

Manipulating self-esteem through subliminal stimulation:

Development and test of a research tool

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Michael Riketta

Dekanin:
Prof. Dr. Dagmar Stahlberg

Gutachter bzw. Gutachterin:
Prof. Dr. Herbert Bless
Prof. Dr. Dagmar Stahlberg

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1 Introduction

Self-esteem is one of the most often studied topics in psychology. A search in the electronic database PsycInfo revealed that up to the year 2002, over 14,000 journal articles that deal with self-esteem have been published. This literature has identified numerous correlates of this construct (for overviews, see Leary, Schreindorfer, & Haupt, 1995; Mecca, Smelser, & Vasconcellos, 1989; Owens, Stryker, & Goodman, 2001). For example, self-esteem has been shown to be associated with school performance (Hansford & Hattie, 1982), emotional reactions to success and failure (Brown & Dutton, 1995; Rosenberg & Owens, 2001), self-serving attribution (Blaine & Crocker, 1993; Fitch, 1970; Swann, Griffin, Predmore, & Gaines, 1987), intergroup discrimination (Aberson, Healy, & Romero, 2000), self-regulation failure (Baumeister, Heatherton, & Tice, 1993), self-handicapping (Tice, 1991), drug abuse (Cookson, 1994; Vega, Zimmermann, Warheit, Apospori, & Gil, 1993), aggressive behavior (Baumeister, Smart, & Boden, 1996; Russell & Hulson, 1992), eating disorders (Gross & Rosen, 1988; Mejboom, Jansen, Kampman, & Schouten, 1999), work behavior (Brockner, 1988; Schooler & Oates, 2001), depression (Beck, 1979; Brown, Andrews, Harris, Adler, & Bridge, 1986; Rosenberg & Owens, 2001; Watson, Suls, & Haig, 2002), anxiety (Coopersmith, 1967; Rosenberg & Owens, 2001), persuasability (McGuire, 1968), pessimism (Rosenberg & Owens, 2001), and life satisfaction (Diener & Diener, 1995).

Partly on the basis of these findings, many researchers and practitioners assumed that a lack of self-esteem can cause or maintain psychological disorders (e.g., Bednar & Peterson, 1995; Branden, 1994; Rogers, 1951) or deviant behaviors such as violence and drug abuse (e.g., Branden, 1994; California Task Force, 1990; Kaplan, 2001; National Association for Self-Esteem, 2000). Some of these authors explicitly suggested that raising self-esteem is a remedy against many individual and social problems (e.g., California Task Force, 1990; National Association for Self-Esteem, 2000). These suggestions have proved influential. Many practical interventions in the fields of social work, school education, and psychotherapy have been designed to raise clients' self-esteem (e.g., Bednar & Peterson, 1995; Eggert, Thompson, Hering, & Nicholas, 1994; Okwumabua, Wong, Duryea, Okwumabua, & Howell, 1999). Moreover, there exists an increasing market for commercial courses and self-help programs that promise to increase individual self-esteem (see Froufe & Schwartz, 2001; National Association for Self-Esteem, 2000).

In spite of the pervasiveness and practical significance of hypotheses regarding the consequences of self-esteem, conclusive tests of these hypotheses have been scarce. In almost all previous studies on self-esteem, this variable was only measured, not manipulated. This is even true for studies designed to test causal models of self-esteem (e.g., Brown et al., 1986). However, such studies

cannot rule out the problem of spurious correlations. In the present context, this means that observed correlations between self-esteem and any second variable may be caused by a third variable that exerts an influence on both self-esteem and the former variable. In this case, the second variable and self-esteem would correlate with each other in the absence of any causal relation between them. For example, students' intelligence may influence their self-esteem as well as their academic performance; in this case, self-esteem and academic performance may correlate even if self-esteem does not affect academic performance nor vice versa. Because it is virtually impossible to measure and control for all variables that may account for spurious correlations in a study, correlational results cannot be taken as evidence for any consequences of self-esteem (Smelser, 1989).

The most conclusive way to explore the consequences of self-esteem would be to manipulate this variable in experiments. Several researchers have already done so (e.g., Arndt & Greenberg, 1999; Bramel, 1962; Deaux, 1972; Gollob & Dittes, 1965; McMillen, Sanders, & Solomon, 1977; Sigall & Gould, 1977; Ybarra, 1999; Walster, 1965, 1970). Typically, these researchers used bogus feedback on personality tests or on intellectual tasks as self-esteem manipulations. However, this method is problematic because it may (a) have side-effects (such as mood changes) that can bias the results and (b) cause a state of boosted or threatened self-esteem, which probably is not comparable to self-esteem as emerging spontaneously in everyday situations. These problems are explained in detail in Chapter 4.1.2. Here it is sufficient to note that these problems impair the conclusiveness of previous experimental research on the consequences of self-esteem. The goal of the present research was to develop and validate a method that promises to avoid these problems – the Method for Subliminal Self-Esteem Manipulation (MSSM).

The next chapter clarifies the meaning of the term *self-esteem* and addresses two dimensions of this construct (global vs. composite, trait vs. state) that are pivotal for the present research. An overview of research on the causes of short-term changes in self-esteem follows (Chap. 3). This overview identifies three basic processes that can underlie such changes. It is concluded from the reviewed research that selective activation of positive versus negative self-knowledge is the process whose role in self-esteem change has been demonstrated most convincingly. Chapter 4 takes a closer look at the methodological aspects of previous experimental research on self-esteem change, with special emphasis on success/failure induction procedures. Above all, the chapter deals with the shortcomings of these procedures. On the basis of the conclusions from Chapter 3 and 4, Chapter 5 describes the rationale for the MSSM. Although the MSSM was designed to affect self-esteem via self-knowledge activation, other mediating mechanisms could not be ruled out a priori. Hence, in total, three models of mechanisms mediating the effects of the MSSM are proposed in Chapter 5. Chapter 6 describes four experiments in which the MSSM was tested. One of these experiments pitted the three alternative models introduced in Chapter 5 against each other. Together, the results of the four experiments attest

to the effectiveness of the MSSM as a self-esteem manipulation and suggest that self-knowledge activation is indeed the dominant mediating process. Finally, Chapter 7 addresses the limitations of the present research and makes suggestions for further investigation.

2 The construct of self-esteem

Chapter 2.1 presents four classic definitions and a working definition of self-esteem. Chapters 2.2 and 2.3 discuss two distinctions that play an important role in the present research: global versus composite and trait versus state self-esteem.

2.1 *Definition of self-esteem*

In psychological research, there is no consensus regarding the nature of self-esteem. This is evident already from the variety of terms that researchers have used either as synonyms for this construct or to denote subtypes of self-esteem: self-worth, self-evaluation, self-appraisal, self-love, self-respect, self-acceptance, self-feeling, self-regard, and others (see Burns, 1979; Wells & Marwell, 1976). The (usually subtle) differences in the meaning of these terms are not discussed here. Rather, the present thesis focuses on what describes the common thread of the conceptualizations that are implied in these terms. For this purpose, at the end of the chapter, a working definition of self-esteem is proposed that is derived from four classic and highly influential definitions of self-esteem (Coopersmith, 1967; James, 1890; Rosenberg, 1965). These definitions are described in turn.

In his famous chapter on the self, William James (1890) offered two definitions of self-esteem. According to the first one, self esteem „is determined by the ratio of our actualities to our supposed potentialities; a fraction of which our pretensions are the denominator and the numerator our successes: thus, Self-Esteem = Success/Pretensions” (p. 310). This definition implies three ideas that have been highly influential in self-esteem research.

First, it implies that self-esteem is a function of the discrepancy between the desired or ideal self (i.e., pretensions) and the actual self (i.e., successes). This idea was very influential in the 1950s and 1960s (e.g., Bills, Vance, & McLean, 1951; Butler & Haigh, 1954) and recently resurrected in the context of Higgins’ (1987) self-discrepancy theory. Until the 1970s, however, convincing evidence had cumulated that measures of the actual self have at least the same predictive validity as measures of actual–ideal self discrepancies (Wylie, 1974). Hence, most contemporary researchers conceive of – and measure – self-esteem as an actual state rather than an actual–ideal discrepancy (see Marsh & Hattie, 1996).

Second, because a person has multiple pretensions and corresponding successes or failures, the mentioned definition implies that self-esteem is an aggregate of domain specific self-evaluations (determined by the successes and pretensions in each domain). This begs the question of how these domain specific self-evaluations are aggregated. In another oft-cited passage of his chapter on the self, James (1890) gave a hint:

I, who for the time have staked my all on being a psychologist, am mortified if

others know much more psychology than I. But I am contented to wallow in the grossest ignorance of Greek. My deficiencies there give me no sense of personal humiliation at all. Had I 'pretensions' to be a linguist, it would be just the reverse. (p. 310)

This suggests that the subjective importance of the domains where a person experiences successes or failures determines whether or to what extent these successes or failures affect self-esteem. Several researchers elaborated on this notion in the form of weighted-average models of self-esteem (e.g., Marsh, 1986; Pelham & Swann, 1989). Although these models did not receive much empirical support (Marsh & Hattie, 1996; see also Chap. 2.2.2), the more general view that self-esteem arises from domain specific self-evaluations is still the prevailing one in contemporary self-esteem research (see Brown, 1998; Brown & Marshall, 2002).

Third, James' formula suggests that self-esteem is malleable: It should rise after successes and fall after failures. Lending support to this notion, numerous studies have shown that experimental inductions of success or failure affect self-esteem (see Chap. 4.1). Moreover, over the last two decades, a growing number of field studies have shown that success and failure experiences can explain fluctuations of self-esteem in everyday life (e.g., Crocker & Wolfe, 2001; Greenier et al., 1999; Wells, 1988). Because the issue of the malleability of self-esteem is pivotal for the present work, the relevant research is discussed at length below (Chap. 2.3 and 3 through 5).

In the same chapter in which he presented his formula, James (1890) proposed a second definition of self-esteem. Specifically, he noted that „there is a certain average tone of self-feeling which each one of us carries about with him, and which is independent of the objective reasons we may have for satisfaction and dissatisfaction“ (p. 306). This definition differs from the success/pretensions formula in that it stresses the context independence and stability of self-esteem. An important implication of this second definition is that there should be stable differences in self-esteem between persons. Evidently, most contemporary self-esteem researchers share this view. This follows from the fact that in most empirical studies on self-esteem, this variable is an exogenous individual difference variable. Indeed, the numerous studies that revealed considerable stability in self-esteem differences over years (see Trzesniewski, Donnellan, & Robins, 2003) provide an empirical justification for the use of self-esteem as an individual difference variable.

Although James' two definitions stress different aspects of self-esteem (stability vs. malleability), he himself made no attempt to reconcile them. Chapter 2.3 presents other researchers' attempts to do so.

Morris Rosenberg (1965) is the author of another classic definition. He described self-esteem succinctly as „a positive or negative attitude towards a particular object, namely, the self“ (p. 30). Specifying this definition, he stated that „when we speak of high self-esteem ... we shall simply mean that the individual respects himself, considers himself worthy; he does not necessarily consider

himself better than others, but he definitely does not consider himself worse“ (p. 31). Rosenberg’s Self-Esteem Scale, the most often used self-esteem measure (Blascovich & Tomaka, 1991), is based on this definition. Accordingly, this scale – and therefore a large part of contemporary empirical self-esteem research – pertains to self-esteem as a whole rather than to domain specific self-evaluations. Nevertheless, Rosenberg (1979) endorsed the view that self-esteem as measured by his scale results from domain specific self-evaluations. This notion has a family resemblance to James’ (1890) success/pretensions formula. Both notions imply a bottom-up process in the sense that specific self-evaluations determine more global ones. As already mentioned, the notion of bottom-up processes in self-evaluation is shared by many contemporary researchers.

