess implicit motive effects on attentional orienting towards emotional versus neutral facial expression. In addition, Schultheiss et al. (2006) have found evidence that implicit motives influence attentional orienting towards FEEs as assessed in the emotional Stroop task. This study clearly demands empirical replication, and whether the effect can be generalized to explicit motives and to words is unclear so far.

2.4.4 Referential Competence (Hypothesis 4)

Inter-individual differences in referential competence (i.e., in the ability to quickly name a nonverbal percept as opposed to perceiving it) were assessed using a newly designed task (Schultheiss, Liening, & Schad, in preparation). In this simplified version of the color Stroop task (lacking an interference condition), participants were asked to name the color of color patches and to read color

words as fast as possible. Calculating the speed-difference between color-naming and color word-reading yields a straightforward measure of referential competence. Individuals that need a lot of additional time to name the color of color patches compared to reading the color words are thought to be slow in referential processing or low in referential competence. These individuals should, thus, not show any motive effects in those conditions in which stimulus and response format do not fit with the motivational domain (explicit or implicit). To the contrary, individuals that are not slower in naming a color as compared to reading it are thought to be fast in referential processing or high in referential competence. Due to this ability, they might show effects of both motives for all formats of stimulus and response.

2.4.5 Additional Prediction

Implicit and explicit motives moderate the incentive value of signals of affiliation and dominance in an equivalent way

I did not expect differences between implicit and explicit motives in the way they interact with stimuli signaling dominance and affiliation. Although previous evidence on the response of motives towards social stimuli signaling dominance and affiliation has been reported for implicit and not for explicit motives (e.g., Schultheiss et al., 2005), I assume that the explicit affiliation and power motives respond to signals of friendliness (versus hostility) and dominance (versus submission) in a similar way.

2.5 Summary of Predictions

Some predictions were stated that were derived from Schultheiss' (2001, in press) information processing account (1st level of predictions) while others predictions concern the particular stimuli and tasks used to test these predictions (2nd level of predictions). Predictions derived from the information processing account (1st level of predictions; see Table 2-1 for an overview):

- 0) Explicit and implicit motives do not correlate with each other. (Hypothesis 0)
- 1) Implicit and explicit motives differ with respect to the kinds of stimuli (verbal vs. nonverbal) they preferentially respond to (Hypothesis 1) and
- 2) the kinds of responses (non-declarative vs. declarative) that they influence (Hypothesis 2).
- 3) Implicit motives only respond to nonverbal stimuli to influence only non-declarative responses. Explicit motives only respond to verbal stimuli to influence declarative responses (Hypothesis 3).

For the present study this yield the following predictions:

- a. Implicit motives respond to FEEs to influence the color naming speed.

- b. Explicit motives respond to words to influence liking ratings.
- 4) In individuals high in referential competence, both motives respond to FEEs and to words to predict the color naming speed and liking ratings (Hypothesis 4).

Table 2-1

Overview of predicted effects for the different experimental conditions (1st level)

		measure of motivation (Hypothesis 2)	
		declarative “How much do you like or dislike the stimulus?”	non-declarative “Please name the color of the stimulus.”
stimuli Hyp. 1	<u>nonverbal</u> (FEEs)	implicit motives: r.c.	implicit motives: yes
		explicit motives: r.c.	explicit motives: r.c.
	<u>verbal</u> (Happy, wdea)	implicit motives: r.c.	implicit motives: r.c.
		explicit motives: yes	explicit motives: r.c.

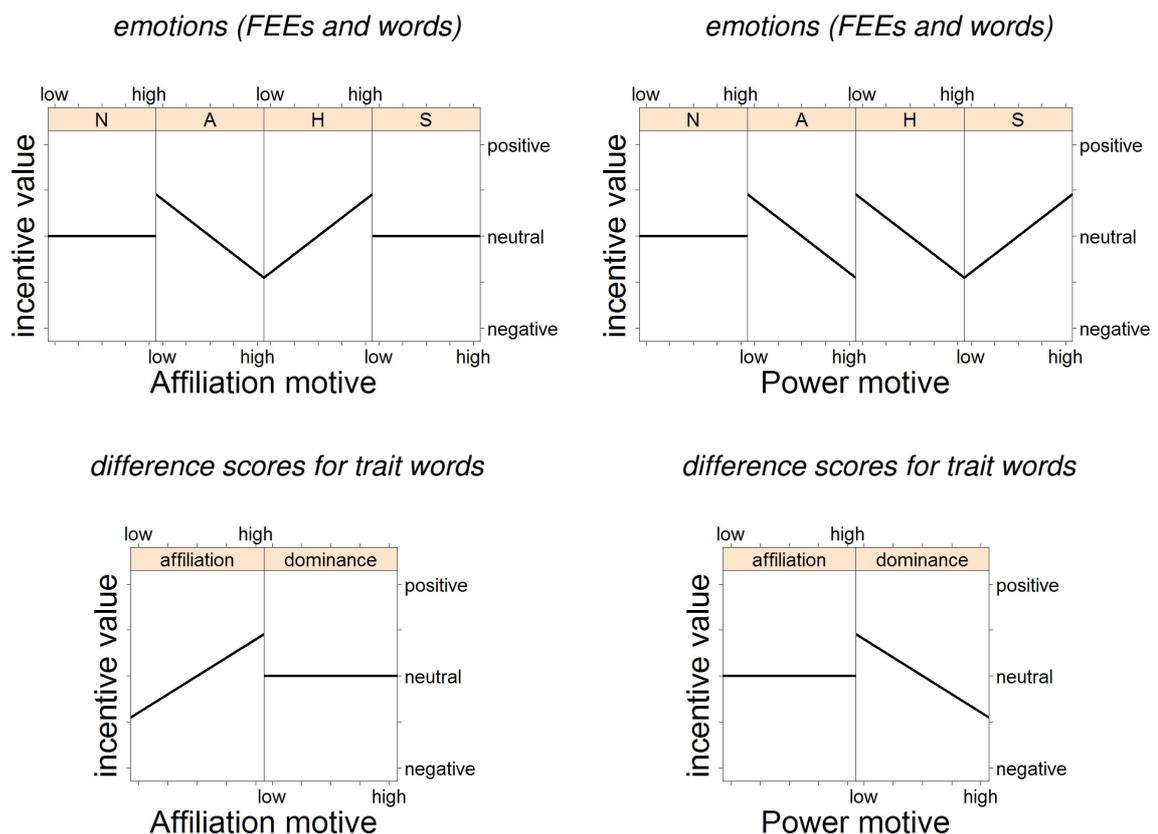
“yes”: motive effects are predicted for this condition; “r.c.”: motive effects are predicted only for individuals high in referential competence (Hypothesis 4)

Predictions concerning the particular stimuli and tasks (2nd level of predictions; see Figure 2-3 for an overview of predictions for stimuli):

- 5) The incentive values of FEEs and Emotion and Trait Words are modulated by the perceiver’s implicit and explicit motives.
 - c. The implicit and explicit affiliation motives responds to signals of friendliness (versus hostility), but does not respond to stimuli signaling neither of the two.
 - i. The affiliation motives positively predict the incentive value of joyful facial expressions, “happy”-words, and trait words signaling high affiliation because these are signals of friendliness.
 - ii. The affiliation motives negatively predict the incentive value of angry facial expressions, “anger”-words, and trait words low in affiliation because these are signals of hostility.
 - iii. The affiliation motives does not moderate the incentive value of stimuli that signal neither friendliness nor hostility and thus do not influence responses to surprised or a neutral facial expressions, to “surprise”-words, to trait words signaling high or low in dominance, or neutral non-words.
 - d. The implicit and explicit power motives responds to signals of dominance (versus submission), and does not respond to stimuli signaling neither of the two.
 - i. The power motives positively predict the incentive value of surprised facial expressions, the word “surprised” and synonyms, and trait words signaling low dominance, because these are signals of submission or low dominance.

- ii. The power motives negatively predict the incentive value of angry or joyful facial expressions, “anger”- or “happy”-words, and trait words high in dominance because these stimuli signal high dominance.
 - iii. The power motives do not influence the incentive value of stimuli that signal neither dominance nor submission. Thus, responses to neutral facial expressions or neutral non-words are not predicted by the implicit or explicit power motives.
 - e. The affiliation and power motives interact (within the implicit and within the explicit domain) to moderate the incentive value of faces and words.
- 6) The incentive value of stimuli is directly expressed in the rating task while the relation between incentive value and the color naming speed is not specified.

Figure 2-3 – Predictions for the effects of the affiliation and the power motive on the incentive value of faces, emotion words, and trait words.



“N” = neutral facial expressions or neutral non-words; “A” = angry faces or words for the emotion anger; “H” = happy faces or words for the emotion joy; “S” = surprised facial expressions or words for the emotion surprise; “affiliation” = difference in the incentive value between trait words signaling high versus low affiliation; “dominance” = difference in the incentive value between trait words signaling high versus low dominance. Incentive value is predicted to symmetrically translate into liking ratings. The direction of influence on the color naming speed is not specified.

3 METHODS

3.1 Participants

86 participants took part in the study. Undergraduates of the University of Michigan attending the introductory psychology class received course credit for their participation while any other members of the University of Michigan were paid \$ 20. Paid participants were recruited via flyers that were posted on the campus of the University of Michigan. Undergraduates receiving course credit were recruited via internet. Four participants had to be excluded due to errors in the data collection process. Out of the remaining 82 participants 48 were female and 34 were male, the mean age was 20.38 years ($SD = 3.64$, $Min. = 17$, $Max. = 40$ years; one participant hadn't reported her age but was included in the analysis), 47 (57.3%) were Caucasian, 15 (18.3%) were Asian, 14 (17.1%) were Black, and 6 (7.3%) were of other races.

3.2 Design

There were six dependent variables that were used in six separate analyses: the participants' responses in two different tasks (dis-/liking ratings of stimuli and the color naming speed for the stimuli) and to three different kinds of stimuli (FEEs, emotion words, trait words). The models for FEEs used the following variables as predictors: continuous motive scores (for n Affiliation, n Power, san Affiliation, and san Dominance) represented measured between-subject covariates and participant gender (men, women) represented a measured between-subject factor. The factors emotion (anger, joy, surprised, neutral), face gender (men, women), face race (Asian, Black, Caucasian), and block (1, 2, 3) were varied orthogonally to each other within subjects, and the within-subject factor stimulus color (red, blue, green) was varied orthogonally to some of the other within-subject factors (for details see below, section 3.6.3). In addition, two more factors were added as crossed random effects to the model as their particular levels were regarded as repeatable and were of no further theoretical interest. The intercept was allowed to vary over subjects (factor participant ID with $n = 82$ levels) and over the levels of the item factor, which coded the identities of twelve different actors (each displaying all three emotions and a neutral expression). Whenever I found motive effects in the neutral condition that made the emotion-effects difficult to interpret, I used responses to neutral facial expressions (ratings or the color naming speed) as a measured time-varying between-subject covariate to test for motive-effects that were emotion-specific. When following up on these effects using linear models, the neutral responses were in addition averaged per subject and used as a measured between-subject covariate in the follow-up analyses.

When modeling responses to emotion words, the within-subject factors face gender and face race did not exist. The random effect of items represented the 24 single words (and non-words) that were nested under emotion. Responses in the neutral condition were averaged over items per subject and block when they were used as a time-varying covariate. All other predictors remained the same as in the models for FEEs. For trait words, the within-subject factor emotion was replaced by the within-subject factors Interpersonal Dimension (affiliation, dominance) and valence (positive, negative; i.e. traits that had previously loaded highly positive or highly negative on the respective trait dimension). Responses to neutral (non-)words, averaged per subject and block, were used as a time-varying between-subject covariate for all models for trait words.

3.3 Procedure

First, participants gave their informed consent to participating in the experiment. Working on personal computers, their implicit motive levels were assessed using a picture-story exercise (PSE) and their explicit motive levels were assessed through two questionnaires (the Personality Research Form, PRF, Jackson, 1974, and a self-constructed motive questionnaire that will not be discussed further in this thesis). The order of the following two tasks – the rating and the emotional Stroop task – was counterbalanced over subjects. Also, the order in which the different kinds of stimuli (faces versus words) were presented within these two tasks and the order of presentation of the different kinds of words (emotion versus trait words) were counterbalanced over participants. As far as possible, given the total number of subjects, balancing of all these factors was done fully orthogonal. In addition, it was made sure that the order in which the different kinds of stimuli were presented in the first task was not exactly repeated in the second task¹. Next, participants worked on the color naming/reading task, the Poffenberger task (Poffenberger, 1912), provided demographic information about themselves and simultaneously gave a saliva-sample, and finally completed two more tasks using subliminal presentation of FEEs. After finishing the computer session, participants filled out a short (paper and pencil) questionnaire about what they believed the tasks were meant to assess. They were debriefed and received the reward for their participation. Sessions lasted about 2 hours. All instructions, stimuli, and materials were presented and responses were collected on personal computers with standard keyboards and by using experimental software. MediaLab (Jarvis, 2005) was used for the PRF, the self-constructed motive-questionnaire, and the demographic information. The Emotional Stroop Task

¹ The balancing of the factors task order (rating, emotional Stroop), verbal/nonverbal order (FEEs, words) in the rating task, verbal/nonverbal order (FEEs, words) in the emotional Stroop task, emotion/trait order (emotion words, trait words) in the rating task, and emotion/trait order (emotion words, trait words) in the emotional Stroop task results in 2⁵ possible cells. The cells representing a repetition of the same stimulus-order over both tasks were left empty, yielding 24 different possible orders that were each realized for three or four participants.

and the Color Naming/Reading task were programmed in DirectRT (Jarvis, 2005), and Inquisit (2005) was used to implement the PSE, the Rating, and the Poffenberger task. For assessing the speed of color naming and color reading, participants had to say the color aloud and responses were detected using microphones. The results from the Poffenberger task as well as from the subliminal FEE tasks will not be discussed in more detail in this thesis due to limits of space.

3.4 Implicit motives

To assess implicit motives, participants wrote imaginative stories about each of the following eight pictures: ship captain, couple by river, trapeze artists, women in laboratory (from Smith, 1992), boxer (from McClelland & Steele, 1972), nightclub scene (from McClelland, 1975), bicycle race, and girlfriend in café with male approaching (from Schultheiss & Pang, in press). Pictures were presented on the computer using standard instructions and procedures (cf. Smith, 1992) and the stories were typed into the keyboard (see Schultheiss, Liening, & Schad, in preparation, for a detailed description of computerized PSE administration). Stories were coded for power and affiliation imagery by a trained coder using the *Manual for Scoring Motive Imagery in Running Text* by (Winter, 1994). The coder had previously reached an agreement of 97 % with an expert coder on the calibration material from the Winter-manual. The manual prescribes scoring of power motive imagery “whenever a story character acts forcefully; tries to persuade, manipulate, and influence others; elicits strong emotions in others; or shows a concern with prestige” (Schultheiss et al., 2005, p. 44). Affiliation motive imagery is scored “whenever a character shows a concern for being close to others by establishing, maintaining, or restoring a relationship; engaging in friendly, reciprocal activities; expressing positive affect about a relationship; or being sad about a separation” (Schultheiss et al., 2005, p. 44). Stories from five participants were coded from a second, expert coder. The correlation between coders over stories was $r = .89$ for the implicit affiliation and $r = .83$ for the implicit power motive. The coders were blind for any information about the participants (including knowledge about participant gender or of presentation of tasks or stimuli). Participant stories contained a mean of 1.07 (SD = 1.43) affiliation and 0.95 (SD = 1.01) power images. Total protocol length ($M = 909$ words, $SD = 307$) was significantly correlated with affiliation ($r = .65$, $p = 5e-11$) and power scores ($r = .56$, $p = 6e-8$). Consequently and following Winter’s (1994) recommendation, the affiliation and the power motive scores were corrected for protocol length by multiplying it by 1,000 and dividing it by word count. For the implicit affiliation motive, these scores (number of motive images per 1,000 words) were used in all further analyses. To ensure normal distribution of motive scores, the power motive scores were transformed using the formula $\sqrt{1 + \text{word-count-corrected motive-score}}$.

3.5 Explicit motives

The participants were administered the PRF scales for affiliation, dominance, aggression, and achievement (Jackson, 1974). These scales have been constructed to capture the same motivational themes that guided the development of the original TAT measures of *n* Affiliation, *n* Power, and *n* Achievement that have been integrated into Winter's (1994) scoring system (cf. Smith, 1992). Each subscale consists of 16 true-false questions describing habits and preferences from the respective motive domain which are either positively or negatively associated with the respective motive. Participants are asked to rate how representative they see each statement as a self-description. The following questions are examples for items from the different subscales: "I seldom put out extra effort to make friends" was a negatively keyed affiliation item and "I feel confident when directing the activities of others" a positively keyed dominance item. A typical achievement item is "I don't mind working while others are having fun" and an aggression item reads "I am quite effective at getting others to agree with me". The affiliation scale was used as a measure of the explicit affiliation motive, and individual's values in the dominance scale were used as the *san* Power variable. Reliability for these two scales was at $\alpha = .79$ for the affiliation scale and $\alpha = .82$ for the dominance scale.

3.6 Emotional Stroop Task and Rating Task

The same stimuli were used in the Emotional Stroop and in the Rating tasks. In both tasks, participants saw three different kinds of stimuli (FEEs, Emotion Words, and Trait Words), which were presented in three distinct blocks.²

3.6.1 Tasks

Stimuli were presented in two tasks in the experiment. Participants had to rate how much they liked or disliked the stimulus in the liking rating task. The question "How much do you like or dislike the stimulus?" was presented on the top of the screen throughout the whole task. Participants answered on a 5-point scale which was numbered from -2 to +2 and labeled "dislike a lot", "dislike a little", "neither like nor dislike", "like a little", and "like a lot" using the mouse. The same question was used for all stimuli to avoid any potential influence of the question on the ratings. Each trial started with the presentation of a stimulus and the appearance of the rating scale on the bottom of the screen. Stimulus, question, and rating scale remained on the screen until the participants responded to the question and, after a 500 ms intertrial interval (ITI), the next stimulus appeared on the screen. After receiving

² The stimuli were presented in blocks to avoid effects that depend on the mixed presentation of different kinds of stimuli and thus to facilitate replication of effects that might be specific to certain kinds of stimuli.

instructions about the task, subjects rated six practice stimuli, which were different from the experimental stimuli, before beginning with the task.

In the Emotional Stroop Task, participants were asked to say the color of the stimulus aloud as fast as they can. The stimulus was presented on the screen (with the rest of the screen being black) until an answer was detected by the microphone. Again, the ITI was 500 ms. Before starting with data collection, the colors of 24 practice stimuli (which were again different from the experimental stimuli) had to be named to adjust the microphone and get used to the task.

3.6.2 Stimuli

For the FEEs, pictures of 12 actors were chosen from the MacBrain Face Stimulus Set (Tottenham, 2002). The actors were from three races (Asian, Black, Caucasian) and two genders (female, male), with two different actors for each race-gender combination. Four pictures for each actor, showing FEEs of anger, joy, surprise, and a neutral facial expression, were used in the experiment. This resulted in $12 \times 4 = 48$ different pictures. All faces were cropped (hairline to chin, cheek to cheek) and colored (red, blue, and green) using Adobe Professional. Thus, each picture was presented three times in three different colors in three different blocks (see below for details on the blocking).

Emotion words were chosen to express emotions that are maximally similar to those expressed in the FEEs. The adjectives describing the emotional states expressed were used (“angry”, “happy”, “surprised”) and each was complemented with five synonyms that were taken from a Thesaurus (Lexico Publishing Group, 2005, see Appendix A) for the complete list). Six non-words were created from the emotion words (two words from each emotion category) by scrambling their letters and used as a neutral condition. Care was taken that the mean word length of neutral non-words and their standard deviation matched those of emotion words³. However, as the frequency of non-words clearly lies below that of emotion words this is likely to influence response times (cf. Larsen, Mercer, & Balota, 2006). This effect, on the other hand, is unable to explain the moderation of the emotional stroop effect by the motive disposition variables. Six different (non-)words were used for each emotion condition (angry, happy, surprised, neutral), resulting in a total of 24 different items in the emotion word condition. Each (non-)word was presented three times in three different colors (red, blue, green).

Trait words were taken from the IAS-R (Wiggins, Trapnell, & Phillips, 1988). To enable a direct test for the effect of the dimensions affiliation and dominance, words were selected from four different categories: high in affiliation (IAS-R scales warm-agreeable), low in affiliation (scales cold-hearted), high in dominance (scales assured-dominant), and low in dominance (scale unassured-

³ To obtain non-words from the respective word-lengths, single letters (randomly chosen from other emotion words) were added to some of the emotion words before scrambling.

submissive). All selected words had loaded high or low only on one factor but had not loaded strongly on the other factor. Six words were selected for each of these four categories⁴. Again, six neutral non-words were produced by scrambling trait words using the same procedure as for emotion words⁵. Each trait word (and non-word) was presented three times in the three different colors red, blue, and green.

Practice stimuli consisted of a set of different adjectives describing people (e.g., “bussy”), a few scrambled words, and FEEs from the Japanese and Caucasian Facial Expressions of Emotion (JACFEE, Matsumoto & Ekman, 1988a) and Japanese and Caucasian Neutral Faces (JACNeuF, Matsumoto & Ekman, 1988b) picture sets. Like the experimental stimuli, also test stimuli were colored using the same colors.

All stimuli were presented in a central position on the screen. The pictures of faces were presented such that their height was 689 pixels with width depending on the physiognomy of the actors. Test stimuli were somewhat smaller in size for FEEs. The font size for words (Arial, size 40) was chosen in such a way that, given a distance of participant’s eyes from the monitors of typically 80 to 100 centimeters, the size of the words did not exceed 1° of visual angle, thus, fit into the fovea, and could potentially be processed without re-fixating.

3.6.3 Blocks

Stimuli were presented in three consecutive blocks to gain the possibility of analyzing motive effects in different phases of the stimulus presentation separately. This was done separately for FEEs, emotion words, and trait words and all three blocks with stimuli of one kind were presented back-to-back. Blocking over time was done in a similar way for each of the different stimuli and tasks.

Each block contained every stimulus (all 48 different FEEs, 24 emotion words, or 30 trait words) in one of the three colors red, blue, or green. For FEEs, all four pictures of one actor that were presented within one block (expressions of three emotions plus neutral expression) were chosen to be from the same color. Stimulus color has been shown to influence the color naming speed (Schultheiss, 2006) and thus, presenting each actor in the same block in only one color prevented face color to confound the emotion factor when analyzing data from only one block.

Three sets were created out of the colored faces and also out of the emotion and the trait words for presentation in three consecutive blocks. For each set, stimuli were colored in a certain pattern. The three sets were presented as blocks one to three and the order of presentation was randomized

⁴ To maximize the likelihood for motive-effects in the Emotional Stroop Task and to reduce redundancy, words were preferentially selected which loaded highly positive or highly negative on a factor, that were of short length, that didn’t contain the opposite meaning in the first part of the word (e.g. forceless), and that didn’t have word parts that were identical to word parts of other words (...-hearted).

⁵ One word was taken from each trait category and additional two non-words were constructed that each contained letters from two trait words from two different categories.

over subjects. As far as possible, colors were equally distributed over blocks and over all cells formed by the within-subject factors. While this was successful for words and for the factor face gender within FEEs, perfect balancing could only be approximated for block and face race in the FEE condition.

3.6.4 Terms for these tasks

In the following, the dis-/liking rating task for faces will be referred to as the “Face Rating” task, the rating task for words will be termed “Word Rating”, the ratings of emotion words will be denoted “Emotion Word Rating”, and “Trait Word Rating” will stand for the dis-/liking ratings of trait words. Equivalently, the emotional Stroop task using faces will be referred to as “Face Stroop” and the one using words as stimuli as “Word Stroop” (using the terms “Emotion Word Stroop” and “Trait Word Stroop” for emotion and trait words).

3.7 Color Naming/Reading Task

In the Color Naming/Reading task, participants read color words (“red”, “blue”, “green”, and “yellow”, written black on white) and named the color of color patches of the corresponding colors. The color patches were rectangles of size 227 (height) x 241 (width) pixels. Words and patches were presented in eight blocks. Within each block, each of the eight stimuli were repeated three times and presented in random order. Response times for color reading and color naming were averaged separately which yielded two measures: one for the speed of reading a color word aloud (color reading) and one for the speed naming a nonverbal color patch and saying the color aloud (which captures the translation of a nonverbal percept into a verbal format). As an additional measure of referential competence, the response times (RTs) for color reading were averaged per block for each color separately and subtracted from the averaged RTs for the corresponding color patches. A general difference score was calculated by averaging all difference scores over colors and blocks. This score reflects the additional time needed to translate the nonverbal information from the color patches into a verbal representation, independent from the baseline-speed of responding to a verbal stimulus. In addition, I averaged the difference scores per block, used these as items in a reliability-analysis, and found internal consistency for this measure of referential competence to lie at $\alpha = .84$.

3.8 Demographic Questionnaire and Saliva Collection

Participants answered several questions about demographic information. Simultaneously, they delivered a sample of saliva for future analysis on salivary hormone levels.

3.9 Statistical Analyses

Analyses were performed in SPSS Version 11.5 and in the *R* system for statistical computing (R Development Core Team, 2006b). Basic correlation statistics were computed in SPSS. All other effects were tested in *R* using linear mixed effects models (lme, e.g., Pinheiro & Bates, 2002) as they are implemented in the lmer program (lme4 package, Bates & Sakar, 2006). Markov Chain Monte Carlo simulation as implemented in the mcmcsmpl program (lme4 package, Bates & Sakar, 2006) was used to test significance of a priori specified contrasts and linear models using the lm program (stats package, R Development Core Team, 2006a) were used for further follow-up tests not involving a within-subject factor.

In SPSS, trials in the emotional Stroop tasks with response times that were faster than 250 ms or slower than 1500 ms were replaced by the mean response time for the condition. Separate preprocessing was done in *R*. Response times (RT) in the emotional Stroop tasks were negatively reciprocally transformed using the formula: $RT_{nr} = -1 / RT$ [sec]. Distributions of transformed response times were investigated using density plots. Cut-off points were defined at 400 ms and 1500 ms and all trials with response times that were faster than 400 ms or 1500 ms were excluded from analysis. This reduced the total number of trials (for all participants and all stimulus conditions) from 25,092 to 23,273. For the Face Stroop task, the number of trials was decreased from 11,808 to 10,956, for the Emotion Word Stroop task, the number dropped from 5,904 to 5,502, and the number of trials in the Trait Word Stroop task shrunk from 7,380 to 6,815. As no missing data existed for the rating tasks, all 25,092 trials were used for analysis. When using responses in the neutral condition as a measured time-varying between-subject covariate, trials in which either the neutral or the emotional response were invalid were excluded from the analysis. Thus, the total number of trials (for all participants and all stimulus conditions) was 19,188 for the rating task (no invalid trials) and 17,797 for the emotional stroop task. For the emotional stroop task, the number of trials was 7,676 for the Face Stroop, 4,031 for the Emotion Word Stroop, and 5,214 for the Trait Word Stroop.

All continuous predictors were centered and standardized before calculating interaction terms. The factor emotion was dummy-coded with the neutral condition functioning as the reference category against which the emotion-specific motive-effects could be tested. When testing effects of the implicit or the explicit affiliation motive, affiliation-related trait words were used as the reference category, while when testing effects of the implicit or the explicit power motive, dominance-related trait words were used as reference. In addition to the continuous motive variables, I split these variable at their median and at the upper and lower tertiles. For these variables, I used dummy coding and individuals low in a motive were coded as the reference category if not otherwise specified.

I used three different kinds of tests in the analysis. All interactions including within-subject-factors and the main effects of these predictors (e.g., Emotion-effects, or Motive \times Emotion interactions) were tested by fitting a mixed effects model to the data. Subsequently, the effect of

interest was dropped from the model and the two models were compared using a chi-square statistics. Participant ID and item were used as crossed random variables unless one of the effects did not explain any variance. In the latter case it was dropped from the model.

Comparison of the effects of between-subject covariate(s) (e.g., motive measures) between the neutral and each emotional condition was done by testing a priori specified contrasts. As no simple t- or F-test for testing the significance of single predictors in the context of the crossed random effects analysis in the lmer program exists, alpha error testing was accomplished by using Markov Chain Monte Carlo simulation as implemented in the mcmcsmpl program (also in the lme4 package, Bates & Sakar, 2006). This program estimates the mean and the distribution of the estimated parameters and, thus, the upper and lower highest posterior density intervals (HPDIs; a Bayesian equivalence for confidence intervals) for various levels of the alpha error can be obtained for the predictors. 10,000 samples were used for the estimation of each HPDI.

Lastly, all effects lacking within-subject factors were tested by fitting linear models with fixed effects only (using the lm program, stats package, R Development Core Team, 2006a) and F- or t-test statistics were calculated for the effects.

4 RESULTS

4.1 Intercorrelations: Predictors and Dependent Variables

4.1.1 Predictor Variables

Table 4-1 – Intercorrelations between Personality Measures, Gender, and Referential Competence

Variable	1	2	3	4	5	6	Mean	Median	SD
1. Implicit Affiliation motive ^a	–						9.59	9.44	3.53
2. Implicit Power motive ^a	-.12	–					8.55	8.29	4.02
3. Explicit Affiliation motive	.01	.04	–				21.45	21.00	3.54
4. Explicit Power motive	.11	.02	.21†	–			22.62	22.00	3.86
5. Participant gender ^b	-.26*	.13	.28*	-.14	–		1.41	1.00	0.50
6. Referential Competence ^c	-.20†	.03	-.22*	-.14	-.08	–	-84.24	-86.85	54.85

^a Implicit Motive scores were word-count corrected. ^b Participant gender was coded 1 for female and 2 for male. ^c Referential Competence was computed by subtracting the reaction time for color naming of color patches from the response time for reading color words (the subtraction was computed for each block and averaged over blocks to reduce the influence of variations in response time over time). High scores reflect fast translation of nonverbal into verbal representations; low scores reflect a slow translation process.

† $p < .10$. * $p < .05$. (2-sided)

Table 4-1 shows the correlations between *n* and *san* Affiliation, *n* and *san* Power, subject gender, and referential competence. Importantly, the correlations between corresponding implicit and explicit motive measures were very low and not significant ($ps > .88$). Also, the correlation between *n* Affiliation and *n* Power was not significant. However, there was a marginally significant correlation between the explicit affiliation and power motive. Both, implicit and explicit measures of the affiliation motive correlated significantly with participant gender. While the significant negative correlation of participant gender with *n* Affiliation indicates that female participants had a higher implicit need to affiliate than men, the significant positive correlation of participant gender with the explicit affiliation motive uncovers a higher explicit need to affiliate in male than in female participants. The level of referential competence was marginally significantly negatively correlated with the implicit and significantly negatively correlated with the explicit affiliation motive, but did not significantly correlate with participant gender.

4.1.2 Dependent Variables: Color Naming Speed and Liking-Ratings

Faces

Table 4-2 shows the inter-correlations between liking ratings and the color naming speed for the FEEs over subjects (with scores averaged per participant). Ratings of all different emotional and neutral expressions were moderately positively and significantly correlated with each other. The only exception was the correlation between angry and happy faces, which was low and not significant. The corresponding inter-correlations for the color naming response times were very high and highly

significant. Liking ratings and color naming speed of faces were overall significantly negatively intercorrelated. Ratings and color naming response times were negatively intercorrelated for all emotions separately, but not all of these correlations reached significance. Ratings of angry faces were not significantly correlated with the color naming speed of any emotion and the ratings of surprised and neutral faces correlated significantly with the color naming speed for only some emotions.

Table 4-2

Intercorrelations between Liking-Ratings and Color Naming Speed of Faces for Different Emotional Expressions and Referential Competence

Variable	1	2	3	4	5	6	7	8	9	M	SD
Liking-Rating											
1. Angry Faces ^a	–									-1.03	.72
2. Happy Faces ^a	-.12	–								.53	.76
3. Surprised Faces ^a	.49**	.54**	–							-.28	.67
4. Neutral Faces ^a	.26*	.39**	.52**	–						-.21	.53
Color Naming Speed [ms]											
5. Angry Faces	-.10	-.23*	-.23*	-.23*	–					665	94
6. Happy Faces	-.06	-.24*	-.18	-.19†	.91**	–				664	93
7. Surprised Faces	-.10	-.21†	-.23*	-.13	.90**	.88**	–			661	89
8. Neutral Faces	-.10	-.27*	-.22*	-.18	.91**	.93**	.92**	–		668	92
9. Referential Competence ^b	.08	.15	.09	.01	-.36**	-.43**	-.40**	-.35**	–	-84	55

^a Ratings were answers to the question “How much do you like or dislike the stimulus?”. Answers were given on a 5-point scale ranging from -2 “dislike a lot” to +2 “like a lot”. ^b Referential Competence was computed by subtracting the reaction time for color naming of color patches from the response time for reading color words (the subtraction was computed for each block and averaged over blocks to reduce the influence of variations in response time over time). High scores reflect fast translation of nonverbal into verbal representations; low scores reflect a slow translation process.

† $p < .10$. * $p < .05$. ** $p < .01$. (2-sided)

Emotion Words

Table 4-3

Intercorrelations Between Liking-Ratings and Color Naming Speed for Different Emotion Words, Neutral Non-Words and Referential Competence

Variable	1	2	3	4	5	6	7	8	9	M	SD
Liking-Rating											
1. Angry ^a	–									-.57	.74
2. Happy ^a	-.44**	–								.80	.73
3. Surprised ^a	-.09	.74**	–							.46	.57
4. Neutral: Non-Words ^a	-.10	.20†	.18	–						-.33	.73
Color Naming Speed [ms]											
5. Angr	-.01	-.15	-.16	-.02	–					689	90
6. Happy	-.04	-.10	-.13	.08	.81**	–				678	85
7. Surprised	.01	-.17	-.21†	-.01	.86**	.81**	–			681	86
8. Neutral: Non-Words	-.09	-.14	-.16	-.02	.81**	.83**	.83**	–		682	90
9. Referential Competence ^b	-.04	-.03	.01	-.10	-.32**	-.44**	-.38**	-.35**	–	-84	55

^a Ratings were answers to the question “How much do you like or dislike the stimulus?”. Answers were given on a 5-point scale ranging from -2 “dislike a lot” to +2 “like a lot”. ^b Referential Competence was computed by subtracting the reaction time for color naming of color patches from the response time for reading color words. High scores reflect fast translation of nonverbal into verbal representations; low scores reflect a slow translation process.

† $p < .10$. * $p < .05$. ** $p < .01$. (2-sided)

The same inter-correlations for emotion words that were discussed for faces in the previous section are given in Table 4-3. Unlike in the faces-condition, ratings of different emotion words were only significantly correlated between words for the emotions angry and happy, for the emotions

surprised and happy and marginally significant for surprised words and non-words. Again, the color naming speeds for words of all emotions were highly and highly significantly intercorrelated. Overall, ratings were not significantly correlated with color naming response times.

Trait Words

As can be seen in Table 4-4, liking ratings of trait words from the different conditions were generally significantly positively correlated. This held true for most conditions, but not for the correlation between words describing individuals low and high in affiliation, which were significantly negatively correlated, and the correlations between non-words and high dominance words as well as non-words and low affiliation words, which were not significantly correlated. For trait words, the correlations between the color naming speed for non-words and those for trait words in all conditions were high and significant. The correlation between ratings of trait words and the color naming speed for trait words was negative and marginally significant.

Table 4-4

Intercorrelations Between Liking-Ratings and Color Naming Speed [ms] for Different Trait Words High or Low in the Dimensions Dominance or Affiliation a, Neutral Non-Words and Referential Competence

Variable	1	2	3	4	5	6	7	8	9	10	11	<i>M</i>	<i>SD</i>
Liking Ratings													
1. high Dominance ^b	–											.17	.48
2. low Dominance ^b	.24*	–										-.11	.57
3. high Affiliation ^b	.45**	.29**	–									.81	.72
4. low Affiliation ^b	.50**	.23*	-.32**	–								-.55	.66
5. Neutral: Non-Words ^b	.06	.25*	.22*	-.05	–							-.34	.78
Color Naming Speed [ms]													
6. high Dominance	-.02	-.18	-.08	-.11	-.10	–						690	85
7. low Dominance	-.10	-.19†	-.18	-.09	-.03	.78**	–					690	91
8. high Affiliation	-.19†	-.18†	-.22*	-.10	-.08	.78**	.79**	–				692	93
9. low Affiliation	.02	-.09	-.11	.03	-.03	.81**	.81**	.78**	–			686	87
10. Neutral: Non-Words	-.07	-.16	-.16	-.09	-.02	.80**	.78**	.83**	.77**	–		687	95
11. Referential Competence ^c	.02	-.06	-.01	-.07	-.05	-.40**	-.37**	-.42**	-.44**	-.40**	–	-.84	55

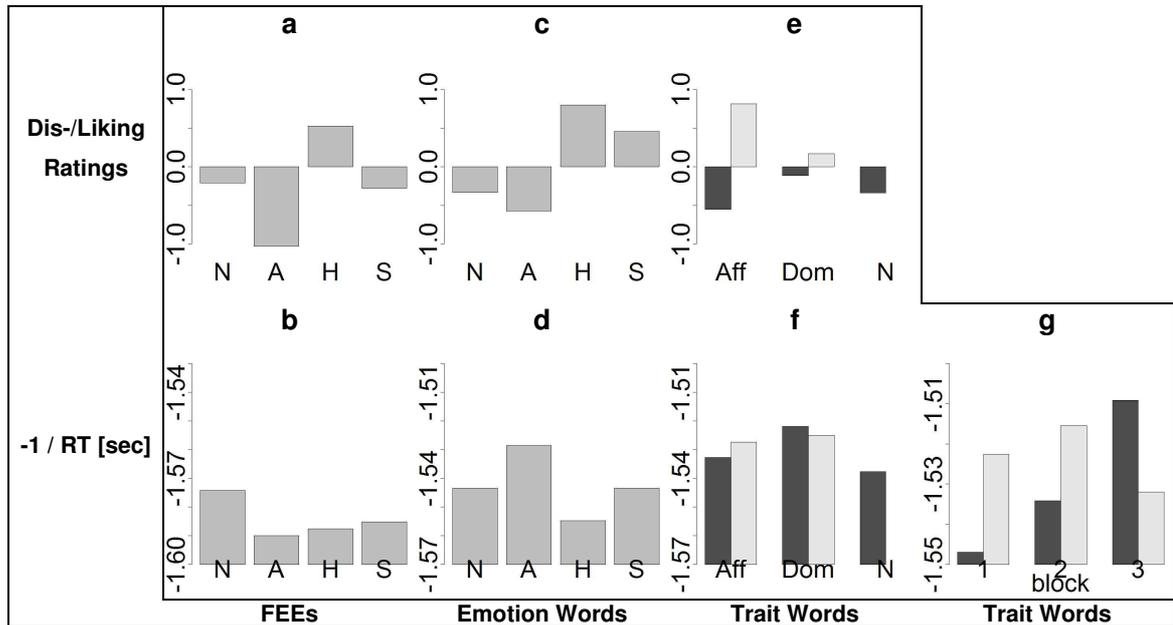
^a The trait words were taken from the IAS-R (Wiggins, Trapnell, & Phillips, 1988). ^b Ratings were answers to the question “How much do you like or dislike the stimulus?”. Answers were given on a 5-point scale ranging from -2 “dislike a lot” to +2 “like a lot”. ^c Referential Competence was computed by subtracting the reaction time for color naming of color patches from the response time for reading color words. High scores reflect fast translation of nonverbal into verbal representations; low scores reflect a slow translation process.