A third classic definition has been formulated by Stanley Coopersmith (1967). He characterized self-esteem as

the evaluation that the individual makes and customarily maintains with regard to himself; it expresses an attitude of approval or disapproval and indicates the extent to which the individual believes himself to be capable, significant, successful and worthy. In short, self-esteem is a personal judgment of worthiness that is expressed in the attitudes the individual holds. (p. 4)

Thus, like Rosenberg (1965, 1979), Coopersmith (1967) looked primarily at self-esteem as a whole rather than at self-evaluation in specific domains. Nevertheless, like James (1890) and Rosenberg (1979), Coopersmith endorsed the view that self-esteem reflects more specific self-evaluations. Thus, also Coopersmith proposed a bottom-up model of self-evaluation. In addition, he emphasized the stability of self-esteem, speaking of an evaluation that is customarily maintained. Thus, in James’ terms, Coopersmith’s definition refers to the „average tone of self-feeling“ that remains stable across situations rather than to a context dependent state.

The common thread of these classic definitions is that *self-esteem denotes how positive or negative a person feels and/or thinks about himself or herself*. This is the working definition of self-esteem that applies to this thesis. Note that this definition encompasses the four classic definitions just described. Hence, this definition is compatible with the way most contemporary researchers conceptualize self-esteem.

Under the umbrella of the mentioned working definition, there is room for a large number of more detailed conceptualizations of self-esteem. Since the classic definitions cited above, many such conceptualizations have been proposed. Most of them decompose self-esteem into two subtypes. For example, researchers have distinguished between state and trait (Heatherton & Polivy, 1991), global and specific (Brown, 1993), implicit and explicit (Epstein & Morling, 1995), individual and group-based (Crocker & Luhtanen, 1990), defensive versus genuine (Schneider & Turkat, 1975), and liking-based versus competence-based self-esteem (Tafarodi, 1998). From these dimensions of the construct, only two are taken up in the following. These are the ones that have received

most attention in research to date. Hence, they seem to be the most important ones for studies designed to validate a self-esteem manipulation, such as the present studies. The two dimensions have already been mentioned above in the discussion of the classic definitions: global versus composite (i.e., aggregated domain specific) self-esteem and state versus trait self-esteem. The following Chapters 2.2 and 2.3 deal with either dimension in detail.

2.2 Global versus composite self-esteem

Because the distinction between global and composite self-esteem is closely tied to measurement issues, this chapter has a methodological focus. Chapter 2.2.1 describes the common ways to measure self-esteem and addresses definitional issues. Chapters 2.2.2 and 2.2.3 provide a discussion of previous theorizing and empirical research on the distinction between global and composite self-esteem.

2.2.1 Operational definitions of global and composite self-esteem

Self-esteem is almost exclusively assessed by self-reports (for exceptions, see, e.g., Coopersmith, 1967; Demo, 1985; Savin-Williams & Jaquish, 1981). Of the available self-report measures of self-esteem, those requiring standardized responses (ratings or *yes/no* answers) are used most often (Blascovich & Tomaka, 1991; Wylie, 1989). These measures can easily be divided into two classes. One class comprises measures that mostly consist of items requiring global judgments of the self. An example is Rosenberg's (1965) 10-item Self-Esteem Scale (also called *Rosenberg scale* hereinafter), which is the previously most often used self-esteem measure (Blascovich & Tomaka, 1991). Sample items of this scale are: „On the whole, I am satisfied with my self”, „I certainly feel useless at times” (reverse coded), „All in all, I am inclined to feel that I am a failure“ (reverse coded). Thus, this measure refers to the self in general rather than to specific facets of the self.

The second class of measures consists of those that mostly refer to self-evaluation in multiple specific domains such as achievement, social relationships, and physical appearance. The most common measures in this class are:

- Coopersmith's (1967) Self-Esteem Inventory (called *Coopersmith scale* hereinafter). Sample items are: „I'm easy to like“, „I'm doing the best work that I can“, and „Things usually don't bother me“.
- Heatherton and Polivy's (1991) State Self-Esteem Scale (SSES). Sample items are: „I feel confident about my abilities“, „I feel satisfied with the way my body looks right now“, and „I am worried about what other people think of me“ (reverse coded)
- Helmreich and Stapp's (1974) Texas Social Behavior Inventory. Sample items are: „Other people look up to me“, „I feel confident of my appearance“, and „I would describe myself as indecisive“ (reverse coded).
- Janis and Field's (1959) Feeling of Inadequacy Scale (called *Janis-Field*

scale hereinafter) and its modifications. Sample items from the Fleming and Courtney (1984) modification are: „Do you often feel uncomfortable meeting new people?“ (reverse coded), „Do you often wish or fantasize that you were better looking?“ (reverse coded), and „Compared with classmates, how often do you feel you must study more than they do to get the same grades?“ (reverse coded).

Although most items of the measures in this class refer to single self-evaluation domains, it is common practice to use the averaged or sum score of the total scale as an indicator of general self-esteem. The usually high internal consistencies of the total scales (Blascovich & Tomaka, 1991; Wylie, 1989) justify this.

In this thesis, the term *global self-esteem* denotes the total score of a measure that is mostly composed of global self-evaluation items whereas the term *composite self-esteem* denotes the total score of a measure that is mostly composed of specific self-evaluation items referring to multiple domains. Thus, both terms indicate different ways to operationalize the construct of self-esteem as defined above. Furthermore, in the following, the term *specific self-evaluation* denotes a self-evaluation pertaining to a single domain (rather than the average across several domains, i.e., composite self-esteem). The respective measures are called *global*, *composite*, and *specific measures*. Where it is necessary to distinguish the construct of self-esteem from its operational form (i.e., global or composite esteem) or from the construct of specific self-evaluations, the term *general self-esteem* is used. When the term *self-esteem* appears without a qualifier in the following, it always denotes general self-esteem. Furthermore, the term *self-evaluation* is used as a general label for the constructs of self-esteem and specific self-evaluations.

Typically, researchers do not provide a rationale for preferring a global measure over a composite one or vice versa. Several researchers even seem to assume that the two types of measures are interchangeable. This is suggested by three observations. First, several researchers tried to replicate findings obtained with global measures by using composite ones and vice versa (e.g., Baumeister et al., 1993; Smith, Norrell, & Saint, 1996). Second, several authors of reviews drew conclusions from findings obtained with global or composite measures and did not question the comparability of those findings (e.g., Baumeister, 1993; Brockner, 1984). Third, several researchers used both a global and a composite scale in the same study but did not take into account possible differences between the two scales in interpreting the results. Rather, they averaged the scores of the two scales into a single self-esteem index (Crocker, Voelkl, Testa, & Major, 1991; Greenwald, Bellezza, & Banaji, 1988) or used a global scale as a baseline measure for a composite scale (Crocker et al., 1991).

A few researchers, however, did assume that global and composite measures tap different constructs. The next chapter gives an overview of the relevant theorizing and findings.

2.2.2 Theory-based research on the relation between global and composite self-esteem

To ask how global and composite measures relate to each other is roughly equivalent to asking how the constructs of general self-esteem and specific self-evaluations relate to each other. Research on this topic has focused on two types of models of the relation between these constructs. Models of the prevailing type assume that general self-esteem is a function of specific self-evaluations (e.g., Coopersmith, 1967; Harter, 1986; Marsh, 1986; Pelham & Swann, 1989; Rosenberg, 1965; Shavelson, Hubner, & Stanton, 1976), whereas models of the other type assume the reverse causal relation (e.g., Brown, 1993, 1998). Following Brown (1993), these models are called *bottom-up models* and *top-down models* hereinafter, respectively. In Chapter 2.2.2.1, the most influential bottom-up model (Shavelson et al., 1976) and subsequent research is described first. Next, a special type of bottom-up models is discussed, weighted average models (Chap. 2.2.2.2). These models assume that specific self-evaluations contribute to self-esteem according to their subjective importance, centrality, or the like. Finally, Brown's prominent top-down model is discussed (Chap. 2.2.2.3).

2.2.2.1 The Shavelson et al. model

In an influential article, Shavelson et al. (1976) proposed a hierarchical structure of the self-concept¹. At the apex of the hierarchy is the general self-concept. At the next subordinate level are the academic, social, physical, and emotional self-concepts. At the next lower level are subareas of each self-concept (e.g., English, Math, and History as subareas of the academic self-concept). The lowest level in the hierarchy consists of self-evaluations in specific situations. Shavelson et al. assumed that the general self-concept is stable. However, they noted that the general self-concept can change if many changes in specific self-concepts occur. Thus, their model assumes a bottom-up process.

A particularly noteworthy feature of the Shavelson et al. model is that it distinguishes between general and emotional self-concept. Although Shavelson et al. did not define the meaning of the latter term, it seems to denote what typical global self-esteem scales such as the Rosenberg scale are designed to measure (see also Fleming & Courtney, 1984). Hence, the emotional self-concept

¹ In its proper meaning, the term *self-concept* denotes a person's descriptive self-knowledge. Not all of this self-knowledge is evaluative. Thus, self-evaluation is a less inclusive construct than self-concept (Fleming & Courtney, 1984). However, Shavelson et al. explicitly did not distinguish between evaluative and non-evaluative aspects of the self-concept, arguing that „as far as we know, the distinction between self-description and self-evaluation has not been clarified either conceptually or empirically” (p. 414). Thus, the tenets of their models seem to refer to the evaluative as well as the non-evaluative aspects of the self-concept. Accordingly, their model has been influential in self-esteem research (e.g., Fleming & Courtney, 1984).

seems to be equivalent to global self-esteem as defined above. It follows that contrary to other hierarchical models (see Chap. 2.2.2.2), the Shavelson et al. model does not assign a superordinate position to global self-esteem but views it as being at the same level as domain specific self-concepts (which include self-evaluations as defined above). This means that the general self-concept in Shavelson et al.'s model is an aggregate of both global and composite self-esteem (alongside non-evaluative self-knowledge). In operational terms, the general self-concept can be defined as a single higher-order factor that emerges if scores of (at least) global and specific self-evaluation items are entered into hierarchical factor analyses (Marsh & Yeung, 1998).

Among the first researchers who provided empirical support for the Shavelson et al. model were Fleming and Courtney (1984; for an earlier test of the model, see Fleming & Watts, 1980). They had college students complete a modified version of the Janis–Field scale. A factor analysis of participants' answers on the items yielded five interrelated factors. Fleming and Courtney labeled them School Abilities, Social Confidence, Physical Appearance, Physical Abilities, and Self-Regard. These factors matched the self-concept domains at the intermediate level in Shavelson et al.'s hierarchical model (academic, social, physical, and emotional self-concept). The items loading on the Self-Regard factor resembled the items of the Rosenberg scale and therefore assessed global self-esteem according to the present terminology. Providing further support for the Shavelson et al. model, all five factors loaded on a single second-order factor. Of particular importance in the present context, the Self-Regard subscale correlated at $r = .65$ with the aggregated score of all other subscales. This suggests that self-esteem measured with a global scale (i.e., global self-esteem) is distinct from, but related to, self-esteem operationalized as an aggregate of specific self-evaluations (i.e., composite self-esteem).

2.2.2.2 Weighted-average models

Shavelson et al. did not make assumptions as to how specific self-evaluations combine into general self-esteem. Weighted-average models are more precise in this respect. These models assume that general self-esteem is the weighted average of specific self-evaluations (e.g., Hoge & McCarthy, 1984; Marsh, 1986, 1993; Pelham & Swann, 1989; Rosenberg, 1965, 1979). Depending on the respective model, the weights reflect the personal importance, centrality, and/or importance of each self-evaluation domain. What is common to all weighted-average models is the idea that an intraindividually fixed weighting scheme is applied in deriving general self-esteem from specific self-evaluations. This idea traces back to James (1890), who noted that only experiences in domains that are personally important are relevant to self-esteem (see Chap. 2.1).