† $p < .10$. * $p < .05$. ** $p < .01$. (2-sided)

4.2 Effects of Emotion, Interpersonal Dimension, and Valence

The effects of emotion on liking ratings and color naming speed for the different kinds of stimuli are displayed in Figure 4-1 and the corresponding means and standard deviations are reported in Tables 4-1 to 4-4.

Figure 4-1 – Effects of Emotion, Interpersonal Dimension, and Valence



The main effects of Emotion and the interaction of Interpersonal Dimension with Valence are displayed for both tasks. (a-f). For the Trait Word Stroop Task, the effect of Interpersonal Dimension is shown additionally as changing over blocks (g). a-d, “N” = neutral condition, for the emotional conditions: “A” = angry, “H” = happy, “S” = surprised; e-g: “Aff” = affiliation-related trait words, “Dom” = dominance-related trait words; e, f, dark bars represent mean responses for words with negative valence, and light bars represent mean responses for traits with positive valence; g, dark bars represent mean responses for affiliation words, and light bars represent mean responses for dominance words.

To test for effects of emotion on *liking ratings of faces*, I regressed liking ratings on the within-subject factor emotion (anger, joy, surprise, neutral) and crossed random intercepts for subjects and items and found a highly significant effect of emotion with $\chi(3) = 3524.1, p < .0001$. Next, I used Markov Chain Monte Carlo sampling to estimate upper and low highest posterior density intervals (HPDIs) for the a priori defined contrasts. As can be seen in Figure 4-1 a, while mean ratings of neutral expressions were slightly and significantly negative ($B = -0.21, SE = 0.074$, upper and lower 99% highest posterior density intervals, HPDIs: $-0.42 < B < -0.01$), ratings of angry expressions were strongly negative ($M = -1.03$) and differed significantly from those of neutral expressions ($\Delta B = -0.82, SE = 0.024, 99.9\%$ HPDIs: $-0.90 < B < -0.74$). Ratings of happy faces were positive ($M = 0.53$, for the difference from neutral faces: $\Delta B = 0.74, SE = 0.024, 99.9\%$ HPDIs: $0.66 > B > 0.82$) and ratings of surprised facial expressions were slightly more negative than those of neutral expressions ($M = -0.28; \Delta B = -0.07, SE = 0.024, 99\%$ HPDIs: $-0.13 < B < -0.01$).

The emotion effect was not significant for response times in the *Face Stroop task* testing an equivalent model as reported above ($p = .43$). However, testing the response to neutral versus emotional facial expressions directly uncovered a trend towards faster color naming for emotional facial expressions ($\chi(1, 2.70, p = .10$), which is illustrated in Figure 4-1 b).

Next, I tested the influence of the emotion-factor on ratings in the *Emotion Word Rating task* using a similar model as the one reported for FEEs and found a highly significant effect, $\chi(3) = 57.12$,

$p < .0001$ (see Figure 4-1 c). Testing of a priori-specified contrasts indicated that the ratings for neutral non-words were significantly below zero ($B = -0.33$, $SE = 0.088$, 99% HPDIs: $-0.57 < B < -0.08$), that ratings of words for the emotion anger ($M = -0.57$) were significantly below those for non-words ($\Delta B = -0.24$, $SE = 0.111$, 95% HPDIs: $-0.51 < B < -0.01$), and that the word happy and synonyms ($M = 0.80$) as well as the word surprised and synonyms ($M = 0.46$) were rated positive and significantly more positive than non-words (happy condition: $\Delta B = 1.13$, $SE = 0.111$, 99.9% HPDIs: $0.73 < B < 1.56$; surprised condition: $\Delta B = 0.79$, $SE = 0.111$, 99.9% HPDIs: $0.36 < B < 1.20$).

The factor emotion was not significant in an equivalent model for the *Emotion Word Stroop task* ($p = .23$). While the difference between all emotional conditions and the non-words was not significant ($p = 1.00$), the emotion-factor approached the level of a trend when responses to neutral non-words were averaged per subject and used as a predictor, $\chi(2) = 4.33$, $p = .12$. As was suggested by diagram d in Figure 4-1 and confirmed by post-hoc tests (done by excluding one emotion each from the model), color naming tended to be faster for happy- ($M = -1.546$) than for angry-words ($M = -1.521$, for the difference: $\chi(1) = 3.58$, $p = .06$) but non of the other differences between conditions were significant ($ps > .20$, mean for surprised-words: $M = -1.536$). Thus, unlike reported in many previous studies (e.g., Williams, Mathews, & MacLeod, 1996), I did not find generally slowed response times for emotion words compared to the neutral control. One potential explanation might be that response times for the neutral condition were comparatively slow because I used non-words with a frequency of zero.

To test for the effects of different trait words in the *Trait Word Rating task*, I regressed liking ratings on the within-subject factors interpersonal dimension (affiliation, dominance), valence (positive, negative), the between-subject covariate mean ratings in the neutral condition, and crossed random intercepts for subjects and items. As is depicted in diagram e in Figure 4-1, words with positive valence (i.e. high in affiliation or highly dominant trait words) were liked more than the negative ones, $\chi(1) = 15.83$, $p < .0001$, while there was no significant difference between trait words from different interpersonal dimensions ($p = .72$). The main effect of trait was also significant, $F(1,80) = 8.09$, $MSE = 1.842$, $p < .01$, indicating that affiliation words were more liked than dominance words. In addition, the interaction between interpersonal dimension and valence was significant ($\chi(1) = 12.53$, $p < .001$). Testing contrasts indicated that while the effect of valence was not significant for dominance-related words (95% HPDIs: $-0.08 < B < 0.35$), it was significantly stronger for trait words related to affiliation ($\Delta B = 0.54$, $SE = 0.144$, 99.9% HPDIs: $0.14 < B < 1.05$).

While the effects of interpersonal dimension, valence, and their interaction were not significant in an equivalent regression model for the *Trait Word Stroop task* ($ps > .46$, Figure 4-1 f), I found a marginally significant Block \times Interpersonal Dimension interaction ($\chi(2) = 5.43$, $p = .07$). This interaction reached significance when I excluded responses to non-words from the analysis ($\chi(2) = 6.05$, $p < .05$). As illustrated in Figure 4-1 g, responses towards affiliation-related trait words were getting slower over blocks ($\chi(2) = 6.25$, $p < .05$) but no block effect occurred for dominance-

related words ($p = .51$). However, Figure 4-1 g suggests that responses to dominance-words were even getting faster towards the end of the task, and a direct comparison of responses in the blocks two and three indicated that this effect was significant at the trend level ($\chi(1) = 2.70, p = .10$). Thus, participants were getting slower in naming the color of affiliation-related trait words over the course of the task but tended to respond faster to dominance-related trait words towards the end of the task.

In summary, while the different emotion and interpersonal dimension \times valence conditions clearly produced specific ratings in an expected manner, I also found some good hints that these variables influenced the color naming speed in the Stroop tasks. As predicted, the emotion effects for ratings were similar between FEEs and emotion words. Ratings were positive for the happy and negative for the anger conditions, while ratings for the neutral conditions were somewhere in the middle between these two and slightly below zero. Only ratings of stimuli expressing surprise differed between faces and words. While surprised facial expressions were rated slightly more negative than neutral facial expression, the word surprise and synonyms were rated clearly more positive than neutral non-words, and nearly as positive as words from the happy-condition. This indicates that the surprise-words that I had used in the experiment captured a meaning that was somewhat different from the one that was conveyed by facial expressions of surprise. Also trait words were rated in a very reasonable manner with positive words being rated positively and negative words being rated negatively. The effect was strong for affiliation-related words but non-significant for dominance-words alone. This indicates that dominance and submission are not as clearly related to positive or negative evaluation as are friendliness versus hostility.

In the Emotion Stroop tasks, I found generally fastened color naming for emotional facial expressions compared to neutral expressions (with no emotion-specific effects) and hints for an emotion-specific effect for color naming of emotion words (with anger-words producing longer response times than happy-words). However, I can not rule out the possibility that lexical factors (e.g. word frequency or word predictability) produced the effect for emotion words as these factors were not controlled for (cf. Larsen, Mercer, & Balota, 2006). While there were no direct effects of interpersonal dimension or valence in the Trait Word Stroop, responses towards affiliation- and dominance-related words changed differently over blocks (with color naming of affiliation-words getting slower and color naming of dominance-words getting faster). Thus, overall, it is clear that the factors Emotion, Interpersonal Dimension, and Valence had effects in the Rating and also in the Emotional Stroop tasks.

4.3 Motive Effects

To test for emotion-specific motive effects on dis-/liking ratings and the emotional Stroop task, I regressed ratings and reciprocally transformed response times on the interaction between the within-subject factor emotion (neutral, angry, happy, surprised) with the between-subject covariates (implicit or explicit) affiliation motive and power motive, as well as all lower order effects contained in this interaction. In addition, if they explained additional variance, subjects and items were added as crossed random effects to the set of predictors. To test the significance of the three-way interaction effect involving the two motive variables and emotion, I used the model-comparison procedure described in the methods section. This approach was taken to test emotion \times motive (\times motive) interactions for each stimulus type (faces, emotion words, trait words) \times task (rating, emotional Stroop) combination separately. For trait words, the emotion factor was replaced by the two factors interpersonal dimension (affiliation, dominance) and valence (traits high = positive or low = negative in the respective trait) as well as their interaction. In some analyses, the responses to neutral non-words were added as a measured time-varying between-subject covariate to reduce the error in the model and to yield motive effects that are specific to trait words. In the follow-up analyses without within-subject factors using linear models, the response in the neutral condition averaged per subject was added as an additional between-subject covariate for more reliable prediction of the mean response per subject.

In the following, I will report effects of implicit and explicit motives in the Face Rating Task (1), the Face Stroop Task (2), the Emotion Word Rating Task (3), the Emotion Word Stroop Task (4), the Trait Word Rating Task (5), and the Trait Word Stroop Task (6).

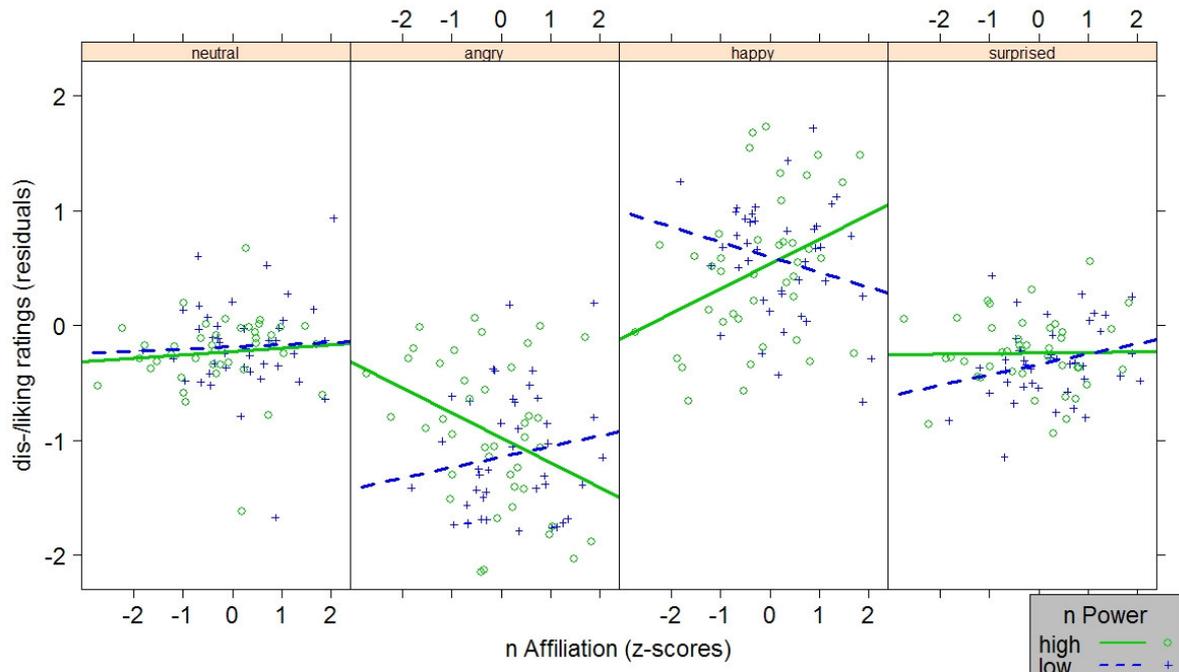
4.3.1 Face Ratings

Implicit motive effects on Face Ratings

To test for implicit motive effects on FEE-driven liking ratings, I regressed ratings of faces on the within-subject factor emotion (neutral, angry, happy, surprised), the within-subject covariates n Affiliation and n Power, and crossed random effects of the intercept varying over subjects and items. The interaction between the implicit affiliation and power motive depended on the emotion condition as indicated by a highly significant Emotion \times n Affiliation \times n Power interaction ($\chi^2(3) = 45.72$, $p < .0001$; tested by comparing the model to a simpler model lacking the effect). Following up on the effect uncovered a significant n Affiliation \times n Power interaction for neutral faces, $F(1,2948) = 8.88$, $MSE = 7.520$, $p < .01$. The same interaction in the angry-face ($\Delta B = -0.069$, $SE = 0.025$, 99% HPDIs: $-0.132 < B < -0.00437$) and in the happy-face ($\Delta B = 0.096$, $SE = 0.025$, 99.9% HDPIs: $0.0153 < B < 0.170$) conditions, but not in the surprised-face condition ($\Delta B = -0.026$,

$SE = 0.025$, 95% HPDIs: $-0.0758 < B < 0.0230$) differed significantly from the effect in the neutral condition.

Figure 4-2 – n Affiliation effects on Face Ratings

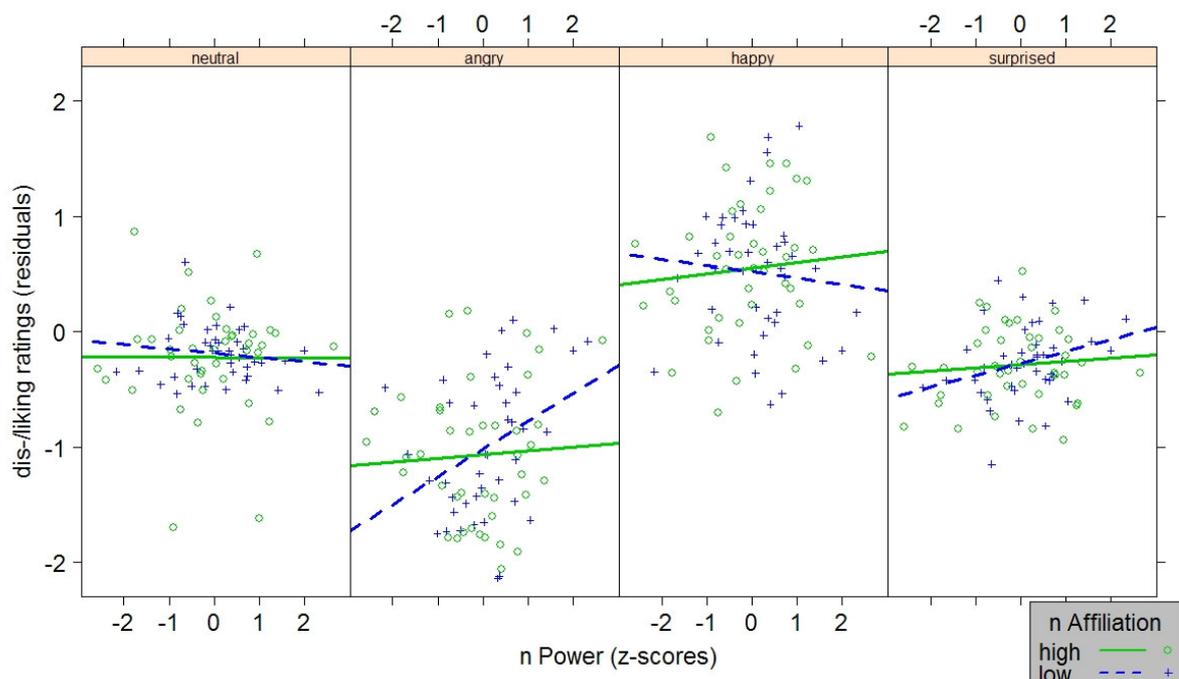


Emotion × Implicit affiliation motive × Implicit power motive (median split) interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes are calculated from the overall model.

Next, I replaced the n Power variable in the previous model by a variable coding individuals low versus high in n Power (median split) and tested the resulting $\text{Emotion} \times n \text{ Affiliation} \times n \text{ Power}$ (median split) interaction by means of model comparison. I found that the way the n Affiliation slope differed for individuals low versus high in n Power depended significantly on the emotion condition, $\chi(3) = 176.44$, $p < .0001$. While the n Affiliation-slope-difference for neutral faces was not significant, $F(1,2948) = 0.08$, $MSE = 0.0683$, $p = .78$, there was a trend for a positive main effect of n Affiliation on ratings of neutral faces ($B = 0.030$, $SE = 0.017$, $p = .08$). The slope-difference significantly differed from the neutral condition in the conditions with angry ($\Delta B = -0.318$, $SE = 0.050$, 99.9% HPDIs: $-0.477 < B < -0.161$), happy ($\Delta B = 0.336$, $SE = 0.050$, 99.9% HPDIs: $0.176 < B < 0.511$), and surprised ($\Delta B = -0.095$, $SE = 0.050$, 94% HPDIs: $-0.191 < B < -0.003$) faces. I analyzed motive responses towards **angry faces** and found a significant n Affiliation-slope difference between individuals low versus high in n Power ($F(1,2948) = 58.68$, $MSE = 64.96$, $p < .0001$). There was a significant negative n Affiliation slope for individuals high in n Power ($B = -0.217$, $SE = 0.03$, $p < .0001$) and a significant positive effect for individuals low in n Power ($B = 0.091$, $SE = 0.03$, $p < .01$) which also tended to be more positive than the corresponding slope for neutral faces ($B = 0.071$, $SE = 0.038$, 94% HPDIs:

0.001 < B < 0.143). Liking ratings of **happy faces** were strongly positively influenced by n Affiliation in individuals high in n Power ($B = 0.216$, $SE = 0.03$, $p < .0001$) but were significantly negatively predicted by n Affiliation in individuals low in n Power ($B = -0.130$, $SE = 0.03$, $p < .0001$, slope difference: $F(1,2948) = 60.75$, $MSE = 81.88$, $p < .0001$). Analyses in the **surprised-face** condition revealed a significant n Affiliation-slope-difference, $F(1,2948) = 4.58$, $MSE = 4.987$, $p < .05$. While individuals low in n Power had a significantly positive n Affiliation-slope ($B = 0.091$, $SE = 0.03$, $p < .01$), which also tended to be more positive than the same slope for neutral faces ($B = 0.071$, $SE = 0.038$, 94% HPDIs: 0.001 < B < 0.143), there was no n Affiliation effect in individuals high in n Power ($p = .84$). As shown in Figure 4-2, n Affiliation negatively predicted ratings of angry and positively predicted ratings of happy, but did not predict ratings of surprised faces within individuals high in n Power. This was different for individuals low in n Power in whom n Affiliation predicted liking of angry, disliking of happy, and liking of surprised faces.

Figure 4-3 – n Power effects on Face Ratings



Emotion × Implicit power motive (median split) × Implicit power motive interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting.

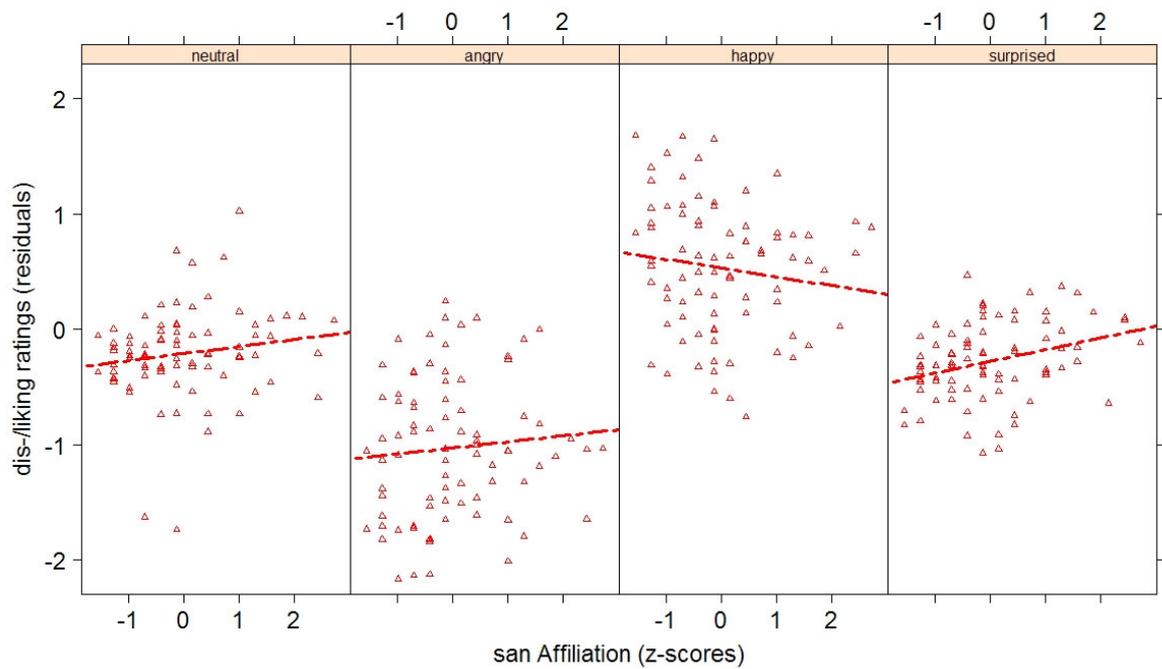
In addition, I split n Affiliation at its median. The resulting Emotion × n Affiliation (median split) × n Power interaction was highly significant, $\chi(3) = 45.72$, $p < .0001$. Following up on this effect revealed no significant n Power slope-difference between individuals low versus high in n Affiliation in the neutral condition, $F(1,2948) = 1.09$, $MSE = 0.933$, $p = .29$). However, there were emotion-specific slope-differences for angry ($\Delta B = -0.245$, $SE = 0.050$, 99.9% HPDIs: $-0.373 < B < -0.114$) and for surprised ($\Delta B = -0.111$, $SE = 0.050$, 95% HPDIs: $-0.208 < B < -0.013$)

faces, but not for happy faces (95% HPDIs: $-0.025 < B < 0.165$). Further analyses in the **angry-face** condition yielded a significantly positive slope of n Power for individuals low in n Affiliation ($B = 0.24$, $SE = 0.030$, $p < .0001$), but no significant n Power effect in individuals high in n Affiliation ($p = 0.22$; for the slope difference: $F(1,2948) = 27.33$, $MSE = 30.61$, $p < .0001$). Although only the n Affiliation \times n Power interaction using continuous variable but not the n Power-slope-difference in the **happy-face** condition was significantly different from the corresponding effect in the neutral condition, both, the continuous and the median-split effect differed significantly from zero for happy faces ($F(1,2948) = 44.44$, $MSE = 60.24$, $p < .0001$ for n Affiliation \times n Power; $F(1,2948) = 5.61$, $MSE = 7.733$, $p < 0.05$ for the slope-difference). This revealed a positive trend of n Power for individuals high in n Affiliation ($B = 0.050$, $SE = 0.027$, $p = .07$). The n Power slope for individuals low in n Affiliation approached a negative trend ($B = -0.055$, $SE = 0.035$, $p = .12$). Next, I followed up the effect on **surprised faces** and found a highly significant positive effect of n Power in individuals low in n Affiliation ($B = 0.10$, $SE = 0.030$, $p < 0.001$) but not in individuals high in n Affiliation ($p = .26$; slope difference $F(1,2948) = 3.63$, $MSE = 3.957$, $p = .06$). Thus, as is depicted in Figure 4-3, n Power predicted liking of angry and of surprised faces only for individuals low but not for those high in n Affiliation. Liking ratings of happy faces tended to be positively predicted by n Power in individuals high and negatively within individuals low in n Affiliation.

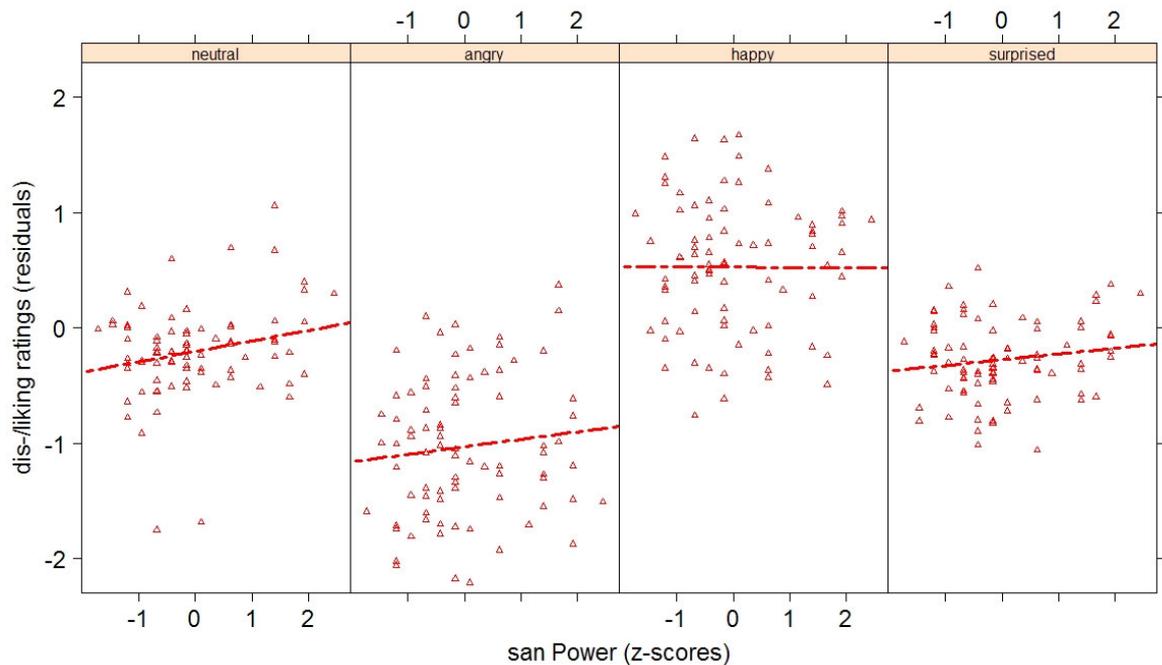
Explicit motive effects on Face Ratings

As replacing the implicit motives in the analyses reported in the previous section by their explicit counterparts did not yield a significant Emotion \times san Affiliation \times san Power interaction ($p = .14$), I tested the interactions of each motive variable with emotion separately. The Emotion \times san Affiliation interaction was highly significant, with $\chi(3) = 59.85$, $p < .0001$.

As can be seen in Figure 4-4, san Affiliation was significantly and positively related to ratings of neutral faces ($B = 0.062$, $SE = 0.02$, $p < .001$). The slope for **angry faces** was also significant and positive ($B = 0.052$, $SE = 0.02$, $p < 0.01$) but not different from the one on neutral expressions (95% HPDIs: $-0.057 < B < 0.036$). San Affiliation tended to predict ratings of **surprised faces** more positively than neutral faces ($\Delta B = 0.040$, $SE = 0.024$, 90% HPDIs: $0.002 < B < 0.081$; for the slope against zero: $B = 0.102$, $SE = 0.02$, $p < .0001$) but significantly predicted ratings of **faces expressing joy** negatively ($B = -0.075$, $SE = 0.02$, $p < .001$) and more negatively than ratings of neutral faces ($\Delta B = -0.137$, $SE = 0.024$, 99.9% HPDIs: $-0.218 < B < -0.062$). Thus, san Affiliation was positively associated with ratings of neutral, angry, and surprised facial expressions, but negatively predicted ratings of happy faces. Only the san Affiliation responses toward surprised and happy faces differed from that for neutral faces.

Figure 4-4 – *san* Affiliation effects on Face Ratings

Emotion × *Explicit affiliation motive* interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting.

Figure 4-5 – *san* Power effects on Face Ratings

Emotion × *Explicit power motive* interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting.

To test for emotion-specific *san* Power effects on liking ratings, I then tested the interaction Emotion \times *san* Power and found it to be significant, $\chi(3) = 15.74, p < .01$. As depicted in Figure 4-5, individuals high in *san* Power liked neutral faces more than individuals low in *san* Power ($B = 0.091, SE = 0.017, p < .0001$). The same effect occurred for angry faces ($B = 0.065, SE = 0.020, p < .001$) and did not statistically differ from the effect on neutral faces (95% HPDIs: $-0.072 < B < 0.023$). The *san* Power slope for happy faces did not significantly differ from zero ($p = .90$) but was significantly more negative than the effect on neutral faces ($\Delta B = -0.093, SE = 0.024, 99.9\%$ HPDIs: $-0.171 < B < -0.010$). In the surprised-face condition, *san* Power was significantly positively related to liking ratings ($B = 0.050, SE = 0.019, p = 0.01$), but – on a trend level – less positively than for neutral faces ($\Delta B = -0.093, SE = 0.024, 90\%$ HPDIs: $-0.081 < B < -0.001$).

4.3.2 Face Stroop

Implicit motive effects in the Face Stroop task

When analyzing implicit and explicit motive effects in the Face Stroop task, I found strong effects in response to neutral faces which made the emotion-specific effects difficult to interpret. In order to be able to interpret emotion-specific motive effects more easily and more clearly¹, I entered variables for the color naming speed in response to neutral facial expressions as a measured time-varying between-subject covariate. All motive-effects found in analyses including responses in the neutral condition as a covariate are per se emotion-specific as the variance associated with responding towards neutral stimuli is controlled for.

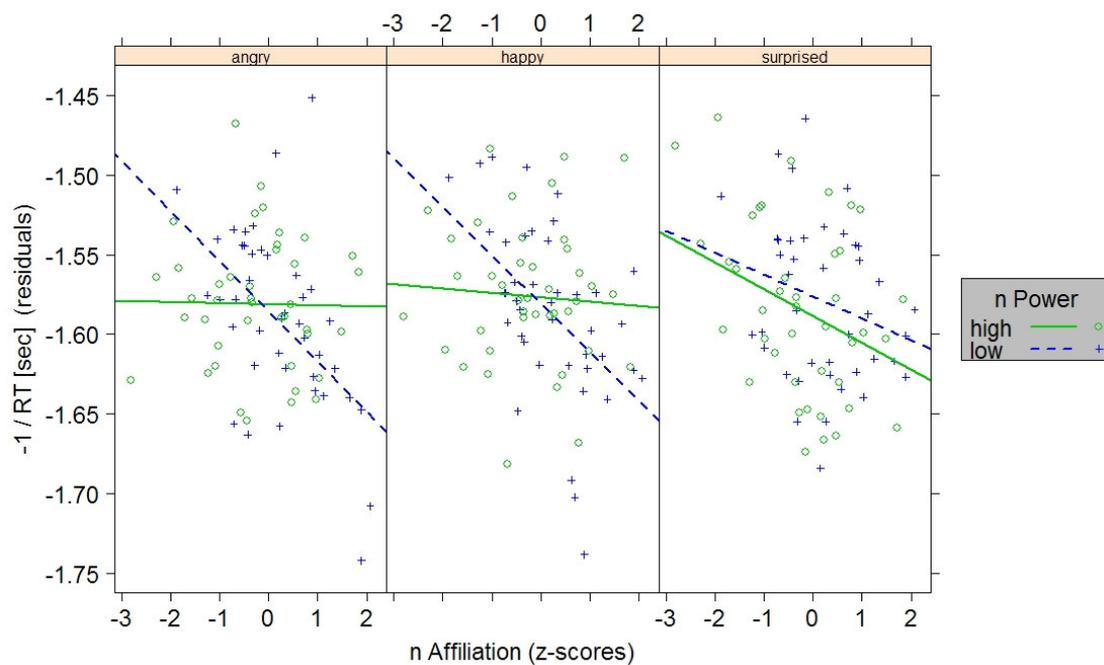
To test for implicit motive effects on FEE-driven reaction times, I regressed the color naming speed for emotional expressions on the between-subject covariates *n* Affiliation and *n* Power, the time-varying covariate response times for neutral expressions (in the disaggregated form for each actor per block), the within-subject factor emotion (angry, happy, surprised), and random intercepts for subjects and items and found a significant Emotion \times *n* Affiliation \times *n* Power interaction, $\chi(2) = 5.98, p = .05$. Following up on this effect using linear regression, I found a significant *n* Affiliation \times *n* Power interaction in the anger- ($F(1,2543) = 9.73, MSE = 0.920, p < .01$) and in the joy- ($F(1,2560) = 8.78, MSE = 0.812, p < .01$), but not in the surprise-face condition.

Next, I tested for *n* Affiliation slope-differences between different levels of the median split *n* Power variable and Emotion and found a marginally significant Emotion \times *n* Affiliation \times *n* Power (median split) interaction, $\chi(2) = 4.94, p = .09$. Further analyses revealed a marginally significant negative *n* Affiliation-slope in response to **angry faces** for individuals low in *n* Power ($B = -0.018, SE = 0.010, p = .08$) which differed significantly from the corresponding and non-significant

¹ Note that the reduction in error variance by adding the neutral predictors was not substantial because the random intercepts for subjects and items already covered most of this variance.

($p = .98$) slope within individuals high in n Power, $F(1,2543) = 4.10$, $MSE = 0.389$, $p < .05$. The same pattern occurred in response to **happy faces**. There was a significant negative n Affiliation slope in individuals low in n Power ($B = -0.020$, $SE = 0.010$, $p < .05$) which differed from that for individuals high in n Power ($p = .63$) on the level of a trend, $F(1,2560) = 3.339$, $MSE = 0.310$, $p = .07$. The equivalent slope-difference in the **surprise-face** condition was not significant ($p = .54$) but a trend for a negative main effect of n Affiliation occurred ($B = -0.011$, $SE = 0.012$, $p = .08$). Thus, as illustrated in Figure 4-6, n Affiliation predicted an emotion-specific shortening of reaction times in response to angry and happy faces within individuals low in n Power and for all individuals in response to surprised facial expressions.

Figure 4-6 - n Affiliation effects in the Face Stroop task

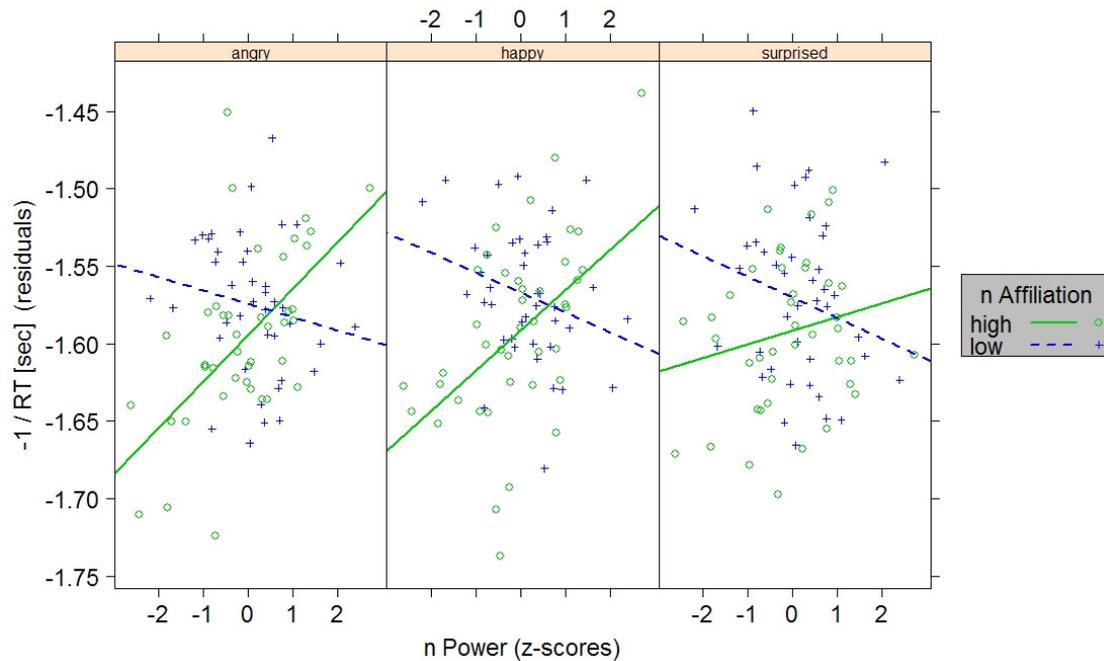


Emotion \times Implicit affiliation motive \times Implicit power motive (median split) interaction effect on the color naming speed ($-1/RT$ [sec]) for faces. Response times are residualized for the responses towards neutral facial expressions and the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

While splitting the n Affiliation variable at its median did not yield a significant Emotion \times n Affiliation (median split) \times n Power interaction ($p = .53$), the n Affiliation \times n Power interaction (using two continuous variables) had proven to be significant in the anger- and in the happy-face conditions (see above). Thus, I tested the difference in n Power-slopes for individuals high versus low in n Affiliation in these conditions and found significant effects for both, the anger ($F(1,2543) = 6.90$, $MSE = 0.654$, $p < .01$) and the joy ($F(1,2560) = 7.17$, $MSE = 0.093$, $p < .01$) condition. As shown in Figure 4-7, n Power predicted slowing of color naming in individuals high in n Affiliation for **angry** ($B = 0.028$, $SE = 0.008$, $p < .001$) and for **happy** ($B = 0.023$, $SE = 0.008$, $p < .01$) FEEs but had non-

significant negative effects within individuals low in n Affiliation ($ps > .26$). The slope-difference as well as the main effect for n Power was non-significant in the **surprise-face** condition ($ps > .15$).