Typically, researchers who tested weighted-average models measured general self-esteem with the Rosenberg scale or similar global scales (e.g., Hoge & McCarthy, 1982; Marsh, 1986, 1993; Pelham & Swann, 1989). Thus, these researchers considered global and general self-esteem equivalent. Remember,

however, that Fleming and Courtney (1984) used a global scale to measure emotional self-esteem, which is at the same level as specific self-evaluations in the Shavelson et al. model. Thus, in their operational form, the common weighted-average models differ from the Shavelson et al. model as well as from Fleming and Courtney's research on this model in that they view emotional or global self-esteem as superordinate to specific self-evaluations. This is also true for some weighted average models that were explicitly based on the Shavelson et al. model (e.g., Marsh, 1986). However, a common feature of both the original Shavelson et al. model and weighted-average models is that they assume a bottom-up process in the sense that specific evaluations combine into more general ones.

Most tests of weighted-average models were conducted in the 1980s and early 1990s (see Marsh & Hattie, 1996). In a pioneering study, Hoge and McCarthy (1984) found a correlation of .45 between global self-esteem (assessed with the Rosenberg scale and global items taken from the Coopersmith scale) on the one hand and the average across nine specific self-evaluations on the other. Surprisingly, and inconsistent with James' (1890) reasoning, the correlations were not substantially higher when the subscale scores were weighted with the individual importance of the respective self-esteem domain. Marsh (1986) and Pelham and Swann (1989) replicated these findings. In particular, Pelham and Swann obtained correlations of .50 and .46 between scores of the Rosenberg scale on the one hand and non-weighted and individual-importance weighted specific self-evaluations (measured with the authors' Self-Attributes Questionnaire) on the other, respectively. Marsh found correlations between a global self-esteem scale similar to the Rosenberg scale on the one-hand and the non-weighted and individual-importance weighted means of specific self-evaluations on the other of .67 and .51, respectively (on scales from the Self-Descriptive Questionnaire III; Marsh, Smith, & Barnes, 1983).

Marsh and Hattie (1996) concluded from their review of these and other studies on weighted-average models of self-esteem:

There is little support for differentially weighting specific domains for each respondent according to individual ratings of importance in any of the research considered in this chapter. The effect of any specific domain on global measures does not vary much for respondents who rated the domain as more or less important. (p. 81)

Thus, the plausible idea that self-esteem is more strongly influenced by self-evaluations that refer to personally important rather than unimportant domains did not receive empirical support. At the practical level, these findings provide a justification for computing non-weighted averages or sum scores as the common way to derive total scores from composite measures. However, from a theoretical perspective, the mentioned findings are disappointing. If importance had moderated the relations between specific self-evaluations and global self-esteem, this would have lend some support to the assumption that specific self-evaluations determine global self-esteem (or to the reverse assump-

tion; cf. the study by Brown, Dutton, & Cook, 2001, which is described in the next chapter). The mentioned findings, however, are mute to the question of whether there is any causal relation between specific self-evaluations and self-esteem.

This ambiguity may have encouraged Jonathon Brown (1993, 1998) to criticize bottom-up models of self-esteem as being both implausible and empirically untenable. The next chapter discusses his arguments.

2.2.2.3 Brown's top-down model

Brown (1993; 1998, pp. 196-225; Brown & Marshall, 2001, 2002) has repeatedly argued that global self-esteem determines specific self-evaluations rather than vice versa. This model is rooted on a criticism of cognitive-hierarchical models, as the following quotations illustrate:

Cognitive models assume that the defining feature of self-esteem is self-criticism. Many low self-esteem people do not fit this pattern ... The problem is not a lack of positive self-evaluations; rather it is an almost unexplicable feeling that one is a bad person. (Brown, 1998, p. 226)

Brown (1998) characterized this feeling as holistic and irrational:

The cognitions that underlie self-esteem occur at a preconscious level ... [and] are undifferentiated and diffuse; they are vague notions about one's general worth as a person ..., not ideas about particular competencies and attributes. ... Ultimately, self-esteem is... based not on a dispassionate consideration of *what* one is but on feelings of affection for *who* one is. (pp. 226-227)

Thus, Brown assumed that general self-esteem is more affective and more stable than specific self-evaluations. In Brown's (1998) view, the reason is that general self-esteem has its origin in childhood experiences of belonging and mastery (for similar assumptions, see Bowlby, 1973; Epstein, 1980; Erikson, 1963). Once shaped by these experiences, general self-esteem should color specific self-evaluations made later in life. In Brown's view, the reverse influence is unlikely to occur: „Self-esteem is not normally predicated on the belief that one possesses any particular quality or attribute“ (Brown, 1993, p. 32). Although Brown acknowledges that persons with high self-esteem „do believe they are good at many things and have many positive attributes“, he views “these beliefs as ordinarily [sic!] consequences of HSE, not antecedents“ (Brown, 1993, p. 50).

At the operational level, Brown seems to consider general self-esteem as equivalent to global self-esteem as defined above (e.g., Brown & Dutton, 1995; Brown et al., 2001). Thus, his model makes the following predictions regarding the relation between global self-esteem and specific self-evaluations:

- (a) Global self-esteem is more stable than specific self-evaluations.
- (b) Global self-esteem is a better predictor of specific self-evaluations rather than the other way round.
- (c) Global self-esteem correlates more strongly with measures of affect than do specific self-evaluations.

Whereas results bearing on prediction (c) are presented in the next chapter,

results relevant to predictions (a) and (b) are reported in turn. In accordance with prediction (a), several studies do suggest that self-esteem or rearing practices in childhood determine self-esteem in adolescence and adulthood (for retrospective studies, see, e.g., Coopersmith, 1967; Gecas & Schwalbe, 1986; for a prospective study, see Keltikangas-Järvinen, Kivimäki, & Keskivaara, 2003). However, at least in the short run, global self-esteem does not seem to be more stable than specific self-evaluations: In several longitudinal studies, Marsh and colleagues found that specific self-evaluations were at least as stable as global self-esteem (see Marsh & Yeung, 1998). This finding contradicts prediction (a).

Also evidence bearing on prediction (b) is mixed. To begin with, Brown and colleagues did report evidence for the postulated top-down processes. For example, Brown and Dutton (1995) found that the correlation between global self-esteem and emotions after false feedback was partly mediated by self-evaluation on the feedback dimension. Furthermore, Brown et al. (2001) manipulated the importance and self-descriptiveness of a fictitious trait (Exp. 1 and 2, respectively) the desirability of traits with initially ambiguous desirability (Exp. 3). Before the respective manipulation, global self-esteem was measured (with the Rosenberg scale). As predicted, participants with high global self-esteem (a) rated important traits higher in self-descriptiveness than unimportant ones (Exp. 1), (b) rated self-descriptive traits higher in importance than non-descriptive ones (Exp. 2), and (c) rated desirable traits higher in self-descriptiveness than undesirable ones (Exp. 3). The findings for participants with low global self-esteem were statistically nonsignificant in each experiment. Together, Brown et al.'s (2001) experiments suggest that people with high global self-esteem do modulate their specific self-evaluations in order to maintain high global self-esteem. Thus, in these studies, domain specific self-evaluations did seem to be a function of global self-esteem.

A similar conclusion follows from research by Kunda and Sanitioso (1989; also Sanitioso, Kunda, & Fong, 1990). They varied the degree to which either of two antagonistic personality attributes (introversion vs. extraversion) was associated with success. They found that participants considered the attribute more strongly associated with success as more self-descriptive than the other attribute. Thus, like Brown et al. (2001), these researchers showed that changes of specific self-views can serve the goal to maintain a positive general self-image (here: the notion of being a successful person). Although the self-description dimensions at which Kunda and Sanitioso looked were not necessarily evaluative in nature, these researchers' reasoning is applicable to evaluative dimensions as well. Therefore, their reasoning and results are in accordance with Brown's top-down model.

Other studies, however, either found no evidence of such top-down processes or suggested that bottom-up processes are more frequent or stronger than Brown's model implies. For one, Marsh and Yeung (1998) conducted a longitudinal study that was designed to determine the relative strength of top-down and bottom-up processes in the domain of physical and achievement-related self-

evaluations. Evidence for both top-down and bottom-up processes was weak. Rather, results were most supportive of a so-called horizontal-effects model, which holds that general and specific self-evaluations are independent of each other. Although it remains to be seen whether these findings replicate for other self-concept domains, the findings do cast doubts on the generality of Brown's top-down model. Even more damaging for Brown's model are experiments that demonstrated that manipulations directed at specific facets of the self-concept (e.g., performance feedback, retrieval of positive versus negative self-knowledge from a specific content domain) can change global self-esteem (e.g., Koper, Van Knippenberg, Bouhuijs, Vermunt, & Wilke, 1993; Levine, Wyer, & Schwarz, 1994; Nurius & Markus, 1990; see Marsh & Yeung, 1998, for a similar criticism). These studies suggest that the impact of specific self-evaluations on global self-esteem is stronger than Brown seems to assume.

In total, the aforementioned findings bearing on Brown's top-down model are inconsistent, especially those relevant to the core prediction that global self-esteem influences specific self-evaluations rather than the other way round. Whereas Brown and his colleagues reported some evidence for this prediction (Brown et al., 2001), other researchers reported evidence for the reverse influence (see Chap. 3 and 4) or evidence that both variables are independent from each other (Marsh & Yeung, 1998). The study by Marsh and Yeung differs from the other relevant studies in that it looked at general and specific self-evaluations only within particular domains (the physical and academic domain) rather than at general self-esteem and specific self-evaluations as defined above. Hence, the Marsh and Yeung study is only tentatively relevant to the present discussion. Because the remaining studies provide some evidence for both bottom-up and top-down processes, it may well be that bottom-up and top-down processes occur simultaneously in self-evaluation (for this view, see also Hoyle, Kernis, Leary, & Baldwin, 1999).

2.2.3 Additional research and conclusion

Whereas the previously mentioned studies on the relation between composite and global measures were explicitly designed to test bottom-up or top-down models of self-evaluation, other studies included such correlations for the purpose of convergent validation of self-esteem measures or as incidental findings. Nevertheless, also this research is relevant in this context. Therefore, I conducted an extensive search for studies in which correlations between global and composite self-esteem were reported. The search identified 26 published correlations between global and (non-weighted) composite self-esteem, including the correlations already cited (see Chap. 9.1.1, Tab. A1 for the search strategy and the results). The correlations range from .25 to .82. The average correlation corrected for sampling error and unreliability (according to the formulas by Hunter & Schmidt, 1990; without correlations involving weighted scores of composite measures) was .67, which corresponds to 45% explained variance.

This meta-analysis suggests that composite and global self-esteem are

clearly distinct from each other. What, then, are the unique features of each type of self-esteem? A way to find out this is to compare their correlates. Only few researchers have done so. Specifically, Dutton and Brown (1997, Exp. 2) had participants complete a global measure (the Rosenberg scale) and a composite measure (a rating scale including ten traits assumed to be important for student's self-definition). Next, participants received false feedback and indicated their emotional reactions to the feedback. Both global and composite self-esteem predicted these reactions. However, global self-esteem predicted the reactions even when composite self-esteem was partialled out whereas composite self-esteem was not a statistically significant predictor any more when global self-esteem was partialled out. This suggests that global versus composite self-esteem overlaps more strongly with affective processes. This finding is in line with two other studies, which showed that global versus composite self-esteem is more strongly related to measures of affect (depression, anxiety, and life satisfaction; Fleming & Courtney, 1984; Fleming & Watts, 1980). Thus, it seems that global self-esteem is better suited to predict affective reactions than is composite self-esteem.