Figure 4-7 – n Power effects in the Face Stroop task



Emotion × Implicit affiliation motive (median split) × Implicit power motive interaction effect on the color naming speed ($-1/RT$ [sec]) for faces. Response times are residualized for the responses towards neutral facial expressions and the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

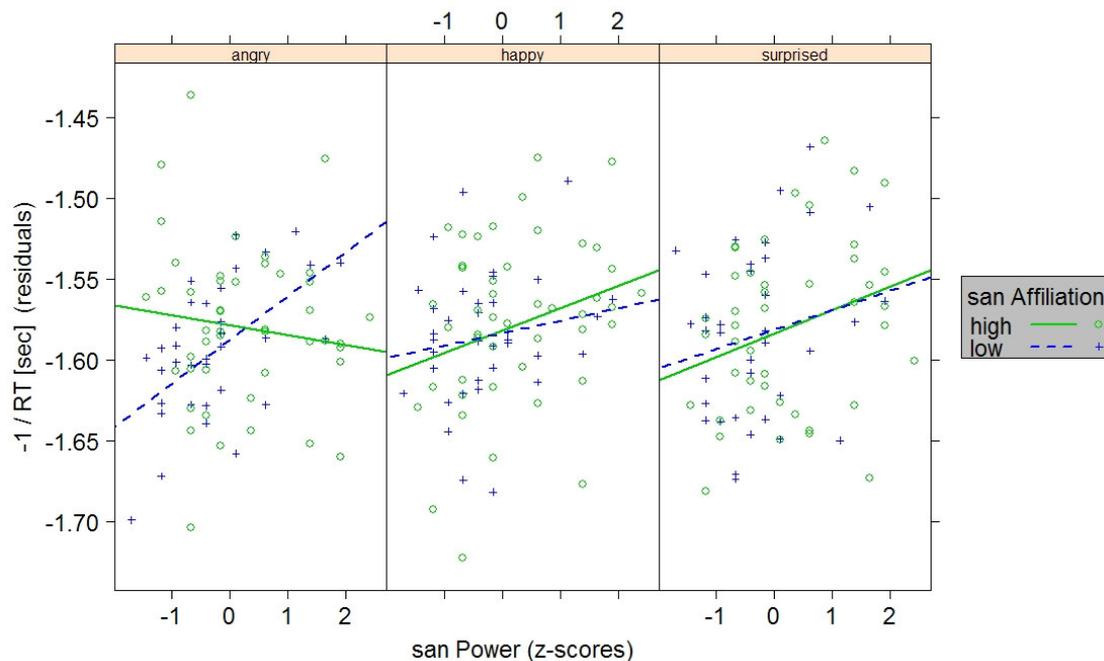
Explicit motive effects in the Face Stroop task

To test for explicit motive effects in the Face Stroop Task, I regressed the color naming speed for emotional expressions on the time-varying covariate response times for neutral facial expressions, the between-subject covariates san Affiliation and san Power, the within-subject factor emotion (angry, happy, surprised), as well as random intercepts for subjects and items. I found a marginally significant $Emotion \times san$ Affiliation $\times san$ Power interaction, $\chi(2) = 5.82$, $p = .06$. The san Affiliation $\times san$ Power interaction was significant for happy ($F(1,2560) = 4.28$, $MSE = 0.397$, $p < .05$) but not for angry or surprised faces ($ps > .17$).

Following up on the overall-interaction, I split the san Power variable at its median but found the $Emotion \times san$ Affiliation $\times san$ Power (median split) interaction to be non-significant ($p = .14$). Also, the $Emotion \times san$ Affiliation interaction was not significant ($p = .72$). In addition, I did an post-hoc test of the san Affiliation $\times san$ Power (median split) interaction for **expressions of joy** as the interaction of continuous variables had been significant in this condition. I found it to be significant ($F(1,2560) = 3.98$, $MSE = 0.369$, $p < .05$), uncovering a significant negative san Affiliation slope for individuals low in san Power ($B = -0.027$, $SE = 0.010$, $p < .01$) but no san Affiliation-effect

for individuals high in *san* Power ($p = .74$). Thus, there was evidence that individuals high in *san* Power liked happy faces less than individuals low in *san* Power if their explicit affiliation motive was low.

Figure 4-8 – *san* Power effects in the Face Stroop task



Emotion × *Explicit affiliation motive (median split)* × *Explicit power motive* interaction effect on the color naming speed ($-1/RT$ [sec]) for faces. Response times are residualized for the responses towards neutral facial expressions and the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

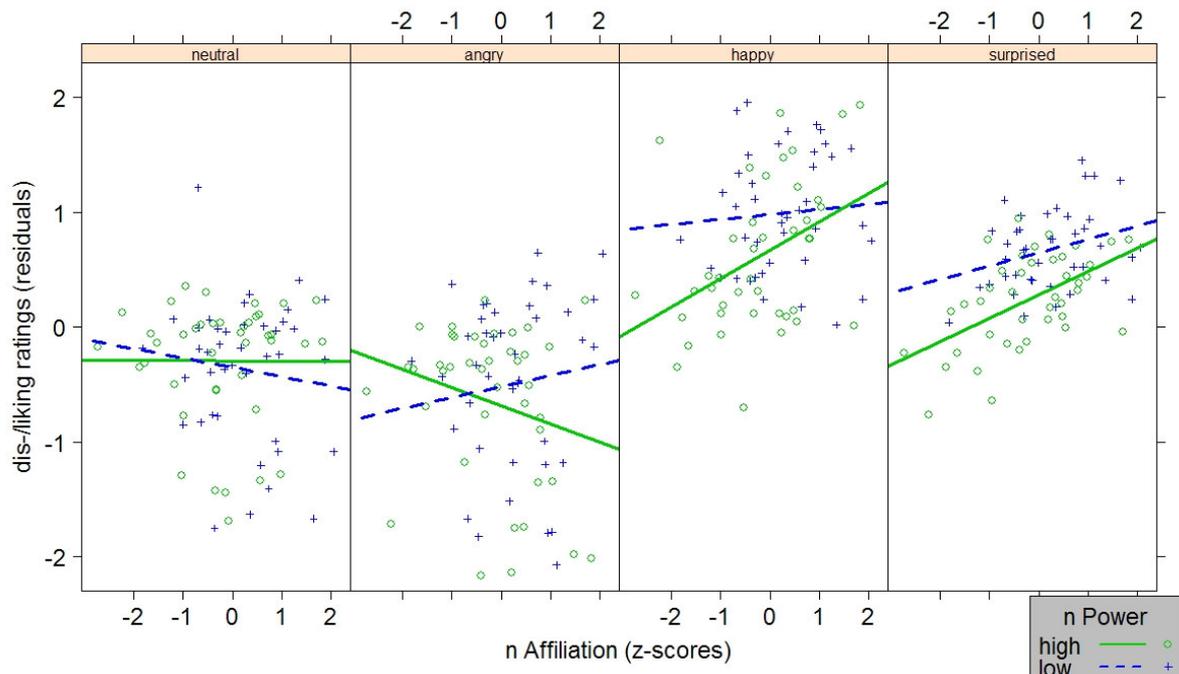
Next, I tested for differences in *san* Power-slopes by using the median-split *san* Affiliation variable in the overall model for the Face Stroop task and found a marginally significant *Emotion* × *san* Affiliation (median split) × *san* Power interaction, $\chi(2) = 5.82$, $p = .06$, which is displayed in Figure 4-8. Follow-up analyses for the different emotion conditions revealed a significant difference in *san* Power slopes for the **anger-face** condition ($F(1,2543) = 5.77$, $MSE = 0.548$, $p < .05$). Splitting the data by individuals high versus low in *san* Affiliation indicated that responses of individuals low ($B = 0.022$, $SE = 0.011$, $p = .06$), but not of those high ($p = .18$) in *san* Affiliation are positively predicted by their explicit power motive. While the equivalent slope-differences for happy and surprised expressions were not significant, there was a positive *san* Power trend in the **surprised-face** condition ($B = 0.010$, $SE = 0.006$, $p = .09$) and a non-significant positive slope in the **happy-face** condition ($B = 0.009$, $SE = 0.006$, $p = .13$). To summarize, there was evidence that a high explicit power motive slowed the color naming speed in response to surprised and, in individuals with a high explicit affiliation motive, to angry faces after controlling for responses to neutral facial expressions. The evidence for a *san* Power-associated slowing in the happy-face condition was weak.

4.3.3 Emotion Word Rating

Implicit motive effects on Emotion Word Ratings

To test for emotion-specific implicit motive effects on declarative measures of motivation in response to verbal stimuli, I regressed ratings of emotion words on the interaction n Affiliation \times n Power, all the effects contained in the interaction, and random intercepts varying over subjects and over items. I tested the interaction by means of model comparison and found it to be highly significant, $\chi(3) = 24.14$, $p < .0001$. The n Affiliation \times n Power interaction was highly significant in response to neutral non-words, $F(1,1472) = 23.08$, $MSE = 23.69$, $p < .0001$, and it significantly differed from the neutral only in the angry- ($\Delta B = -0.168$, $SE = 0.039$, 95% HPDIs: $-0.300 < B < -0.038$), but not in the happy- (95% HPDIs: $-0.087 < B < 0.064$) or surprised-word (95% HPDIs: $-0.111 < B < 0.093$) conditions.

Figure 4-9 – n Affiliation effects on Emotion Word Ratings



Emotion \times Implicit affiliation motive \times Implicit power motive (median split) interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes are calculated from the overall model.

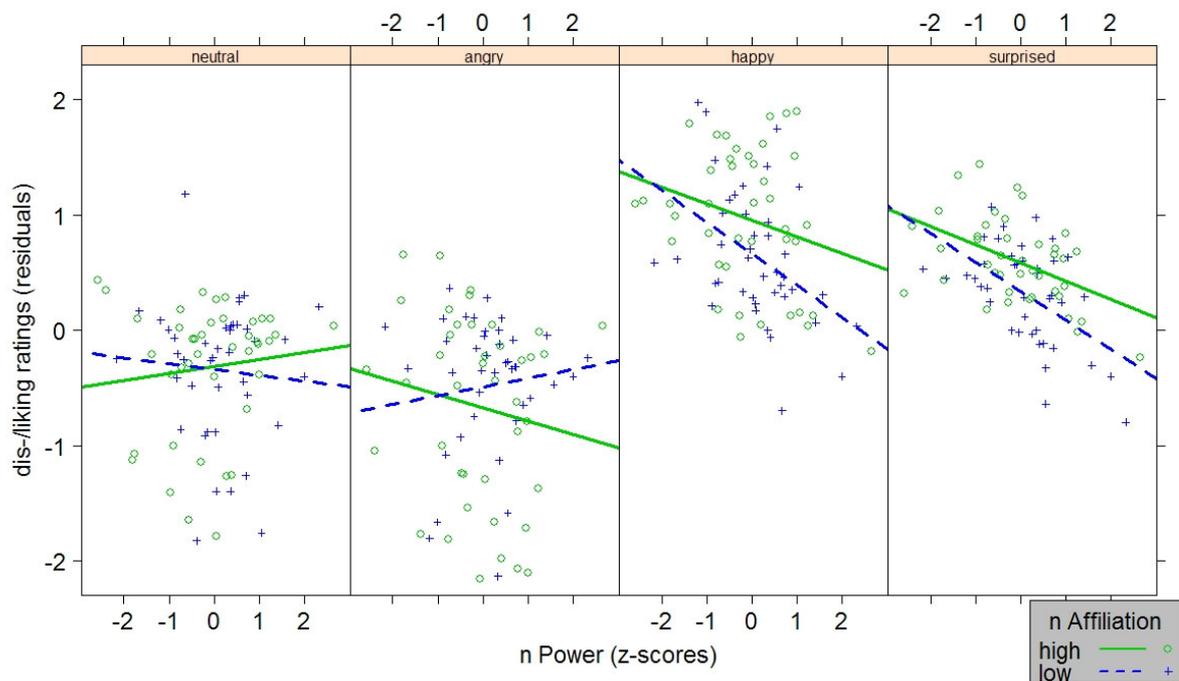
To follow up on the n Affiliation effects, I next replaced the n Power variable by the same variable split at the median and found a significant $Emotion \times n$ Affiliation \times n Power (median split) interaction, $\chi(3) = 38.63$, $p < .0001$. Following up on this finding revealed no significant n Affiliation effects in the neutral condition ($p = .16$ for the slope difference and $p = .12$ for the main effect). The n

Affiliation slope-difference for the **angry** condition was significantly different from that in the neutral condition ($\Delta B = -0.330$, $SE = 0.077$, 99.9% HPDIs: $-0.580 < B < -0.079$) and driven by a highly significant negative n Affiliation slope for individuals high in n Power ($B = -0.158$, $SE = 0.038$, $p < .0001$) and a positive trend for individuals low in n Power ($B = 0.094$, $SE = 0.050$, $p = .06$; for the slope difference: $F(1,1472) = 16.58$, $MSE = 21.82$, $p < .0001$). Likewise, the interaction between n Affiliation and the median split n Power variable in the **happy** condition tended to differ from that for neutral facial expressions ($\Delta B = 0.127$, $SE = 0.077$, 90% HPDIs: $0.003 < B < 0.258$). While there was a strong and highly significant positive n Affiliation slope for individuals high in n Power ($B = 0.247$, $SE = 0.040$, $p < 7.8 \cdot 10^{-10}$), the same effect for individuals low in n Power was positive but not significant ($p = .31$), yielding a highly significant slope difference, $F(1,1472) = 12.34$, $MSE = 14.33$, $p < .001$. When testing for **surprise**-specific n Affiliation-slope differences, I failed to find a significant difference from the neutral condition (95% HPDIs: $-0.192 < B < 0.211$). In order to check for a main effect of n Power in response to words in the surprise condition I tested the Emotion \times n Affiliation interaction without including n Power as a predictor and found that the n Affiliation-slope varied significantly over emotion conditions, $\chi(3) = 80.39$, $p < 2.2 \cdot 10^{-16}$. Comparing the n Affiliation slope for neutral facial expressions to that for surprised facial expressions revealed a highly significant difference ($\Delta B = 0.250$, $SE = 0.037$, 99.9% HPDIs: $0.120 < B < 0.385$) which was due to a strong positive slope of n Affiliation on ratings of words that are synonyms for surprise ($B = 0.208$, $SE = 0.028$, $p < .0001$). Thus, as displayed in Figure 4-9, n Affiliation was a negative predictor of liking ratings for words for the emotion anger in individuals high in n Power but a somewhat positive predictor in individuals low in n Power. On the other hand, n Affiliation was a positive predictor of liking ratings of the word “happy” and synonyms in individuals high in n Power. It also was a positive predictor of liking ratings for the word “surprised” and synonyms independent from individual’s strength of the implicit power motive.

Splitting the n Affiliation variable at its median and testing the interaction Emotion \times n Affiliation (median split) \times n Power showed that the difference between n Power slopes varied significantly over emotional conditions, $\chi(3) = 23.85$, $p < .0001$, as displayed in Figure 4-10. There was a significant difference in n Power slopes between individuals high versus low in n Affiliation in response to neutral non-words ($F(1,1472) = 4.15$, $MSE = 4.315$, $p < .05$). I followed up on this effect by modeling responses separately for individuals high and for those low in n Affiliation and found a positive trend of n Power in individuals high in n Affiliation ($B = 0.061$, $SE = 0.031$, $p = .06$) but no significant effect for individuals low in n Affiliation ($p = .27$). The n Affiliation (median split) \times n Power interaction in the **angry-word** condition differed significantly from that in the neutral non-word condition ($\Delta B = 0.125$, $SE = 0.076$, 99.9% HPDIs: $-0.554 < B < -0.067$). Follow-up analyses revealed that this was due to a significant negative slope of n Power in individuals high in n Affiliation ($B = -0.116$, $SE = 0.039$, $p < .01$) and a positive effect of n Power in individuals low in n Affiliation that approached the level of a trend ($B = 0.075$, $SE = 0.047$, $p = .11$), yielding a significant slope

difference of $F(1,1472) = 9.74$, $MSE = 12.86$, $p < .01$. In the **happy-word** (95% HPDIs: $-0.122 < B < 0.173$) as well as in the **surprise-word** (95% HPDIs: $-0.160 < B < 0.135$) condition, the n Affiliation (median split) $\times n$ Power interactions did not significantly differ from the same interaction for neutral non-words. To check for n Affiliation-independent emotion-specific implicit power motive effects in the happy- and in the surprise-word condition, I tested the Emotion $\times n$ Power interaction by dropping all effects containing the n Affiliation variable in the model reported above and found it to be highly significant ($\chi(3) = 60.72$, $p < .0001$). While the main effect of n Power in the neutral condition was not significant (with $p = .60$) the n Power slope was significantly more negative in the **happy-** ($\Delta B = -0.228$, $SE = 0.038$, 99.9% HPDIs: $-0.348 < B < -0.101$) and in the **surprise-word** ($\Delta B = -0.224$, $SE = 0.038$, 99.9% HPDIs: $-0.347 < B < -0.098$) conditions. Both effects also significantly differed from zero (for “happy” and synonyms: $B = -0.214$, $SE = 0.028$, $p < .0001$; and for “surprise” and synonyms: $B = -0.210$, $SE = 0.028$, $p < .0001$). Thus, as depicted in Figure 4-10, the implicit power motive predicted disliking of words for the emotion anger in individuals high in n Affiliation and approached a positive trend for individuals low in n Affiliation. Liking ratings of words for the emotions joy and surprise were consistently negatively predicted by n Power.

Figure 4-10 – n Power effects on Emotion Word Ratings

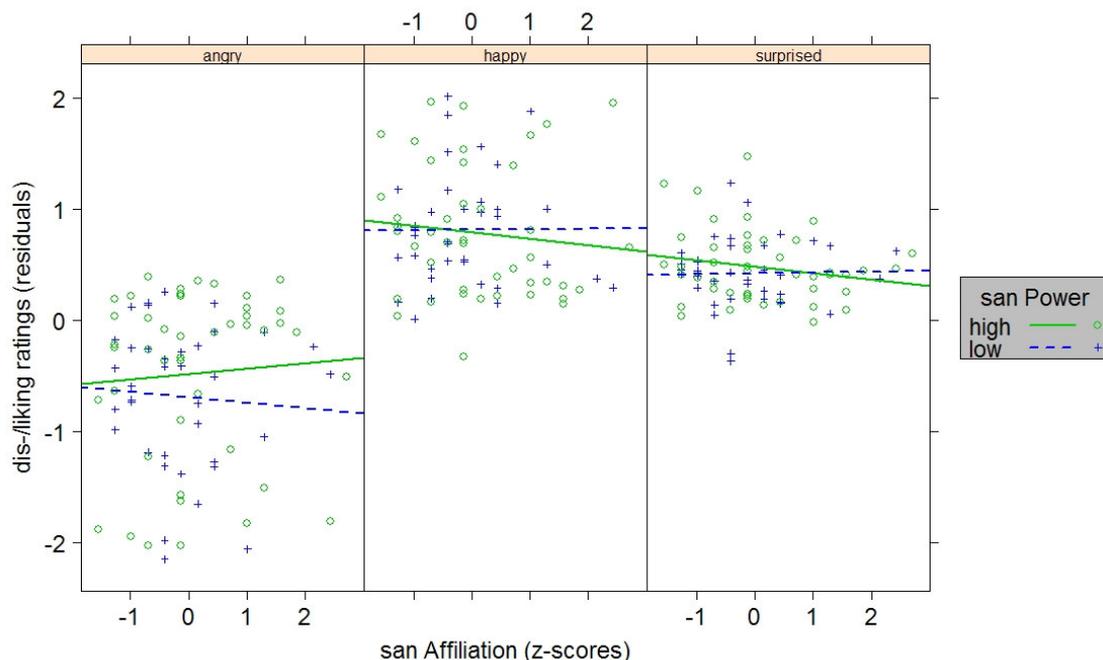


Emotion \times Implicit affiliation motive (median split) \times Implicit power motive interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes are calculated from the overall model.

Explicit motive effects on Emotion Word Ratings

Again, like in the Face Stroop task, a strong effect on the ratings of neutral non-words made the emotion-specific effects of explicit motives difficult to interpret in the Emotion Word Rating task. Thus, to simplify the analysis, I treated ratings of neutral non-words (averaged over items within each block) as a predictor variable and entered it as a time-varying covariate into the model. I regressed liking ratings on the new emotion-factor (angry, happy, surprised), the between-subject covariates *san* Affiliation and *san* Power, the time-varying covariate ratings of neutral non-words, and random intercepts for subjects and items. I found the *Emotion* \times *san* Affiliation \times *san* Power interaction to be significant ($\chi(2) = 6.34, p < .05$). Splitting the data by emotion yielded a significant *san* Affiliation \times *san* Power interaction on in the anger-word condition ($F(1,1470) = 3.88, MSE = 5.11, p < .05$) but no significant interactions in response to words for the emotions joy or surprise ($ps > .24$).

Figure 4-11 – *san* Affiliation effects on Emotion Word Ratings

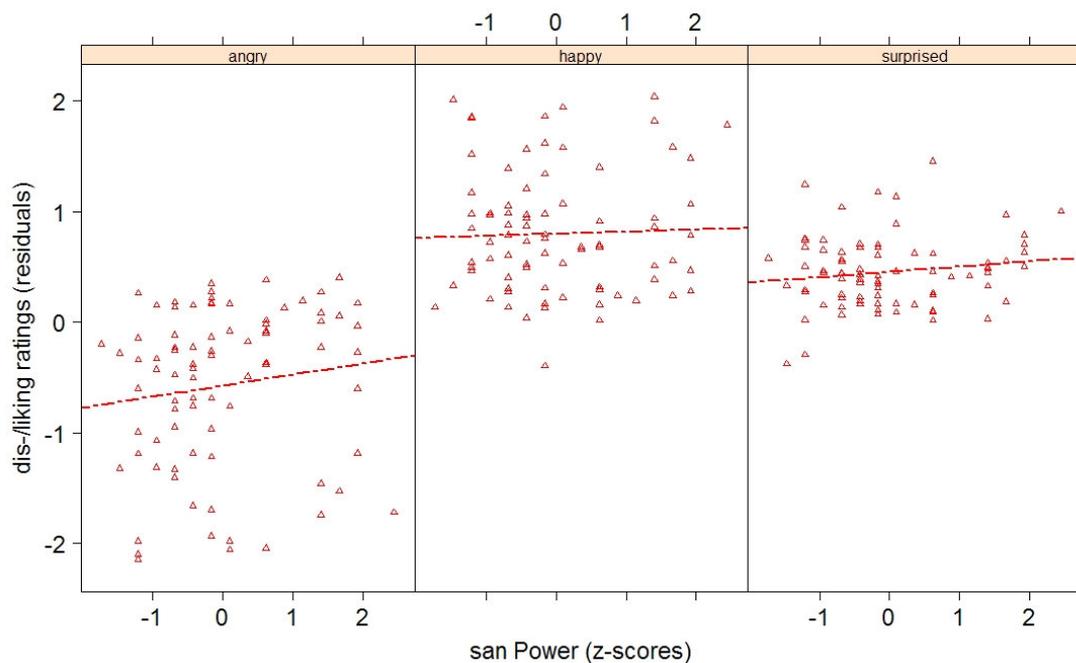


Emotion \times *Implicit affiliation motive* \times *Implicit power motive (median split)* interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the ratings of neutral non-words and the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

To investigate the effects of *san* Affiliation more closely, I split the *san* Power variable at its median and found a marginally significant *Emotion* \times *san* Affiliation \times *san* Power (median split) interaction, $\chi(2) = 5.49, p = .07$. Following up on this effect using linear regression and adding ratings of neutral non-words as averaged per subject as an additional covariate revealed a significant positive *san* Affiliation slope in response to **anger-words** for individuals high in *san* Power ($B = 0.096$,

$SE = 0.041, p < .05$). This slope differed significantly ($F(1,1470) = 5.00, MSE = 6.57, p < .05$) from the non-significant *san* Affiliation slope for individuals low in *san* Power ($p = .30$). While the equivalent slope-differences were not significant for synonyms of the words happy and surprise ($ps > .14$), there was a negative *san* Affiliation trend for ratings of **joy-** ($B = -0.054, SE = 0.029, p = .07$) but not of **surprise-words** ($p = .19$). Thus, as illustrated in Figure 4-11, high *san* Affiliation predicted high ratings for words for the emotion anger within individuals high, but not within those low in *san* Power. In addition, high levels of *san* Affiliation predicted general disliking of synonyms of the word “happy” but did not predict liking ratings of words in the surprise condition.

Figure 4-12 – *san* Power effects on Emotion Word Ratings



Emotion × Implicit power motive interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for the ratings of neutral non-words and the random intercepts for subjects and items and are averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

Replacing the *san* Affiliation variable by its median-split counterpart in the overall model indicated that the *Emotion × san* Affiliation (median split) × *san* Power interaction was not significant ($p = .12$). However, testing *san* Affiliation-independent effects of the explicit power motive uncovered a marginally significant *Emotion × san* Power interaction ($\chi(2) = 4.62, p = .10$) which could be traced back to a highly significant *san* Power effect in response to **anger-words** ($B = 0.113, SE = 0.030, p < .001$), no significant slope for **happy-words** ($p = .74$), and a positive slope for **surprise-words** that only approached the level of a trend ($B = 0.044, SE = 0.029, p = .13$). As shown in Figure 4-11, there was strong evidence that the explicit power motive positively predicts ratings of anger-words. In addition, there is a hint for a positive association of the explicit power

motive with surprise-word ratings, but not even a suggestion for an effect in the happy-word condition.

4.3.4 Emotion Word Stroop

I used the same overall model as described for the Emotion Word Rating task to test for interactions of the explicit and implicit affiliation and power motives with the emotion factor on the color naming speed for emotion words. None of these interactions was significant. Thus, no evidence for emotion-specific motive-effects could be found in this task. However, when using responses to neutral non-words as a control (aggregated per emotion condition and block and the mean responses per subject), there were significant interactions of n Affiliation \times n Power ($F(1,4025) = 5.00$, $MSE = 0.52$, $p < .05$) and san Affiliation \times san Power ($F(1,4025) = 20.54$, $MSE = 2.14$, $p < .0001$) on the color naming speed for all emotion words. Splitting the **implicit** affiliation motive variable at its median revealed a significant n Power slope-difference for individuals high versus low in n Affiliation ($F(1,4025) = 8.69$, $MSE = 0.91$, $p < .01$). This slope-difference was driven by a significant positive n Power slope for individuals high in n Affiliation ($B = 0.078$, $SE = 0.012$, $p < .0001$) and no n Power effect for individuals low in n Power ($p = .70$). None of the n Affiliation effects were significant ($ps > .55$ for slope difference and main effect). Splitting the **explicit** power motive measures at its median revealed a significant san Affiliation slope-difference ($F(1,4025) = 18.44$, $MSE = 1.91$, $p < .0001$) indicating that the san Affiliation slope for individuals low in san Power ($p = .34$) was more positive than the one for individuals high in san Power ($p = .91$). Testing for san Affiliation-dependent san Power slopes uncovered a highly significant positive san Power slope for individuals low in san Affiliation ($B = 0.025$, $SE = 0.006$, $p < .0001$) but no significant san Power effect within individuals high in san Affiliation ($p = .14$; for the slope-difference: $F(1,4025) = 30.22$, $MSE = 3.13$, $p < .0001$).

Thus, color naming of emotion words was significantly slowed in individuals with high levels of the implicit power motive among individuals with a strong, but not among those with a weak implicit need to affiliate. Likewise, color naming of emotion words was significantly slower in individuals with a strong explicit power motive among individuals with high, but among those with low levels of the explicit affiliation motive. In addition, the effect of san Affiliation depended on the levels of san Power.

4.3.5 Trait Word Rating

For the analysis of motive-effects on trait words, I replaced the emotion factor from the previous tasks by two within-subject factors: a factor called interpersonal dimension (affiliation, dominance) encoding whether a trait is perceived as related to affiliation or to dominance and a factor valence (positive, negative) that encodes whether a word is positively or negatively associated with the

dimension. E.g., “dominant” is a trait that signals high dominance, i.e. it is positive on the dimension dominance, while “cold-hearted” signals low affiliation and is thus negative on the interpersonal dimension of affiliation.

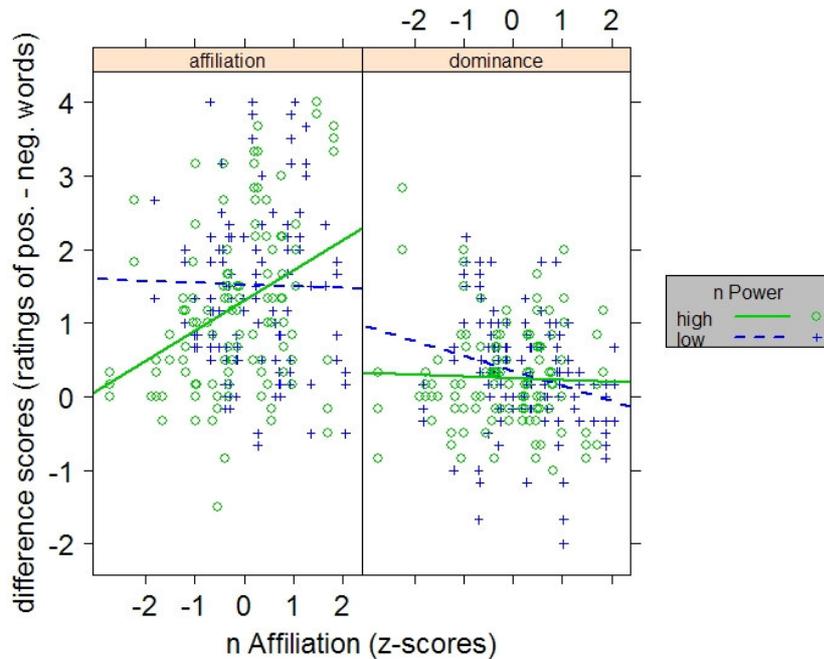
I hypothesized that motives respond to trait words to the extent that they are signals for the interpersonal dimensions that are relevant for the motives. Thus, the power motive was predicted to respond to trait words signaling dominance, and the affiliation motive was expected to be aroused by trait words signaling affiliation. In addition, trait words were predicted to respond differentially depending on whether the word is positive or negative on the dimension. Individuals with a strong need to be close to others were expected to like trait words signaling high affiliation more and trait words signaling low affiliation less than individuals with no such need, but to not differ from low affiliation motivated individuals in their liking for dominance-related trait words. Likewise, a strong need to dominate others was expected to be associated with a less positive incentive value of high-dominance signaling trait words and a more positive incentive value of trait words signaling low dominance, but to not influence the incentive value of trait words signaling affiliation. Consequently, my prediction was that the *Interpersonal Dimension × Valence* interaction should interact with measures of motive dispositions to influence responses to trait words.

Implicit motive effects on Trait Word Ratings

To test for interpersonal dimension- and valence- specific implicit motive effects on liking ratings of trait words, I regressed ratings on the within-subject factors interpersonal dimension (affiliation, dominance) and valence (positive, negative), the between-subject covariates *n* Affiliation and *n* Power, and crossed random effects for the intercept varying over subjects and items. Ratings of neutral non-words were averaged per block and added as a time-varying covariate to reduce error variance and to control for variance that was not specific to ratings of trait words. As the hypothesized four-way interaction *Interpersonal Dimension × Valence × n Affiliation × n Power* only approached the level of a trend ($p = .12$) in this model, I added additional predictors to reduce error variance. Adding fixed effects for the within-subject factors stimulus color (red, green, blue) and block (1, 2, 3) lead to a significantly better model fit, $\chi(4) = 155.6, p < .0001$. On a second step, I allowed the stimulus color and the valence effect to vary over subjects. This, again, significantly explained extra variance, $\chi(7) = 488.23, p < .0001$, indicating that individuals differed in the influence that these factors had on their liking ratings. Importantly, adding the additional predictors to the model reduced the error variance from $\varepsilon = 1.00$ in the simpler model to $\varepsilon = 0.85$ in the more complex model and pushed the *Interpersonal Dimension × Valence × n Affiliation × n Power* interaction to the level of a trend, $\chi(1) = 3.00, p = .09$. Note that color and block varied orthogonally to the interpersonal dimension and to the valence factors within subjects, thus excluding the possibility that the decrease in alpha error probability was due to a suppressor constellation. Following up on this effect, I found the

Valence \times n Affiliation \times n Power interaction to be non-significant for affiliation- ($p = .27$) as well as for dominance-related ($p = .49$) trait words.

Figure 4-13 – n Affiliation effects on Trait Word Ratings



Interpersonal Dimension \times Implicit affiliation motive \times Implicit power motive (median split) interaction effect on difference scores of trait word ratings (ratings of traits positive minus traits negative on one of the interpersonal dimensions affiliation or dominance). Ratings were done in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Data is displayed per participant and block and regression lines are linear least squares fits to this data.

Next, I split the n Power-variable at its median and found a significant Interpersonal Dimension \times Valence \times n Affiliation \times n Power (median split) interaction, $\chi(1) = 6.73, p < .01$ ². I tested the a priori specified contrasts in the model using Markov Chain Monte Carlo Sampling and found that the Valence \times n Affiliation \times n Power (median split) interaction for **affiliation-related trait words** differed not only significantly from that in the dominance-word condition (as indicated by the significant overall interaction) but also from zero ($\Delta B = -0.218, SE = 0.075, 99.9\%$ HPDIs: $-0.435 < B < -0.013$)³. In addition, the Valence \times n Affiliation interaction for affiliation-words was highly significant for individuals high in n Power ($\Delta B = 0.206, SE = 0.049, 99.9\%$ HPDIs: $0.074 < B < 0.347$). Post-hoc analyses indicated that the same interaction was not significant for individuals low in n Power ($\chi(1) = 0.00, p = 1.00$). In order to simplify the effect, I aggregated the data

² I also tested whether this interaction would reach significance without the extra predictors that I had used to reduce error variance. This was the case with $\chi(1) = 5.64, p < .05$.

³ I coded the n Affiliation factor as a dummy variable using high n Power as reference because the n Affiliation effects in the Face and Emotion Word Ratings had shown to be generally stronger in individuals high in n Power in the previous analyses.

over items (within the conditions given by the other factors) and created difference scores by subtracting ratings of words negative on an interpersonal dimensions from ratings for the respective positive words. This enabled a direct test of the hypothesis that the affiliation motive is *symmetrically* related to the affiliation a stimulus signals while the power motive is *reciprocally* related to the signaled dominance. To test the effects of *n* Affiliation on these difference scores, I regressed difference scores on *n* Affiliation in simple linear regression models and found a significantly positive *n* Affiliation slope for individuals high in *n* Power ($B = 0.412$, $SE = 0.04$, $p < .0001$). The same *n* Affiliation-slope was not significant for individuals low in *n* Power ($p = .84$). The two effects differed significantly from each other, $F(1,242) = 8.43$, $MSE = 10.86$, $p < .01$.

When following up on the Valence \times *n* Affiliation \times *n* Power (median split) interaction for **dominance-related trait words**, I dropped the random effect of valence as varying over subjects from the model to prevent it from “stealing” variance from the fixed effect of valence. The analysis indicated that the interaction significantly differed from zero $\chi(1) = 5.92$, $p < .05$. This effect was due to a significant Valence \times *n* Affiliation interaction for individuals low, $\chi(1) = 13.26$, $p < .001$, but not for those high in *n* Power ($p = .61$). Testing simple linear regression models for the influence of *n* Affiliation on aggregated difference scores confirmed a significant (negative) effect of *n* Affiliation on the ratings of dominance-related trait words in individuals low ($B = -0.202$, $SE = 0.077$, $p < .01$), but not in those high ($p = .70$) in *n* Power. Thus, as displayed in Figure 4-13, the implicit affiliation motive was strongly symmetrically related to the affiliation signaled by a trait word within individuals high, but not within those low in *n* Power. In addition, it was reciprocally related to the dominance conveyed by trait words within individuals low, but not in those high in *n* Power.

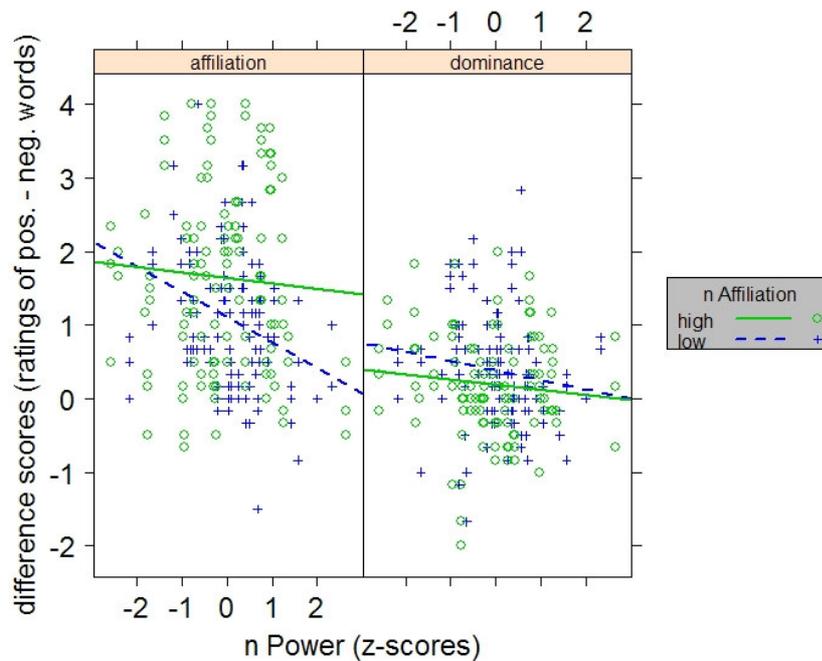
To test for effects of the *n* Power-variable on trait word ratings, I next performed a median split on the *n* Affiliation variable and entered it into the final model with two continuous motive predictors, replacing the continuous *n* Affiliation variable. I found the Interpersonal Dimension \times Valence \times *n* Affiliation (median split) \times *n* Power interaction to be significant, $\chi(1) = 4.62$, $p < .05$ ⁴.