It should be noted that numerous other studies revealed a considerable overlap (usually, r between .5 and .8) between the scores of global self-esteem measures (typically, the Rosenberg scale) on the one hand and measures of affect on the other (depression, neuroticism, affectivity; e.g., Diener & Diener, 1995; Heatherton & Polivy, 1991; Judge, Erez, & Bono, 2002; Nezlek, Kowalski, Leary, Blewins, & Holgare, 1997; Rosenberg, 1965; Rosenberg & Owens, 2001; Watson et al., 2002). However, these studies did not compare global and composite self-esteem. Thus, on the one hand, they do attest to the affective nature of global self-esteem, thereby supporting the aforementioned prediction (c) of Brown's (1993, 1998) model. On the other hand, they do not demonstrate that this is a unique property of global as opposed to composite self-esteem.

To conclude, the research reviewed in this and the preceding chapter suggests that self-esteem operationalized as an aggregate of specific self-evaluations (i.e., composite self-esteem) is not the same as self-esteem operationalized as a global self-evaluation (i.e., global self-esteem). A meta-analysis indicated that these two operational forms of self-esteem typically share less than half of their variance. Thus, there is good reason to assume that global self-esteem is distinct from composite self-esteem at the phenomenological level. The nature of this difference, however, is poorly understood. Brown's (1998) argument that global self-esteem is more affective in nature than composite self-esteem seems intuitively plausible and has received some support. However, more research is needed before this argument can be considered as empirically well grounded. Brown's additional argument that global self-esteem is more change resistant than composite self-esteem is more controversial. On both empirical and theoretical grounds, Marsh and Yeung (1998) argue that the reverse is more likely, namely that global self-esteem is more malleable than specific self-evaluations (and hence than composite self-esteem).

Although this ambiguity is unsatisfying from a theoretical perspective, it has important methodological implications. The available data suggest that global and composite self-esteem measures are not interchangeable operationalizations of the same construct. Hence, in particular, researchers should be cautious with generalizing results obtained only with global or composite measures to general self-esteem. Only if the same effects are observed on both types of measures, it seems appropriate to conclude that general self-esteem is involved in the effects. Effects that are observed only on one type of measure but not on the other, however, may involve only a more specific construct than general self-esteem. Thus, hypotheses referring to general self-esteem should be tested by using both global and composite measures.

2.3 Trait versus state self-esteem

Like any psychological construct, self-esteem can be conceived of as either a momentary state or a stable personality characteristic (i.e., a trait). Already James (1890) made this distinction with respect to self-esteem. On the one hand, he stressed the state quality of self-esteem in both his successes/prestensions formula (see Chap. 2.1) and another passage, in which he noted that self-esteem may fluctuate even „with no adequate exiting cause. And in fact we ourselves know how the barometer of our self-esteem and confidence rises from day to another through causes that seem to be visceral and organic rather than rational“ (p. 307). On the other hand, he emphasized the trait quality of self-esteem when he wrote of an „average tone of self-feeling“ that people maintain across situations (p. 306; see Chap. 2.1).

Both views have received considerable empirical support. Evidence for the trait quality of self-esteem comes from studies on the retest reliability of measures of this construct. Over several weeks, the retest reliabilities of the common self-esteem measures are usually above .80 (see Blascovich & Tomaka, 1991; Wylie, 1989). Even over longer time intervals, retest reliabilities often were remarkably high. For example, Byrne (1983), McCarthy and Hoge (1984), and Robins, Hendin, and Trzesniewski (2001) reported retest reliabilities between .50 and .69 over several months for the Rosenberg scale. O'Malley and Bachman (1983) reported annual retest reliabilities between .70 and .92 for the same scale. Coopersmith (1967) reported a retest reliability of .70 over three years for his own scale. In a recent meta-analysis ($k = 168$), Trzesniewski et al. (2003) reported a mean disattenuated retest reliability of .64 over a mean time interval of 2.9 years (for ages 6 to 82) and across a variety of measures (comprising both global and composite ones).

There are several plausible explanations for this relatively high stability of self-esteem. First, self-esteem may be shaped by childhood experiences, above all by the relationship to the parents. As already mentioned, prominent theorists such as Bowlby (1973) and Epstein (1980) suggested this, and empirical support is available from both retrospective and prospective research (e.g., Coopersmith,

1967; Gecas & Schwalbe, 1986; Keltikangas-Järvinen et al., 2003).

A second reason for the stability of self-esteem may be that most people live in environments that are stable over a long period of time. As a consequence, even if self-esteem were largely context dependent, it would remain the same because the context remains the same (Markus & Kunda, 1986).

Finally, the stability of self-esteem evident from the results cited above may reflect properties of the measures used. Because high retest reliability is generally desirable for measures of personality characteristics, most self-esteem scales may have been designed such that they tapped mainly invariant components of self-esteem (Heatherton & Polivy, 1991). Thus, even if self-esteem were unstable for the most part, most self-esteem measures would fail to indicate this because they would selectively tap the stable aspects of self-esteem.

In line with the latter argument, many researchers found that self-esteem can fluctuate considerably over a short period of time (i.e., days or weeks). This research attested to the state quality of self-esteem. In particular, two bodies of research are relevant here. First, short-term self-esteem fluctuations were observed in correlational field studies (e.g., Crocker & Wolfe, 2001; Greenier et al., 1999; Heatherton & Polivy, 1991; Kernis & Waschull, 1995; Nezlek & Pleško, 2001; O'Brien & Epstein, 1974; Savin-Williams & Demo, 1983; Wells, 1988). These fluctuations were observed on both global and composite measures (e.g., Kernis & Waschull, 1995, and Heatherton & Polivy, 1991, respectively). It is important that in some of these studies, meaningful correlations between specific daily events (such as announcement of, or failure at, a test; interaction with certain persons) and subsequent changes in self-esteem emerged (e.g., Crocker & Wolfe, 2001; Greenier et al., 1998; Heatherton & Polivy, 1991; Wells, 1988; but see Savin-Williams & Demo, 1983, who found no relation between momentary self-esteem and the immediate context). These findings suggest that the observed self-esteem fluctuations at least partly reflect influences of the immediate context and hence cannot be totally reduced to measurement error. Second, self-esteem has been manipulated in numerous experiments. For example, self-esteem has been shown to respond to social comparisons, bogus feedback, and mood manipulations. Because this research is of utmost importance for present thesis, it is discussed more in detail below (Chap. 3).

In light of these results, several researchers distinguished between stable and unstable aspects of self-esteem (e.g., Heatherton & Polivy, 1991; Kernis & Waschull, 1995; Rosenberg, 1986; Savin-Williams & Demo, 1983; Trzesniewski et al., 2003; Wells, 1988). For example, Savin-Williams and Demo (1983) suggested „viewing self-feelings having a baseline level from which contextual variations emerge“ (p. 830). This plausible view is endorsed also in this thesis.

Note that this view refers to state and trait (i.e., unstable and stable) self-esteem from an observer's perspective. These constructs are called *objective state* and *trait self-esteem* hereinafter, respectively. An important question is whether persons make an analogous distinction at the subjective level. Results by Kernis and Johnson (1990) suggest an affirmative answer. They found that a

feedback manipulation affected participants' subjectively current self-evaluations more strongly than subjectively typical self-evaluations. This suggests that persons can distinguish between their momentary (i.e., state) and their typical or average (i.e., trait) self-esteem. These constructs are hereinafter referred to as *subjective state* and *trait self-esteem*, respectively.

What persons perceive to be their trait self-esteem (i.e., subjective trait self-esteem) is not necessarily identical to trait self-esteem from an observer's perspective (i.e., objective trait self-esteem). Rather, like subjective state self-esteem, subjective trait self-esteem may reflect situational influences and hence may fluctuate from an observer's perspective. Lending support to this notion, several experiments demonstrated that judgments of subjective trait self-esteem can be manipulated (e.g., on the Rosenberg scale: Greenberg & Pyszczynski, 1985; Levine et al., 1994; on the Coopersmith scale: Morse & Gergen, 1970).

What, then, determines whether persons consider their own current self-esteem either as reflective of a trait or as a temporary state? It is proposed here that this depends on whether persons are or are not aware of an event that may have temporarily changed their current self-esteem (e.g., recent feedback). If persons are aware of such an event, they may consider their current self-esteem as different from their typical (i.e., subjective trait) self-esteem. In this case, judgments of subjective trait and state self-esteem may differ (cf. Kernis & Johnson, 1990). However, if persons are not aware of such an influence, they may consider their current self-esteem as typical. In this case, persons' judgments of their subjective trait and state self-esteem should not differ.

This reasoning has an important implication for attempts to manipulate self-esteem as an independent variable. A manipulation that is directed at self-esteem in a blatant manner (i.e., such that participants notice the self-relevance of the event; e.g., in the case of feedback) may influence only subjective state self-esteem. However, a manipulation that is directed at self-esteem in an unobtrusive manner (i.e., such that participants do not notice the self-relevance of the event) may influence both subjective state and subjective trait self-esteem. Thus, when the research goal requires a manipulation of subjective trait self-esteem, an unobtrusive manipulation is preferable. Obviously, the ideal way to manipulate self-esteem unobtrusively is to present stimuli below participants' threshold of conscious perception (i.e., to present the stimuli subliminally). Examples of previous studies that used such self-esteem manipulations are described in Chapter 4.2. Consequently, also the method proposed in this thesis, the MSSM, was designed to influence self-esteem subliminally (Chap. 5).

The remainder of this thesis deals with self-esteem in a particular situation at a particular time (namely after an experimental manipulation) rather than across situations or times of measurement. Thus, objective state rather than objective trait self-esteem is of interest (cf. Cattell, 1950). The next chapter deals with determinants of objective state self-esteem. Specifically, the chapter discusses three basic mechanisms that can underlie changes in this construct. The conclusions from this discussion constitute a part of the rationale for the MSSM.

3 Causes of changes in state self-esteem

This chapter provides an overview of processes that can underlie changes in objective state self-esteem. Experimental research has revealed a large number of events that can cause such changes, for example,

- bogus feedback referring to personal relevant domains such as intellectual achievement (Heatherton & Polivy, 1991; Ybarra, 1999) or social acceptance (Leary, Haupt, Strausser, & Chokel, 1998; Leary, Tambor, Terdal, & Downs, 1995) or to one's personality as a whole (Greenberg et al., 1992)
- mood induction with either self-related imagery (Brown & Mankowski, 1993; Wright & Mischel, 1982), recall of positive versus negative memories (Levine et al., 1994), or music (Brown & Mankowski, 1993)
- self-related imagery (not intended to be a mood induction) (Leary et al., 1998; Nurius & Markus, 1990)
- selective retrieval of positive versus negative memories (not intended to be a mood induction) (Vallacher, Nowak, Froelich, & Rockloff, 2002)
- listing of positive versus negative self-attributes (McGuire & McGuire, 1996)
- subliminal exposure to stimuli referring to significant social relationships (Baldwin, 1994; Baldwin, Carrell, & Lopez, 1990; Sommer & Baumeister, 2002; Schurtman, Palmatier, & Martin, 1982)
- instruction to prepare or carry out a positive or negative self-presentation (Andersen & Williams, 1988; Jones et al., 1981; Rhodewalt & Agustsdottir, 1986; Schlenker, Dlugolecki, & Doherty, 1994)
- social comparison (Brewer & Weber, 1994; Brown et al., 1992; Morse & Gergen, 1970)
- social discrimination (Fein & Spencer, 1997; Lemyre & Smith, 1985)
- self-stereotyping (Lemyre & Smith, 1985)
- heightened self-awareness (Ickes et al., 1973)

It would be beyond the scope of the present thesis to review this research in detail. Instead, the following discussion focuses on three basic processes that may underlie changes in objective state self-esteem: activation of stored self-knowledge, on-line inferences from new self-knowledge, and affective processes. Although other relevant processes are conceivable (see Chapter 5.2.3 for an example), the three mentioned ones appear the most plausible and/or empirically best supported ones. Each of the following Chapters 3.1 through 3.3 deals with one of the three processes.

3.1 *Self-knowledge activation*

The term *activation* is related to the term *accessibility*. According to Higgins (1996), *accessibility* denotes the potential for the use of a particular piece of

knowledge stored in memory. Examples of knowledge use are conscious retrieval of the knowledge or the use of the knowledge as a (conscious or unconscious) basis for judgments. Like all other person characteristics, accessibility has a trait and state aspect. The trait aspect denotes the average accessibility across situations. This aspect is usually referred to in the literature as *chronic accessibility* (Higgins, 1996). The state aspect denotes the accessibility in a specific situation.²

The term *activation* denotes an increase in state accessibility (Higgins, 1996). Thus, in particular, the term *self-knowledge activation* denotes a temporary increase in the accessibility of some stored self-knowledge. Although activation may be spontaneous (i.e., may occur without an observable external cause) the more interesting case for present purposes is activation that is due to external events, especially due to experimental manipulations.

The following chapters review theoretical and empirical research on the effects of self-knowledge activation on self-esteem. In particular, Chapter 3.1.1 presents the general hypothesis tested in that research. Chapters 3.1.2 through 3.1.4 review empirical tests and theoretical refinements of this hypothesis.

3.1.1 The knowledge activation hypothesis

It seems intuitively plausible that activation of positive self-knowledge increases self-esteem whereas activation of negative self-knowledge decreases it. In fact, this idea is one of the most common explanations for short-term fluctuations of self-esteem. This idea is called the *knowledge activation hypothesis* hereinafter.

Some researchers referred to the knowledge activation hypothesis to explain the self-esteem effects of specific events such as self-presentation (e.g., Gergen, 1971; Jones et al., 1981), mood induction (Sedikides, 1995), and social comparison (Mussweiler, 2001a, (b)). Other researchers, however, included the hypothesis in more comprehensive models of the self (e.g., Markus & Kunda, 1986; Hannover, 1997). An example is Hazel Markus' model of the working self. This model was proposed to explain the context dependency of the self-concept (Markus & Wurf, 1986, Markus & Kunda, 1986). According to Markus, the working self consists of the self-knowledge activated in a given situation. The content of the working self

depends on what subset of selves was active just before, on what has been invoked by the individual as a result of an experience, event, or situation, and, very

² In addition, it is possible to distinguish between subjective and objective accessibility (cf. Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991). In this thesis, the term *accessibility* always refers to objective accessibility, that is, to accessibility from the researchers' perspective. Evidently, this is also the most common meaning of accessibility in the social cognition literature (see Higgins, 1996). Analogously, the term *activation* denotes objective activation herein.

importantly, on what has been elicited by the social situation at the given time. (Markus & Kunda, 1986, p. 859)

Although Markus' own research on the working self has focused mainly on its descriptive components (e.g., Markus & Kunda, 1986; Markus & Wurf, 1986), she did suggest that also self-esteem can depend on the currently activated self-knowledge: „Such variations in the content of the working self-concept ... can have powerful consequences for one's mood, for *temporary self-esteem*, and for the immediately consequent thoughts and actions“ (Markus and Kunda, 1986, p. 859, italics added; see also Nurius & Markus, 1990). Hannover (1997) clarified this idea. She assumed „that self-constructs [i.e., self-knowledge] can contain information with different valence, with self-esteem corresponding to the average valence of the self construct“ (p. 146).³

The latter quotation indicates that the knowledge activation hypothesis implies a bottom-up model of self-esteem. Specifically, the hypothesis is built on the assumption that the valence attached to single pieces of activated self-knowledge combines into a single value. The difference from the bottom-up models mentioned in Chapter 2.2 is that the latter ones pertain to objective trait self-esteem (at least implicitly) whereas the knowledge activation hypothesis refers (and the models implying it refer) to objective state self-esteem. This difference in the conceptualization of self-esteem is evident also from the fact that bottom-up models are typically tested by comparing between persons (i.e., by computing correlations between individual difference variables; see Chap. 2.2), whereas the knowledge activation hypothesis is typically tested by comparing between situations (i.e., by computing differences between experimental conditions; see the remainder of this chapter).

The following research overview distinguishes between studies that tested the knowledge activation hypothesis per se (Chap. 3.1.2) and those that tested it in the context of more detailed models. Studies of the latter type looked at knowledge activation as a possible mediator of specific events, above all, of self-presentation and social comparison (Chapters 3.1.3 and 3.1.4, respectively).

3.1.2 Tests of the knowledge activation hypothesis per se

This chapter reviews experimental research that dealt with the self-knowledge hypothesis without couching it in models of specific social events (such as self-presentation). In this research, self-knowledge accessibility was an independent variable (manipulated by instructing participants to retrieve positive and/or negative self-knowledge) and self-esteem was a dependent variable. Three studies of this sort are discussed in turn.

One relevant study was conducted by McGuire and McGuire (1996). Their

³ My translation. Original wording of the quotation: „...daß Selbstkonstrukte unterschiedlich valente Informationen enthalten, wobei das Selbstwertgefühl der mittleren Valenz des Selbstkonstruktes korrespondiert“.

theoretical point of departure was the so-called „persuasion-from-within approach“, which „asserts that the person’s attitude can be changed ... simply by directing the person’s thought to enhance the momentary salience of a biased subset of relevant information ... within the person’s thought system“ (p. 1117). Evidently, this is a generalization of the knowledge activation hypothesis to attitudes in general. In two experiments designed to test this approach in the domain of self-esteem change (Exp. 2 and 3), McGuire and McGuire assigned participants to one of four variants of a thought-generating task: listing desirable characteristics possessed, undesirable characteristics possessed, desirable characteristics not possessed, or undesirable characteristics not possessed. Next, participants indicated their self-esteem on a semantic differential (Exp. 2) and a self-constructed global scale (Exp. 3). The most important finding for present purposes is that in both experiments, self-esteem was higher after listing desirable characteristics possessed than after listing undesirable characteristics possessed. This is consistent with the knowledge activation hypothesis.

However, McGuire and McGuire’s (1996) research is associated with two problems that render the results only suggestive of knowledge activation effects. One problem is that the blatantness of the manipulation may have made it easy for participants to guess its intended effect. Therefore, the observed changes in self-esteem ratings may result from demand characteristics (Orne, 1962). McGuire and McGuire did not report to have probed participants for suspicion or to have obscured the relation between the thought listing task and the measurement of self-esteem (as it has been common, for example, in research on self-presentation effects on self-esteem, see Chap. 3.1.3). Thus, demand effects cannot be ruled out.

The second problem is that McGuire and McGuire did not disentangle the effects of affective and descriptive processes. For example, in addition to activating specific self-knowledge, their method may have influenced participants’ mood, which, in turn, may have directly influenced participants’ self-esteem (see Chapter 4.1.2 for a more thorough discussion of this process). McGuire and McGuire did not measure mood or include control conditions where participants listed positive and negative thoughts unrelated to the self (cf. Ikegami, 2002). Therefore, their data cannot rule out this alternative explanation either. Thus, even if one assumes that their procedure indeed affected participants’ self-esteem, the results do not necessarily provide support for the knowledge activation hypothesis.

Vallacher et al. (2002) conducted another test of the knowledge activation hypothesis. Their participants had to retrieve five positive, five negative, or no memories, depending on the experimental condition. Next, participants described their current thoughts aloud for five minutes at maximum. The descriptions were tape-recorded. After that, each participant listened to the recording of his or her description and indicated on-line (with a computerized graphic measure) how positively he or she had evaluated himself or herself when he or she had reported the respective thoughts. The average ratings were equal in the

positive and control condition and were statistically significantly lower in the negative condition. Moreover, the effect was statistically significant only for the ratings referring to the first third of the tape. Together, Vallacher et al.'s findings suggest that (a) self-knowledge activation can influence self-esteem, (b) the effect is asymmetric (stronger effects for activation of negative self-knowledge), and (c) the effect declines fast (within 1 to 2 minutes). However, like McGuire and McGuire, Vallacher et al. provided only suggestive but not conclusive evidence for the knowledge activation hypothesis. Again, the reasons are that they did not control for the mediating influence of mood and evidently did not probe participants for suspicion. Thus, like in the McGuire and McGuire (1990) studies, mood effects and the influence of demand characteristics cannot be ruled out.

Another test of the self-knowledge hypothesis was conducted by Schoenberger (1988, reported in Jones, 1990). Participants were female students who were interviewed about their experiences at the university. The crucial part of the interview consisted of questions designed to elicit either positive or negative self-knowledge, depending on the experimental condition (e.g., „Thinking about the past 3-4 years, what are some decisions you made that you think were especially good ones / that you would like to change if given the opportunity?“). Before and after these questions, participants completed a self-esteem scale (the Janis-Field scale and the Self-Valuation Triads by Gergen, 1962, respectively).⁴

Although the answers in the interview did indicate retrieval of self-knowledge consistent with the evaluative load of the questions, there was virtually no change in self-esteem in either condition. This outcome contradicts the knowledge activation hypothesis. An additional analysis of Schoenberger's data suggested an explanation (Jones, 1990). Independent judges rated the degree to which participants transformed the questions in answering them. It turned out that participants with high self-esteem had transformed the negative questions into positive ones, whereas participants with low self-esteem had transformed the questions into negative ones. Thus, as Jones noted, the results are in line with Swann's (1987) assertion that persons are motivated to maintain their habitual self-image and that persons may even forgo opportunities to self-enhance to do so.

Altogether, the studies by McGuire and McGuire (1996), Vallacher et al. (2002), and Schoenberger (1988) provide only mixed and suggestive support for the knowledge activation hypothesis. However, before making a final judgment about this hypothesis, one has to take into account several other studies. They are reviewed in the following.

⁴ It is not clear from Jones' (1990) description of this study whether the pretest took place in the same session as the posttest or in an earlier one.

3.1.3 Self-knowledge activation and strategic self-presentation

Several studies have shown that strategic self-presentation can affect self-esteem. In a seminal study, Gergen and Taylor (1966, cit. in Gergen, 1971) had participants spend ten minutes in developing a talk on why they were qualified for a particular position. Some weeks before the talk and immediately after, participants completed a self-esteem questionnaire. A control group completed the same questionnaire without preparing a talk. The talk-preparation group showed a greater increase in self-esteem than the control group. Gergen (1971) offered a knowledge activation explanation for these findings, assuming that „the simple process of scanning the memory for supportive facts proved sufficient to alter self-conception“ (p. 57). However, he did not report an empirical test of this mediator hypothesis.

In the 1980s, several researchers proposed rather complex models of the effects of strategic self-presentation on self-esteem or specific self-evaluations (Andersen & Williams, 1988; Jones et al., 1981; Rhodewalt & Agustsdottir, 1986; Schlenker et al., 1994). These models assumed that knowledge activation is one of several processes that can account for the effects. Most important for present purposes, the authors of these models did test for the mediating influence of knowledge accessibility. Because these are the best-controlled available tests of the knowledge activation hypothesis, they deserve a closer look in the present context.