Testing a priori specified contrasts revealed a significant Valence \times *n* Affiliation (median split) \times *n* Power interaction ($\chi(1) = 12.82$, $p < .001$) for **affiliation-related trait words**. The corresponding effect for dominance related trait words was far from significant ($p = .41$). I followed up on the effect on ratings of affiliation words by testing Valence \times *n* Power interactions for individuals low and high in *n* Affiliation separately and found the interaction to be significant only if *n* Affiliation was below ($\chi(1) = 36.42$, $p < .0001$) but not if it was above the median ($p = .13$). To simplify the effect, I aggregated the data over items (within the cells formed by the other factors) and created difference scores by subtracting ratings of negative from those of positive affiliation words. Using simple linear regression of the difference scores on *n* Power, I found a significant negative *n*

⁴ Again, the same interaction was still significant ($\chi(1) = 3.88$, $p < .05$) after dropping the additional fixed and random effects of block and stimulus color, and the random effects for valence from the set of predictors to reduce model complexity.

Power-slope for individuals low in n Affiliation ($B = -0.346$, $SE = 0.098$, $p < .001$) but no significant effect for individuals high in n Affiliation ($p = .48$).

Figure 4-14 – n Power effects on Trait Word Ratings



Interpersonal Dimension × Implicit affiliation motive (median split) × Implicit power motive interaction effect on difference scores of trait word ratings (ratings of traits positive minus traits negative on one of the interpersonal dimensions affiliation or dominance). Ratings were done in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Data is displayed per participant and block and regression lines are linear least squares fits to this data.

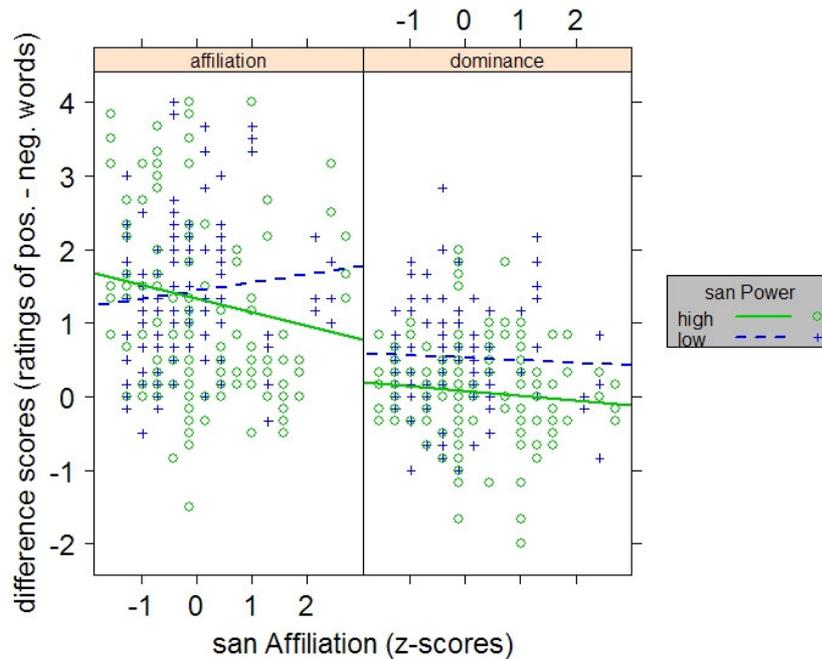
As the full interaction had not been significant for **dominance trait words**, I next checked for n Affiliation-independent n Power effects on ratings by dropping the median-split n Affiliation variable from the last model for the whole dataset. I found the *Interpersonal Dimension × Valence × n Power* interaction to be significant, $\chi(1) = 6.48$, $p < .05$. Testing the *Valence × n Power* interaction for dominance-related words proved it to be significant, $\chi(1) = 4.99$, $p < .05$. Creating difference scores after aggregating the data over items revealed a trend for a negative n Power-slope as indicated by a simple linear regression ($B = -0.082$, $SE = 0.047$, $p = .09$). Thus, as can be seen in Figure 4-14, the difference between ratings of positive versus negative words was negatively predicted by the implicit power motive for dominance-words and for affiliation-related trait words within individuals low in n Affiliation.

Explicit motive effects on Trait Word Ratings

To test for effects of explicit motives on Trait Word Ratings, I regressed liking ratings on the within-subject factors interpersonal dimension (affiliation, dominance) and valence (positive, negative), on the between-subject covariates *san* Affiliation and *san* Power, on the time-varying

covariate neutral non-word ratings (averaged per block), and on crossed random effects for the intercept varying over subjects and items.

Figure 4-15 – *san* Affiliation effects on Trait Word Ratings



Interpersonal Dimension × Explicit affiliation motive × Explicit power motive (median split) interaction effect on difference scores of trait word ratings (ratings of traits positive minus traits negative on one of the interpersonal dimensions affiliation or dominance). Ratings were done in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Data is displayed per participant and block and regression lines are linear least squares fits to this data.

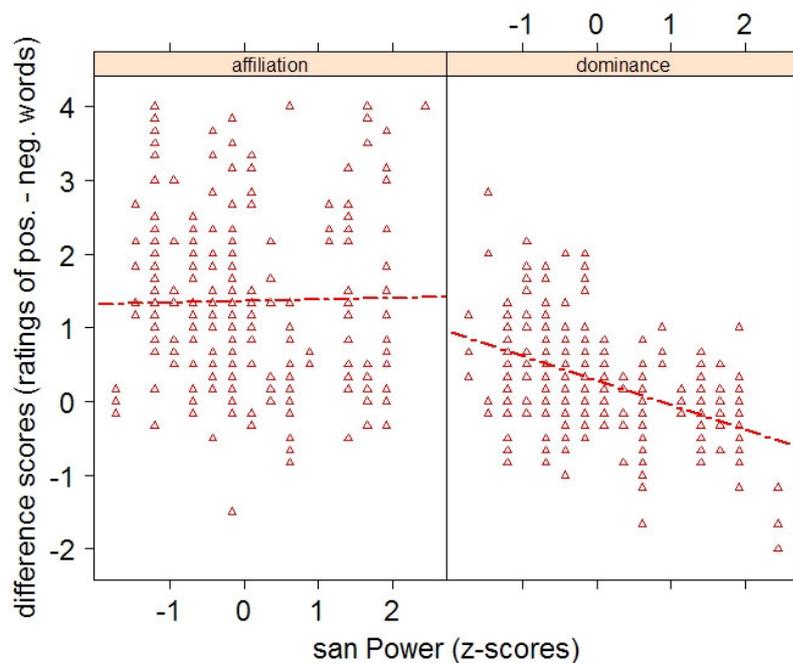
Although the interaction *Interpersonal Dimension × Valence × san Affiliation × san Power* was not significant ($p = .62$), I found a significant *Interpersonal Dimension × Valence × san Affiliation × san Power (median split) effect*, $\chi(1) = 5.92, p < .05$. The parameter for the *Valence × san Affiliation × san Power (median split) effect* in this model was significant ($\Delta B = -0.148, SE = 0.039, 99.9\% \text{ HPDIs: } -0.269 < B < -0.021$), indicating that this effect did not only differ between affiliation and dominance words but was also significantly different from zero in the **affiliation-word** condition. Testing the *Valence × san Affiliation* interaction in response to affiliation words for individuals with a high and low explicit power motive separately revealed a trend for individuals low in *san Power* ($\chi(1) = 3.30, p = .07$) and a highly significant effect for those high in *san Power*, $\chi(1) = 14.62, p < .001$. Next, I calculated difference scores on aggregated data and regressed them on *san Affiliation* using simple linear regression. There was a trend for a negative *san Affiliation* slope within individuals high in *san Power* ($B = -0.185, SE = 0.105, p = .09$), but no effect for individuals low in *san Power* ($p = .29$).

I also tested the *Valence × san Affiliation × san Power (median split) interaction* in the **dominance-word** condition but it failed to become significant ($p = .70$). Instead, a significant

Valence \times *san* Affiliation effect occurred ($\chi(1) = 4.94, p < .05$) which translated into a negative trend for *san* Affiliation ($B = -0.082, SE = 0.047, p = .09$) on the aggregated difference scores.

Thus, as depicted in Figure 4-15, there was evidence that, within individuals low in *san* Power, the explicit affiliation motive was *symmetrically* related to the liking for the affiliation conveyed by trait words negative on the interpersonal dimension of affiliation (with a slope that was negative and more negative than for positive affiliation words). while it was reciprocally related to the signaled affiliation for individuals high in *san* Power. In addition, *san* Affiliation tended to be reciprocally related to liking for dominance signaled by trait words related to this interpersonal dimension.

Figure 4-16 – *san* Power effects on Trait Word Ratings



Interpersonal Dimension \times Explicit power motive interaction effect on difference scores of trait word ratings (ratings of traits positive minus traits negative on one of the interpersonal dimensions affiliation or dominance). Ratings were done in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Data is displayed per participant and block and regression lines are linear least squares fits to this data.

When testing for effects of the explicit power motive, I found a the Interpersonal Dimension \times Valence \times *san* Affiliation (median split) \times *san* Power interaction to be non-significant ($p = .95$). Instead, the Interpersonal Dimension \times Valence \times *san* Power effect was highly significant, $\chi(1) = 45.53, p < .0001$. The Valence \times *san* Power predictor in this model was highly significant ($\Delta B = -0.167, SE = 0.018, 99.9\%$ HPDIs: $-0.226 < B < -0.109$) which indicated a valence-specific *san* Power effect for dominance-words. Testing the corresponding effect for affiliation-related trait words did not yield a significant effect ($p = .60$; for the main effect of *san* Power: $p = .44$). Aggregating the data over items and regressing difference scores on *san* Power confirmed these results by revealing a

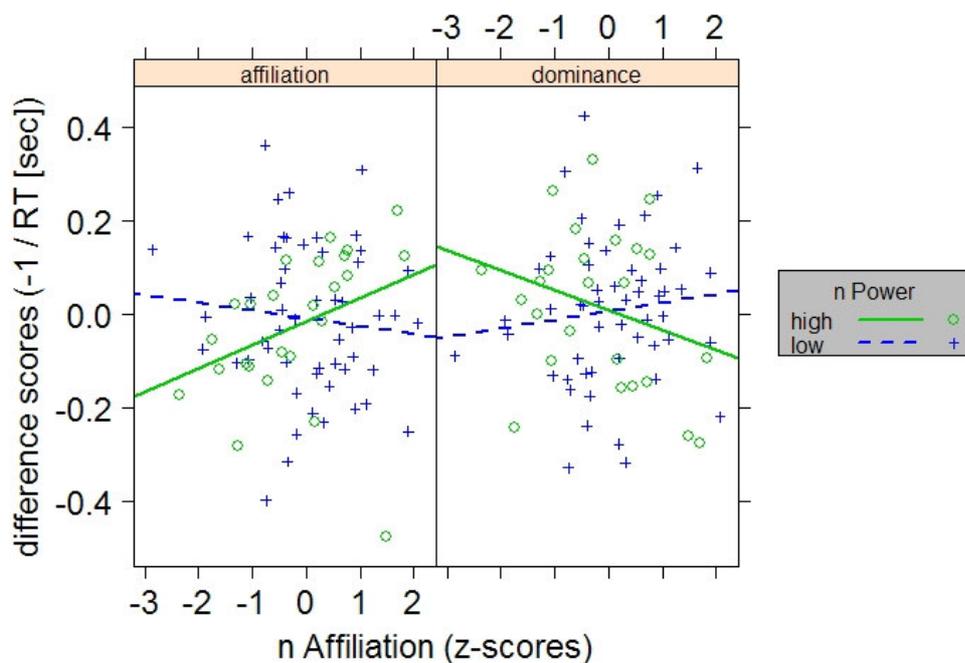
significant negative slope for dominance-words ($B = -0.334$, $SE = 0.043$, $p < .0001$), but no significant effect for affiliation-related trait words ($p = .80$). Thus, as shown in Figure 4-16, n Power was reciprocally related to the dominance but not related to the affiliation that was signaled by words for traits.

4.3.6 Trait Word Stroop

Implicit motive effects on the Trait Word Stroop task

For the analysis of motive effects in the Trait Word Stroop task, I used the same set of predictors as reported for Trait Word Ratings (see previous section). However, I did not find a significant interaction involving implicit motives and the two factors interpersonal dimension and valence ($ps > .35$). However, there was a trend for a Block \times Interpersonal Dimension \times Valence \times n Affiliation \times n Power interaction, $\chi(2) = 5.18$, $p = .08$. Testing the Interpersonal Dimension \times Valence \times n Affiliation \times n Power interaction for each block separately, I found an effect in the first block ($\chi(1) = 2.99$, $p = .09$) that was significant on the trend level, but no effects in the second ($p = .15$) or third ($p = .32$) block. All further analyses were thus restricted to the first block. Testing the Valence \times n Affiliation \times n Power interaction for affiliation- and dominance-related trait words did not yield significant effects ($ps > .13$).

Figure 4-17 – n Affiliation effects in the Trait Word Stroop task



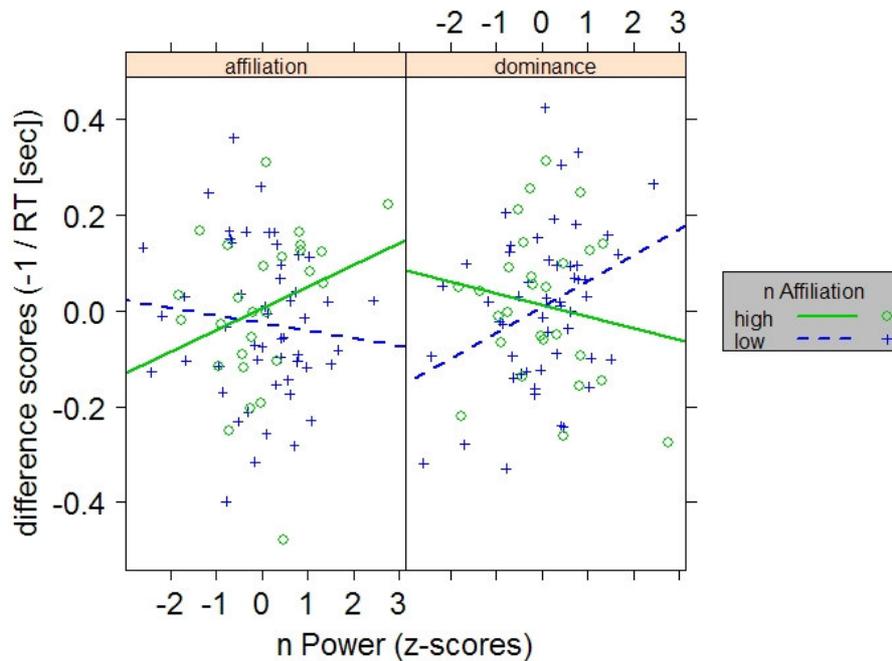
Interpersonal Dimension \times Implicit affiliation motive \times Implicit power motive (upper trentile split) interaction effect on difference scores of the color naming speed for trait words (-1 / RT for traits positive minus traits negative on one of the interpersonal dimensions) in the first block. Data is displayed per participant and regression lines are linear least squares fits to the data.

Replacing the *n* Power variable with its median-split version did not result into a significant Interpersonal Dimension \times Valence \times *n* Affiliation interaction ($p = .11$). Thus, I split the *n* Power variable such that those individuals in the upper third formed one group and those in the middle and lower thirds formed a separate category. Entering this variable into the model, I found a significant Interpersonal Dimension \times Valence \times *n* Affiliation \times *n* Power (upper trentile split) interaction, $\chi(1) = 4.52, p < .05$. Following up on this interaction uncovered a marginally significant Valence \times *n* Affiliation \times *n* Power (upper trentile split) interaction for **trait words signaling affiliation**, $\chi(1) = 2.77, p = .10$, but no equivalent effect for **trait words signaling dominance** ($p = .17$; and $p = .84$ for the Valence \times *n* Affiliation interaction). Testing Valence \times *n* Affiliation interactions for different levels of *n* Power indicated that the effect for individuals low in *n* Power was non-significant ($p = .52$). For individuals with a high implicit power motive, on the other hand, it approached the level of a trend, $\chi(1) = 2.45, p = .12$. Follow-up-analyses for aggregated difference scores using linear regression uncovered a trend for a positive *n* Affiliation slope in response to **affiliation-related trait words** in individuals high in *n* Power ($B = 0.050, SE = 0.028, p = .09$), but no effect within individuals low in *n* Power ($p = .46$). The difference between these two slopes was marginally significant, $F(1,74) = 0.085, MSE = 0.085, p = .08$. The equivalent interaction in the **dominance-word** condition only reached the level of a trend ($F(1,74) = 2.67, MSE = 0.068, p = .11$) and uncovered non-significant single slopes ($ps > .17$) for individuals high versus low in *n* Power. Thus, as can be seen in Figure 4-17, *n* Affiliation symmetrically predicted difference scores of color naming in response to trait words signaling high or low affiliation within individuals high, but not within individuals low in *n* Power, and didn't predict difference scores of response times for trait words signaling high versus low dominance.

To test for *n* Power effects on Trait Word Stroop task, I split the *n* Affiliation variable in the overall model reported for the first block at its upper trentile. Testing this model yielded a significant Interpersonal Dimension \times Valence \times *n* Affiliation (upper trentile split) \times *n* Power effect ($\chi(1) = 5.38, p < .05$). I followed up on this effect and found the Valence \times *n* Affiliation (upper trentile split) \times *n* Power interaction to be marginally significant for **dominance-** ($\Delta B = -0.040, SE = 0.022, 92\%$ HPDIs: $-0.078 < B < -0.0005$) but not for **affiliation-words** ($p = .13$). Further analyses revealed that the *n* Power \times Valence interaction was significant for individuals low in *n* Affiliation in response to dominance words, but not for individuals high in *n* Affiliation or any of the two groups in response to affiliation-words ($ps > .21$). Likewise, I found a significant positive *n* Power slope on aggregated difference scores of responses to dominance words for individuals low ($B = 0.054, SE = 0.021, p < .05$) but not for those high in *n* Affiliation ($p = .43$; the slope difference was significant, $F(1,74) = 4.45, MSE = 0.108, p < .05$). No such effects occurred in response to affiliation-words ($ps > .16$ for the single slopes, and $p = .12$ for the difference between them). Thus, as illustrated in Figure 4-18, a high implicit power motive was associated with slower color naming for high compared to low dominance

words. This effect occurred only in individuals with a low, but not in those with a high implicit affiliation motive. The corresponding effects for affiliation words did not reach significance.

Figure 4-18 – *n* Power effects in the Trait Word Stroop tasks



Interpersonal Dimension × *Implicit affiliation motive (upper trentile split)* × *Implicit power motive* interaction effect on difference scores of the color naming speed for trait words (-1 / RT for traits positive minus traits negative on one of the interpersonal dimensions) in the first block. Data is displayed per participant and regression lines are linear least squares fits to the data.

Explicit motive effects in the Trait Word Stroop task

I replaced the implicit motive variables in the overall regression model reported in the previous section with its explicit counterparts. This yielded no significant effects involving the interaction between the explicit affiliation and power motive ($ps > .37$) and no interaction of *san* Power with the factors *Interpersonal Dimension* and *Valence* ($p = .68$, including block: $p = .55$). However, the *Interpersonal Dimension* × *Valence* × *san* *Affiliation* interaction was marginally significant, $\chi(1) = 3.49$, $p = .07$. Following up on this effect revealed a significant *Valence* × *san* *Affiliation* interaction for dominance words ($\chi(1) = 7.17$, $p < .01$). This effect was due to a significant positive *san* *Affiliation* slope for negative dominance-words ($B = 0.032$, $SE = 0.009$, $p < .001$) and no effect for positive dominance words ($p = .98$). While the equivalent slopes did not differ from each other for affiliation related words ($p = .96$), there was a significant positive main effect of *san* *Affiliation* on the color naming of affiliation related trait words ($B = 0.017$, $SE = 0.006$, $p < .01$). Thus, while the explicit affiliation motive selectively slowed responses towards negative but not towards positive dominance words, there was evidence for a valence-independent slowing-effect of the explicit affiliation motive for affiliation words.

4.4 Moderating Effects of Referential Competence

To analyze moderating effects of referential competence for responses of implicit and explicit motives to FEEs and emotion words, I tested the interaction of each motive variable (*n* Affiliation, *n* Power, *san* Affiliation, and *san* Power) with the experimentally manipulated within-subject factor Emotion (angry, happy, surprised) and the measured between-subject covariates Color Naming speed for color patches and Color Reading speed for color words. Responses in the neutral condition were added as measured two covariates in all models. As the first covariate, the responses to neutral stimuli were averaged per participant and entered as a between-subject covariate. In addition, the response in the same block to the same actor displaying a neutral facial expression (for FEEs) or the responses to neutral non-words in the same block (averaged over items; for words) were used as time-varying covariates. In addition, I added crossed random effects for the intercept varying over subjects ($n = 82$) and items (6 words per emotion-condition or 12 actors) to the set of predictors. These models were tested for all stimulus- and response- conditions. To test the moderating effects of referential competence for trait words, I did not, as in the main analysis, use the factors Interpersonal Dimension and Valence. Instead, I included the four different categories as levels of one emotion factor (high dominance, low dominance, high affiliation, low affiliation). To reduce complexity, I investigated how referential competence moderates effects of single motives.

I used the following strategy to follow up on the effects: If the Motive \times Emotion \times Color Naming \times Color Reading effect was significant in an analysis, I split the interaction by Emotion and tested Motive \times Color Naming \times Color Reading interactions for each level of the emotion factor separately. Next, I followed up on significant effects by replacing the Color Naming \times Color Reading interaction by the difference-measure of referential competence (color reading minus color naming). Lastly, I tested whether motive effects differed between individuals high or low in referential competence (using either the median or the upper or low trentiles as cut-off points) and whether the single motive slopes for these two groups differed from zero.

For the plotting of motive effects, I decided to plot the slopes that can be calculated from the coefficients from the overall model (and not slopes for simple linear regressions done for each condition separately). Likewise, I residualized the data for the effects of neutral responses and for the estimated random factors for the intercept varying over items and subjects before plotting. Consequently, when splitting the referential competence variable for plotting, I had to decide on one split for all emotion conditions (median- or upper or lower trentile-split). When following up on the effects statistically, on the other hand, I could flexibly perform splits that best explained the data for each emotion condition. Thus, what is displayed in the figures sometimes differs slightly from the effects that are tested in the follow-up analyses.

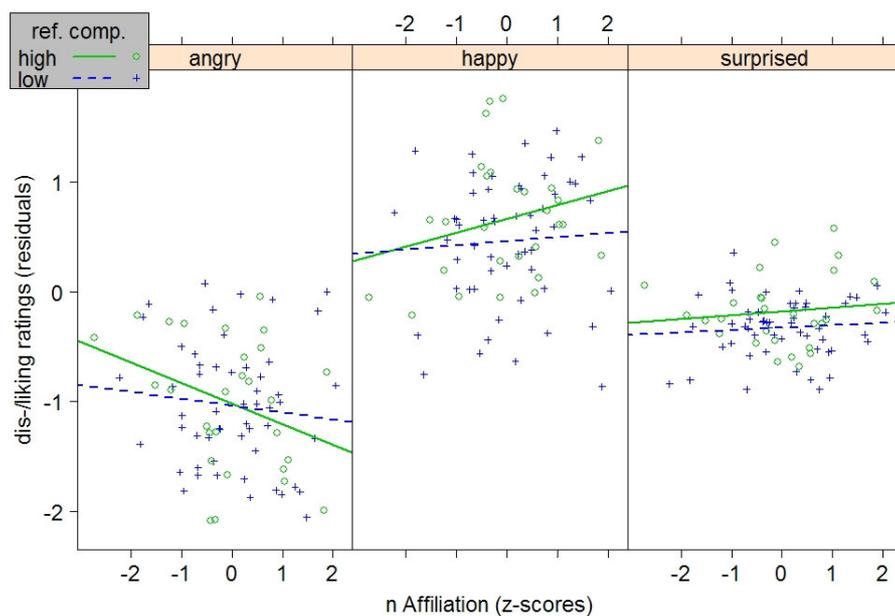
4.4.1 Face Rating

n Affiliation effects on Face Ratings

To test whether *n* Affiliation effects on Face Ratings depend on an individual's referential competence, I regressed Face Ratings on the manipulated within-subject factor emotion (angry, happy, surprised) and the measured between-subject covariates *n* Affiliation, color naming, and color reading. In addition, I added ratings of neutral facial expressions as averaged per subject and disaggregated as a time-varying covariate as well as random intercepts for items (12 different actors) and subjects ($n = 82$) to control for responses to neutral stimuli and to reduce error variance. Equivalent models were used to test referential competence-dependent motive effects for all motive variables and for all stimulus- and response conditions. For the *n* Affiliation effect on Face Ratings, I found a significant *n* Affiliation \times Emotion \times Color Naming \times Color Reading interaction ($\chi(2) = 13.69, p = .001$). Following my interest in emotion-specific Motive \times Referential Competence interactions, I next split the interaction by emotion and regressed face ratings for each emotion condition on *n* Affiliation, color naming, color reading, and ratings of neutral facial expressions as averaged per subject and disaggregated as a time-varying covariate. I found significant *n* Affiliation \times Color Naming \times Color Reading interactions for the happy- ($F(1,2942) = 21.19, MSE = 1.20, p < .0001$) and the surprise- ($F(1,2942) = 13.76, MSE = 0.91, p < .001$), but not for the angry-face ($p = .52$) condition. To yield a more direct measure of referential competence, I replaced the Color Naming \times Color Reading interaction from the previous models with the single difference-measure for referential competence (color reading minus color naming) and found significant *n* Affiliation \times Referential Competence interactions in the happy ($F(1,2946) = 26.53, MSE = 1.20, p < .0001$) and in the surprise ($F(1,2946) = 17.75, MSE = 0.94, p < .0001$) conditions, but not in the anger condition ($p = .47$). Next, I split the referential competence variable at its median and found a significant *n* Affiliation-slope difference between individuals high versus those low in referential competence for ratings of **surprised faces** ($F(1,2946) = 5.35, MSE = 0.95, p < .05$). While for individuals high in referential competence, higher levels of *n* Affiliation were associated with more liking of surprise faces ($B = 0.054, SE = 0.026, p < .05$), no *n* Affiliation did not significantly influence liking ratings for individuals low in referential competence ($p = .20$). Following up the effect in the **happy-face** condition, I split the referential competence variable at its upper trentile and found *n* Affiliation-slopes to marginally significantly differ between the groups formed by this split ($F(1,2946) = 2.99, MSE = 1.20, p = .09$). While *n* Affiliation did not significantly influence Face Ratings in individuals low in referential competence ($p = .19$), higher levels of *n* Affiliation were associated with more liking for happy faces among individuals with a high referential competence ($B = 0.099, SE = 0.032, p < .01$). Although the interaction of *n* Affiliation with color naming and color reading as well as its interaction with referential competence had not reached significance, I also tested whether the influence of *n* Affiliation on Face Ratings differed between individuals above versus below the upper trentile in

referential competence and found this to be the case ($F(1,2946) = 11.02$, $MSE = 1.07$, $p < .001$). While higher levels of n Affiliation were associated with greater disliking of angry faces for individuals high as well as for those low in referential competence, this effect was stronger for individual with a high ($B = -0.199$, $SE = 0.032$, $p < 0.0001$) compared to those with a low referential competence ($B = -0.064$, $SE = 0.024$, $p < .01$). Thus, as displayed in Figure 4-19, high referential competence was associated with stronger influences of n Affiliation on ratings of angry, happy, and surprised faces.

Figure 4-19 – Referential competence-dependent n Affiliation effects on Face Ratings

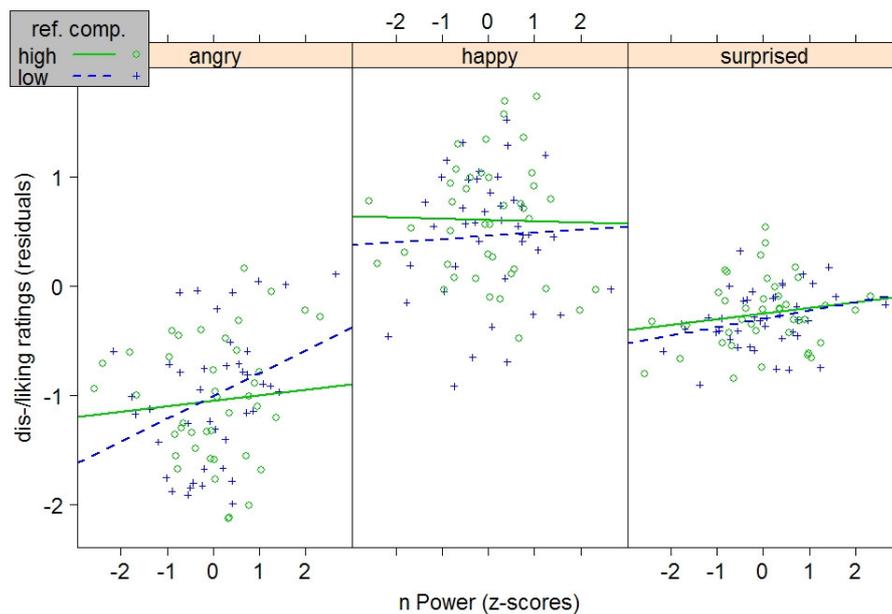


Implicit affiliation motive \times Emotion \times Referential Competence (upper trentile split) interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral facial expressions and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

n Power effects on Face Ratings

To test for referential competence-dependent n Power effects on Face Ratings, I used the model reported in the previous section and replaced the n Affiliation variable with n Power. I found a significant n Power \times Emotion \times Color Naming \times Color Reading interaction ($\chi(2) = 7.13$, $p < .05$). Splitting the interaction by emotion revealed a significant n Power \times Color Naming \times Color Reading interaction for angry facial expressions ($F(1,2942) = 7.12$, $MSE = 1.05$, $p < .01$), but not for happy ($p = .40$) or for surprised ($p = .57$) facial expressions. I followed up on the effect for **angry faces** and found a significant n Power \times Referential Competence interaction ($F(1,2946) = 47.53$, $MSE = 1.05$, $p < .0001$). Higher levels of n Power were associated with less disliking of angry facial expressions in individuals with a referential competence below ($B = 0.205$, $SE = 0.027$, $p < 3.7e-14$) and in those above ($B = 0.057$, $SE = 0.027$, $p < .05$) the median, but the effect was stronger in individuals low compared to those high in referential competence ($F(1,2946) = 15.00$, $MSE = 1.07$, $p < .001$).

Figure 4-20 – Referential competence-dependent *n* Power effects on Face Ratings



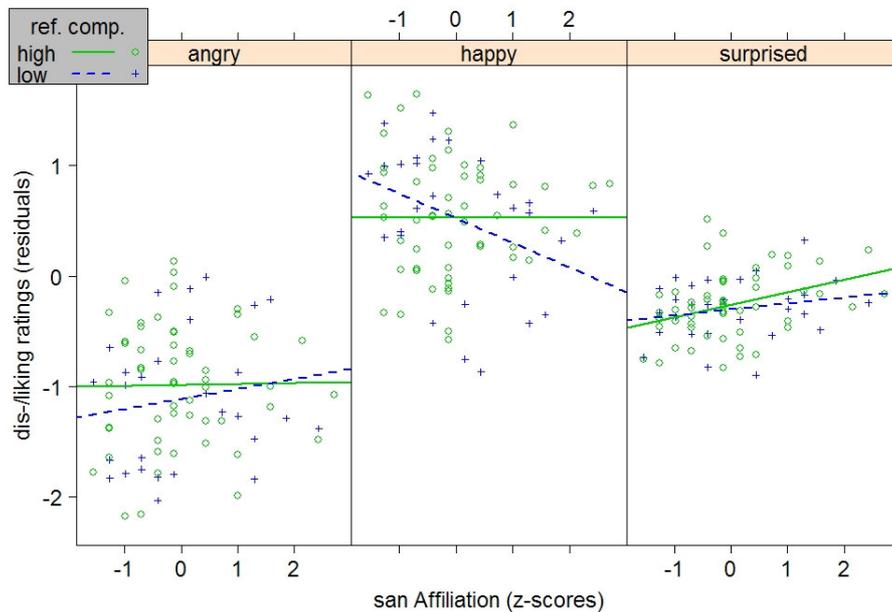
Implicit power motive × Emotion × Referential Competence (median split) interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral facial expressions and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

san Affiliation effects on Face Ratings

I tested whether effects of the explicit affiliation motive on Face Ratings depended on individual’s referential competence by using the *san* Affiliation variable in the model reported for the two previous sections. I found a significant *san* Affiliation × Emotion × Color Naming × Color Reading interaction ($\chi(2) = 17.22, p < .001$), which could be traced back to significant *san* Affiliation × Color Naming × Color Reading interactions for angry ($F(1,2942) = 7.92, MSE = 1.06, p < .01$) and for happy ($F(1,2942) = 3.02, MSE = 1.20, p = .09$) faces. The same interaction for surprised faces was not significant ($p = .60$), indicating that referential competence did not moderate *san* Affiliation effects in this condition. I further followed up on the effects for angry and happy faces by testing *san* Affiliation × Referential Competence interactions for both emotion-conditions and found the *san* Affiliation effect to significantly depend on referential competence for angry ($F(1,2946) = 19.21, MSE = 1.10, p < .0001$) and happy ($F(1,2946) = 4.12, MSE = 1.20, p < .05$) facial expressions. Higher levels in the explicit affiliation motive were associated with less negative ratings of **angry facial expressions** among individuals with a referential competence below ($B = 0.096, SE = 0.028, p < .001$) but not with a referential competence above ($p = .68$) the lower trentile (for the slope-difference: $F(1,2946) = 4.76, MSE = 1.10, p < .05$). Higher levels of *san* Affiliation were associated with less liking for **happy facial expressions** among individuals with a referential competence above ($B = -0.136, SE = 0.027, p < .0001$) and with one below ($B = -0.061, SE = 0.033,$

$p = .07$) the lower trentile, but this effect was marginally significantly stronger among individuals low compared to those high in referential competence ($F(1,2946) = 3.21$, $MSE = 1.20$, $p = .08$).

Figure 4-21 – Referential competence-dependent *san* Affiliation effects on Face Ratings



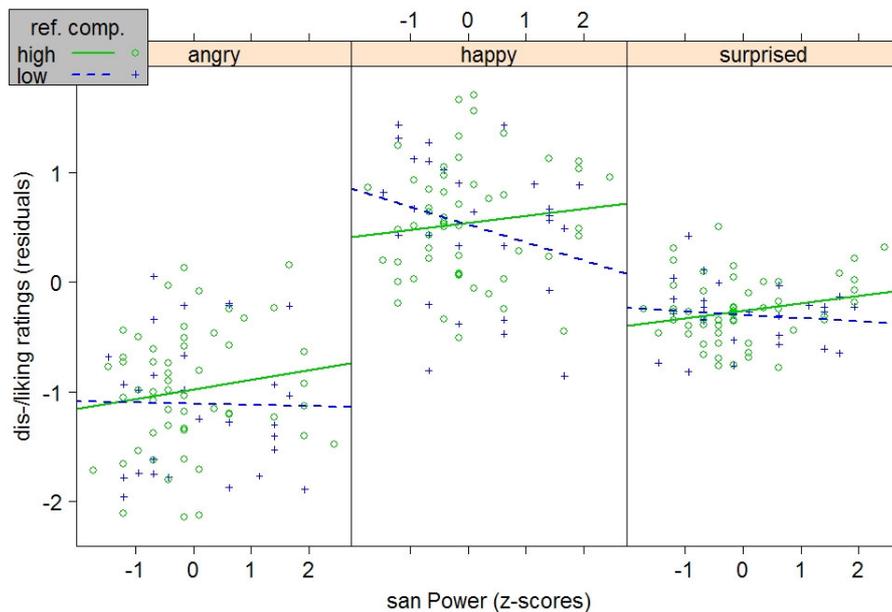
Explicit affiliation motive × Emotion × Referential Competence (lower trentile split) interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral facial expressions and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

***san* Power effects on Face Ratings**

I tested whether the effects of the explicit power motive were moderated by an individual’s level in referential competence, and found a significant *san* Power × Emotion × Color Naming × Color Reading interaction, $\chi(2) = 40.61$, $p < .0001$. I followed up on this effect by testing *san* Power × Color Naming × Color Reading interactions for each level of the emotion factor separately. I found it to be significant for angry ($F(1,2942) = 17.81$, $MSE = 1.07$, $p < .0001$) and surprised ($F(1,2942) = 15.09$, $MSE = 1.20$, $p < .001$) facial expressions, but not for happy faces ($p = .32$). Replacing the Color Naming × Color Reading interaction by the difference score for referential competence yielded a significant *san* Power × Referential Competence interaction for angry ($F(1,2946) = 15.71$, $MSE = 1.10$, $p < .0001$) but not for surprised facial expressions ($p = .98$). For **angry faces**, higher levels in the explicit power motive were associated with less negative liking ratings among individuals with a high referential competence ($B = 0.067$, $SE = 0.026$, $p < .01$), but among individuals with a referential competence below the lower trentile ($p = .97$). The difference between these two slopes was significant ($F(1,2946) = 6.47$, $MSE = 1.10$, $p < .05$). For **surprised facial expressions**, on the other hand, higher levels of *san* Power were associated with more negative ratings among individuals with a referential competence score that was below the lower trentile ($B = -0.065$, $SE = 0.031$, $p < .05$),

but was not significantly related to ratings of individuals with a referential competence score above that value ($p = .36$). Again, the slope difference was significant ($F(1,2946) = 8.70$, $MSE = 0.95$, $p < .01$).