In the first one of these tests (Jones et al., 1981, Exp. 3), participants were announced an interview and instructed to present themselves in a general positive versus negative light during the interview. In addition, the activation of relevant self-knowledge was manipulated. Participants either had to improvise the self-presentation or were provided with a detailed script for it. Thus, in the former but not in the latter condition, participants had to retrieve relevant self-knowledge in order to present themselves in the required manner. After the interview, in an alleged independent study, participants completed a composite self-esteem measure (Gergen's, 1962, Self-Valuation Triads).

Jones et al. found that in the positive self-presentation condition, participants who had to improvise – and hence were likely to activate self-knowledge consistent with their (positive) self-presentation – reported higher self-esteem than participants who did not have to improvise. In the negative self-presentation condition, however, improvisation had no effect. This pattern of findings suggests that knowledge accessibility can indeed mediate the effect of the self-presentation. However, this process may be limited to self-esteem change in the positive (rather than negative) direction. It is important that Jones et al. probed participants for suspicion and found no awareness of the study purpose. Thus, demand characteristics can be ruled out as an alternative explanation of their findings.

Building on these results, Rhodewalt and Agustsdottir (1986) tested the hypothesis (formulated by Jones et al., 1981, referring to Fazio, Zanna, & Cooper, 1977) that knowledge activation accounted for self-esteem shifts only within a

person's latitude of acceptance. Rhodewalt and Agustsdottir assumed that the latitude of acceptance of evaluative self-relevant information is determined by the general evaluative tone of persons' stored self-knowledge. For persons with generally positive self-views, the latitude of acceptance should be broader for positive versus negative information, whereas the reverse should be true for persons with generally negative self-views. As a consequence, for the former (latter) persons, knowledge activation should mediate upward (downward) shifts in self-esteem.

To test this, Rhodewalt and Agustsdottir repeated the Jones et al. experiment with students for whom depressivity scores were available from a pretest. The findings confirmed the expectations. For participants with relatively low depressivity scores, the findings of Jones et al. (1981) replicated. For participants with relatively high depressivity scores, the reverse pattern emerged: Knowledge activation had an effect after negative, but not after positive, self-presentation. Again, the authors probed participants for suspicion and found no awareness of the study purpose. Thus, a demand-characteristics explanation of the results can be ruled out.

A limitation of the studies by Jones, Rhodewalt, and colleagues is that they manipulated knowledge accessibility only in the context of self-presentation. According to the knowledge activation hypothesis (and the reasoning of Jones, Rhodewalt, and colleagues in particular), knowledge accessibility should have the same effects under private conditions, that is, when participants expected to remain anonymous throughout the experiment. Other studies on self-presentation did test for this possibility. In these studies, the publicness of the knowledge activation task was varied.

One of these studies was conducted by Andersen and Williams (1985). They instructed participants to prepare a positive self-description for later self-presentation. To this end, all participants had to read general descriptions of everyday situations (e.g., being alone or being with friends) and to recall either cognitive/affective reactions, behavioral reactions, or unspecified reactions to those situations. Participants did so either publicly or privately. In the private condition, participants simply had to think about their reactions. In the public condition, participants had to verbalize their reactions and were told that the verbal reports would be tape-recorded and assessed by trained judges. Self-esteem was measured with two composite scales (the Coopersmith scale and Gergen's, 1962, Self-Valuation Triads) in an allegedly independent preceding session and immediately after the knowledge activation task in another allegedly independent study.

Andersen and Williams found a statistically significant Task Type (private vs. public) x Reaction Type (cognitive/affective, behavioral, unspecified) interaction. Reaction type had a statistically significant effect on self-esteem only in the private conditions. In particular, when recall was private, the increase in self-esteem was strongest in the affective/cognitive-reactions condition, weaker in the behavioral-reactions condition, and weakest (i.e., around zero) in the condi-

tion without specific retrieval instructions. By contrast, when recall was public, increase in self-esteem was at an intermediate level and similarly strong for all three reaction-type conditions. Thus, the public versus private nature of recall did matter for the effects of the recalled knowledge on self-esteem.

Although the results for the public condition can be explained without assuming an impact of self-knowledge activation on self-esteem (namely by assuming a direct impact of the self-presentation; cf. the research by Schlenker et al., 1994, described below), the results in the private condition point to a genuine influence of the (type of) activated self-knowledge. Hence, the results in the private condition support the knowledge activation hypothesis. Besides, Andersen and Williams measured mood alongside self-esteem after the manipulation and found that it did not mediate the self-esteem effect. Therefore, these researchers could rule out direct affective influences as an alternative explanation for the self-esteem shifts they observed. In addition, demand characteristics cannot account for the findings because during debriefing no participant reported to have recognized a connection between the alleged two studies.

However, a limitation of Andersen and Williams' study is that all of their participants expected to have to present themselves to others. Thus, their so-called private condition was not truly private. As a consequence, one cannot rule out that a self-presentation goal is necessary for effects of knowledge activation on self-esteem.

Schlenker et al. (1994) addressed this issue in three experiments. Each experiment had a control condition in which participants activated self-knowledge without a self-presentation goal. In Experiment 1, Schlenker et al. orthogonally manipulated self-presentation (positive self-presentation during an interview vs. no self-presentation and no interview at all) and knowledge accessibility (recall of positive knowledge vs. recall of non-positive knowledge vs. undirected recall). The self-presentation manipulation always preceded the knowledge accessibility manipulation. Unlike in the self-presentation studies described so far, the manipulations pertained to the single dimension of sociability rather than to the self as a whole. Next, participants were asked to rate their sociability, self-esteem (on the Rosenberg scale) and mood. Participants were told that the ratings should be made irrespective of the preceding tasks. Schlenker et al. found that self-presentation but not knowledge accessibility affected self-ratings of sociability. This contradicts the knowledge activation hypothesis. Neither independent variable affected global self-esteem or mood.

In Experiment 2, Schlenker et al. used a similar design. The only modification was that there were four conditions in this experiment (experimental groups with a positive self-presentation task followed by one of the following tasks: recall of positive experiences, recall of negative experiences, or an irrelevant task; control group with neither self-presentation task nor recall task). Again, only self-presentation but not recall had an effect on self-ratings of sociability. No effects on mood or global self-esteem were evident. Thus, the findings from Experiment 1 were replicated.

In Experiment 3, Schlenker et al. held knowledge accessibility constant by having all participants answer the same questions about themselves. All participants were instructed to describe themselves positively (specifically, as independent) in answering the questions. The independent variable, which was varied between participants, was the situation in which participants had to answer the questions:

- (a) a face-to-face interview in which the questions were asked orally
- (b) a situation where participants expected an interview and received the questions in written form; they were asked to complete questions as a „warm-up or rehearsal“ for the interview
- (c) a situation identical to (b) with the exception that the interview was canceled before participants received the dependent variables questionnaire.
- (d) a situation where they answered the questions in written form and expected to remain anonymous; no interview was announced to them

Next, participants provided ratings of their independence, global self-esteem, and mood (among other variables). Schlenker et al. did not report the precise cover story so that it is not clear whether participants were lead to make these ratings independently from the preceding tasks. It was found that self-ratings of independence changed only in conditions (a) and (b), which involved (actual or expected) public self-presentation. No change occurred in conditions (c) and (d). Like in Experiments 1 and 2, there were no effects on global self-esteem and mood. Schlenker et al. concluded from the results of their three experiments that commitment (as evoked by performing or expecting a self-presentation task) rather than knowledge activation is crucial for effects of self-presentation on private self-evaluations.

The null effects in the non-self-presentation conditions of Schlenker et al.'s three experiments are particularly striking because (a) these conditions resemble those of McGuire and McGuire's (1996) experiments and (b) McGuire and McGuire as well Schlenker et al. used a global self-esteem scale as dependent measure. How can one reconcile these findings? One cause may be the methodological differences between Schlenker et al.'s and McGuire and McGuire's experiments. In the former experiments, the knowledge activation and self-presentation tasks pertained only to single dimensions of the self (independence or sociability) and not to the self in general like in the latter experiments. It is conceivable that the self-evaluation on this dimension was too specific to generalize to the self as a whole. Although this can explain why Schlenker et al. observed no effect on global self-esteem, it cannot explain why they observed no effects on the specific self-evaluation referring to the self-presentation domain. This null effect does have implications for the knowledge activation hypothesis. That hypothesis implies that when the activated knowledge pertains to a single domain of the self-image, it should affect self-evaluation (at least) in that domain. According to the bottom-up model implied by the knowledge activation hypothesis, such domain specific effects are precondition for a change in global

self-esteem. Therefore, the fact that Schlenker et al. did not find a domain specific effect of knowledge activation contradicts the knowledge activation hypothesis.

Yet, there is another methodological difference between the Schlenker et al. and McGuire and McGuire studies. At least in Experiments 1 and 2, Schlenker et al. instructed participants to ignore the preceding task in providing the self-ratings. This may have signaled to participants that the former task may have biased their self-ratings. As a consequence, participants may have been motivated to correct their self-ratings for the assumed influence of that task. Indeed, several studies have shown that judges engage in mental correction processes when they are aware of potential biases or contaminations in their judgments (Strack & Hannover, 1996; Wegener & Petty, 1995; Wilson & Brekke, 1994). McGuire and McGuire (1996), however, did not mention to have given a similar instruction. This may explain why their participants evidently did use the knowledge activated by the first experimental task in judging their self-esteem whereas Schlenker et al.'s participants evidently did not. As already mentioned, McGuire and McGuire's participants might have done so even deliberately, in an attempt to meet the researchers' expectations.

Under the assumption that this explanation is correct, another question arises: Why didn't participants engage in correction processes in the self-presentation conditions of Schlenker et al.'s experiments? The authors pointed to an answer in that they assumed that when their participants performed or expected a self-presentation, they changed their self-image into the direction of the self-presentation (for similar effects, see Festinger & Carlsmith, 1959; Kiesler, 1971). This argument has interesting implications. After a change of their self-image in the direction of the self-presentation, participants may have viewed any accessible self-knowledge that is consistent with the self-presentation as representative for their typical self-image. Under these circumstances, they may not have considered the recall task as a source of bias in the subsequent self-rating tasks and therefore may have refrained from correction processes. According to this interpretation, for example, participants in conditions (a) and (b) in Schlenker et al.'s Experiment 3 may have based their self-ratings on both their self-presentation and the recalled self-knowledge. However, in conditions (c) and (d) of the same experiment, participants may have corrected for the assumed influences of the preceding tasks [i.e., the recall task in both conditions and the cancelled self-presentation task in condition (c)]. This can explain why self-ratings changed in conditions (a) and (b) but not in conditions (c) and (d). Moreover, the notion of a change in the typical self-image due to a (performed or expected) self-presentation is suited to explain why participants evidently did not correct for the influence of the knowledge-retrieval tasks in the previously described experiments by Jones, Rhodewalt, Andersen, and colleagues. Also in these studies, participants may have been committed to the required self-

presentation.⁵

Altogether, the reviewed studies on the effects of self-presentation on self-esteem provide consistent support for the knowledge activation hypothesis under conditions where participants expect to present themselves to others. That is, self-knowledge that participants activate in order to prepare for a self-presentation task does seem to affect self-esteem. This effect replicated in three experiments, in all of which (Jones et al., 1981, Exp. 3; Rhodewalt & Agustsdottir, 1986; Andersen & Williams, 1988) demand characteristics were empirically ruled out as an alternative explanation and in one of which (Andersen & Williams, 1988) a mediating effect by mood was ruled out. However, these experiments could not answer the question of whether knowledge activation effects occur under conditions where participants expect to remain anonymous. Building on the self-presentation studies by Jones, Rhodewalt, and colleagues, Schlenker et al. (1994) addressed this issue by including an anonymity condition in their experimental design. They found no effects of self-knowledge retrieved in this condition on both specific and global self-evaluations. However, it is conceivable that Schlenker et al.'s coverstory prompted participants in the anonymity condition to correct for possible effects of the retrieved knowledge on their self-judgments.