Figure 4-22 – Referential competence-dependent *san* Power effects on Face Ratings



Explicit power motive × Emotion × Referential Competence (lower trentile split) interaction effect on ratings of faces in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral facial expressions and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

4.4.2 Face Stroop

I tested whether referential competence moderated motive effects in the Face Stroop task by testing Motive × Emotion × Color Naming × Color Reading interactions for all four motive measures using similar models as the overall-models reported for the Face Rating task. These interactions did not reach significance for any of the four motives ($ps > .13$).

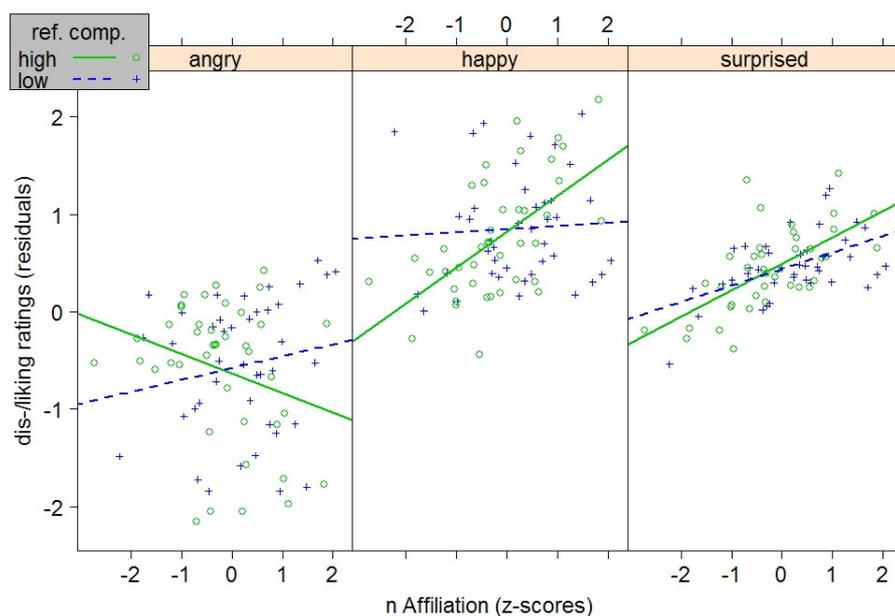
4.4.3 Emotion Word Rating

***n* Affiliation effects on Emotion Word Ratings**

To test whether the effects of the implicit affiliation motive on Emotion Word Ratings were also moderated by the level of referential competence, I used the same set of predictors as reported for the overall model for the Face Rating task to predict liking ratings of emotion words. I found a significant *n* Affiliation × Emotion × Color Naming × Color Reading interaction ($\chi(2) = 35.70$, $p < .0001$) which could be traced back to significant *n* Affiliation × Color Naming × Color Reading

interactions in the angry- ($F(1,1466) = 25.88, MSE = 1.25, p < .0001$) and the happy- ($F(1,1466) = 10.72, MSE = 1.11, p < .001$) word conditions. The same interaction for surprise-words approached the level of a trend ($F(1,1466) = 2.46, MSE = 1.12, p = .12$). Next, I tested the n Affiliation \times Referential Competence interaction for each emotion-condition and found it to be significant for anger ($F(1,1470) = 28.90, MSE = 1.31, p < .0001$), for happy- ($F(1,1470) = 65.06, MSE = 1.12, p < .0001$), and for surprise-related ($F(1,1470) = 9.45, MSE = 1.14, p < .01$) words.

Figure 4-23 – Referential competence-dependent n Affiliation effects on Emotion Word Ratings



Implicit affiliation motive \times Emotion \times Referential Competence (median split) interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

Among individuals with a referential competence above the median, higher levels of n Affiliation were associated with significantly more disliking for **anger-words** ($B = -0.188, SE = 0.046, p < 4.7e-5$). The n Affiliation effect among individuals with a low referential competence differed significantly from that for individuals with a high referential competence ($F(1,1470) = 21.35, MSE = 1.31, p < .0001$) and among individuals low in referential competence, higher levels of n Affiliation were associated with less negative ratings for anger-words ($B = 0.095, SE = 0.042, p < .05$). In the **happy-condition**, higher levels of n Affiliation were strongly and significantly associated with greater liking for happy-words among individuals with a high referential competence ($B = 0.351, SE = 0.042, p < .0001$) but was not significantly related to word-liking of individuals with a referential competence below the median ($p = .67$; slope difference: $F(1,1470) = 29.82, MSE = 1.15, p < .0001$). **Surprise words** were liked more by individuals with an higher level in the implicit affiliation motive among individuals with a referential competence above ($B = 0.271, SE = 0.046, p < .0001$) and with one below ($B = 0.169, SE = 0.036, p < .0001$) the lower trentile. However, this

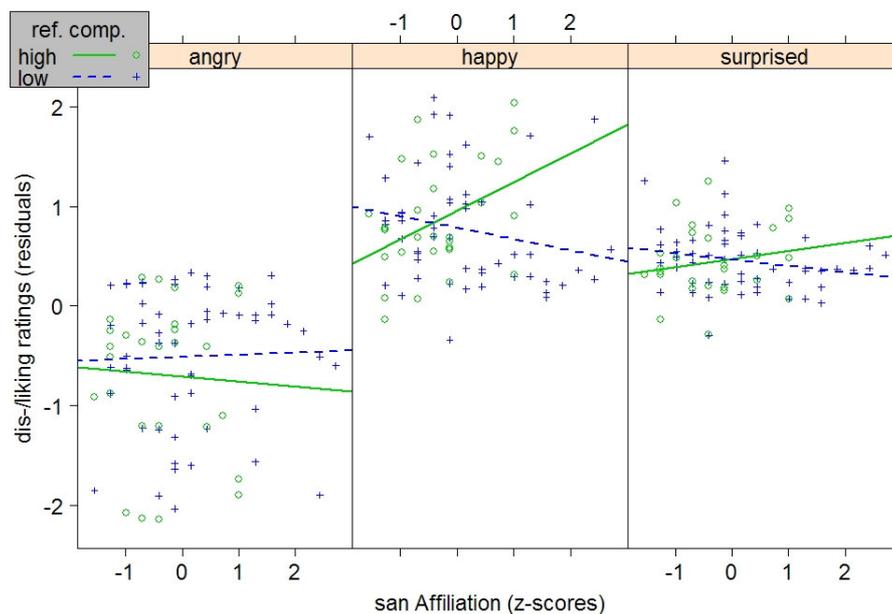
effect tended to be stronger among individuals high in referential competence ($F(1,1470) = 3.13$, $MSE = 1.15$, $p = .08$).

n Power effects on Emotion Word Ratings

I tested whether the effect of the implicit power motive in the Emotion Word Stroop task was moderated by the measure of referential competence but found that the *n* Power \times Emotion \times Color Naming \times Color Reading interaction did not reach significance, $\chi(2) = 4.39$, $p = .12$.

san Affiliation effects on Emotion Word Ratings

Figure 4-24 – Referential competence-dependent *san* Affiliation effects on Emotion Word Ratings



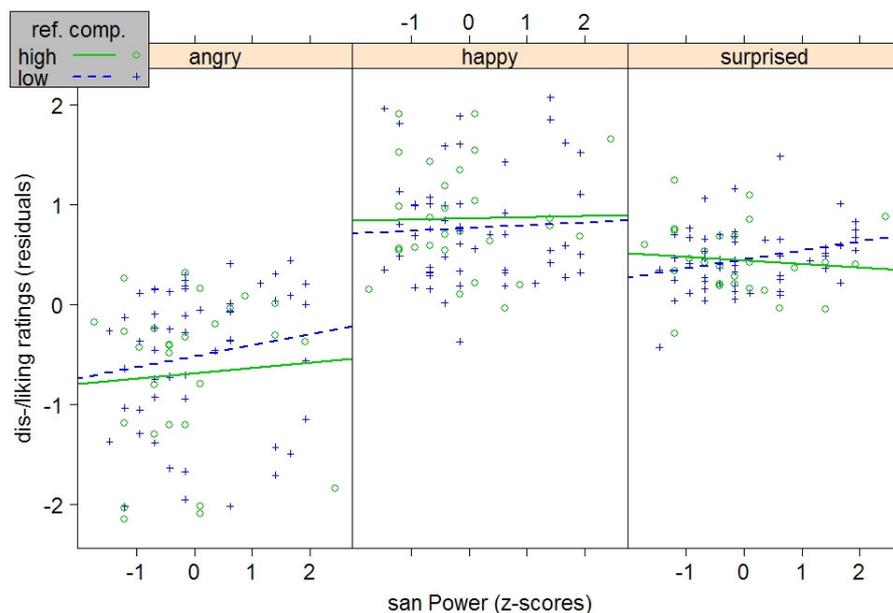
Explicit affiliation motive \times Emotion \times Referential Competence (upper trentile split) interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

The *san* Affiliation \times Emotion \times Color Naming \times Color Reading interaction was significant for the Emotion Word Rating task ($\chi(2) = 15.40$, $p < .001$). The *san* Affiliation \times Color Naming \times Color Reading interaction was significant for anger-related words ($F(1,1466) = 13.12$, $MSE = 1.30$, $p < .001$) and approached the level of a trend for happy-related emotion words ($F(1,1466) = 2.38$, $MSE = 1.20$, $p = .13$), but failed to become significant for words related to surprise ($p = .34$). Using difference scores for the referential competence effect yielded a significant *san* Affiliation \times Referential Competence interaction for anger- ($F(1,1470) = 4.51$, $MSE = 1.33$, $p < .05$), but no significant effect for happy-related emotion words ($p = .62$). Splitting referential competence at its median did not reveal a significant difference between *san* Affiliation slopes for the ratings of **anger words** ($p = .78$). However, higher levels of *san* Affiliation were significantly associated with more

disliking of anger-words among individuals high in referential competence ($B = 0.001$, $SE = 0.001$, $p < .05$) while the corresponding effect among individuals with a low referential competence only reached the level of a trend ($B = 0.051$, $SE = 0.030$, $p = .10$). In the **happy condition**, high levels of *san* Affiliation were significantly associated with greater liking for happy-words among individuals with a referential competence above the upper trentile ($B = -0.116$, $SE = 0.033$, $p < .001$), but were associated with less positive liking ratings among individuals with a referential competence below the upper trentile ($B = 0.164$, $SE = 0.070$, $p < .05$; slope difference: $F(1,1470) = 25.88$, $MSE = 1.19$, $p < .0001$).

san Power effects on Emotion Word Ratings

Figure 4-25 – Referential competence-dependent *san* Power effects on Emotion Word Ratings



Explicit power motive × Emotion × Referential Competence (upper trentile split) interaction effect on ratings of emotion words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of neutral non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

I tested whether *san* Power effects on Emotion Word Ratings depended on individual’s referential competence and found the *san* Power × Emotion × Color Naming × Color Reading interaction to be significant ($\chi(2) = 7.61$, $p < .05$). The *san* Power × Color Naming × Color Reading interaction was significant for ratings of happy-words ($F(1,1466) = 4.33$, $MSE = 1.20$, $p < .05$) and approached the level of a trend for surprise-words ($F(1,1466) = 2.49$, $MSE = 1.18$, $p = .12$), but was not significant for words expressing the emotion anger ($p = .18$). I followed up on these effects by testing the *san* Power × Referential Competence interaction and found it to be non-significant for happy- ($p = .88$) as well as for surprise ($p = .35$) words. However, I split the referential competence variable at its lower trentile and found a significant *san* Power-slope difference for ratings of **happy-**

words between individuals high versus low in referential competence ($F(1,1470) = 5.69$, $MSE = 1.31$, $p < .05$). The effect that higher levels of *san* Power were associated with greater liking for happy-words among individuals with a high referential competence approached the level of a trend ($B = 0.058$, $SE = 0.037$, $p = .12$) and the same association for individuals low in referential competence did not reach significance ($p = .19$). Likewise, in the **surprise condition**, higher levels of *san* Power were associated with more positive ratings of surprise-words among individuals with a referential competence above the upper trentile ($B = 0.072$, $SE = 0.036$, $p < .05$). The equivalent association was not significant among individuals low in referential competence ($p = .68$) and the effect significantly differed from that for individuals with a high referential competence ($F(1,1470) = 4.15$, $MSE = 1.20$, $p < .05$).

4.4.4 Emotion Word Stroop

I tested whether referential competence moderated motive effects in the Emotion Stroop task by testing Motive \times Emotion \times Color Naming \times Color Reading interactions for all four motive variables using equivalent models as the overall-models reported in the previous sections. These interactions did not reach significance for any of the four motives ($ps > .10$).

4.4.5 Trait Word Rating

When testing moderating effects of referential competence for the influence of implicit and explicit motives in response to trait words, I tested the motive effects for each category of trait words separately. I replaced the factors Interpersonal Dimension and Valence that I had used in the previous analyses (see section 4.3 Motive Effects) by the within-subject factor emotion with the four different categories as levels of one emotion factor.

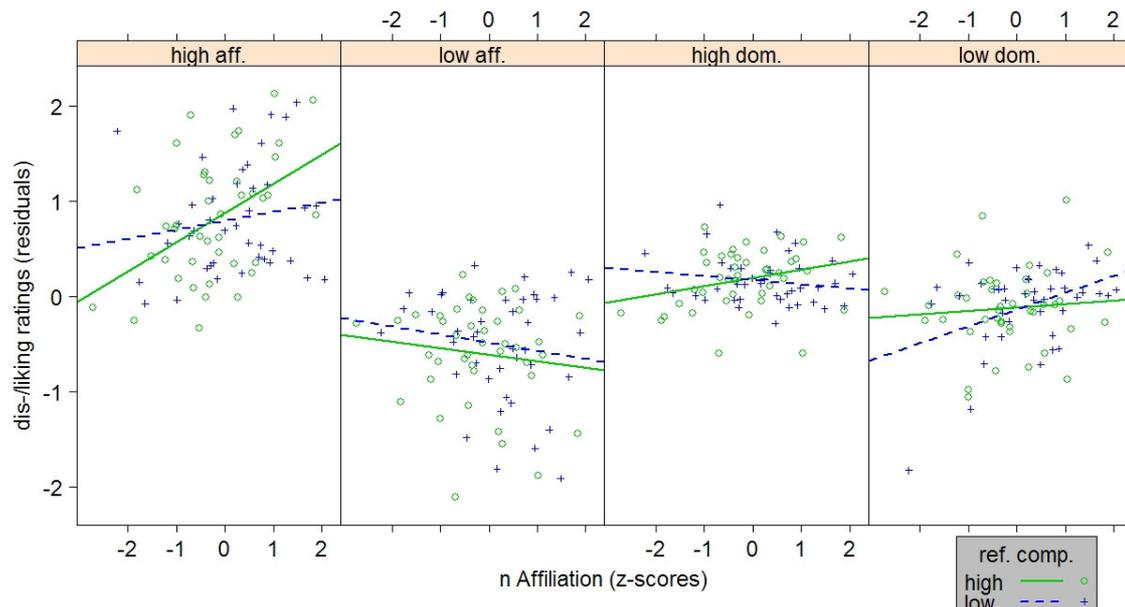
***n* Affiliation effects on Trait Word Ratings**

To test whether the level of referential competence moderates effects of the implicit affiliation motive on Trait Word Ratings, I regressed liking ratings for trait words on the manipulated within-subject factor emotion (high dominance, low dominance, high affiliation, low affiliation), the measured between-subject covariates *n* Affiliation, color naming, and color reading. In addition, I added responses to neutral non-words averaged per participant as a measured between-subject covariate and averaged per block as a measured time-varying covariate. Lastly, I added crossed random effects for the intercept varying over subjects and items (six words per emotion condition).

I found a significant *n* Affiliation \times Emotion \times Color Naming \times Color Reading interaction ($\chi(3) = 10.92$, $p < .05$). Again, I followed up on the effect by testing the *n* Affiliation \times Color Naming \times Color Reading interaction for each category of trait words separately. I found the interaction to be significant for trait words signaling high ($F(1,1466) = 4.62$, $MSE = 1.01$, $p < .05$) and marginally significant for words signaling low affiliation ($F(1,1466) = 3.14$, $MSE = 1.25$, $p < .08$). I also found it

to be significant for trait words signaling low dominance ($F(1,1466) = 5.70$, $MSE = 0.99$, $p < .05$), but not for those signaling high dominance ($p = .20$). Next, I further followed up on the effects by using the difference score as a measure for referential competence and found the n Affiliation \times Referential Competence interaction to be significant for trait words signaling high affiliation ($F(1,1470) = 67.63$, $MSE = 1.02$, $p < .0001$) and for those signaling low dominance ($F(1,1470) = 3.65$, $MSE = 1.06$, $p = .06$). For trait words signaling low affiliation, this same effect did not reach significance ($p = .15$) and also the difference in n Affiliation slopes between individuals high versus low in referential competence was not significant ($p = .53$). For **trait words signaling high affiliation**, higher levels of n Affiliation were associated with greater liking ratings among individuals with a low ($B = 0.095$, $SE = 0.037$, $p < .05$) as well as for those with a high ($B = 0.302$, $SE = 0.041$, $p < .0001$) referential competence (using the median as a cut-off). This effect was significantly stronger among individuals high in referential competence (for the slope difference: $F(1,1470) = 13.07$, $MSE = 1.05$, $p < .001$). Higher levels of n Affiliation were also associated with greater liking for **trait words signaling low dominance** among individuals low in referential competence (using a median split, $B = 0.178$, $SE = 0.037$, $p < .0001$), but not among individuals with a high referential competence ($p = .41$; slope difference: $F(1,1470) = 7.97$, $MSE = 1.05$, $p < .01$)

Figure 4-26 – Referential competence-dependent n Affiliation effects on Trait Word Ratings



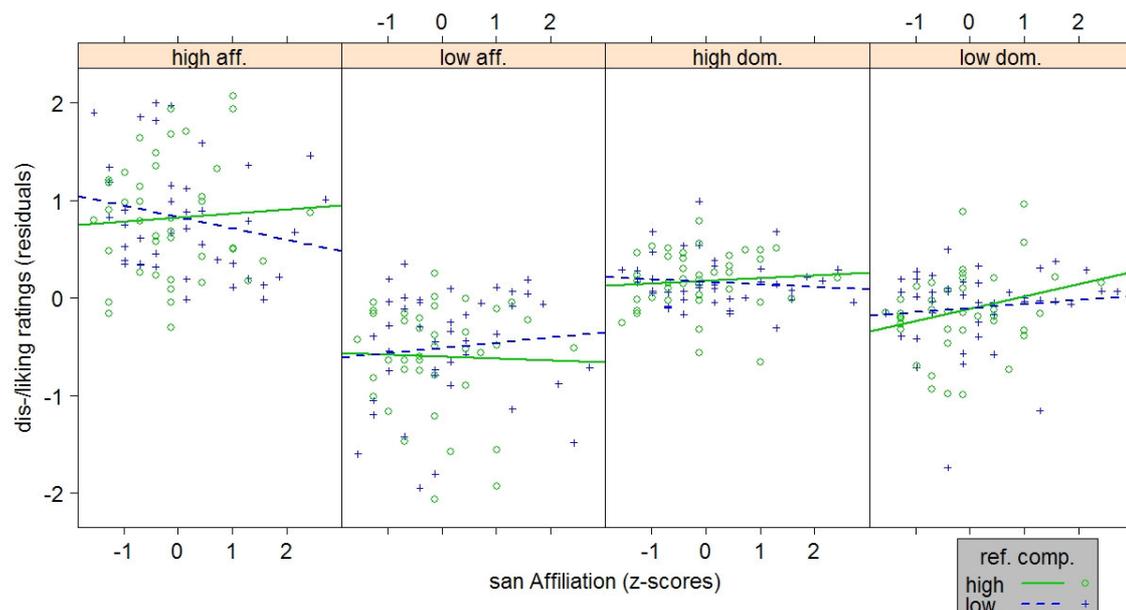
Implicit affiliation motive \times Emotion \times Referential Competence (median split) interaction effect on ratings of trait words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

n Power effects on Trait Word Ratings

I tested whether the effect of the implicit power motive on Trait Word Ratings was moderated by the measure of referential competence, and I found that the *n* Power \times Emotion \times Color Naming \times Color Reading interaction did not reach significance ($p = .94$).

san Affiliation effects on Trait Word Ratings

Figure 4-27 – Referential competence-dependent *san* Affiliation effects on Trait Word Ratings



Explicit affiliation motive \times Emotion \times Referential Competence (median split) interaction effect on ratings of trait words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

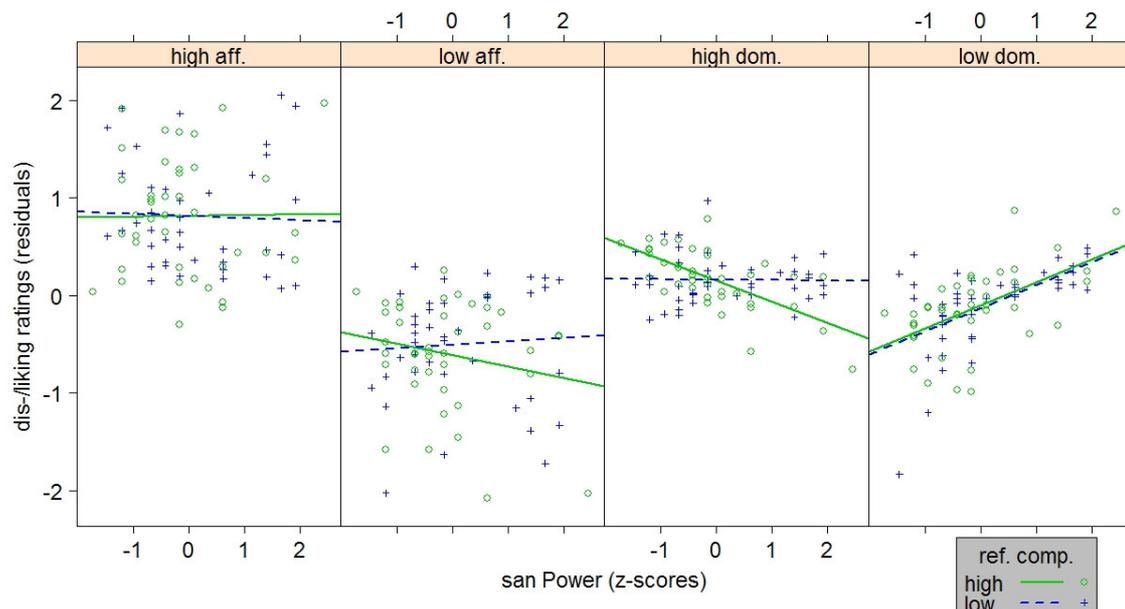
To test for referential competence-dependent *san* Affiliation effects on Trait Word Ratings, I used the same testing strategy as reported for the previous sections and found the *san* Affiliation \times Emotion \times Color Naming \times Color Reading interaction to be significant, $\chi(3) = 27.26$, $p < .0001$. Following up on the effect revealed significant *san* Affiliation \times Color Naming \times Color Reading interactions in the low affiliation- ($F(1,1466) = 4.03$, $MSE = 1.24$, $p < .05$) and in the low dominance- ($F(1,1466) = 37.80$, $MSE = 1.01$, $p < .0001$) condition, but non-significant interactions for trait words signaling high affiliation or dominance ($ps > .84$). Next, I tested the *san* Affiliation \times Referential Competence interaction for negatively valenced trait words and found it to be significant for trait words signaling low affiliation ($F(1,1470) = 6.54$, $MSE = 1.09$, $p < .05$), but only to approach the level of a trend for trait words signaling low dominance ($F(1,1470) = 2.49$, $MSE = 1.55$, $p = .12$). Higher levels of *san* Affiliation were associated with less liking of **trait words signaling high affiliation** among individuals with a low ($B = -0.119$, $SE = 0.033$, $p < .001$), but not among those with

a referential competence greater than the median ($p = .61$; slope difference: $F(1,1470) = 7.81$, $MSE = 1.09$, $p < .01$). Higher levels of *san* Affiliation were also associated with more liking of **trait words signaling low dominance** among individuals with a referential competence below the lower trentile ($B = 0.162$, $SE = 0.050$, $p < .01$), but not among those above that value ($p = .35$; slope difference: $F(1,1470) = 3.67$, $MSE = 1.06$, $p = .06$).

***san* Power effects on Trait Word Ratings**

The *san* Power \times Emotion \times Color Naming \times Color Reading interaction for Trait Word Ratings was significant ($\chi(3) = 34.43$, $p < .0001$) and could be traced back to significant *san* Power \times Color Naming \times Color Reading interactions for trait words signaling low dominance ($F(1,1466) = 31.38$, $MSE = 0.96$, $p < .0001$) and for those signaling high affiliation ($F(1,1466) = 4.88$, $MSE = 1.09$, $p < .05$). The interaction was not significant for trait words signaling high dominance or low affiliation ($ps > .26$). While the *san* Power \times Referential Competence interaction was marginally significant for trait words signaling low dominance ($F(1,1470) = 2.91$, $MSE = 1.02$, $p = .09$), it did not reach significance for trait words signaling high affiliation ($p = .22$). Although the interaction involving color naming and color reading had not been significant for trait words signaling high dominance, *san* Power significantly interacted with the difference score for referential competence in this condition ($F(1,1470) = 6.51$, $MSE = 1.54$, $p < .05$). Splitting the difference score-variable for referential competence at its median and testing *san* Power effects for individuals high versus low in referential competence separately revealed that higher levels of *san* Power were associated with greater disliking for **trait words signaling high dominance** among individuals with a high ($B = -0.221$, $SE = 0.049$, $p < .0001$) but not among those with a low referential competence ($p = .97$; slope difference: $F(1,1470) = 9.76$, $MSE = 1.53$, $p < .01$). For **trait words signaling low dominance**, *san* Power slopes did not significantly differ between individuals high versus low in referential competence ($p = .91$ for the median split). However, calculating the coefficient for the *san* Power \times Referential Competence interaction ($B = -0.001$, $SE = 0.001$, $p = .09$) indicated that higher levels of referential competence tended to be associated with less positive effects of *san* Power. For **trait words signaling high affiliation**, higher levels of *san* Power were significantly associated with less positive liking ratings among individuals low in referential competence ($B = -0.123$, $SE = 0.046$, $p < .001$). This association differed significantly ($F(1,1470) = 10.21$, $MSE = 1.09$, $p < .01$) from a non-significant effect *san* Power effect among individuals high in referential competence ($B = 0.056$, $SE = 0.034$, $p = .11$).

Figure 4-28 – Referential competence-dependent *san* Power effects on Trait Word Ratings



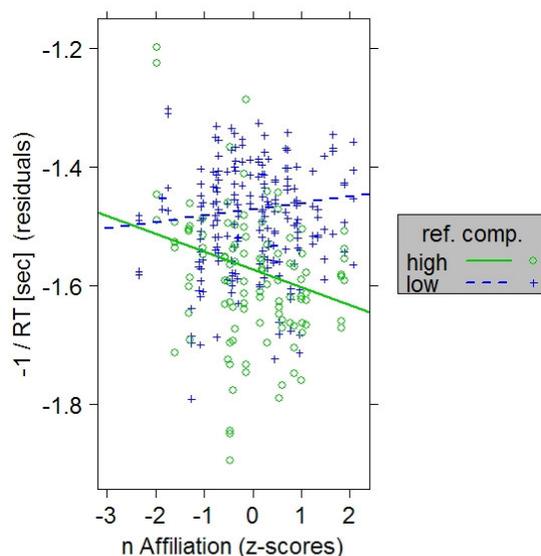
Explicit power motive × Emotion × Referential Competence (lower trentile split) interaction effect on ratings of trait words in response to the question “How much do you like or dislike the stimulus?” (response categories: +2 = like a lot; -2 = dislike a lot). Ratings are residualized for ratings of non-words and for the random intercepts for subjects and items. Residualized ratings were averaged per participant for plotting.

4.4.6 Trait Word Stroop

n Affiliation effects in the Trait Word Stroop task

To test for moderating effects of referential competence on influences of *n* Affiliation on color naming latencies, I tested the *n* Affiliation × Emotion × Color Naming × Color Reading interaction and found it to be non-significant ($p = .47$). However, the Block × *n* Affiliation × Emotion × Color Naming × Color Reading reached the level of a trend ($\chi(3) = 11.19, p = .09$). I split this interaction by block and found a significant *n* Affiliation × Emotion × Color Naming × Color Reading interaction in the third block ($\chi(3) = 10.45, p < .05$), but not in the first or second blocks ($ps > .68$). I followed up on the effect in the third block by splitting the interaction by emotion and found the *n* Affiliation × Color Naming × Color Reading interaction to be significant for trait words signaling high affiliation ($F(1,428) = 6.45, MSE = 0.11, p < .05$), but not for trait words signaling low affiliation or high or low dominance ($ps > .14$). Following up on the effect for **high affiliation-trait words**, I found the *n* Affiliation × Referential Competence interaction to be marginally significant ($F(1,1470) = 2.74, MSE = 0.11, p = .10$). Next, I split the referential competence variable at its upper trentile and found that, although the *n* Affiliation slopes for individuals high and for those low in referential competence failed to become significant ($p > .21$), the difference between these slopes approached the level of a trend ($F(1,1470) = 2.65, MSE = 0.11, p = .11$).

Figure 4-29 – Referential competence-dependent *n* Affiliation effect in the Trait Word Stroop task



Implicit affiliation motive × Emotion × Referential Competence (upper trentile split) × Block interaction effect on the color naming speed ($-1/RT$ [sec]) for trait words. Displayed is the response to trait words signaling high affiliation in the third block. Response times are residualized for responses towards non-words and for the random intercepts for subjects and items. Residualized response times were averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

***n* Power effects in the Trait Word Stroop task**

I tested whether the effect of the implicit power motive in the Trait Word Stroop task was moderated by the measure of referential competence. I found that the *n* Power × Emotion × Color Naming × Color Reading interaction did not reach significance in this task ($p = .87$).

***san* Affiliation effects in the Trait Word Stroop task**

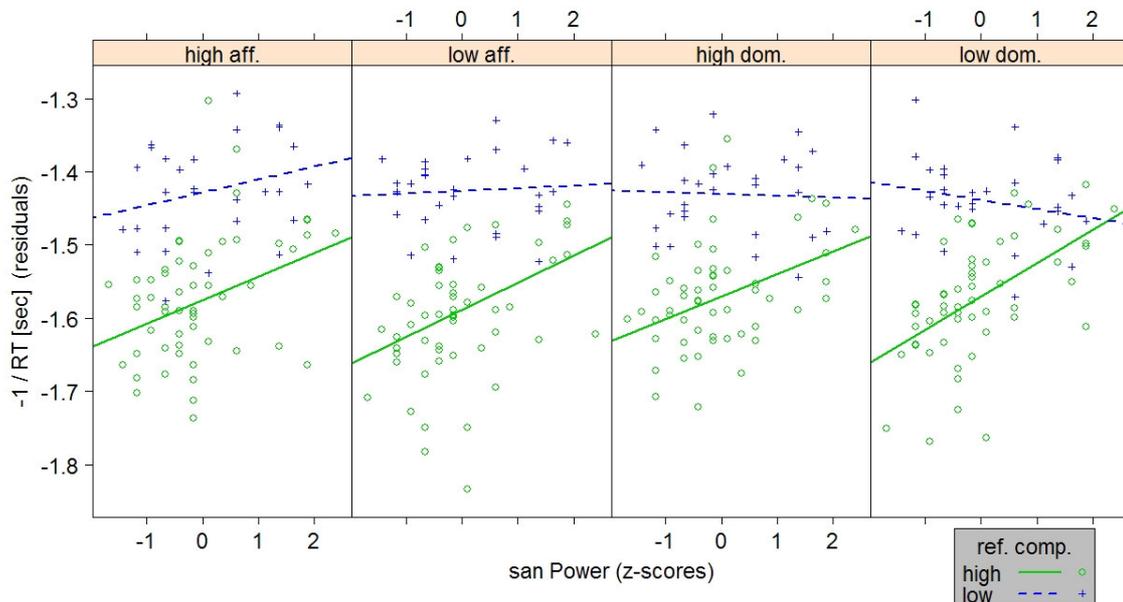
Likewise, I tested whether the level of referential competence moderated the effect of the explicit affiliation motive in the Trait Word Stroop task, but found the relevant interaction to be non-significant ($p = .60$).

***san* Power effects in the Trait Word Stroop task**

Lastly, I tested for moderating effects of the level of referential competence on emotion-specific *san* Power effects on color naming latencies for trait words. I found the *san* Power × Emotion × Color Naming × Color Reading interaction to be significant, $\chi(3) = 8.19, p < .05$. Splitting the interaction by Emotion revealed significant *san* Power × Color Naming × Color Reading interactions for trait words signaling high ($F(1,1294) = 4.76, MSE = 0.10, p < .05$) and for those signaling low affiliation ($F(1,1294) = 7.85, MSE = 0.10, p < .01$) as well as for high-dominance trait

words ($F(1,1294) = 4.38, MSE = 0.09, p < .05$). Only the effect for low-dominance trait words failed to become significant ($p = .44$).

Figure 4-30 – Referential competence-dependent *san* Power effects in the Trait Word Stroop task



Explicit affiliation motive × Emotion × Referential Competence (lower trentile split) interaction effect on the color naming speed (-1 / RT [sec]) for trait words. Response times are residualized for responses towards non-words and for the random intercepts for subjects and items. Residualized response times were averaged per participant for plotting. Residuals and slopes were calculated using the overall model.

Following up on the effect for **trait words signaling high dominance**, I found a significant *san* Power × Referential Competence interaction ($F(1,1294) = 5.17, MSE = 0.10, p < .05$) and found *san* Power slopes for individuals high versus low in referential competence (cut-off: lower trentile) to differ significantly from each other on the level of a trend ($F(1,1294) = 3.56, MSE = 0.10, p = .06$). Among individuals high in referential competence, higher levels of *san* Power were associated with longer color-naming latencies ($B = 0.023, SE = 0.011, p < .05$). Among individuals with a low referential competence, on the other hand, *san* Power was not significantly related to color-naming latencies ($p = .55$). Although the *san* Power × Color Naming × Color Reading interaction had not reached significance for **trait words signaling low dominance**, the *san* Power × Referential Competence interaction was significant ($F(1,1294) = 14.69, MSE = 0.10, p < .05$). Splitting the variable for referential competence at its median revealed a significant difference between *san* Power slopes between individuals with a high versus those with a low referential competence ($F(1,1294) = 4.34, MSE = 0.10, p < .05$). While higher levels in the explicit power motive were significantly associated with longer color-naming latencies for individuals with a high referential competence ($B = 0.040, SE = 0.013, p < .01$), the same association was not significant among individuals with a low referential competence ($p = .69$). Following up on the

effect for **high-affiliation trait words** uncovered a non-significant *san* Power \times Referential Competence interaction ($p = .15$) and no significant difference in *san* Power slopes between individuals high versus low in referential competence ($p = .26$ for the median split). For **trait words signaling low affiliation**, the *san* Power \times Referential Competence interaction was significant ($F(1,1294) = 7.63, MSE = 0.10, p < .01$) and translated into a marginally significant *san* Power-slope difference between individuals with a high versus those with a low referential competence (cut-off point: lower tertile; $F(1,1294) = 3.83, MSE = 0.10, p = .06$). While *san* Power did not influence color-naming latencies among individuals with a low referential competence ($p = .95$), higher levels in *san* Power were associated with longer color-naming latencies among individuals with a high referential competence ($B = 0.029, SE = 0.011, p < .01$).

5 DISCUSSION

In this study, I investigated how implicit and explicit motives differ with respect to nonverbal versus verbal stimulus and non-declarative versus declarative response formats. Based on Schultheiss' (2001) information processing account of implicit motive arousal, I had hypothesized (1st level of hypotheses) that implicit motives respond to nonverbal stimuli to influence non-declarative measures of motivation and that explicit motives respond to verbal stimuli to influence declarative measures of motivation. Only in individuals with a high referential competence (the ability to quickly translate a non-stimulus into a verbal representation) implicit motives were expected to respond to verbal stimuli and to influence declarative measures of motivation and explicit motives were expected to respond to nonverbal stimuli and to influence non-declarative measures of motivation.

I had hypothesized that the implicit and explicit dispositional needs for affiliation and dominance respond to signals of affiliation and dominance (2nd level of hypotheses). I used FEEs as nonverbal stimuli and words for emotions and for traits as verbal stimuli that are signaling dominance and affiliation to test these hypotheses. To assess behavioral effects of implicit and explicit motives, I used dis-/liking judgments for the stimuli as a declarative measure of motivation (referred to as the rating task) and an emotional Stroop task as a non-declarative measure of motivation. While the implicit and explicit affiliation motives were predicted to be *symmetrically* related to the incentive value of the affiliation signaled by a stimulus, the implicit and explicit power motive were predicted to be *reciprocally* related to the incentive value of the dominance signaled by a stimulus. Thus, high levels in the implicit or explicit affiliation motive were hypothesized to be associated with more liking for stimuli signaling friendliness and more disliking for stimuli signaling hostility compared to low levels in the respective motive. FEEs and words for the emotion happy and trait words signaling high affiliation were used as stimuli signaling friendliness, and FEEs and words for the emotion anger and trait words signaling low affiliation were used as signals of hostility. High levels in the implicit or explicit power motive were hypothesized to be associated with more liking for stimuli signaling submission and more disliking for stimuli signaling dominance compared to low levels in the respective motive. FEEs and words for the emotion surprise and low-dominance trait words were used as stimuli signaling submission, while FEEs and words for the emotions anger and joy and high-dominance trait words were used as signals of dominance. In addition, I explored how the affiliation and the power motive from the same (implicit or explicit) domain interact in influencing behavior. The motive-dependent incentive value of stimuli was predicted to be symmetrically associated with dis-/liking ratings for these stimuli, but the direction of motive-dependent incentive value with color naming latencies was not specified.

My findings provide evidence for the predictions concerning responses of the implicit and explicit affiliation and power motive to signals of affiliation and dominance (2nd level of hypotheses). My findings also suggest that implicit as well as explicit motives can respond to nonverbal and to

verbal stimuli to influence non-declarative and declarative measures of motivation. These effects were particularly strong in individuals with a high referential competence, but they also occurred in individuals with a low referential competence in several conditions. These findings provide support for Schultheiss' (2001) information processing account. However, the finding that motives show effects among individuals with a low referential competence in the non-fitting conditions demonstrates that the distinctions are not as strict as might be assumed on the basis of Schultheiss' model. Additional mechanisms have to be drawn upon to explain this effect in the context of this model. In the following sections, I will first discuss the findings concerning responses of the affiliation and power motives to signals of affiliation and dominance (in the context of the second level predictions; chapter 5.1), will then summarize the findings concerning the predictions derived from Schultheiss' information processing account (chapter 5.2) and will finally discuss the implications of these findings for the understanding of how implicit and explicit motives differ (chapter 5.3).

5.1 Motives Respond to Signals of Affiliation and Dominance (2nd level hypotheses)¹

5.1.1 Effects of the implicit affiliation motive

I found that the effects of the implicit affiliation motive were as predicted for individuals high in the implicit power motive, but contrary to the predicted effects for individuals low in the implicit power motive.

Emotions: FEEs and Words

Compared to individuals low in *n* Affiliation, I found that high levels of *n* Affiliation predict more negative ratings for **anger**-FEEs and anger-words in individuals high in *n* Power and less negative ratings of the same stimuli in individuals low in *n* Power. In addition, when controlling for responses to neutral facial expressions, high levels of *n* Affiliation were associated with shorter response times for naming the color of anger-FEEs, but did not influence color naming for emotion words.

Thus, as predicted, anger-stimuli are aversive for individuals with a strong dispositional need to be close to others if they also have a strong need to influence others. However, the effect was opposite to the prediction for individuals with a weak implicit power motive. This clearly demands explanation. One possibility might be that *n* Power moderates the expression of individuals' emotions (cf. Gross, 2001). This interpretation receives support through findings by McClelland and Pilon (1983). They showed in a long-term study that individuals who were allowed to show sexual and

¹ See Appendix B) for tables summarizing the results.

aggressive behavior during childhood developed a strong implicit power motive in adulthood. Low *n* Power, on the other hand, developed among individuals whose parents did not permit expression of sexual and aggressive impulses. Thus, individuals with high levels of *n* Power have learned to derive pleasure from having impact on others through aggressive behavior and thus might not mind expressing their disliking for an angry face. Individuals with a low implicit power motive, on the other hand, might have learned not to express their impulses and feelings openly and thus not to react aggressively to signals of rejection. Instead, the latter individuals might try to correct their negative ratings for the anger-stimuli. Overcorrection (cf. Ottati & Isbell, 1996) might lead to the resulting positive effect of *n* Affiliation within this group². This account of the data can also explain why the implicit need to be close to others influences the color naming speed for anger-stimuli in individuals low, but not in those high in *n* Power. Suppression of emotions has been found to lead to heightened physiological arousal (Gross, 1998). This increased arousal might lead to activation and, thus, to a faster response. In addition, individuals high in *n* Affiliation and low in *n* Power might use fast responses as an additional strategy to suppress their emotion by avoiding longer exposure to the emotion-eliciting stimulus.

An alternative explanation for these findings might be that, within individuals low in *n* Power, *n* Affiliation positively predicted ratings of anger-stimuli because individuals low in both implicit motives have an inhibited fear of rejection and fear of impact. This would explain their strong disliking and slowed color naming of anger-stimuli.

I also found that, among individuals with high levels of *n* Power, *n* Affiliation positively predicted ratings of FEEs and emotion words in the **happy**-condition. In individuals low in *n* Power, on the other hand, *n* Affiliation was a negative predictor for ratings of FEEs expressing joy, but did not predict ratings of emotion words expressing happiness. As for the color naming speed for anger-FEEs, high *n* Affiliation accelerated the color naming speed of joy-FEEs in individuals low in *n* Power but did not influence response times among individuals with a high implicit need to have impact on others. Responses in the Emotion Word Stroop task were not predicted by the implicit affiliation motive. As predicted, I found that individuals with a strong implicit affiliation motive like FEEs and emotion words signaling friendliness if they also have a strong implicit need to influence others. Again, one potential explanation for the opposite effect within individuals low in *n* Power might be that individuals high in *n* Affiliation but low in *n* Power also suppress the expression of their positive feelings when looking at a stimulus signaling high affiliation. This somewhat surprising finding might be explained by a general tendency of individuals low in *n* Power to express their feelings irrespective

² Assuming that the positive *n* Affiliation slope within individuals low in *n* Power is due to suppression of negative emotions within individuals high in *n* Affiliation, it might be surprising to find that ratings of individuals low in *n* Power are not overall more positive but rather slightly more negative than those of individuals high in *n* Power, who are not expected to suppress emotions. This effect might stem from the overall positive main effect of *n* Power on ratings. Potential explanations for this effect are given below.

of whether they are negative (as has been found to be the case for sex and aggression, McClelland & Pilon, 1983) or positive. Alternatively, the tasks involving FEEs (but not those using emotion words as stimuli) might have been emotionally negative situations for individuals low in *n* Power. As was demonstrated by Butler et al. (2003), suppressing emotions in an emotionally negative social situation leads to suppression not only of negative, but also of positive affective responses, thus explaining the suppression of positive *n* Affiliation-associated affect within individuals low in *n* Power in the happy-face, but not the happy-word condition³. As for the anger-condition, the emotion regulation-perspective is also capable of explaining the equivalent *n* Affiliation effect in the Face Stroop task by the increased physiological arousal that might lead to faster responses after repressing emotions.

Again, the alternative explanation that individuals low in *n* Affiliation and low in *n* Power combine suppressed fear of rejection with fear of submission is also capable of explaining the findings. These individuals would exhibit the strongest sensitivity for signals of friendliness and like joyful FEEs even more than individuals high in *n* Affiliation and low in *n* Power. This assumption of suppressed fear of rejection in individuals low in both motives also explains their slowed color naming for happy faces.

Earlier research (Schultheiss et al., 2005) has found that *n* Affiliation predicts the incentive value of facial expressions of joy only within individuals high, but not within individuals low in *n* Power in an implicit learning task. I extended this finding by reporting a negative *n* Affiliation effect on ratings of joy-faces within individuals low in *n* Power. The finding of Schultheiss and colleagues is somewhat difficult to explain by the assumption that emotion regulation is responsible for the interaction between the implicit affiliation and power motive (although reappraisal as a more antecedent-focused form of emotion regulation might also influence implicit learning without awareness). Instead, the null-effect in the findings by Schultheiss and colleagues might suggest that only individuals high in *n* Power are sufficiently interested in the FEEs for their implicit affiliation motives to respond to the expression of joy. However, this explanation fails to explain the negative *n* Affiliation effect of individuals low in *n* Power on liking ratings and, importantly, on the color naming speed. Another reason for the interaction and the paradoxical effect of *n* Affiliation within individuals low in *n* Power might lie in the ways in which individuals high versus low in *n* Power pursue their affiliation interests and thus in how they interpret the expression of joy. Thus, individuals with a strong implicit power motive might try to affiliate with others by influencing others to like them. However, why how this should lead to a negative *n* Affiliation effect on the ratings of happy faces remains puzzling and awaits further empirical investigation.

³ If individuals actually suppress their emotions, one might expect their ratings to be generally closer to the neutral mid-point of the ratings scale. However, their ratings were not much more negative than ratings of those individuals who are not expected to suppress their emotions. This surprising finding might be due to the high dominance signaled by the happy facial expressions, which is disliked more by individuals high in *n* Power.

When analyzing effects in the **surprise**-condition, I found that n Affiliation had no effect on ratings of FEEs within individuals high in n Power, but that it slightly positively predicted liking ratings for surprised expressions within individuals low in n Power. Likewise, individuals with a strong implicit affiliation motive gave higher liking ratings for emotion words compared to individuals with a low implicit affiliation motive independent of their level of n Power. In addition, individuals high in n Affiliation tended to be faster in naming the color of surprise-faces independent of n Power, but again no n Affiliation effect occurred for the color naming of words. Although the n Affiliation effect on ratings of surprised facial expression was as predicted and significant within individuals high in n Power, the existence of n Affiliation effects in the other conditions was contrary to my predictions. Thus, unlike hypothesized, surprise does not seem to be fully neutral for the implicit affiliation motive. Why n Affiliation responds to these stimuli is unclear at present and needs further investigation.

Trait Words

Among individuals with a strong implicit need to have impact, I found that high levels of n Affiliation were associated with higher liking ratings for trait words signaling high compared to those signaling low affiliation, but that n Affiliation effects in response to trait words signaling dominance were not valence-specific. In addition, high levels of n Affiliation predicted slowed color naming of trait words signaling high compared to those signaling low affiliation in individuals high in n Power, but n Affiliation did not predict valence-specific effects in response to trait words signaling dominance. Within individuals with a low implicit power motive, on the other hand, n Affiliation showed no valence-specific effect on ratings of trait words signaling affiliation, but a negative effect on difference scores for those signaling dominance. Valence-specific n Affiliation effects in the Trait Word Stroop task were not significant within individuals low in n Power.

Thus, as for the ratings of FEEs and Emotion Words, individuals high in n Power responded as predicted in the Trait Word Rating task. For these individuals, n Affiliation was *symmetrically* related to the incentive value of trait word affiliation and was not related to the incentive value of trait word dominance. This was visible in the rating as well in the emotional Stroop task. In individuals low in n Power, on the other hand, the implicit affiliation motive again responded in an unpredicted manner. While n Affiliation was not related to the liking ratings or the color naming speed for trait words signaling affiliation and to the color naming of trait words signaling dominance in a valence-specific way, it was *reciprocally* related to the difference scores for ratings of dominance-related trait words. I speculate that individuals with a low level of n Power see an opportunity to affiliate with individuals low, but not with those high in dominance, leading to more liking for low dominance and less liking for high dominance traits within individuals high in n Affiliation.

Summary

I found good evidence for the 2nd level prediction that the implicit affiliation motive is *symmetrically* related to the incentive value of the affiliation signaled by a stimulus. This prediction worked out particularly for individuals high in *n* Power, in which *n* Affiliation negatively predicted liking ratings for signals of hostility (FEEs and words for the emotion anger, low affiliation trait words), positively predicted liking ratings for signals of friendliness (FEEs and words for the emotion joy, high affiliation trait words), and predicted the color naming speed in response to trait words signaling high versus low affiliation. The implicit affiliation motive responded in an unpredicted way to influence liking ratings within individuals with a low implicit need to influence others. High *n* Affiliation was associated with less disliking of anger-stimuli, less liking of happy faces, but more liking for trait words signaling low compared to those signaling high dominance. It was also associated with faster responses in the Face Stroop task for happy and angry faces, which matches the predictions. Two possible explanations for the paradoxical effects of *n* Affiliation at low levels of *n* Power are the habitual regulation of emotions of individuals high in *n* Affiliation and a suppressed fear of rejection element of individuals low in *n* Affiliation. The prediction for the surprise-condition only worked out for ratings of surprised facial expressions within individuals high in *n* Power. Why *n* Affiliation positively predicted ratings of surprise stimuli in the other conditions and negatively predicted the color naming speed for surprised FEEs awaits further investigation.

5.1.2 Effects of the explicit affiliation motive

As *san* Affiliation influenced responses in the neutral condition in each task, I entered these responses as covariates to the model. Thus, all the reported effects are independent of responses towards neutral non-words and are thus specific to the emotional content of the stimuli.

Emotions: FEEs and Words

I found evidence that individuals with a low explicit affiliation motive gave more negative ratings for stimuli in the **anger**-condition. While the effect approached a trend for the Face Rating task, it was significant for individuals high in *san* Power for ratings of emotion words. No effects of the explicit affiliation motive could be found on anger-stimuli in the Face and the Emotion Word Stroop tasks. Thus, the effects were exactly opposite to my prediction that individuals high in *san* Affiliation dislike anger-stimuli more. A good explanation for this paradoxical effect is the association of the explicit affiliation motive with adult attachment style. Randolph, Brown, Smart, and Nelson (1997) found out that high levels of the explicit affiliation motive are associated with a secure attachment style among adults, which equals a “positive orientation towards self and others” (p. 115). Low levels of the explicit affiliation motive, on the other hand were found to be associated with the attachment style of “fear”, which corresponds to a “negative orientation towards the self and towards others” (p. 115). Given these findings, my seemingly paradoxical results for the effect of *san*

Affiliation in response to anger-stimuli make sense. Individuals with a low explicit affiliation motive are actually insecurely attached and, consequently, have a high fear of rejection. Thus, signals of affiliation (friendliness versus hostility) are more important for individuals low than for those high in *san* Affiliation.

In the analyses in the **happy**-condition, I found that individuals with a low explicit affiliation motive indicated to like happy faces and emotion words more than individuals with a strong explicit need to be close to others (this effect was marginally significant for individuals high in *n* Power). In addition, low levels of *san* Affiliation were associated with slowed color naming for happy faces for individuals low in *san* Power. Thus, the rating effects were again in the opposite direction as predicted. Equivalent to the effects for anger-stimuli, individuals low in *san* Affiliation were also more sensitive to happy-stimuli. This indicates once more that, due to the insecure attachment styles of individuals low in *san* Affiliation, the explicit affiliation motive is *reciprocally* related to the incentive value of the affiliation signaled by a stimulus.

I also found effects of the explicit dispositional need to be close to others in the **surprise**-condition. Individuals low in *san* Affiliation disliked surprised faces more than individuals with a high explicit affiliation motive, but did not show a different response on ratings of surprise-words or on the color naming speed for surprised facial expressions or surprise-words. This effect might be explained by the negative relation of insecurely attached individuals to their self. It has been suggested (e.g., Schultheiss et al., 2005) that looking into a surprised face is likely to signal an own past violation of an expectation. Thus, the surprised face would indicate increased social salience due to own unexpected behavior and should consequently activate the self. As the relation to the self is negative in insecurely attached individuals, individuals low in *san* Power should dislike social salience as indicated by a surprised facial expression. The same effect is not significant for surprise-words, presumably because surprise-words do not produce the same social salience as does a surprised facial expression. Why this effect only occurred for ratings but not for color naming is unclear.

Trait Words

I found that *san* Affiliation tended to negatively predict difference scores for ratings of trait words signaling affiliation. Thus, individuals with low levels of *san* Affiliation made a bigger difference in the ratings of positive compared to negative affiliation-traits compared to individuals with high levels of *san* Affiliation. This effect occurred within individuals high, but not within those low in *san* Power. *San* Affiliation also tended to negatively predict difference scores of ratings of trait words signaling dominance. Consequently, *san* Affiliation predicted ratings of high dominant trait words more negatively than ratings of low dominant trait words. In summary, the explicit affiliation motive was *reciprocally* related to the incentive value of the affiliation (for high levels of *san* Power) and of the dominance signaled by a trait word. Thus, secure individuals that are high in *san* Affiliation and high in *san* Power (which is related to dominance) care least about the affiliation signaled by trait words, while insecure individuals prefer trait words signaling high affiliation over those signaling low

affiliation. Again, this confirmed that low *san* Affiliation individuals are more sensitive for signals of affiliation than individuals high in the explicit affiliation motive.

I also found a valence-specific *san* Affiliation effect in the Trait Word Stroop task. While color naming for affiliation-related trait words was faster at low levels of *san* Affiliation independent of the valence of affiliation, color naming for dominance-related trait words depended on *san* Affiliation only for traits signaling low dominance.

Summary

Individuals who report having a low dispositional need for being close to someone have an insecure attachment style and are more sensitive to signals of affiliation than individuals reporting a high dispositional need for affiliation. Thus, they dislike stimuli signaling hostility (anger-stimuli and traits signaling low affiliation) more and like signals of friendliness (happy-stimuli and traits signaling high affiliation) more than individuals reporting a high need for affiliation. In addition, they seem to dislike social salience due to the negative relation to their self.

The effects of the explicit affiliation motive were moderated by the explicit need to influence others in a way that was parallel to the effects of the implicit affiliation motive. Again, the effects of the need for affiliation on Emotion Word Ratings for anger and joy, and for difference scores for trait words signaling affiliation were most pronounced (and significant only) in individuals high, but not in those low in *san* Power. And again, the opposite effect occurred for the emotional Stroop task: individuals low, but not those high in *san* Power showed an effect of the explicit affiliation motive in response to happy faces. Replication of the finding for different stimulus formats as well as for the explicit and implicit domain underlines the effect and calls for theoretical explanation. As for the implicit affiliation and power motives, I suggest that emotion regulation in individuals low in the explicit power motive leads to decreased responses of the explicit affiliation motive on declarative ratings, but to increased responses on the non-declarative emotional Stroop task. The alternative explanation that fear of rejection in individuals high in *san* Affiliation and low in *san* Power has contributed to the effect seems unlikely for explicit motives as highly explicit affiliation motivated individuals are more securely attached than those with a low explicit affiliation motive.

5.1.3 Effects of the implicit power motive

When testing the effects in the Face and the Emotion Word Stroop task, responses in the neutral conditions were controlled for by adding them as covariates to the model. This facilitated the interpretation of effects as the implicit power motive also responded in the neutral condition in these tasks.

Emotions: FEEs and Words

I found that individuals with a strong implicit need to influence others made less negative liking ratings for **angry** facial expressions and for anger words (the effect approached a trend for words) than individuals low in the implicit power motive if they did not have a strong implicit need to be close to others. If they had a strong implicit need to affiliate, this effect disappeared for angry faces and even turned around for anger-words, leading to more disliking for words of the emotion anger of individuals high compared to those low in the implicit power motive. In the Face Stroop task, there was a positive *n* Power effect on color naming of angry faces in individuals high, but not for those low in *n* Affiliation. The *n* Power effect on the color naming speed for emotion words depended on individuals' level in the implicit affiliation motive but did not differ between emotion conditions. The implicit power motive positively predicted the color naming speed for emotion words among individuals with a strong but not among those with a weak implicit need to affiliate with others. Note that this effect was specific to emotion words as responses to neutral non-words had been controlled for.

Only the *n* Power effect on ratings of anger-words in individuals high in *n* Affiliation was negative as predicted, but all other effects on ratings did not match the predictions. Thus, the positive *n* Power effect on ratings of anger-faces and anger-words for low levels of *n* Affiliation was contrary to my predictions and also to previous findings, in which anger had been found to be aversive for individuals high in *n* Power (e.g., Schultheiss et al., 2005). This finding had been interpreted as a dominance-threat for individuals with high levels of *n* Power by signals of dominance. Schultheiss et al. found that implicit learning was generally impaired in the context of angry faces. However, the evidence for this was weak and generalized to neutral-face and no-face conditions. Using a dot-probe task, Schultheiss and Hale (in press) reported that high *n* Power was associated with attentional orienting away from anger faces. This again indicates that high *n* Power individuals do not like looking into angry faces. Why then did I find less disliking for angry facial expressions within individuals high in *n* Power if they were also low in *n* Affiliation?

Also unpredicted was the lack of an *n* Power-effect on ratings of angry facial expressions in individuals with a high level of *n* Affiliation. However, this null-effect was not due to a failure of angry faces to arouse the implicit power motive. This is evident as the *n* Power effect on the color naming speed for angry faces was significant and positive among the same individuals. Thus, individuals high in *n* Affiliation clearly showed an enhanced sensibility for the emotion expressed by another person as indicated by the stronger *n* Power response on the color naming speed in these individuals. Why did this response not influence ratings?

One potential explanation for my findings is that individuals high in *n* Power actually perceived the anger-faces as less aversive than those low in *n* Power. There are two possible reasons why this could be the case despite the high dominance that is expressed by an anger-face. One possibility is that individuals high in *n* Power perceive the anger as caused by themselves (*caused*

emotion hypothesis). In this case, the anger would be a consequence of their own past action and would indicate that they have had impact on the other individual. As high *n* Power individuals have a strong need to influence others, this would be rewarding for them and would express in less negative liking ratings. Thus, given a low level of *n* Affiliation, *n* Power would predict whether individuals like (or at least don't care about) making someone else angry. This line of reasoning should hold true for individuals low, but not for those high in *n* Affiliation. The latter would not profit from making the other person angry as this would run to meet their need to be close to the other person. To the contrary, they might be shocked to see that they have made someone else angry and thus be slowed in naming the color of the stimulus. This would explain the null-effect of *n* Power on ratings and the positive *n* Power effect on color naming of angry facial expressions within individuals high in *n* Affiliation. The problem with this account is that it cannot explain the contrary findings in previous research as it does not specify why individuals should have perceived the anger as being caused by themselves in this study, but not in previous studies.

The other explanation that is based on the assumption that individuals high in *n* Power actually do not care about angry faces suggests that individuals high in *n* Power perceived the expression of anger as controllable (*controlled emotion hypothesis*). This might be the case because unlike in previous studies that were using fixed presentation durations, participants were able to terminate the presentation of each stimulus by responding in the task. Thus, individuals high in *n* Power would not feel threatened in their dominance and, in addition, might experience their control over the expression of anger as rewarding (at least they might not care about anger as long as they can control it). Again, when following this explanation, anger would be experienced as aversive by individuals with a high implicit affiliation and power motive even when its expression can be controlled. This would be the case because terminating the expression of anger would still prevent the fulfillment of the individuals' need for affiliation. The conflict between ensuring their dominance and seeking affiliation would slow responses compared to individuals that do not care about the dominance expressed by the FEE (individuals low in *n* Power but also high in *n* Affiliation). Thus, the central prediction from this explanation is that whether high dominance-stimuli are punishing or rewarding for individuals high in *n* Power depends on whether they can control their expression or presentation.

A further potential explanation for the present results and their mismatch with previous findings is, that although individuals high in *n* Power actually disliked faces displaying anger, they pretended to not care about them by giving relatively neutral ratings (*emotion regulation hypothesis*). They might give less negative ratings as a strategy against dominance-loss, for impression management (to not admit the dominance-threat), or due to attentional avoidance of mildly aversive stimuli (see Schultheiss & Hale, in press). Individuals high in *n* Affiliation might not use the equivalent strategy because it would run to meet their interest to affiliate with the other person. Again, this might induce a conflict for individuals high in both motives, leading to slower responses in the emotional Stroop task. The central prediction from this hypothesis is that the direction of *n* Power

effects does not depend on whether the presentation duration of anger-stimuli can be controlled by participants, but whether individuals are able to control their own behavior via control strategies.

In the **happy**-condition, I found that compared to individuals low in n Power, liking ratings of individuals high in n Power were less positive for happy faces (effect approached a trend in individuals low in n Affiliation) and happy-words (strong effect independent of n Affiliation). Individuals high in n Affiliation, on the other hand, showed a marginally significant positive n Power effect on ratings of happy faces. The influence of n Power on color naming for happy facial expressions was the same as for angry faces: there was a positive n Power-effect for individuals high in n Affiliation, but no effect for individuals low in n Affiliation.

Thus, as predicted, n Power influenced responses in the emotional Stroop task. Again, high n Affiliation seemed to increase the salience of interpersonal signals. Also, the prediction that high levels in the implicit power motive are associated with disliking of the emotion joy because of the dominance signaled by this emotion found support. The only exception to this finding was the unpredicted positive n Power effect in individuals high in n Affiliation that approached the level of a trend. Their high need to be close to others might lead these individuals to try to influence others by causing the others to like them. Thus, looking into a smiling face would signal success of such an attempt and would consequently be rewarding.

For the **surprise** stimuli, I found high n Power to be associated with more positive liking ratings for surprised faces within individuals low, but not in those high in n Affiliation, and with less positive liking ratings for surprise-words (independent of the level of n Affiliation) compared to low levels of n Power. The implicit power motive did not significantly influence the color naming speed for surprised facial expressions.

As predicted, individuals with a strong implicit dispositional need to influence others found it rewarding to look into a surprised face presumably because this signals low dominance of the other person and indicates that they have control over the situation (cf. Schultheiss et al., 2005). The negative n Power response to surprise-words is contrary to the hypotheses. A potential explanation for this effect might be that reading single emotion words does not necessarily mean that the individual reading the word is startling someone else. Instead individuals might relate these words to experiences in which they themselves have been surprised by others. As individuals with a strong need to have influence on others strongly dislike to be taken by surprise themselves, they would thus not like surprise-words. It seems that this latter interpretation is prevalent among highly implicit power motivated individuals.

Trait Words

In the Trait Word Rating task, I found that n Power tended to negatively predict difference scores for words signaling dominance independent of the implicit affiliation motive. Thus, the implicit power motive predicted ratings of words signaling high dominance more negatively than ratings for words signaling low dominance. I also found that individuals liked traits signaling high affiliation

more than those signaling low affiliation on average. This effect held true for all individuals except for those with a strong implicit power motive and low levels of *n* Affiliation. The latter group made a much smaller difference between positive and negative affiliation signaling trait words. In addition, *n* Power predicted the color naming speed for trait words more positively if they signaled high than if they signaled low dominance in individuals low but not in those high in *n* Affiliation. The valence-specific *n* Power effects on the color naming speed for affiliation-related trait words were not significant.

Thus, as predicted, *n* Power was *reciprocally* related to the incentive value of trait word dominance in the Trait Word Rating task, and also influenced responses in the emotional Stroop task for dominance- but not for affiliation-related trait words. The effect on ratings of trait words signaling affiliation for individuals high in *n* Power and low in *n* Affiliation can be interpreted as a sign for cold dominance of these individuals. Unlike individuals either high in *n* Affiliation or low in *n* Power, they do not care so much about positive or negative affiliation as they do not seek to be close to others nor about interpersonal connections as they are dominant and don't fear interpersonal conflicts. This finding parallels the effect for angry faces (with individuals low in *n* Affiliation and high in *n* Power not caring about signals of hostility) and can – through its emphasis on the affiliation-aspect of anger-faces – provide an additional explanation for the latter.

Summary

I found good evidence that *n* Power is *reciprocally* related to the incentive value of stimulus dominance as captured in liking ratings. As predicted by the second level hypotheses, stimuli signaling low dominance (surprised facial expressions, low dominance trait words) had a positive incentive value and signals of high dominance (facial expressions of joy at low levels of *n* Affiliation, anger-words at high levels of *n* Affiliation, happy-words, high dominance trait words) had a negative incentive value for individuals with a high dispositional need to influence others. As predicted, *n* Power also influenced the color naming speed in response to angry and happy facial expressions and to words of all emotions for individuals high in *n* Affiliation and for dominance-signaling trait words for individuals low in *n* Affiliation.

I also found some unexpected effects of the implicit power motive. In individuals low, but not in those high in *n* Affiliation, high *n* Power was associated with *less* negative ratings of anger-faces and anger-words and with a smaller difference in ratings between trait words high versus low in affiliation. Besides more dominance-focused explanations for the anger-effects, these findings might also indicate that only individuals high in *n* Power and low in *n* Affiliation don't care so much about signals of hostility. The unexpected negative *n* Power slope on ratings of surprise-words suggests that individuals high in *n* Power associate surprise-words with threat of their own dominance instead of interpreting it as a signal for their influence on others.

A general explanation for the way in which the *n* Power effects are moderated by *n* Affiliation might be that a low implicit need to affiliate with others seem to “free” high *n* Power individuals to

explicitly express their dominance interests (i.e., indicate less disliking for anger-faces and –words, less liking for happy faces, more liking for surprised facial expressions), while individuals with a high implicit need to be close to others don't dare to express their dominance interests (i.e., their liking for making someone angry, their disliking for someone else being openly happy). The emotion regulation associated with the latter might result in slowing of color naming in the emotional Stroop tasks. Alternatively, *n* Affiliation moderates the incentive value of the involved stimuli by interpreting the emotion-stimuli as caused or controlled by them.

5.1.4 Effects of the explicit power motive

As I found effects of *san* Affiliation on responses in the neutral conditions for all tasks, I used these responses as covariates in all analyses.

Emotions: FEEs and Words

I found individuals that reported a high dispositional need to influence others to give more positive liking ratings for **angry** facial expressions (on the level of a trend) and anger-words than individuals with a low explicit power motive. I also found that *san* Power positively predicted the color naming speed for angry faces within individuals low, but not within those high in the reported need for affiliation. The *san* Power effect in the Emotion Word Stroop task did not differ between the emotion conditions, but there was a significant *san* Power effect for all emotion words after controlling for responses towards the corresponding neutral non-words that depended on the level of *san* Affiliation. In individuals with a low explicit need to affiliate, I found that high levels in the explicit power motive went along with slowed color naming for emotion words, while the corresponding effect did not significantly differ from zero in individuals with a high reported need to be close to others.

As for the implicit power motive and contrary to my prediction, high levels of the explicit power motive (for individuals low in *n* Affiliation) were associated with less negative ratings of **anger**-faces (on the level of a trend) and anger-words. However, the effect was not significantly moderated by *san* Affiliation. I suggest that this effect might be explained by the same lines of thought as outlined for the implicit power motive. Individuals with a high reported need to influence others might have either interpreted the anger as being caused by themselves (and thus as an indication for their influence on the other person), they might have perceived it as being controllable (as the anger-stimuli disappeared when participants responded in the task), or they might have actually disliked the anger-stimuli more than individuals low in *n* Power but pretended to not care about them as a strategy to keep their dominance, to make a good impression, or due to attentional avoidance.

That the explicit power motive influenced the color naming speed of emotion words only in individuals low in *san* Affiliation indicates that these individuals, who are also less securely attached, have the highest sensibility for emotional stimuli.

For the **happy**-condition, I found that high levels of *san* Power were associated with less positive ratings for expressions of joy. The effect on color naming of happy faces approached a trend with high *san* Power leading to slowed responses. The equivalent effect for anger-words was not significant. Thus, as predicted, individuals with a high reported power motive disliked the dominance signaled by a happy facial expression, which tended to lead to slowed color naming for these stimuli.

The *san* Power effect on ratings of **surprise**-stimuli was not significant for surprised facial expressions, but approached a positive trend for surprise-words. High *san* Power was also associated with slower response times for naming the color of surprised facial expressions. Thus, while this prediction did not work out for implicit motives, surprise-words were slightly more liked by individuals with a high reported need to influence others, indicating that these individuals like the verbally signaled submission of another individual and the impact associated with surprise. Although this was not significant for ratings, the *san* Power effect in the Face Stroop task indicates that *san* Power also responds to facial expressions of surprise.

Trait Words

I found that *san* Power predicted ratings of trait words signaling high dominance more negatively than trait words signaling low dominance, while the equivalent effect on affiliation-signaling trait words was not significant. Also, I found no valence-specific *san* Power effects in the Trait Word Stroop task. Thus, as predicted, *san* Power was *reciprocally* related to the incentive value of signaled trait word dominance, but not to that of signaled trait word affiliation.

Summary

I found evidence that the incentive value of signaled stimulus-dominance is *reciprocally* related to the level of *san* Power (for the ratings of happy faces, surprise-words, and trait words high versus low in dominance) and that the reported need to dominate others influences responses to dominance-related stimuli in the emotional Stroop tasks. Contrary to the prediction, anger-stimuli were rated less negatively by individuals with a strong explicit power motive. This effect replicates parallel findings from the implicit power motive and can be explained in a parallel way. While I did not find the explicit affiliation motive to moderate responses of the explicit power motive in the ratings tasks, I could replicate the finding from the implicit domain that in those individuals that are highly sensitive to social stimuli (those low in *san* Affiliation) the explicit power motive responds more strongly to influence spontaneous attentional processes in the emotional Stroop tasks.

5.1.5 Summary

As hypothesized, the incentive value of FEEs and Emotion and Trait Words was moderated by the perceivers' implicit and explicit motives. I had hypothesized that the implicit and explicit affiliation motives respond to signals of friendliness (versus hostility), and that the implicit and

explicit power motives respond to signals of dominance (versus submission). More specifically, I had predicted that the (implicit or explicit) affiliation motive is *symmetrically* related to the incentive value of stimulus affiliation. While stimuli signaling friendliness (the emotion happy and high affiliation trait words) were expected to be rewarding, signals of hostility (anger-stimuli and trait words signaling low affiliation) were expected to be punishing for individuals with a strong implicit or explicit need to be close to others. While these predictions could be matched for the implicit affiliation motive, the explicit affiliation motive responded exactly opposite to the predictions. This can be explained by the finding that individuals with a low reported need to affiliate also have an insecure attachment style (cf. Randolph et al., 1997). This insecure attachment might be responsible for the effects which would otherwise seem to be paradoxical. The implicit or explicit power motives were hypothesized to be *reciprocally* related to stimulus dominance. Stimuli signaling submission (stimuli for the emotion surprise and low dominance trait words) were predicted to be rewarding and signals of dominance (stimuli expressing joy or anger and trait words signaling high dominance) were predicted to be punishing for individuals with a strong reported or implicit need to influence others. The hypotheses concerning the implicit and explicit power motive received strong support.

In addition to these predictions, I explored interactions of the affiliation and power motives. I found the effects of the affiliation motive to better match the predictions within individuals with a strong need to influence others in the rating tasks (on the implicit level), but to be more as predicted for individuals with a low need to influence others in the emotional Stroop tasks. The implicit and explicit power motives responded to signals of dominance to influence responses in the emotional Stroop tasks mainly in individuals with a high sensitivity for affiliation (high *n* Affiliation or low *san* Affiliation), and which effects better matched predictions was mixed for the influence of the implicit power motive on ratings.

Thus, while I found strong support for my hypotheses concerning the general response of the implicit affiliation and power motive to signals of affiliation and dominance, the findings for explicit motives and for interactions between motives are exploratory. I could interpret most effects in the context of my predictions, but clearly more research is needed to support or to choose among the presented, or to generate new explanations.

As expected, I did not find a systematic relation between dis-/liking ratings and color naming latencies. While the predicted incentive value was generally symmetrically related to dis-/liking ratings, the association with color naming latencies was not systematic.

5.2 More Data on the Theory: Support for the 2nd Level Hypotheses

Based on Schultheiss' information processing account of implicit motive arousal, I had hypothesized that

0) explicit and implicit motives do not correlate with each other (Hypothesis 0).

I had also hypothesized that implicit and explicit motives differ with respect to

- 1) the kinds of stimuli (verbal vs. nonverbal) they preferentially respond to (Hypothesis 1), and with respect to
- 2) the kinds of responses (non-declarative vs. declarative) that they influence (Hypothesis 2).
- 3) I expected implicit motive effects only for nonverbal stimuli and non-declarative responses and expected explicit motive effects only for the combination of verbal stimuli with declarative responses (Hypothesis 3).
- 4) I predicted referential competence to moderate motive effects in those stimulus- and response-conditions that do not fit the (implicit or explicit) motive (Hypothesis 4).

While I found support for the hypothesis about a statistical dissociation between the two measures, the three predictions concerning functional dissociations between implicit and explicit motives were not supported by my data. I found that implicit and explicit motives responded to nonverbal and to verbal stimuli to influence non-declarative and declarative measures of motivation. They showed clear and interpretable effects in all four conditions: they responded to FEEs and to words to influence liking ratings and performance in the emotional Stroop task. Lastly, I found support for the predictions derived from hypothesis 4. Motive effects were generally stronger or better matched predictions in individuals high compared to those low in referential competence.

Hypothesis 0: Statistical Dissociation between Implicit and Explicit Motive Measures

Replicating previous findings about correlations between measures of implicit and explicit motives (e.g., Pang & Schultheiss, 2005), I found very low and non-significant correlations between the implicit and explicit motives from a respective domain. The correlations were $r = .01$ for the affiliation and $r = .02$ for the power domain ($ps > .88$). Once more, this finding nicely demonstrates the statistical independence of questionnaire and imagery measures of motives and thus supports the view of two separable motivational systems.

Hypothesis 1: Implicit motives respond to nonverbal and explicit motives to verbal stimuli.

I did not observe a functional dissociation between implicit and explicit motives concerning their response to nonverbal versus verbal stimuli. Thus, my findings do not support hypothesis 1.

Hypothesis 1a: Implicit motives respond to nonverbal stimuli.

I found clear and predicted effects of the implicit affiliation and the implicit power motive in response to FEEs signaling affiliation and dominance. For the emotional Stroop task, these results

replicate previous findings (Schultheiss & Hale, in press; Schultheiss et al., 2006) and the effects on the newly designed liking rating task provide additional evidence for the validity of this hypothesis. Thus, implicit motives responded to nonverbal stimuli, providing further evidence for Hypothesis 1a.

Hypothesis 1b: Explicit motives do not respond to nonverbal stimuli.

This study is the first to report explicit motive-responses to clearly nonverbal stimuli. Although previous studies have investigated explicit motive responses to FEEs signaling affiliation and dominance, these studies failed to find effects that could be explained in the context of interpersonal theory (Schultheiss, personal communication, October 2005). However, I found effects of explicit motives in response to FEEs that could be explained in the context of my hypotheses in both tasks and could replicate the direction of the effects for equivalent verbal stimuli in several conditions.

For the explicit power motive, the response to happy faces was as predicted (negative) and could be reasonably explained for angry facial expressions although the effect in the rating task was contrary to my prediction. The notion that the *san* Power effect in response to angry faces is valid was supported by parallel effects of *san* Power for anger-words and of *n* Power to FEEs and words for the emotion anger. Although the direction of the effects of the explicit affiliation motive on ratings were opposite to the prediction and also opposite to those of the implicit affiliation motive, this finding can be explained by the association of low levels of the explicit affiliation motive with an insecure attachment style (see Randolph et al., 1997). Thus, compared to individuals with a high level of the explicit affiliation motive, individuals low in *san* Affiliation have an increased, and not decreased, sensibility for signals of affiliation. This can explain the seemingly paradoxical effects of *san* Affiliation on Face Ratings and also the finding that *san* Power predicted color naming of faces in individuals low, but not in those high in *san* Affiliation.

Hypothesis 1c: Implicit motives do not respond to verbal stimuli.