To conclude, the research reviewed in this and the preceding chapter suggests that the knowledge activation hypothesis holds true only under certain circumstances. For one, when persons are aware of recent events affecting the current accessibility of their self-knowledge (as it was probably the case in all studies reviewed in this and the preceding chapter), a necessary condition for these events to affect self-esteem may be that persons have a justification for using the self-knowledge that was subjectively activated by these events. Either of the following factors may provide such a justification:

(a) demand characteristics, that is, the belief that the experimenter expects

⁵ In light of these arguments, one may wonder why the experimental interview in Schoenberger's (1988) study evidently did not change participants' typical self-image. In answering this question, one should take into account that the type and strength of effects of self-presentation depends on many factors (Festinger & Carlsmith, 1959; Kiesler, 1971), for example, on the degree to which one perceives the self-presentation as voluntary and on the publicness of the self-presentation. In the mentioned experiments by Jones, Rhodewalt, Schlenker, Andersen and colleagues, participants had the explicit choice to perform the self-presentation task or not and/or were lead to believe that their self-presentation would be judged by several others. Thus, role-playing was voluntary and/or public to some extent in these studies. Both choice and publicness might have been lower in Schoenberger's experiment (1988); at least, Jones' (1990) description of this experiment does not contradict this possibility. Therefore, Schoenberger's participants may have felt less committed to the self-presentation, and hence been more prone to defend against its effects, than were the participants in the other studies.

participants to use the blatantly activated self-knowledge. This may have happened, for example, in the McGuire and McGuire studies but not in the Schlenker et al. studies.

- (b) the impression that the activated knowledge is representative for the self. This may have occurred in the self-presentation (or expectation-of-self-presentation) conditions of all experiments described in this chapter. Precondition is commitment to the self-presentation (Schlenker et al., 1994; see Kiesler, 1971, for a detailed discussion of the antecedents of commitment).

These preconditions apply only to the case that persons are aware of recent events influencing their self-knowledge accessibility. If persons are not aware of such events, they may always use their accessible self-knowledge in judging their self-esteem (see also Higgins, 1996). Hence, in particular, subliminal manipulations of self-knowledge activation may be particularly effective in changing self-esteem. As already mentioned, this idea is crucial for the method presented in this thesis (see Chapters 4.2 and 5). Before this method is described, however, let us turn to another event that may affect self-esteem through knowledge activation.

3.1.4 Self-knowledge activation and social comparison

Effects of social comparison on self-esteem have been frequently reported in the social psychological literature. In a classic study, Morse and Gergen (1970) had participants fill out a self-esteem questionnaire first and then wait in the presence of a confederate. The confederate had either socially desirable or socially undesirable attributes (e.g., wearing a business suit vs. a smelly T-shirt). Next, participants completed another self-esteem measure. Participants' self-esteem ratings increased in the undesirable-other condition and decreased in the desirable-other condition. That is, there was a contrast effect.

Several studies have conceptually replicated Morse and Gergen's findings (e.g., Blanton, Crocker, & Miller, 2000; Stapel & Koomen, 2000a; Thornton & Moore, 1993). In other studies, however, the reverse pattern (i.e., assimilation) emerged, that is, participants' self-esteem was more positive after comparison with a superior versus inferior other (e.g., Blanton et al., 2000; Brown, Novick, Lord, & Richards, 1992). Studies with specific self-evaluations as dependent variables yielded similarly mixed results (e.g., Brewer & Weber, 1994; Brown et al., 1992; Pelham & Wachsmuth, 1995; Thornton & Moore, 1993; for recent reviews, see Blanton, 2001; Collins, 1996; Taylor, Wayment, & Carrillo, 1996).

When does social comparison lead to contrast and when does it lead to assimilation? The available research points to a large number of moderators, for example, group membership of self and target (ingroup vs. outgroup; Blanton, 2001; Brewer & Weber, 1994; Mussweiler & Bodenhausen, 2002), self-construal (independent vs. interdependent; Gardner, Gabriel, & Hochschild, 2002), psychological closeness (Tesser, 1988), attainability of the comparison standard (Lockwood & Kunda, 1997), and personal relevance of the comparison

dimension (Tesser, 1988). Several authors tried to integrate these findings by reducing the effects of these moderators to basic mechanisms (Blanton, 2001; Mussweiler, 2001, a, b; Stapel & Koomen, 2000a). Of these integrative attempts, Mussweiler's (2001a, b; Mussweiler & Bodenhausen, 2002) selective accessibility model of social comparison is particularly interesting in the present context because it is built on the knowledge activation hypothesis.

The basic assumption of Mussweiler's model is that both assimilation and contrast result from a multi-stage hypotheses-testing process. In the initial step, persons briefly judge the similarity with the other person (called *standard* in the following). In the next step, persons engage in a knowledge search in order to verify their initial judgment. If the initial judgment points to similarities with the standard, persons search for self-knowledge indicating that they are indeed similar to the standard. However, if the initial judgment points to differences from the standard, persons search for self-knowledge indicating that they are indeed different from the standard. As a result, self-knowledge indicating similarity and dissimilarity, respectively, is rendered accessible. In the final step, a self-judgment is derived from the accessible self-knowledge. Therefore, depending on whether persons have a similarity or a dissimilarity hypothesis in comparing themselves with others, their self-judgments are either assimilated toward or contrasted away from the standard.

Mussweiler (2001a, b; Mussweiler & Bodenhausen, 2002) suggested that several variables that had been found to moderate the effects of social comparison (e.g., group membership, self-esteem, psychological closeness, and perceived similarity) determine the initial hypothesis that guides the search for standard consistent versus standard inconsistent self-knowledge. Thus, the model can explain the effects of those variables in a parsimonious manner.

In several studies, Mussweiler and colleagues tested single aspects of his model, using self-judgments of specific dimensions (e.g., assertiveness) as dependent variables. Specifically, Mussweiler (2001a) showed that priming participants with a dissimilarity versus similarity search task (in an allegedly unrelated study) influenced the effects of subsequent social comparisons in the predicted direction. Mussweiler and Bodenhausen (2001, Study 3) and Mussweiler and Strack (2000, Exp. 1 and 2) found that social comparisons affected the accessibility of standard-consistent and/or standard-inconsistent self-knowledge as predicted by Mussweiler's model. Finally, Mussweiler (2001b, Study 2) found that judgments of overall similarity with the standard did indeed (albeit only partly) mediate the effects of a similarity-search versus dissimilarity-search manipulation on assimilation and contrast.

However, to date, no study has tested for the total chain of events that Mussweiler's model postulates. Thus, it is yet unclear whether knowledge activation can indeed mediate assimilation and contrast after social comparisons. In fact, the mentioned findings by Mussweiler and colleagues regarding self-evaluative judgments can be explained without the assumption of a mediating effect of knowledge activation. Specifically, the findings can be interpreted as

direct consequences of the initial similarity–dissimilarity hypothesis. In this case, another class of processes – on-line judgments – would be a more parsimonious explanation of the findings (cf. Chap. 3.3).

Another limitation of Mussweiler’s described research is that the dependent variables were specific self-evaluations pertaining to a single domain in each study (e.g., assertiveness, adjustment to college life). It still remains to be seen whether the same effects would have emerged if Mussweiler and colleagues had used global measures of self-esteem or the average across several specific self-evaluations as dependent variables.

To conclude, research on social comparison has spawned another model that assumes that current self-evaluation depends on the accessible self-knowledge (Mussweiler, 2001a, (b)). However, that research has not yet provided unequivocal evidence for this relation.

3.1.5 Conclusion

Altogether, evidence for the knowledge activation hypothesis is mixed. The most consistent and compelling evidence comes from three experiments in which participants retrieved self-knowledge in order to prepare a self-presentation (Andersen & Williams, 1988; Jones et al., 1981; Rhodewalt & Agustsdottir, 1986). In all of these experiments, the retrieved self-knowledge had an effect on general self-esteem. Of importance, participants were probed for suspicion in that research. Moreover, Andersen and Williams found that their effects were independent of mood. Hence, it seems that the results of the mentioned three experiments cannot be totally reduced to demand characteristics or affective side-effects of the knowledge accessibility manipulation. A limitation of these experiments is that they used only composite measures of self-esteem as dependent variables. Thus, it is unclear whether the findings can be generalized to global measures.

The experiments in which participants retrieved self-knowledge without an explicit self-presentation instruction yielded inconsistent and partly ambiguous results. On the one hand, Schlenker et al. (1994) and Schoenberger (1988) obtained null findings in four experiments together. On the other hand, McGuire and McGuire (1996) and Vallacher et al. (2002) obtained statistically significant results in three experiments together. However, the statistically significant results can be interpreted alternatively as effects of mood induction or demand characteristics.

An explanation that can reconcile the findings from all tests of the knowledge activation hypothesis described so far is that accessible self-knowledge influences self-esteem only under certain circumstances. In particular, this effect may occur under the following conditions (either of which is sufficient for this effect): persons (a) are unaware of external events influencing their self-knowledge accessibility or (b) are aware of such events but have a justification for using the self-knowledge that they assume to be activated by these events (e.g., if they believe that this knowledge is representative for their selves or if

they use this knowledge due to demand characteristics).

The studies reviewed in this chapter are not the only ones that dealt with self-knowledge activation effects on self-esteem. Several researchers who manipulated self-knowledge accessibility considered their manipulation an affect induction procedure rather than, or in addition to, a knowledge accessibility manipulation (e.g., Esses, 1989; Levine et al., 1996). Accordingly, these researchers were interested in the consequences of affect rather than, or in addition to, the effects of knowledge activation. The next chapter reviews this research insofar as self-esteem was measured as dependent variable. In addition, the chapter deals with experiments that explored the influence of affect on self-esteem using other methods.

3.2 *Affect*

Following Forgas (1992), *affect* is used here as a general label for mood and emotions. Forgas defined *mood* as „low-intensity, diffuse and relatively enduring affective states without a salient antecedent cause and therefore little cognitive content (e.g., feeling good or feeling bad)“ (p. 230). Compared with mood, *emotions* „are more intense, short-lived and usually have a definite cause and clear cognitive content“ (p. 230) (e.g., fear, anger, pride).

The hypothesis that self-esteem reflects current affective states appears intuitively plausible. In theory, this influence can be mediated by two mechanisms (Forgas, 1995; Sedikides, 1995). First, affect may activate evaluative self-knowledge. This self-knowledge, in turn, may influence self-esteem. In this case, affect would instigate the processes implied in the knowledge activation hypothesis.

Second, when judging their self-esteem, persons may use their current affective state as a heuristic cue. In this case, persons would infer from their positive (negative) affective state that they have high (low) self-esteem. Such effects of the informational value of affect on judgments have been documented frequently, usually with other judgments than self-evaluations as dependent variables (e.g., life satisfaction or evaluations of unfamiliar others; for a seminal study, see Schwarz & Clore, 1983; for a review, see Clore, Gasper, & Garvin, 2001). The processes whereby the informational value of affect influences judgments are hereinafter referred to as *affect-as-information effects*.

Forgas (1995) proposed a comprehensive model of affective influences on judgmental processes, the affect-infusion model (AIM). It integrates many findings and ideas regarding boundary conditions of such influences (mediated by either knowledge activation or affect-as-information effects). For present purposes, the most important prediction of the AIM is that affective influences are most likely to occur when (a) the target of the judgment is personally important and (b) judges do not have specific goals that guide information processing (e.g., the goal to selectively search self-enhancing information or to correct for potential biases on one's judgments). Under these circumstances, affec-

tive influences on self-esteem (as a special type of judgments) seem possible as well.