Contrary to hypothesis 1c, I found effects of implicit motives in response to words for emotions and for traits, providing a clear-cut demonstration that purely verbal stimuli are indeed able to arouse implicit motives. The predictions could particularly be confirmed for ratings of words of the emotions joy and – in interaction of *n* Affiliation and *n* Power – anger as well as for words for traits. In addition, the direction of the motive effects were replicated in response to FEEs and to Emotion Words (particularly for Emotion Word Ratings), thus lending additional support to the validity of the findings.

Hypothesis 1d: Explicit motives respond to verbal stimuli.

As predicted, I found that the explicit affiliation and power motives responded to words for emotions and for traits. While the finding that explicit motives respond to verbal stimuli is not new (e.g., see the measurement of explicit motives), this study is the first to report evidence that the explicit affiliation and power motives respond to signals of affiliation and dominance in an interpersonal context. Again, *san* Power showed the predicted effects while seemingly paradoxical

effects of *san* Affiliation could be explained with the association of low *san* Affiliation with an insecure attachment style (see Randolph et al., 1997).

Summary

Some of these findings confirm previous views and replicate findings from previous research. The effect that implicit motives respond to nonverbal stimuli to influence non-declarative measures of motivation replicates data from a series of studies by Schultheiss and colleagues (e.g., Schultheiss et al., 2006). In addition, the response of explicit motives to verbal stimuli is not new. However, the other results were contrary to my expectations and have not been reported previously: The findings that implicit motives respond to verbal stimuli and that explicit motives respond to nonverbal stimuli have not been found in previous research. Also, the observation that implicit motives can also influence declarative measures of motivation and that explicit motives can also influence non-declarative measures of motivation are new. These findings that are contrary to previous theorizing and research might help to adjust our understanding of how implicit and explicit motives work and differ.

Hypothesis 2: Implicit motives influence non-declarative and explicit motives influence declarative measures of motivation.

I found implicit and explicit motives to predict responses in the liking rating as well as in the emotional Stroop tasks. Thus, implicit and explicit motives both influenced non-declarative as well as declarative measures of motivation, yielding strong evidence against my second hypothesis about the differential validity of implicit and explicit motive measures.

Hypothesis 2a: Implicit motives influence non-declarative measures of motivation.

Replicating previous findings (Schultheiss & Hale, in press; Schultheiss et al., 2006), I found evidence that implicit motives influence performance on emotional Stroop tasks. While previous research had already investigated implicit motive effects on non-declarative measures in response to FEEs, my findings indicate that arousal of implicit motives by verbal stimuli also influences attentional processes. Thus, I could find additional support for Hypothesis 2a.

Hypothesis 2b: Explicit motives do not influence non-declarative measures of motivation.

While I had predicted that explicit motives do not influence non-declarative measures of motivation, my findings provide evidence opposing this prediction. To the contrary, explicit motives clearly influenced emotional Stroop task performance even in response to nonverbal stimuli (FEEs) and in a direction that was comparable to the effects of the corresponding implicit motives. However, the effects for verbal stimuli (words) did not reach significance in all analyses (no *san* Power effects in the Trait Word Stroop task) and did not differ between emotion conditions in the Emotion Word Stroop task. Taken together, there was clear evidence for explicit motive effects on a non-declarative measure, a finding contradicting Hypothesis 2b.

Hypothesis 2c: Implicit motives do not influence declarative measures of motivation.

Contrary to this Hypothesis, I found very clear, strong, and theoretically meaningful associations of implicit motives with ratings. These effects were obtained for ratings of FEEs and of words, with the effects nicely replicating over nonverbal and verbal stimulus formats. Thus, the hypothesis that declarative measures of motivation are not influenced by implicit motives is strongly challenged by this data.

Hypothesis 2d: Explicit motives influence declarative measures of motivation.

My findings clearly support the notion that explicit motives influence declarative measures of motivation. While this is not very surprising for words the explicit motive effects for ratings of FEEs have not been found previously.

Hypothesis 3: Implicit motives only show effects for nonverbal stimuli and non-declarative measures of motivation. Explicit motives only show effects for verbal stimuli and declarative measures of motivation.

Contrary to hypothesis 3, implicit and explicit motives showed significant effects in all four conditions. Thus, the hypothesis about an interaction of stimulus and response formats for the effects of implicit and explicit motives was not supported by the data.

Hypothesis 4: In individuals high, but not in those low in referential competence, both motives respond to both kinds of stimuli to influence both kinds of responses.

In addition to the direct responses of motives to stimuli signaling affiliation and dominance, I had also used an inter-individual difference measure of referential competence: the color naming/reading task. I had hypothesized that individuals high in referential competence (i.e., those that do not need much additional time for naming the color of a color patch compared to reading a word) show stronger motive effects in response to signals of affiliation and dominance than individuals low in referential competence. For implicit motives, this effect was predicted to exist for all conditions except for non-declarative responses to nonverbal stimuli. Explicit motive effects on the other hand were hypothesized to depend on referential competence in all conditions except for declarative responses to verbal stimuli.

Thus, I tested whether the measure of referential competence moderated motive-effects. I found support for the notion that high referential competence is associated with clearer motive effects. The effects of implicit motives (particularly of *n* Affiliation) were moderated by the level of referential competence in the predicted conditions and in the predicted direction. The moderating effect of referential competence for the effects of explicit motives was mixed, yielding some predicted and some unpredicted effects. However, this might have partly been due to the fact that my measure of referential competence only assessed the speed with which nonverbal information can be translated into a verbal format, but not how fast verbal information can be translated into a nonverbal format.

In more detail, I had hypothesized that

although this is not the case without referential processing, referential processing (due to an active effort or high referential competence) can enable implicit motives

- *to respond to verbal stimuli (Hypothesis 4a) and*
- *to influence declarative measures of motivation (Hypothesis 4b).*

These predictions concerning the effects of implicit motives could be confirmed. As predicted, implicit motive effects on non-declarative measures of motivation in response to nonverbal stimuli were not stronger in individuals high compared to those low in referential competence, but moderated the effects of implicit motives in response to verbal stimuli and on declarative measures of motivation in the predicted way.

I found the *n Affiliation* effect to depend on referential competence for all stimulus and response formats. For Face Ratings, the *n Affiliation* effect was more negative in response to angry faces and more positive in response to happy faces within individuals high than within those low in referential competence. In addition, the unpredicted *n Affiliation* response to surprised facial expressions was significant and positive only for high levels of referential competence.

Likewise, I found the *n Affiliation* effects to be moderated by responses in the color naming/reading task for Emotion Word Ratings. As predicted, high referential competence was associated with a more negative *n Affiliation* slope in response to angry, and a more positive *n Affiliation* slope in response to happy faces compared to low referential competence. Again, as for Face Ratings, the unpredicted response to surprise-words was more positive in individuals with a high referential competence. Thus, the moderating effects of referential competence were replicated for two different kinds of stimuli expressing the same emotions.

Responses in the Trait Word Rating task also depended on level of referential competence. As predicted, *n Affiliation* responded more positively to positive affiliation words if they were high in referential competence compared to low levels of referential competence. The effect for negative affiliation words was not moderated by referential competence.

I did not find any emotion-specific *n Affiliation* effects that were moderated by individuals' level of referential competence in the Face and in the Emotion Stroop tasks, but the moderating influence of referential competence on the emotion-specific *n Affiliation* effects in the Trait Word Stroop task differed significantly between blocks. This was particularly due to a moderating effect of referential competence on the influence of *n Affiliation* color naming latencies for positive affiliation words in the third block. Although the single slopes for individuals high or low in referential competence were not significant in this condition, the effect was stronger among individuals high than among those low in referential competence.

The effects of *n Power* on ratings of FEEs were also moderated by responses in the color naming/reading task. The *n Power* slope in response to angry facial expressions was less positive within individuals high than within individuals low in referential competence. Thus, the *n Power* effect was more like the predicted negative effect that had also been found in previous research (cf.

Schultheiss & Hale, in press; Schultheiss et al., 2005) for individuals with a high ability to perform referential processing. This suggests, that the unpredicted positive effect of the *n* Power variable within individuals low in *n* Affiliation was not due to a more positive incentive value of angry FEEs for individuals high compared to those low in *n* Power but is instead more likely to originate from strategies of individuals high in *n* Power to cope with the threat of their own dominance. Following this line of reasoning, the more negative *n* Power slope within individuals high in referential competence would reflect a clearer perception of their negative affective response which then translated into less positive ratings compared to individuals low in referential competence. However, this argument is clearly speculative and needs further empirical investigation. Unlike in the anger-condition, the *n* Power effects on ratings for FEEs were not significantly moderated by responses in the color naming/reading task in the happy- and the surprise-conditions.

The interaction of *n* Power with emotion and referential competence did not reach significance in the Emotion and in the Trait Word Rating tasks as well as in all three emotional Stroop tasks. This lack of effects had been predicted for the Face Stroop task. For the Word Stroop tasks, it might be explained by the fact that I measured referential competence for translating nonverbal information into a verbal format but not that for translating verbal information into a nonverbal representation.

In summary, I found that some effects of implicit motives in response to verbal stimuli and on declarative measures of motivation were moderated by individuals' levels of referential competence in a predicted manner. However, the effects of implicit motives were also significant for individuals low in referential competence in some of the analyses⁴.

In addition, I had predicted that

although explicit motives

- *do not respond to nonverbal stimuli and*
- *do not influence non-declarative measures of motivation without the occurrence of referential processing,*

referential processing (which is done quickly by individuals with a high referential competence) can lead to such responses (Hypotheses 4c and 4d).

While the predictions concerning the moderating effect of referential competence worked out pretty well for implicit motives, the evidence for the equivalent effects of explicit motives were less clear. I had predicted that explicit motives respond to verbal stimuli to influence declarative measures of motivation without the need for referential processing to occur. Contrary to this prediction, I found clear and significant Motive \times Referential Competence interactions for the ratings of words for emotions and traits. In addition, explicit motive effects on the non-declarative emotional Stroop task in

⁴ For example, *n* Affiliation and *n* Power effects on ratings of stimuli of the emotion anger (FEEs and Emotion Words) were significant in individuals with a high and in those with a low referential competence. In addition, motive effects in the Face and in the Emotion Word Stroop task reached significance for low referential competence-individuals. Lastly, several effects of implicit motives were not significantly moderated by referential competence at all.

response to nonverbal FEEs were not significantly moderated by my measure of referential competence although this had been predicted on the basis of Schultheiss' (2001, in press) information processing account. However, the failure to find effects in this condition might be due to the fact that the measure of referential competence assessed the speed of translating a nonverbal percept into a verbal format and not the speed of translating a verbal representation into a nonverbal format. Third, the directions of the moderating effects of referential competence on explicit motive effects were not interpretable in a straightforward way in all conditions and some of the effects were contradictory. However, several effects accorded nicely to the predictions.

The ways in which the *san* **Affiliation** effects on ratings were moderated by the measure of referential competence was inconsistent between different emotion and stimulus conditions. While the *san* Affiliation effects were stronger or more like the previously found *san* Affiliation effects (see section 5.1) for ratings of angry and happy faces and happy-words, the opposite was true for ratings of anger-words and of trait words signaling low affiliation. The former might suggest that individuals high in referential competence know better about their needs and thus exhibit less paradoxical *san* Affiliation effects while the latter is difficult to explain in the context of the present predictions. The effects of *san* Affiliation on ratings of the emotion surprise and of high affiliation-signaling trait words were not significantly moderated by the level of referential competence. The emotion-specific *san* Affiliation effects in the Face and Word Stroop tasks did not depend on the level of referential competence.

The emotion-specific effects of the *san* **Power** variable differed depending on the level of referential competence in a predicted way in several instances. The *san* Power effect in the surprise conditions of the Face and the Emotion Word Rating tasks were more positive, and thus more as predicted by the second level hypotheses, for individuals high than for those low in referential competence. Also, *san* Power effects on the color naming speed in the emotional Stroop tasks were stronger at high compared to low levels of referential competence for trait words signaling high or low dominance. In addition to these effects, there was some evidence that individuals high in *san* Power made more positive ratings for stimuli signaling dominance compared to individuals low in *san* Power if they had a high, but not if they had a low level of referential competence. This effect was significant for FEEs displaying anger, for happy-words, and for trait words signaling high dominance. The *n* Power effects in response to signals of dominance (to FEEs and words of the emotion anger) were less positive in individuals high than in those low in referential competence. This was different for *san* Power, for which high referential competence lead to a more positive association of ratings with *san* Power.

In summary, I found some evidence that the effects of explicit motives were more pronounced within individuals high in referential competence. In how far these effects are valid findings needs to be tested in further research. As for implicit motives and contrary to my predictions, I again found

evidence that explicit motives also respond to nonverbal stimuli and influence non-declarative measures of motivation among individuals low in referential competence⁵.

Conclusion

I found evidence that implicit motives respond to stimuli and influence behavior more strongly within individuals with a high referential competence if either the stimulus format is verbal or the response format is declarative. This was particularly evident for the implicit affiliation motive but was also argued to hold true for the implicit power motive. The evidence for an equivalent effect-difference for explicit motives was mixed. I found unexpected effects in the conditions with verbal stimuli and declarative responses. In addition, I found some inconsistencies in the direction of the effects in the rating tasks. The lack of effects in the condition with nonverbal stimulus and non-declarative response formats might be due to the fact that I assessed referential competence for translating nonverbal into verbal representations but not for translating verbal into nonverbal representations. Although referential competence clearly moderated many motive effects, not all of the effects in non-fitting stimulus and response conditions were solely due to high referential competence. Thus, while I found support for the idea of referential competence, these effects could not explain all implicit motive responses for verbal stimuli and declarative responses or all explicit motive effects for nonverbal stimuli or non-declarative responses. Table 5-1 lists the effects of implicit and explicit motives in response to nonverbal and verbal stimuli and indicates the conditions under which referential competence was found to moderate these responses.

⁵ Besides the several significant effects of the *san* Affiliation variable within individuals that are slow in transforming a nonverbal percept into a verbal representation, I also found a marginally significant positive *san* Power slope for the color naming of emotion words for low levels of referential competence.

Table 5-1

Overview of the effects found for the different experimental conditions

		measure of motivation	
		<u>declarative</u> “How much do you like or dislike the stimulus?”	<u>non-declarative</u> “Please name the color of the stimulus.”
stimuli	<u>nonverbal</u> (FEEs)	implicit motives: <i>yes (r.c.)</i>	implicit motives: yes (-)
		explicit motives: <i>yes (r.c.)</i>	explicit motives: <i>yes (-)</i>
	<u>verbal</u> (Happy, wdea)	implicit motives: <i>yes (r.c.)</i>	implicit motives: <i>yes (r.c.)</i>
		explicit motives: yes (r.c.)	explicit motives: <i>yes (r.c.)</i>

“yes”: significant motive effects in this condition; “r.c.”: individuals high in referential competence showed stronger motive effects.

bold: predicted effects, *italic*: non-predicted effects

5.3 Schultheiss’ Information Processing Account

Strong support for Schultheiss’ (2001, in press) information processing account of implicit motive arousal comes from the replicated null-correlation between implicit and explicit motive measures and from the findings on the moderating role of referential competence (i.e., the ability to quickly translate nonverbal information into a verbal format and vice versa) for the effects of implicit and explicit motives on behavior. As hypothesized, the motive effects were stronger or better matched the predictions in individuals high compared to those low in referential competence. Thus, in individuals that are able to quickly translate a nonverbal percept into a verbal representation, motives respond more strongly to incentive-signaling cues. For implicit motives, this effect occurred, as predicted, in all stimulus- and response-conditions except for non-declarative responses to nonverbal stimuli. Thus, high referential competence led to stronger implicit motive effects in response to verbal stimuli. This finding is compatible with the notion that implicit motives respond to verbal stimuli only if they are translated into a nonverbal format. However, my measure of referential competence assessed the speed of translating nonverbal into verbal information. Thus, it should primarily moderate the influence of nonverbal information onto declarative responses. According to this prediction, high referential competence led to stronger implicit motive effects on a declarative measure of motivation: on liking judgments for the stimuli. This finding suggests that the nonverbally represented affective responses that are triggered by implicit motives need to be translated into a verbal format in order to influence liking ratings for these stimuli. Thus, my findings support the hypothesis that the measure of referential competence that I used in this study captures dispositional referential processing speed for translating nonverbal into verbal representations.

The findings about a moderating role of referential competence on explicit motive effects did not match the predictions as nicely as for implicit motives. Explicit motives did not consistently predict behavior more strongly or more like predicted in individuals with high compared to those with low referential competence. In addition, the pattern of effects across the four different stimulus- and response-conditions did not correspond to the predictions derived from the information processing account. While the effects for nonverbal stimulus and declarative response formats as well as for verbal stimulus and non-declarative response formats had been predicted by the information processing account, the results for the other two conditions did not match my hypotheses. First, the level of referential competence did not significantly moderate influences of explicit motives on non-declarative responses in response to nonverbal stimuli although explicit motive effects had been observed independent from referential competence for this condition. However, given that the measure of referential competence used in this study assessed referential competence for translating nonverbal into verbal, and not referential competence for translating verbal into nonverbal information, it might simply not have been able to capture the referential processing that was responsible for the explicit motive effects in this condition. Secondly, that referential competence moderated effects of explicit motives for declarative responses to verbal stimuli was not expected based on Schultheiss' (in press) model. Thus, while the hypotheses about the moderating role of referential competence on motive effects for nonverbal and verbal stimuli as well as non-declarative and declarative response formats received strong support for implicit motives, the corresponding evidence for explicit motives was less clear.

But did individuals low in referential competence actually fail to show motive effects on behavior in those stimulus- and response- conditions in which referential processing was necessary to produce results? Contrary to the prediction that this should be the case, I consistently found some motive effects in individuals low in referential competence in conditions in which these effects should not have occurred. This suggests that some referential processing occurs spontaneously and automatically in all or at least most individuals (cf. Preston & Stansfield, 2007; Stroop, 1935). If this interpretation is correct, however, additional factors must be responsible for the null-responses of implicit motives to purely verbal instructions in many previous studies (cf. Schultheiss, 2001) and for the motive-triggering effect of goal imagery (cf. Schultheiss & Brunstein, 1999, 2002).

Alternative Interpretations for the measure of referential competence

The main support for the information processing account comes from the finding that individuals high in referential competence show implicit motive effects that are stronger or better match conditions than individuals with a low referential competence. This interpretation rests on the assumption that the measure of referential competence that I used in this study actually assesses inter-individual differences in the speed of translating nonverbal information into a verbal format. However, response differences between color naming and color reading might be driven by other factors than the speed of nonverbal/verbal-translations. One might argue that color naming and word reading are very

different tasks and that they differ in many respects additional to the necessity to translate a nonverbal into a verbal representation. Instead, individuals can be expected to use different strategies to give the answers in the two tasks. While reading a (color) word is well learned behavior that is strongly controlled by automatic processing, naming the color of a color patch might be practiced less and might thus depend on controlled processes to a greater extent. Such controlled processes, on the other hand, might be influenced by additional or other factors which would thus influence the measure of referential competence. For example, controlled processes might depend on a high motivation to pursue the task more strongly than automatic processes. Thus, smaller differences between the color naming and the color reading speed might depend on motivation to participate in the task and not only on the ability to quickly translate a nonverbal stimulus into verbal format. If this would be true, the moderating effect of referential competence on motive effects might not be due to inter-individual difference in the ability to quickly translate a nonverbal into a verbal representation (cf. Schultheiss, in press) but in the general motivation to participate in the tasks. Thus, that referential competence moderates motive effects would simply mean that individuals who are involved in the task take the presented stimuli more serious, are more involved in the tasks, and thus showed stronger motivational responses.

One way to avoid such problems with different strategies for task execution might lie in assessing automatic priming of verbal representations by nonverbal stimuli or of nonverbal representations by verbal stimuli. This is exactly what is measured in the interference condition in the original Stroop task (Stroop, 1935). In one version of this task, participants are asked to read color words as fast as possible. The color words themselves are presented in different colors which are either congruent or incongruent to the color expressed by the word. The main finding in this task is that reading of color words is slowed if the word is displayed in an incongruent color compared to when it is presented in the same color. Thus, the amount of interference in the incongruent condition might give a measure of referential competence. Note that unlike the measure used in the present study, this measure would be independent of different strategies for task execution.

Conclusion

In summary, and despite these potential objections, the present study demonstrates that an inter-individual difference measure for referential competence was successful in moderating implicit motive effects in response to verbal stimuli and on declarative responses. This supports Schultheiss' (2001, in press) information processing account and suggests that verbal stimuli need to be translated into a nonverbal format in order to arouse implicit motives and that responses of implicit motives to nonverbal representations must to be transferred to the verbal-symbolic system in order to influence ratings. The support for the corresponding role of referential competence for explicit motives was less clear.

5.4 Discussion of Unexpected Findings – what can we learn?

5.4.1 Explicit Motives Responded to Nonverbal Stimuli

On the basis of Schultheiss' information processing account (2001, in press), a possible explanation for the explicit motive responses to FEEs is that verbal concepts are automatically activated in all participants when seeing FEEs. This interpretation is supported by the finding that presentation of nonverbal stimuli interferes with responses to verbal stimuli (cf. Preston & Stansfield, 2007; Stroop, 1935). Preston and Stansfield (2007) designed a true emotional Stroop task in which participants responded nonverbally to emotion words that were presented in front of FEEs. The emotion displayed by the FEEs was either congruent or incongruent to the emotion words and was found to slow responses in incongruent trials. Thus, FEEs automatically activated semantic representations or, in other words, nonverbal stimuli were automatically translated into a verbal-symbolic format.

As was suggested by Schad (2005), measuring the speed of information transfer between the verbal and the nonverbal domain for specifically affective and motivationally relevant information might provide an emotion-specific measure of referential competence. Schad suggested that this can be accomplished by measuring the priming effect of FEEs on emotion words (cf. Preston & Stansfield, 2007). Compared to the measure of referential competence that I used in the present study, such a measure might be even better suited to capture inter-individual differences in how strongly motives respond in non-fitting stimulus and response conditions. In addition to assessing the speed with which general translation processes are performed, it might capture emotion- or motivation-specific causes for a low affective referential competence (e.g., motivated avoidance or repression).

5.4.2 Implicit Motives were aroused by Verbal Stimuli

Earlier research was not very telling concerning implicit motive responses to verbal stimuli. Although verbal instructions have been used in much research on implicit motives, it is unclear whether this verbal information actually produced the results. Instead, the nonverbal behavior of the experimenter, which was not controlled for in most studies, might have caused the effects (cf. Klinger, 1967; Schultheiss, 2001). Schultheiss and Brunstein (1999, 2002) found that verbal instructions by themselves failed to arouse implicit motives in a series of tasks, but that implicit motives responded in the same tasks after participants had completed a goal imagery exercise that had been designed to translate verbally coded goals into a nonverbal format. Consequently, Schultheiss and Brunstein (1999, 2002, see also Schultheiss, 2001) concluded (a) that implicit motives do not respond to purely verbal stimuli and (b) that the goal imagery task enables participants to translate the verbally coded instructions into a nonverbal format that is readable for implicit motives.

My findings indicate that referential processing can partly explain the effects of implicit motives in response to words. Individuals high in referential competence showed implicit motive

effects that were stronger or better matched the predictions. To my knowledge, this is the first conceptual replication of Schultheiss and Brunstein's findings (Schultheiss, 2001; Schultheiss & Brunstein, 1999, 2002) and supports their interpretation that the goal imagery exercise triggers implicit motive responses because it gives individuals the chance to translate verbally coded information from the instructions into a nonverbal format. However, I also found some effects of implicit motives to be independent from individuals' level of referential competence and found implicit motives to respond to words for individuals with a low referential competence. Thus inter-individual differences in referential processing as assessed in the color naming/reading task are incapable of explaining the full range of findings. Although I am not aware of any studies that have investigated this in the motive domain, the presented data suggest that nonverbal representations of emotions are automatically activated by the corresponding verbal stimuli and thus enable implicit motives to respond to verbal stimuli. Independent of the precise mechanisms of how this influence takes place, my findings clearly indicate that purely verbal stimuli are also sufficient to arouse implicit motives in individuals low in referential competence.

But why then were purely verbal instructions unable to arouse implicit motives in previous research? If implicit motives are aroused by words even in individuals that are low in referential competence, that is, in individuals who are relatively slow in translating a verbal stimulus into a nonverbal format, why then did implicit motives not respond to the instructions in Schultheiss and Brunstein's (1999, 2002) control conditions?

Why do implicit motives respond to single words, but not to task instructions?

Schultheiss' information processing account of implicit motive arousal (2001, in press) assumes that implicit motives only respond to words if nonverbal representations are generated from these stimuli. My findings demonstrate that individuals with a high referential competence are better in performing this translation. However, they also show that all individuals generate such images automatically when confronted with single words that are relevant for implicit motives. If implicit motives respond to single words in all individuals, why is this not the case for somewhat more complex verbal instructions? I see three possible reasons why implicit motives might not respond to verbal instructions to influence goal commitment. Individuals might not create nonverbal representations when listening to the instructions because they are busy understanding their task. However, this seems to be unlikely, as nonverbal representations are activated quickly and automatically as is evident by the implicit motive effects in the Emotion Word Stroop task. Alternatively, the "wrong" images might be created from task-instructions. This might happen if individuals do not focus on the incentives that are relevant for their implicit motives, but instead on other, distracting aspects of this situation. Lastly, nonverbal representations of the incentives might be generated in all individuals but the images might not be consistent. Thus, implicit motives might respond to the images immediately but would not be able to influence behavior later in the experiment because the incentives associated with the goal would not be represented in a nonverbal way any more.

To summarize, distraction by the task, complexity of the instructions, or the short-lived nature of the nonverbal representation and delay of the responses might explain why implicit motives respond to single words to influence ratings and color naming but not to verbal instructions to influence goal commitment.

If this listing is correct, goal imagery could make goal commitment contingent on individual's implicit motives by (a) giving them the opportunity to nonverbally imagine goal pursuit, by (b) focusing individual's attention on the motive-relevant aspects of the goal, and (c) by creating nonverbal images that are stable enough to guide further behavior.

5.4.3 Explicit Motives Influenced a Non-Declarative Measure of Motivation

Previous studies had not found explicit motive effects on performance measures of motivation (cf. Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; deCharms et al., 1955; Koestner et al., 1991; Schultheiss & Brunstein, 1999, as reported in Schultheiss, in press). In all of these studies, dependent measure were chosen in such a way that good performance on the task led to incentive attainment – either in the experimental situation or in real life. Thus, these studies mainly investigated the energizing function of motives and failed to find an effect for explicit motives. To the contrary, good or bad performance in the emotional Stroop task, the non-declarative measure of motivation used in the current study, was not related to the attainment of an incentive in the current study⁶. However, various mechanisms have been suggested to influence performance in the emotional Stroop task (cf. Williams et al., 1996). Thus, although explicit motives do not energize motivated behavior, they seem to influence one or more of these mechanisms in a non-declarative way.

5.4.4 Implicit Motives Influenced a Declarative Measure of Motivation

Under which conditions do implicit motives influence judgments?

The responses in the rating tasks were all given relatively spontaneously. Thus, my findings demonstrate that implicit motives influence reflective responses towards stimuli (e.g., Strack & Deutsch, 2004). Whether implicit motives are also able to influence reflexive responses is unclear.

How do implicit motives influence dis-/liking judgments?

Implicit motives have been hypothesized to trigger or moderate affective responses towards cues signaling the availability of an incentive (e.g., Schultheiss, 2001). Thus, implicit motives might

⁶ Responding fast to a punishing stimulus or more slowly to a rewarding stimulus would enable participants to increase their exposure to pleasant and decrease their exposure to unpleasant stimuli. The emotional Stroop task thus has the potential to assess the energizing function of motives. However, the data did generally show this effect.

influence judgments either through using consciously experienced feelings as information in forming the judgment (Schwarz & Clore, 1983, in press) or without conscious experience of the affective response (cf. Berridge & Winkielman, 2003; Winkielman, Zajonc, & Schwarz, 1997; Zajonc, 1980). While McClelland et al. (1989) have argued that the influence of implicit motives on behavior is not mediated by any conscious experience, Schultheiss (2001) assumed that implicit motive responses do not have to, but can be experienced consciously. However, clear empirical data on this question is missing and whether and in how far immediate implicit motive responses are consciously experienced remains to be tested empirically⁷.

Some hints for conscious experience of affect

While it seems highly likely that affective responses to consciously perceived and attended stimuli would also be consciously experienced, direct evidence for this is missing. Some indirect evidence for the conscious awareness of the emotional response comes from details how implicit motives influenced judgments in the rating tasks. Some of the data could best be explained by assuming that some individuals engaged in emotion regulation (see section 5.1). A prerequisite for regulating the experience or the expression of one's emotions, however, is the conscious experience of this emotion. An additional argument can be derived from supra-modular interaction theory (Morsella, 2005). Supra-modular interaction theory is a theory on the function of consciousness and hypothesizes that consciousness is a prerequisite for the interaction of supra-modular systems as they compete for access to motor output. Two such supra-modular systems might be identified by the experiential and the verbal-symbolic systems on which implicit and explicit motives are based. Thus, according to this theory, interactions between implicit and explicit motives should only be possible if their responses to a stimulus are consciously experienced. I tested this assumption in additional analyses.

In addition to the previously reported tasks, I had included a task at the end of the experiment in which FEEs were presented subliminally. They were masked by Chinese characters and were found to influence liking ratings for the masks although they were not perceived consciously (cf. Berridge & Winkielman, 2003; Winkielman et al., 1997; Zajonc, 1980)⁸. Thus, supra-modular interaction theory predicts that implicit and explicit motives do not interact to influence behavior for subliminal presentation durations, but to interact for supraliminal presentation of FEEs. I tested the interaction between the implicit and the explicit affiliation motive and the emotion-factor for the Face Rating Task and for the Chinese character task and found it to be significant only for supraliminal, but not for subliminal presentation of FEEs. This finding supports the notion that affective responses to the presentation of masked FEEs were unconscious, but that participants were aware of these responses

⁷ This might be accomplished by asking people how they feel after viewing a stimulus that is relevant for the implicit motives or by causing individuals to either reject or to use their feelings for judgments.

⁸ I tested whether participants had been consciously aware of the presentation of the FEEs using a forced choice recognition task. I found FEE detection to not significantly differ from the chance level indicating that the masking procedure had been successful at preventing awareness of the FEEs.

for the supraliminal presentation in the Face Rating task. Although no firm conclusions can be drawn from these analyses, they provide some hints that affective responses as they are modulated by implicit motives were consciously experienced. Consequently, I assume that conscious feelings were used as information to make the dis-/liking judgments.

Feelings as information and the conditions under which implicit motives influence judgments

Affect can influence judgments about stimuli when people use their feelings as information in forming the judgment (Schwarz & Clore, 1983, in press). The feeling-as-information account suggests conditions under which feelings influence judgments. For feelings to inform judgments, these feelings have to (a) be experienced at the time of the judgment and (b) have to be used in forming the judgment. To fulfill the first condition, an affective response to the target of judgment has to occur and this feeling has to be experienced by the person at the time when forming the judgment. If any stimuli fail to arouse an affective response in an individual or if too much time has passed since the emotional response, the feeling will not be strong enough to be used to inform the judgment. Instead, either incidental feelings that are caused by an unrelated stimulus or rather cognitive attitudes and other heuristics will be used to make the judgment. Additional analyses indicated that incidental feelings were also used as information in the ratings tasks in the present study. I tested whether judgments of a FEE depended not only on the interaction of individual's implicit motives with the emotion expressed by this FEE, but also added the emotions expressed by previous FEEs as a predictor. The emotion of the previous FEE significantly influenced ratings of the present FEE. This indicates that the affective response that was elicited by the previous FEE had not yet vanished and was, thus, used as information in forming the next judgment⁹. Further analyses provided additional support for this assumption by indicating that ratings were also influenced by the emotion displayed on the previous trial.

Assumed that some implicit motive-triggered affect is consciously experienced at the time when a judgment is made. In this case, the affect will only influence the judgment if it is used as information for forming the judgment. The conditions under which affect is used as information, thus, might also describe conditions under which implicit motives influence declarative measures of motivation. Schwarz and Clore (in press) reviewed what is known about when feelings influence judgments. One condition for the influence of affect on judgments is that the feeling is **perceived** as having **informational value** for the judgment. "We discount feelings as a source of information when there is reason to assume that they may not reflect our reaction to the target, but should see them as particularly informative when our apparent reaction to the target contradicts the plausible impact of

⁹ When combining the emotions displayed by FEEs that were presented two and three trials in advance, this combined factor also influenced ratings on the level of a trend. In addition, influences of previous trials were also found in the Face Stroop task. Thus, it is unlikely that the effect was due to the methodological artifact that participants were simply slow or lazy in moving the cursor of the mouse to the other side of the rating scale.

other influences” (Schwarz & Clore, in press, p. 9). In the rating tasks used in the present study, affective responses can clearly be attributed to the stimuli that are presented on the screen as these stimuli are also in the focus of attention and no other information is presented that could alternatively be used as an explanation. Thus, affect should have had high informational value for the judgments in these tasks.

An affective response to a stimulus also has to be **perceived** as being **relevant** for the judgment. Pham (1998, p. 366) for example suggested that we rely on feelings more strongly for “assessing the potential fulfillment of experiential goals (e.g., ‘Would I have fun at this movie?’) than for assessing the potential fulfillment of instrumental goals (e.g., ‘Would seeing this motive help me for the project?’).” Accordingly, affect should be seen highly relevant for making liking judgments about affectively charged stimuli. Judgments have also been found to rely on affect as information more strongly under conditions of high time pressure “presumably because it interferes with relevance assessments and the search for alternative inputs” (Schwarz & Clore, in press, p. 10; see also Siemer & Reisenzein, 1998). In the present study, the responses in the rating tasks were given rather quickly ($M = 1.69$ sec, $SD = 2.10$). This supports the assumption that feelings instead of elaborate thoughts served as a basis for the ratings.

Affective experiences can not only influence judgments in a congruent way (with positive feelings leading to more positive and negative feelings leading to more negative judgments). **Mood-incongruent judgments** can occur when individuals correct for a perceived influence, for example if they perceive a feeling as incidental to the object of judgment. This often results in overcorrection “unless the person can draw on other accessible inputs as an alternative route to judgment.” (Schwarz & Clore, in press, p. 12). Mood-incongruent judgments have also served as an interpretation for some of the motive effects in the present study (section 5.2). For example, contrary to the hypotheses, n Affiliation positively predicted ratings of angry FEEs and words and negatively predicted ratings of happy FEEs in individuals low in n Power. This finding can be explained by assuming that individuals low in dominance corrected for the affective influences on their ratings and that overcorrection in individuals high in n Affiliation lead to results that were opposite to the prediction.

An additional route of how implicit motives might influence ratings is through influencing the fluency with which stimuli are processed. Individuals high in an implicit motive might be exposed to certain emotions more frequently (e.g., highly implicit power motivated individuals might see angry faces more often). Due to this association “anger” might be highly activated either temporarily or chronically, and thus make processing of stimuli expressing anger more fluent. Processing fluency has been demonstrated to influence liking judgments and thus provides a potential explanation for implicit motive effects on judgments. For example, processing fluency might have been responsible for the unexpected positive n Power effect on ratings of angry FEEs in individuals low in n Affiliation (see section 5.2.3).

Why did previous studies not find effects of implicit motives on declarative measures of motivation?

Previous studies did not find influences of implicit motives on declarative measures of motivation. I argue that these studies failed to find an effect because the conditions under which an affective response to a target of judgment is used in forming a judgment were not fulfilled in these studies.

For example, DeCharms et al. (1955) found that implicit motives do not influence whether individuals rely on an expert opinion when judging the quality of artworks. This finding is easily explainable using the feeling-as-information account as the current feeling state is probably irrelevant for the decision whether to use the expert opinion as a source of information.

Wende (2006) found that implicit motives failed to influence liking judgments about a movie. The judgments were not made directly after seeing the movies. Instead, participants worked on some other tasks before forming the judgments. This delay explains why individual's feelings (and with them their implicit motives) did not influence the judgments. The affective response to the movie might have either declined or might have been discounted because it was not perceived as originating from the motive any more. Instead, recall of episodes from declarative memory might have served as information for forming these judgments. This explains why explicit, but not implicit motives were found to influence these judgments.

Implicit motives also failed to predict judgments about the own affective involvement in a future task (e.g., ratings of task commitment in the control group, Schultheiss & Brunstein, 1999). One explanation for this finding is that the verbal instructions were unable to arouse an affective response in the participants. Research by Gilbert, Pinel, Wilson, Blumberg, and Wheatley (1998) indicates that humans are chronically bad at predicting their affective responses to future situations. Consequently, implicit motives did not have a chance to influence this declarative measure of motivation. Imagining goal pursuit with an emphasis on the incentives associated with goal attainment vividly (imagery group in Schultheiss & Brunstein, 1999, study) might have been sufficient to arouse such feelings which were then used in the judgments about the goal.

Lastly, although one's feelings seem to be a useful information when deciding whether to continue with a task or to do something else, implicit motives have been found to not influence this decision (cf. Brunstein & Hoyer, 2002; Brunstein & Maier, 2005). However, this might have been due to the particular task instructions. Participants in the studies by Brunstein and Maier (2005, p. 210) were explicitly asked to "consider for a moment if they wanted to continue with the [...] task or wanted to switch to" another task. Subsequently, they had to wait for eight seconds before they could then indicate their choice. These instructions, combined with a relatively long waiting period presumably triggered more cognitive and value-related thoughts and prevented the application of a more feeling-based heuristic.

Why do implicit and explicit motives dissociate statistically and functionally although implicit motives influence dis-/liking judgments?

My findings indicate that individuals with a high implicit affiliation motive know that they like a face they are looking into or a word that they read when it is signaling affiliation in the moment when they see the stimulus. But they do not infer from experiences like this that they are generally a person who likes being close to others. Nor do they use this feeling as information in many other judgments or decisions. Thus, an interesting question to ask is which processes exactly fail and thus prevent affective responses as triggered by the implicit motives to influence declarative measures of motivation and questionnaires assessing explicit motivational needs. I have argued that the affect-as-information account is able to explain why implicit motives did not influence declarative measures of motivation in many instances. Thus, the reasons for the statistical and functional dissociations between implicit and explicit motives seem to lie in the difficulty to perceive, understand, and to remember the own affect, and to base judgments about one's own needs (e.g., as made in motive questionnaires) on the memory for such feelings. One prerequisite for an understanding of or memory for such affective responses might be the translation of one's implicit motive-triggered affective responses into a propositional and verbal format of representation.

Referential Competence and Affect

I found that referential competence moderates liking judgments for faces and words. How can this finding be understood in the context of the feeling-as-information approach? Why do implicit motives influence ratings more strongly in individuals high in referential competence? Individuals high in referential competence might have stronger affective responses (for words) and they seem to make more use of their affective responses when forming a judgment. But why is the latter the case? What precisely differs between individuals high versus low in referential competence? Is implicit motive-triggered affect itself represented nonverbally and has to be translated into a verbal format to be used as information for a judgment? Or do individuals high in referential competence rely more strongly on nonverbal information when making judgments? They might do so when judging the color of a simple color patch and likewise when judging their liking based on their feelings.

Conclusions

I suggested that implicit motive-triggered affective responses to supraliminally presented motivationally relevant stimuli can be consciously experienced. This hypothesis clearly needs to be further tested. If it should receive more additional support, one step would be taken to close the gap between implicit and explicit motivational systems. However, it remains puzzling why these feelings are not understood as caused by individual's motivational needs and why they are not remembered and not integrated into a coherent and more valid view of individuals about themselves. These questions await explanations in future research.

Thus, the challenge for the future is to more precisely disentangle the processes that moderate the influence of implicit (and explicit) motives on various measures of motivation. A simple dissociation between implicit and explicit motives with respect to the general classes of behavior that they influence is not sufficient to understand their functioning satisfactorily. Instead, a more detailed analysis of the involved processes will be necessary.

5.4.5 Conclusions

Unlike predicted by the information processing account of implicit motive arousal, I found that implicit motives respond to verbal stimuli and that explicit motives respond to nonverbal stimuli. However, the finding that referential competence moderated these effects for implicit motives supports Schultheiss' (2001) hypothesis that implicit and explicit motives differ with respect to the verbal versus nonverbal format of representation that they respond to. Thus, automatic referential processing has to be assumed to explain the present findings. The hypothesis that explicit motives do not influence non-declarative measures of motivation and that implicit motives do not influence declarative measures of motivation was also not supported by the present findings. Again, and particularly for implicit motives, referential competence moderated these effects, indicating that referential processing was responsible for their occurrence. What exactly happens in individuals high in referential competence and how they differ from individuals low in referential competence needs to be investigated in future research. In summary, the findings provide support for Schultheiss' (2001, in press) information processing account of implicit motive arousal. However, the precise mechanisms that are at work need to be explored in more detail.

5.5 The PSE as a Measure of Implicit Motives

My findings clearly demonstrate that it is possible to find predicted effects of implicit motives on behavior that are replicable for different stimulus and response conditions. Particularly the motive responses to emotions that were expressed by nonverbal and verbal stimuli provided a nice replication of implicit motive effects. Thus, contrary to earlier criticisms, the PSE has again been demonstrated to be a valid measure of implicit motives that reliably predicts motive-relevant behavior in response to motive-related cues. Comparing the effects of the fantasy-measures of motivation to the questionnaire measures of motivation additionally revealed that more effects of the PSE reached significance and reached higher levels of significance than the corresponding scales of the PRF. Thus, the PSE clearly provides an excellent method for assessing dispositional motivational needs that cannot be accessed via questionnaires.

5.6 Limitations and Future Directions

Exploratory nature of findings

Most of the reported findings are clearly of exploratory nature. While effects of the implicit affiliation and power motives on performance in a Face Stroop task have been found in a previous study (Schultheiss et al., in preparation), their arousal by words for emotions and traits and their influence on simple liking ratings for these stimuli had not been investigated previously. In addition, all effects of the explicit affiliation and power motives in response to signals of affiliation and surprise had not been reported in previous studies. Although initial evidence for interactions between the affiliation and the power motive in moderating the incentive value of FEEs was reported by Schultheiss et al. (2005), a systematic exploration of these effects has not been published up to date. Lastly, the theoretically crucial effects of referential competence have not been tested before and clearly demand additional empirical support. Thus, all of these effects are exploratory and it would clearly be desirable to replicate and extend them in further research. However, comparing parallel effects for different kinds of stimuli, for implicit and explicit motives, and for different tasks already provides a lot of convergent evidence and conceptual replication within this study.

Validating the interpretation of motive responses to FEEs and to words for emotions and traits

Most predictions for how motives influence the incentive value of FEEs and words could be confirmed. However, additional independent evidence is lacking in support of the notion that the affiliation and power motives responded to these stimuli because they signal affiliation or dominance. While testing interactions between the affiliation and power motive as well as testing effects of words for emotions and traits gave a first additional possibility to test the validity of previous assumptions, I suggest that more research is needed that specifically tackles these questions. Two ways to validate the current interpretations of motive responses to FEEs and words for emotions and trait might lie in testing the subjective availability of the reasons for individuals' responses to these stimuli directly (i.e., asking: "Why do you like the stimulus?") or to investigate which concepts are primed by these stimuli and whether the priming effects also depends on individual's implicit motive dispositions.

Understanding what happens during referential processing

Given my findings on the role of referential competence for the validity of implicit and explicit measures of motivation, and given the role that referential processing has for differentiating implicit and explicit motivational systems, understanding in more detail how these processes work is an important next step in research on implicit and explicit motives. A better understanding might be achieved by exploring in more detail what distinguishes individuals high from those low in referential competence, by developing or using other measures for referential competence (e.g., a true emotional stroop task, Preston & Stansfield, 2007), and finding ways to experimentally control referential

processing. An interesting way to investigate referential processes would be to analyze interactions between implicit and explicit motives in greater detail.

Implicit motives and conscious awareness

Do individuals consciously experience implicit motive-triggered affective responses when viewing signals of affiliation and dominance, and under which conditions do they experience these feelings? Do individuals have insight into the reasons for these affective responses (e.g., that they dislike an angry face due to the hostility or dominance it signals)? If these emotions are consciously experienced, why are they not reported, not remembered, and not integrated into the self? These thrilling questions should be tackled in future research and the present work might represent a starting point for such an investigation.

Processes that mediate the influences of explicit and implicit motives on behavior and an experimental framework

Previous models about how implicit and explicit motives differ have approached this question by defining general and distinct classes of behavior that are supposedly influenced by each motive. However, these accounts have not been successful in explaining the whole range of available data on this question so far. Again, the current findings demonstrate that a distinction that is based on overt behavior does not hold true in all circumstances. This questions the strategy that has been taken up to date. Contrary to this conception, the current study demonstrates that the exact same behavior can very well be influenced by both, implicit and explicit motives in a parallel way. Finding such similarities on the behavioral surface level does not mean that the same processes mediated both influences. Thus, instead of defining distinct classes of behavior, it seems to be more promising to try to understand the precise ways in which each, implicit and explicit motives influence behavior. Or, as Brunstein and Maier stated in a recent publication (2005, p. 220): “It is [...] important to analyze in greater detail the cognitive and affective processes that mediate the way in which motive dispositions translate into overt behaviors.”

I suggest that the feeling-as-information model provides a formidable framework for tackling this question for implicit motives (cf. Schultheiss, 2001). Likewise, research on declarative memory and on heuristic and reward-based decision making should hold valuable insights concerning the processes that mediate influences of explicit motives on behavior. Thus, having identified single stimuli that arouse implicit motives does not only allow researchers to investigate “motivational processes in humans” using “behavioral measures adapted from cognitive psychology” (Schultheiss et al., 2005, p. 53), but also to answer questions about how these motivational processes translate into behavior (e.g., judgments, social interactions) using methods and theoretical knowledge from social psychology. Improving our understanding of how implicit and explicit motives differ in such a way would be a great contribution to motive research. It might help to understand in a better way when one

can expect motive-influences on behavior and might also provide a good foundation to understand how implicit and explicit motives interact to influence behavior.

My findings provide an excellent starting point for further research to pinpoint these questions. I found that implicit and explicit motives were aroused by previously unpredicted cues and that both influenced previously unpredicted measures of behavior. Explaining the difference between these and previous findings might be one way to reach such a better understanding. Such an undertaking greatly benefits from groundbreaking work recently conducted by Schultheiss and colleagues (e.g., Schultheiss, 2001; Schultheiss et al., 2005). Having identified single and simple stimuli that arouse implicit motives provides an excellent framework for studying these processes that mediate motive influences on behavior in great detail. Within this framework, it is possible to precisely manipulate various aspects of the situation while keeping the rest of the setting constant. Some possible variations might be to ask participants not only how much, but also why they like or dislike stimuli signaling affiliation or dominance, to manipulate attributions made about implicit motive-driven affective responses, or to manipulate which other information besides own affect is used to make similar judgments.

Correlational nature of findings

The correlational nature of the present findings does not allow the claims about a causal influence of FEEs and words on motive arousal and a causal influence of motives on ratings and color naming. Optimally, the processes described in Schultheiss' information processing account should be investigated experimentally. I believe that this is particularly interesting for the process of unconscious emotions becoming consciously accessible and for the kinds of psychological and neurological mechanisms that moderate this process. Besides investigating the role of referential processing for this process, other factors like the suppression of emotions or of incentives would be valuable objects of investigation.

5.7 Conclusion

A few years ago, Schultheiss (2001, p. 3) stated that “despite over 50 years of research on implicit motives, the exact nature of motive-arousing cues is still not understood very well.” Since then, a lot of progress in the understanding of implicit motives has been made. Implicit motives have been shown to respond to identifiable stimuli and a new theoretical model on implicit and explicit motivational systems has been developed (2001, in press). Taking these two developments as a starting point, motive research can come to a better understanding of why and how implicit and explicit motives differ by investigating the functioning of these systems in greater detail than has been possible before. The present study is an example of how existent theoretical approaches can (and should) be tested empirically and might serve as a valuable starting point for more theoretically guided

research. Such research will lead to more precise formulations of present theories or to the development of new models and thus to a better answer to a question that McClelland and colleagues have started to ask many years ago: the question of what implicit and explicit motives are and how they differ from each other.

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APPENDIX

A) Words used as Stimuli in the Word Rating and the Word Stroop tasks

Table A-1 – Emotion Words

Angry	happy	surprised	neutral non-words
angry	joyful	surprised	wdea
annoyed	happy	amazed	pyahp
furious	cheerful	awed	sedaelp
mad	delighted	shocked	dierrpsus
outraged	elated	dazzled	onydena
hateful	pleased	startled	edartogu

Words for emotions were synonyms for the words printed in bold and were taken from a Thesaurus (Lexico Publishing Group, 2005); neutral words were created by scrambling emotion words.

Table A-2 – Trait Words

Dominance		Affiliation		neutral
high	low	high	low	
assured-dominant	unassured-submissive	warm-agreeable	cold-hearted	
self-assured	timid	kind	ruthless	dreudr
self-confident	shy	gentlehearted	ironhearted	uess-sdrefsl
assertive	meek	tenderhearted	hardhearted	henymptucetasi
dominant	unauthoritative	charitable	coldhearted	rsethfdmi
forceful	unbold	tender	unsympathetic	ekme
domineering	unaggressive	sympathetic	cruel	eldeteagreh

Trait words were taken from the IAS-R (Wiggins et al., 1988) from the scales indicated; neutral words were created by scrambling trait words.

B) Overview of the effects of the explicit and the implicit affiliation and power motives

Table B-1 – Effects of the implicit affiliation motive

	Implicit affiliation motive			
stimuli & task	<i>n</i> Power	angry	happy	surprised
Face Rating	high	-0.217***	+0.216***	n.s.
	low	+0.091**	-0.130***	+0.091**
	all	-0.133***	+0.045†	n.s.
Face Stroop	high	n.s.	n.s.	
	low	-0.018†	-0.020*	
	all			-0.011†
Emotion Word Rating	high	-0.158***	+0.247***	
	low	+0.094†	n.s.	
	all			+0.208***
Emotion Word Stroop			n.s.	
stimuli & task	<i>n</i> Power	affiliation	dominance	
Trait Word Rating	high	+0.412***		n.s.
	low	n.s.		-0.202**
Trait Word Stroop	high	+0.050†		n.s.
	low	n.s.		n.s.

Table B-2 – Effects of the explicit affiliation motive

	Explicit affiliation motive			
stimuli & task	<i>san</i> Power	angry	happy	surprised
Face Rating	all	n.s.	-0.112***	+0.062***
Face Stroop	high		n.s.	
	low		-0.027**	
	all	n.s.		n.s.
Emotion Word Rating	high	+0.096*	n.s.	n.s.
	low		-0.054†	
	all			
Emotion Word Stroop	all		n.s.	
stimuli & task	<i>san</i> Power	affiliation	dominance	
Trait Word Rating	high	-0.185†		
	low	n.s.		
	all	(neg. aff. words: -0.132**)		-0.082†
Trait Word Stroop		all aff. words: +0.017**		neg. dom. words: +0.032***

Table B-3 – Effects of the implicit power motive

	Implicit power motive			
stimuli & task	<i>n</i> Affiliation	angry	happy	surprised
Face Rating	high low all	n.s. +0.24***	+0.050† -0.055 (.12)	n.s. +0.10***
Face Stroop	high low all	+0.028*** n.s.	+0.023** n.s.	n.s.
Emotion Word Rating	high low all	-0.116** +0.075 (.11)	-0.214***	-0.210***
Emotion Word Stroop	high low	+0.078*** n.s.		
stimuli & task	<i>n</i> Affiliation	affiliation	dominance	
Trait Word Rating	high low all	n.s. -0.346***	-0.082†	
Trait Word Stroop	high low	n.s. n.s.	n.s. +0.054*	

Table B-4 – Effects of the explicit power motive

	Explicit power motive			
stimuli & task	<i>san</i> Affiliation	angry	happy	surprised
Face Rating	all	+0.033†	-0.055**	n.s.
Face Stroop	high low all	n.s. +0.022†	+0.009 (.13)	+0.010†
Emotion Word Rating	all	+0.113***	n.s.	+0.044 (.13)
Emotion Word Stroop	high low	n.s. +0.025***		
stimuli & task	<i>san</i> Affiliation	affiliation	dominance	
Trait Word Rating	all	n.s.	-0.334***	
Trait Word Stroop		n.s.		

German Summary / Zusammenfassung

Wie unterscheiden sich implizite und explizite Motive? Auf welche Arten von Reizen reagieren sie und welche Arten von Verhalten beeinflussen sie? Unterscheiden sich Personen darin gut sie Informationen zwischen ihrem impliziten und ihrem expliziten Motivsystem transferieren können? Diesen Fragen geht die vorliegende Arbeit nach.

Theorie

Implizite und explizite Motive

Motivation wird von Rheinberg (2006) definiert als die „Ausrichtung des aktuellen Lebensvollzugs auf einen positiv bewerteten Zielzustand“. Das belohnende an einem erreichten Reiz oder Zustand wird als Anreiz bezeichnet. Im Gegensatz zur Motivation bezeichnen Motive kein aktuelles Geschehen, sondern eine Abstraktion von einzelnen Situationen auf relativ stabile Persönlichkeitseigenschaften. Die Stärke eines Motivs in einer Person ist darüber definiert wie sehr eine Person eine bestimmte Klasse von Anreizen als belohnend erfährt. Motive werden von situationalen Hinweisreizen angeregt welche die Verfügbarkeit eines Anreizes signalisieren. Nach McClelland (1980) werden angeregte Motive wirksam indem sie Verhalten orientieren, auswählen, und energetisieren.

In über 50 Jahren empirisch-psychologischer Forschung über Motive haben sich vor allem zwei Methoden zur Erfassung von inter-individuellen Unterschieden in der Stärke von Motiven etabliert. Zum einen wurde für die Messung von Motiven die Bildergeschichten Aufgabe (picture story exercise, PSE, McClelland et al., 1989) verwendet, welche eine Forschungsversion des thematischen Apperzeptionstests darstellt. Zudem sind Motiv-Fragebögen ein gängiges Instrument zur Erfassung dieser Disposition. Es ist einer der erstaunlichsten Befunde der 50-jährigen Motivforschung, dass diese beiden Maße keinerlei Korrelation untereinander aufweisen (siehe z.B. Schultheiss & Brunstein, 2001) obwohl sie konzipiert waren dasselbe hypothetische Konstrukt zu erfassen. Zudem hat sich gezeigt, dass beide Maße auf unterschiedliche Arten von Anreizen reagieren und dass sie unterschiedliche Arten von Verhalten beeinflussen. Ausgehend von diesen Befunden haben McClelland, Koestner und Weinberger (1989) geschlussfolgert, dass es sich bei Motiven wie sie durch Fragebögen und durch den PSE erhoben werden um unterschiedliche Konstrukte handelt und dass Menschen somit zwei über verschiedene Motivationssysteme verfügen. Nach dem Modell von McClelland und Kollegen werden implizite Motive von Aufgaben-intrinsischen Anreizen (*task intrinsic*, oder auch Tätigkeitsanreize) angeregt und beeinflussen operantes Verhalten, während explizite Motive auf sozial-extrinsische Anreize (*social-extrinsic*) reagieren und respondentes Verhalten beeinflussen.

Informationsverarbeitungs-Modell zur Anregung impliziter Motive (Schultheiss, 2001, in press)

Schultheiss (2001) kritisierte die Beschreibung der Anreiz- und Verhaltensbedingungen durch McClelland und Kollegen (1989) unter denen implizite und explizite Motive angeregt werden und Verhalten vorhersagen. In seinem Informationsverarbeitungs-Modell (*information processing account for the arousal of implicit motives*) (Schultheiss, 2001, in press) entwirft er ein neues Bild von impliziten und expliziten Motivsystemen und stellt neue Hypothesen über die Bedingungen für ihre Validität auf. Nach Schultheiss (2001, in press) sind implizite Motive Teil eines Erfahrungssystems (*experiential system*) das Informationen nonverbal verarbeitet. Explizite Motive hingegen basieren auf einem verbal-symbolischen System (*verbal-symbolic system*), welches Information abstrakt in Form von Sprache oder Symbolen repräsentiert. Das Erfahrungssystem (*experiential system*) reagiert auf nonverbale Reize und beeinflusst non-deklarative Motivationsmaße. Schultheiss (in press, p. 18 f.) definiert non-deklarative Motivmaße als all diejenigen Maße von Verhalten und Prozessen, die nicht vom Selbstkonzept oder verbal repräsentierten Absichten kontrolliert werden oder für diese zugänglich sind. Das verbal-symbolische System hingegen verarbeitet laut Schultheiss verbale und symbolische Reize und beeinflusst deklarative Motivationsmaße. Deklarative Motivationsmaße sind laut Schultheiss (in press, p. 19) all solche Maße, die „das verbal repräsentierte Selbst, sowie die damit verbundenen Überzeugungen, Einstellungen, Urteile, Entscheidungen, und Ziele anzapfen“¹.

Referentielle Verarbeitung (*referential processing*) wird von Schultheiss (in press) als ein Prozess beschrieben, bei dem Information von einer Form der Repräsentation in die andere übersetzt wird. So können nonverbale Reize vom verbal-symbolischen System verarbeitet werden, in dem sie benannt werden. Ebenso kann verbale Information durch lebhaftere Vorstellung der beschriebenen Situation im Erfahrungssystem repräsentiert werden. Diese referentielle Verarbeitung benötigt laut Schultheiss zusätzliche Zeit und Anstrengung.

Hypothesen der 1. Ebene und ihre Unterstützung

Vier zentrale Hypothesen können aus dem Informationsverarbeitungs-Modell abgeleitet werden.

Hypothese 1: Implizite und explizite Motive korrelieren nicht miteinander.

Die bisherige Forschung konnte wiederholt bestätigen, dass implizite und explizite Motive niedrig oder gar nicht miteinander korrelieren (z.B., Schultheiss & Brunstein, 2001; Spangler, 1992).

Hypothese 2: Implizite Motive werden durch nonverbale, jedoch nicht durch verbale Reize angeregt. Explizite Motive werden durch verbale, jedoch nicht durch nonverbale Reize angeregt.

¹ Eigene Übersetzung

In der Literatur gibt es Hinweise darauf, dass implizite Motive auf nonverbale Reize, nicht jedoch auf rein verbale Reize reagieren (z.B. Schultheiss, 2001; Schultheiss & Brunstein, 1999). Während starke Evidenz für die Fähigkeit nonverbaler Reize zur Anregung impliziter Motive existiert (z.B. Klinger, 1966; Schultheiss et al., 2005) sind die Befunde bezüglich verbaler Reize uneindeutig, da das nonverbale Verhalten des Experimentators in vielen Studien nicht kontrolliert wurde (vgl. Schultheiss, 2001). Während explizite Motive eindeutig auf verbale Reize reagieren (vgl. die Messung expliziter Motive durch Fragebögen), ist unklar ob sie auch von nonverbalen Reizen angesprochen werden.

Hypothese 3: Implizite Motive beeinflussen non-deklarative, aber nicht deklarative Motivmaße. Explizite Motive beeinflussen deklarative, aber nicht non-deklarative Motivmaße.

Diese Hypothese hat in der Vergangenheit gute Unterstützung erhalten. Viele Studien kamen unter Verwendung von verschiedenen Maßen zu diesem Ergebnis (z.B. deCharms et al., 1955; Koestner et al., 1991). Ebenso stimmt sie mit metaanalytischen Befunden überein (Spangler, 1992).

Hypothese 4: Wenn referentielle Verarbeitung stattfindet zeigen implizite und explizite Motive Effekte bei allen Reiz- und Verhaltensformaten.

Diese Hypothese wird bisher vor allem durch eine Serie von Studien unterstützt, die von Schultheiss und Brunstein (1999, 2002) durchgeführt wurde. In diesen Studien reichten verbale Instruktionen nicht aus um die Zielbindung der Versuchspersonen abhängig von ihren impliziten Motiven zu machen. Erst nachdem sie Gelegenheit hatten sich die Zielverfolgung lebhaft vorzustellen, also die verbalen Instruktionen in nonverbale Repräsentationen zu übersetzen, beeinflussten implizite Motive verschiedene Maße der Zielbindung.

Aktuelles Experiment

In der vorliegenden Studie wurden das Anschluss- und das Machtmotiv untersucht. Das Anschlussmotiv bezeichnet das Bedürfnis anderen Menschen nahe zu sein, während das Machtmotiv das Bedürfnis nach Einfluss auf und Dominanz über andere Menschen beinhaltet. Implizite Motive wurden unter Verwendung des PSE erhoben. Explizite Motive wurden mit dem Motivfragebogen Personality Research Form (PRF, Jackson, 1974) erhoben.

Die Auswahl der Reize für die Motivanregung orientierte sich an der Hypothese, dass Reize welche Anschluss oder Dominanz der Anreizwert eines Reizes für das Anschluss- bzw. Machtmotiv davon abhängt, in welchem Ausmaß der Reiz Anschluss bzw. Dominanz signalisiert. Als nonverbale Reize wurden Bilder von freudigen, ärgerlichen, überraschten und neutralen Gesichtsausdrücken verwendet, da diese Signale für Anschluss (oder Feindseligkeit) und Dominanz (oder Unterwerfung) darstellen. Frühere Befunde (z.B. Hess et al., 2000; Knutson, 1996) haben gezeigt, dass freudige Gesichter als freundlich (hoher Anschluss) aber dominant wahrgenommen werden, während ärgerliche Gesichter Feindseligkeit und Dominanz signalisieren. Überraschte Gesichter werden weder als freundlich noch als feindselig wahrgenommen, stellen aber ein Zeichen für niedrige Dominanz dar

(Schultheiss et al., 2005). Adjektive, welche dieselben Emotionen beschreiben wie sie von den Gesichtern dargestellt waren (z.B. „fröhlich“, „ärgerlich“, „überrascht“) wurden als verbale Reize verwendet. Ich nehme an, dass diese Emotionswörter Anschluss und Dominanz auf die selbe Art und Weise signalisieren wie die emotionalen Gesichtsausdrücke. Neutrale Reize wurden aus den Emotionswörtern hergestellt, indem die Reihenfolge der Buchstaben innerhalb eines Wortes durcheinander gebracht wurde. Zudem wurden Eigenschaftswörter als verbale Reize verwendet, welche Anschluss oder Feindseligkeit beziehungsweise Dominanz oder Unterwerfung signalisieren.

Für die Messung der Auswirkungen der Anregung von Motiven wurden ein deklaratives und ein non-deklaratives Motivmaß verwendet. Als deklaratives Motivmaß wurden Urteile der Versuchspersonen über die Reize verwendet. Sie beurteilten auf einer 5-stufigen Skala wie sehr sie den Reiz mögen oder wie sehr sie ihn nicht mögen. Die emotionale Stroop Aufgabe wurde als non-deklaratives Motivmaß verwendet. Die Aufgabe für die Versuchspersonen bestand in dieser Aufgabe darin, möglichst schnell die Farbe eines emotionalen Reizes zu benennen. Frühere Befunde haben gezeigt, dass die Antwort für emotionale Reize signifikant verlangsamt wird. Zur Erklärung dieses Phänomens wird häufig angenommen, dass Aufmerksamkeitsressourcen durch den emotionalen Inhalt des Bildes angezogen und von der Aufgabenausführung (Farbe benennen) abgezogen werden.

Referentielle Verarbeitung wurde als Maß für inter-individuelle Unterschiede in referentieller Kompetenz operationalisiert. Individuen unterscheiden sich darin wie schnell sie Information von nonverbalen Reizen in verbale Repräsentationen und von verbalen Reizen in nonverbale Repräsentationen übersetzen können. Angelehnt an Paivio (1986) und Bucci (1984, 1985) beschreibt Schultheiss (in press) diese Geschwindigkeit als referentielle Kompetenz (*referential competence*). Individuen mit einer hohen referentiellen Kompetenz können demnach schneller einen nonverbalen Reiz benennen oder eine nonverbale Vorstellung von einer verbalen Repräsentation erzeugen. Zur Messung dieser referentiellen Kompetenz hatten Versuchspersonen die Aufgabe, so schnell wie es Ihnen möglich war die Farbe von farbigen Quadraten zu benennen. Zudem sollten sie Farbwörter lesen so schnell es ihnen möglich war (z.B. „rot“). Der Unterschied in der Geschwindigkeit mit der eine Versuchsperson diese beiden Aufgaben ausführen gibt ein Maß ab für die Geschwindigkeit mit der nonverbale in verbale Informationen übersetzt werden können.

Hypothesen der 2. Ebene

Für Individuen mit einem starken Anschlussmotiv sollten Reize für die Emotionen „Freude“ sowie Eigenschaftswörter, die Anschluss signalisieren (z.B. „mitfühlend“) einen positiven Anreizwert haben. Negativen Anreizwert hingegen sollten Reize besitzen, die die Emotion Ärger ausdrücken sowie Eigenschaftswörter, welche Feindseligkeit oder Ablehnung von Anschluss signalisieren (z.B. „kalthertzig“). Für Individuen mit einem starken Machtmotiv sollten hingegen Reize welche die Emotion „Überraschung“ ausdrücken oder Eigenschaftswörter die niedrige Dominanz signalisieren (z.B. „furchtsam“) einen positiven Anreizwert besitzen. Ein negativer Anreizwert sollte all denjenigen

Reizen (Gesichtern oder Emotionswörtern) zukommen, die die Emotionen „Ärger“ oder „Freude“ ausdrücken sowie Eigenschaftswörtern die Dominanz signalisieren (zB. „tyrannisch“). Neben der Überprüfung dieser Hypothesen wurden zusätzlich und jeweils innerhalb des impliziten bzw. expliziten Bereichs Interaktionen zwischen dem Anschluss- und dem Machtmotiv exploriert.

Zum Zusammenhang zwischen Anreizwert und Verhaltensantwort sagte ich vorher, dass der Anreizwert eines Reizes sich direkt (symmetrisch) in seiner Beurteilung wieder spiegeln sollte. Der Zusammenhang zwischen Anreizwert und Reaktionszeit in der emotionalen Stroop Aufgabe wurde hingegen in seiner Richtung nicht näher bestimmt.

Methode

Alle Aufgaben wurden in Computern implementiert und von 81 Versuchspersonen jeweils einer ca. zweistündigen Sitzung gegen Zahlung von 20 USD bzw. Anrechnung von Versuchspersonenstunden bearbeitet.

Ergebnisse

Für die statistischen Analysen wurden in R (R Development Core Team, 2006b) lineare gemischte Modelle mit gekreuzten Zufallsfaktoren für den Intercept gerechnet, der über Versuchspersonen und Items variierte. Für jede Reiz- und Verhaltensbedingung wurden Interaktionen von Motiven mit Emotion getestet.

Diskussion

Hypothesen der 2. Ebene

Das Anschluss- und das Machtmotiv interagieren miteinander um Verhalten zu beeinflussen. Auch wenn die Vorhersagen nicht in allen Bedingungen zutrafen, so konnten die Hypothesen bezüglich des Anreizwertes von Signalen für Anschluss und Dominanz für das implizite und explizite Anschluss- und Machtmotiv weitestgehend bestätigt werden.

Das implizite und das explizite Anschlussmotiv wurden durch Reize angeregt die Anschluss oder Feindseligkeit signalisieren. Beide Motive sagten sowohl Urteile als auch Reaktionszeiten in der emotionalen Stroop Aufgabe vorher. Während der Anreizwert von Signalen von Anschluss und Dominanz vom impliziten Anschlussmotiv im Großen und Ganzen wie vorhergesagt beeinflusst wurde, war die Richtung der Effekte für das explizite Anschlussmotiv genau entgegengesetzt zur Vorhersage. Individuen, die angaben allgemein ein geringes Bedürfnis nach zwischenmenschlichem Anschluss zu haben reagierten sensibler auf Reize die Anschluss oder Feindseligkeit signalisieren als solche, die von einem starken Bedürfnis berichten. Dieser scheinbar paradoxe Befund kann dadurch erklärt werden, dass der Bindungsstil von schwach explizit Anschlussorientierten eine höhere Unsicherheit aufweist als der von stark explizit Anschlussorientierten (Randolph et al., 1997).

Aufgrund dieser Bindungsunsicherheit reagieren sie sensibler auf Signale von Anschluss oder Feindseligkeit als Individuen, die ein starkes Bedürfnis nach zwischenmenschlichem Anschluss berichten.

Für das Machtmotiv beeinflussten sowohl seine explizite als auch seine implizite Ausprägung die Reaktionen auf Signale von Dominanz oder Unterwerfung in der Beurteilungs- und in der emotionalen Stroop Aufgabe. Reize, die niedrige Dominanz signalisieren wurden von stark im Vergleich zu schwach machtmotivierten Individuen positiver beurteilt, während Reize die hohe Dominanz ausdrücken von stark machtmotivierten Individuen im Vergleich negativer beurteilt wurden.

Hypothesen der 1. Ebene

Hypothese 1: Wie vorhergesagt lagen die Korrelationen zwischen impliziten und expliziten Motiven nahe bei null ($r_s < .03$) und waren nicht signifikant ($p_s > .88$).

Hypothese 2: Die Hypothese, dass implizite und explizite Motive sich darin unterscheiden ob sie auf nonverbale oder verbale Reize reagieren konnte nicht bestätigt werden. Sowohl explizite als auch implizite Motive wurden von emotionalen Gesichtsausdrücken als auch von Emotions- und Eigenschaftswörtern angeregt.

Hypothese 3: Die Hypothese, dass implizite und explizite Motive sich darin unterscheiden ob sie non-deklarative oder deklarative Verhaltensmaße beeinflussen konnte ebenfalls nicht bestätigt werden. Sowohl explizite als auch implizite Motive sagten die deklarative Beurteilung von Reizen als auch die non-deklarativen Reaktionszeiten in der emotionalen Stroop Aufgabe vorher.

Hypothese 4: Referentielle Kompetenz moderierte die Motiveffekte in der vorhergesagten Art und Weise. Die impliziten Motiv-Effekte waren stärker bzw. entsprachen den Vorhersagen besser in Individuen mit einer hohen referentiellen Kompetenz. Wie vorhergesagt existierte dieser moderierende Effekt in allen Bedingungen außer für nonverbale Reize in Kombination mit non-deklarativen Antworten. Die Vorhersagen für explizite Motive konnten nur zum Teil bestätigt werden. Die moderierenden Effekte waren nicht immer direkt und einfach interpretierbar und einige der Effekte waren widersprüchlich. Zudem moderierte referentielle Kompetenz Effekte der Expliziten Motive in der Bedingung, in denen keine Effekte erwartet worden waren: bei verbalem Reiz- und deklarativem Antwortformat. Die expliziten Motiveffekte wurden hingegen bei nonverbalen Reizen und non-deklarativem Antwortformat nicht von referentieller Kompetenz moderiert, obwohl dies theoretisch vorhergesagt worden war. Letzterer Befund lässt sich jedoch durch die Tatsache erklären, dass das verwendete Maß für referentielle Kompetenz die Übersetzung von nonverbalen in verbale Repräsentationen, nicht jedoch die Übersetzung von verbalen in nonverbale Repräsentationen erfasst. Zusammengefasst bieten die Ergebnisse also Unterstützung für die Annahme, dass die Fähigkeit nonverbale Reize schnell in ein verbales Format zu übersetzen es impliziten Motiven erleichtert auf

verbale Reize zu reagieren und deklaratives Verhalten zu beeinflussen. Die entsprechende Evidenz für explizite Motive ist weniger eindeutig.

Neben den Befunden zu stärkeren impliziten Motiveffekten in Individuen mit hoher referentieller Kompetenz zeigen die Befunde jedoch, dass implizite und explizite Motive auch in Individuen mit niedriger referentieller Kompetenz Effekte in Reiz- beziehungsweise Verhaltensbedingungen aufweisen, in denen diese nicht theoretisch erwartet werden sollten. So reagierten implizite Motive auch in Individuen mit niedriger referentieller Kompetenz auf verbale Reize und beeinflussten ein deklaratives Verhaltensmaß. Ebenso reagierten in diesen Individuen explizite Motive auf nonverbale Reize und beeinflussten non-deklarative Verhalten.

Schlussfolgerungen bezüglich des Informationsverarbeitungs-Modells zur Anregung impliziter Motive

Die Befunde zur referentiellen Kompetenz stellen eine Unterstützung für Schultheiss' (2001, in press) Modell dar. So stützen die Befunde die Hypothese, dass Übersetzungsprozesse zwischen nonverbalen und verbalen Repräsentationen Effekte von impliziten Motiven bei „unpassenden“ Reiz- und Verhaltensbedingungen ermöglichen. Dass implizite und explizite Motive bei solchen „unpassenden“ Reiz- und Verhaltensbedingungen auch bei Individuen reagieren und Verhalten beeinflussen, die eine niedrige referentielle Kompetenz haben, widerspricht jedoch Schultheiss' Informationsverarbeitungs-Modell.

Warum traten diese Effekte dann dennoch auf? Auf der Basis des Informationsverarbeitungs-Modells zur Anregung impliziter Motive spricht dieser Befund für eine automatische Aktivierung nonverbaler Repräsentationen durch verbale Reize und verbaler Repräsentationen durch nonverbale Reize. Die Interferenzbedingung der originalen Stroop Aufgabe demonstriert, dass eine solche automatische Aktivierung bei einfachen Farbreizen statt findet. Ebenso aktivieren emotionale Gesichtsausdrücke automatisch verbale Repräsentationen der entsprechenden Emotionen (vgl. Preston & Stansfield, 2007). Somit könnten in allen Individuen implizite Motive zu einem gewissen Ausmaß auch auf verbale Reize und explizite auch auf nonverbale Reize reagieren. Diese automatischen Übersetzungsprozesse würden jedoch nicht ausreichen um komplexere Beschreibungen von Zielen wie sie in vielen motivationspsychologischen Experimenten vorkommen (siehe z.B. Schultheiss & Brunstein, 1999, , 2002) impliziten Motiven zugänglich zu machen.

Interessant ist zudem der Befund, dass implizite Motive deklarative Beurteilungen von Reizen vorhersagen. Dies steht im Gegensatz zu den Ergebnissen vieler früheren Studien und wirft die Frage auf warum die Effekte in dieser Bedingung, nicht jedoch in anderen Studien gefunden wurden. Eine mögliche Erklärung für diese Inkonsistenz stellt der Stimmung als Informations-Ansatz (*mood-as-information*, Schwarz & Clore, 1983) dar. Danach können affektive Reaktionen auf einen Reiz Beurteilungen dieses Reizes beeinflussen. Implizite Motive würden also Urteile dadurch beeinflussen, dass sie die bewusste affektive Reaktion auf einen Reiz moderieren. Die Bedingungen für den Einfluss

impliziter Motive auf Urteile wären demnach gleichzusetzen mit den Bedingungen für die Verwendung eines Gefühls für dasselbe Urteil. Dieser Ansatz stellt eine einfache Dichotomisierung des von Motiven beeinflussten Verhaltens nach deklarativ oder non-deklarativ in Frage. Stattdessen erfordert und ermöglicht er eine detailliertere Beschreibung der beteiligten Prozesse. Ein weiterer Ansatz zur Erklärung des Befundes liegt in der Unterscheidung zwischen reflektivem und impulsivem Verhalten (z.B. Strack & Deutsch, 2004). Implizite Motive würden als Teile eines impulsiven Systems nur spontanes Verhalten beeinflussen. Die Urteile in der vorliegenden Studie wurden spontan (innerhalb weniger Sekunden, $M = 1.69$ sek, $SD = 2.10$) gefällt. Längere Reflektion über die Beurteilung der Reize könnte den Einfluss der impliziten Motive verschwinden lassen.

Insgesamt unterstützen die vorliegenden Befunde Schultheiss' (2001, in press) Informationsverarbeitungs-Modell zur Anregung impliziter Motive. Die explorative und korrelative Natur der Befunde zur referentiellen Kompetenz, sowie mögliche alternative Erklärungsmöglichkeiten für dessen moderierende Effekte machen klarerweise weitere Forschung hierzu notwendig. Die Ergebnisse über Einflüsse impliziter Motive auf Urteile könnte Wege zu einer präziseren Beschreibung der Prozesse öffnen, die den Einfluss impliziter Motive auf deklaratives Verhalten vermitteln und somit auch ein besseres Verständnis der Bedingungen ermöglichen, unter denen implizite Motive welches Verhalten beeinflussen.

DECLARATION / ERKLÄRUNG

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