Did previous research find such influences? To answer this question, I conducted a comprehensive search for experiments in which affect was manipulated and self-esteem was measured afterwards. The search identified 20 experiments (see Chap. 9.1.2, Tab. A2 for the study search strategy and the description of the experiments). Most (16) of the experiments found at least partial support for the plausible prediction that self-esteem is higher after induction of positive rather than negative affect. This effect was observed on both global and composite scales (e.g., Levine et al., 1996, and Brown & Mankowski, 1993, respectively). In the remaining 4 experiments, the affect manipulation had no statistically significant effects.

Thus, at first glance, the results seem to suggest that affect does influence self-esteem. However, a closer inspection of the methodological features of the retrieved studies suggests that this conclusion is premature. The reason is that some of the methods used to manipulate affect may have manipulated the self-image in addition (for this criticism, see also Cunningham, 1988; Heatherton & Polivy, 1991; Ikegami, 2002). Therefore, the effects of these methods may have been mediated by cognitive rather than affective processes. This criticism holds also for most experiments listed in Table A2. In the following, this is explained for each affect-induction method used in the experiments listed in Table A2.

To begin with, the mentioned criticism obtains for the most common mood induction procedure, the Velten technique. This technique requires participants to read self-referring sentences (e.g., „I am a capable person“, „I feel energetic“, „I am worthless“, and „I feel tired and listless“) and to imagine the events described in them (Velten, 1968). Evidently, this task is likely to mold persons' current self-image (at least their hypothetical self-image) in either a positive or a negative direction. The Velten technique was used in seven of the experiments listed in Table A2 (Brown & Mankowski, 1992, Exp. 1 & 2; Esses, 1989, Exp. 1 & 2; Nasby, 1994, 1996; Turzo & Range, 1991), partly in combination with a self-knowledge retrieval task (Esses, 1989). In light of the self-reference of the stimuli of the Velten technique, it should not be surprising that six of these experiments did reveal effects on self-esteem. It is conceivable that this effect was only due to the effects of the task on persons' current self-image (i.e., the imagery of being an unhappy or lonely person and the like) and not at all due to mood or emotions. Thus, although the Velten technique is undoubtedly effective in inducing particular affective states (as the manipulation checks of the listed studies revealed; see also Kenealy, 1986), its effect on affective states may have been independent of the self-esteem effects reported in the experiments listed in Table A2.

To date, only Rholes, Riskind, and Lane (1987) have reported a study on the role of self-reference in the effects of the Velten technique. Rholes et al. induced positive versus negative affect either with evaluative statements referring to the self (e.g., „I am worthless“) or with nonevaluative statements referring to

somatic states (e.g., „I feel tired and listless“). All statements were taken from, or modeled after, Velten’s (1968) original list of items. Rholes et al. found that both types of statements had equally strong effects on self-reported mood. However, the self-evaluative statements facilitated autobiographical recall more than non-self-evaluative statements did. Furthermore, Rholes et al. found that only the effects of the non-self-evaluative statements on recall but not the effects of the self-evaluative statements were mediated by mood. Provided that autobiographical recall can affect self-esteem (as the knowledge activation hypothesis implies), these findings suggest that the Velten technique can influence self-esteem through a nonaffective route.

A similar criticism can be made against studies that used self-related imagery as affect induction procedure. This procedure consists of instructing participants to recall or imagine a happy or sad (or, more seldom, another type of positive or negative) situation. This technique was used in seven of the experiments listed in Table A2 (Esses, 1989, Exp. 1 & 2; Ikegami, 2002, Exp. 1-3; Levine et al., 1996; Wright & Mischel, 1982), partly in combination with the Velten technique (Esses, 1989). Six of these experiments revealed effects on self-esteem. However, like the Velten technique, self-related imagery may affect self-esteem through persons’ current self-image and not necessarily through mood.

Also Sedikides’ (1994, 1995) procedure, which differs from the two ones described so far, can be criticized in this manner. To manipulate mood, Sedikides had participants imagine a happy versus sad event involving a friend of theirs (winning in a lottery versus dying after an accident). However, the concepts of friend and self are likely to be associated in memory. Therefore, the manipulation may have elicited evaluative self-related thoughts such as the thought of losing a friend or of sharing a joyful experience with a friend. Again, these self-related thoughts rather than mood may have caused the observed effects on self-esteem.

Some researchers did use mood manipulations that did not bear on participants’ self-image. This is true for seven experiments listed in Table A2 (Brown & Mankowski, 1993, Exp. 2; Cunningham, 1988; Ikegami, 2002, Exp. 1-3; Smith & Petty, 1996, Exp. 2 & 3). With the exception of the Brown and Mankowski experiment, these studies did not find statistically significant effects of the non-self-referring manipulation on self-esteem. Even though Brown and Mankowski did report a statistically significant effect, it was weaker than the effects caused by the Velten technique in the same experiment.

Of course, many variables can account for these relatively weak effects of non-self-referring mood manipulations (e.g., properties of the self-esteem measures or samples used). The small number of available studies does not permit a meta-analytic test of these conjectures. Nevertheless, this theoretical analysis suggests that statistically significant effects of affect induction on self-esteem do not necessarily support the hypothesis that self-esteem is a function of affective states.

In this respect, Ikegami's (2002) experiments are particularly noteworthy because they were designed to find out whether self-referring and non-self-referring manipulations of affect have different effects. Affect was manipulated by means of a sentence completion task. The experimental conditions were as follows:

- (a) negative manipulation referring to the self (thinking about one's negative attributes, e.g., „I hate myself because...“, „The failure that I made and still regret is...“)
- (b) negative manipulation referring to others (thinking about negative attributes of other people, e.g., „I hate people foremost who...“, „The person whom I feel contempt for is...“)
- (c) control condition (thinking about oneself in evaluatively ambiguous situations, e.g., „When I describe something to others, I...“, „When I contact someone, I...“).

Ikegami consistently found in three experiments that self-esteem (measured by the SSES) did not statistically significantly differ between conditions (b) and (c) but was lower in condition (a). By contrast, self-reported mood did not statistically significantly differ between conditions (a) and (b) but was more positive in condition (c). The dissociation of mood effects and self-esteem effects in condition (b) suggests that mood induction is not sufficient to affect self-esteem. Ikegami's findings can be interpreted even without assuming an impact of mood on self-esteem. Rather, it may be that the self-esteem reducing effect of his condition (a) was completely due to the negative self-related thoughts rather than the affective states elicited in this condition. Therefore, mood may have been even unnecessary for the observed self-esteem effects. This interpretation is in accordance with the above methodological criticism of studies on the effects of affect on self-esteem.

To summarize, most of the available experimental findings on affective influences on self-esteem are inconclusive. Most statistically significant results are open to the alternative interpretation that they reflect the effects of the manipulation on the current self-image rather than on affect. Researchers who ruled out this alternative interpretation by using a non-self-referring mood manipulation yielded mostly null effects.

All this is not to say that affect cannot exert an influence on self-esteem. Forgas' (1995) affect-infusion model suggests that this may indeed occur under specific circumstances (see Sedikides & Green, 2001, for an application of this model to self-evaluations). The point I wish to make here is that previous experimental research on the impact of affect on self-esteem failed to rule out plausible alternative explanations. This situation is astonishing because the data of all studies cited in Table A2 would have allowed for clarifying statistical analyses. Specifically, all of these studies included self-report measures of affect as manipulation checks. Thus, it would have been possible to conduct mediator analyses with affect conditions as independent variables, self-esteem as the dependent variable, and self-reported affect as the potential mediator (cf. Baron &

Kenny, 1986). To the extent that affect is a mediator, partialing out self-reported affect from the relation between affect conditions and self-esteem should statistically significantly weaken this relation (Baron & Kenny, 1986). None of the studies listed in Table A1 included such an analysis. Therefore, the authors of these studies failed to exhaust their possibilities of demonstrating the causal role of affect in their findings.

Of importance, most studies in which the manipulation of affect and of self-related imagery was confounded revealed a statistically significant effect on self-esteem whereas most studies that used pure manipulations of affect did not. Therefore, the results of the former studies may reflect consequences of self-related imagery rather than of affect. Specifically, the manipulation may have activated positive versus negative self-knowledge. This activated self-knowledge may have caused upward and downward shifts in self-esteem, respectively (consistent with the knowledge activation hypothesis). In light of these arguments, the statistically significant findings listed in Table A2 (except those of Brown & Mankowski, 1993, Study 2) are more suggestive of a causal role of knowledge activation rather than of a causal role of affect in self-esteem shifts.

3.3 *On-line judgments*

The preceding two chapters have presented evidence for the hypothesis that self-esteem is a function of the retrieval of self-knowledge. A related hypothesis is that self-esteem is a function of new self-knowledge (e.g., conveyed in feedback). Hastie and Park (1985) coined the term *on-line judgments* to denote conclusions drawn immediately from new information. Thus, the hypothesis just mentioned can be reformulated as follows: Self-esteem can reflect on-line judgments.

This hypothesis is implied in a well-known theory of the function of self-esteem, Leary's sociometer theory (Leary, Tambor, et al., 1995; Leary & Baumeister, 2000). This theory holds that state self-esteem functions to monitor one's social inclusion versus exclusion. To borrow a comparison from Leary, Tambor, et al. (1995): Like a gasometer has the function to warn the car driver when he or she is in risk of running out of gas, persons' self-esteem has the function to warn them when they are in risk of social exclusion. Leary and colleagues tested their model mainly by providing participants with false feedback about their social acceptance or by having them imagine such feedback (e.g., Leary, Tambor et al., 1995; Leary et al., 1998; Leary, Cottrell, & Phillips, 2001). These studies – as well as several other, theoretically unrelated studies (e.g., Baumgardner et al., 1989; Crocker et al., 1991; Nurius & Markus, 1990) – revealed that accepting feedback increased self-esteem whereas rejecting feedback decreased it (see Chap. 4.1). Obviously, sociometer theory assumes that the underlying process is an on-line judgment: The information included in the feedback is transformed into a judgment of one's social inclusion or exclusion.

Next, this judgment affects self-esteem.

Sociometer theory suggests that on-line judgments may be at least partly responsible for the remarkable effectiveness of the most common type of self-esteem manipulation in experiments – false feedback (see Chap. 4.1, for an overview). The reason is that negative (positive) feedback may often signal social rejection or exclusion (acceptance or inclusion) in some form (Leary & Baumeister, 2000). However, because specific indicators of on-line judgments (see Hertel & Bless, 2000) were usually not measured in false-feedback studies, these studies' results can be explained alternatively, above all, by assuming knowledge activation effects or direct influences of affect. Hence, most false-feedback studies do not provide unequivocal evidence for an effect of on-line judgments on self-esteem.

McConnell, Rydell, and Leibold (2002) provided the currently most convincing evidence for a role of on-line judgments in self-evaluation. In three experiments, participants took part in an analogy task (Exp. 2 and 3) or an alleged extraversion test (Exp. 4). After each trial, participants received feedback about their performance and their extraversion, respectively. Next, participants had to rate their analogy-solving skill and extraversion, respectively. Drawing on several established indicators of on-line-judgments (e.g., recency effects, null-correlation of recall and judgment; see Hastie & Park, 1986; Hertel & Bless, 2000), McConnell et al. found converging evidence that that by default, participants formed an on-line judgment from the sequentially prevented feedback. Additional results showed that this process was inhibited when cognitive load was induced (Exp. 4) or when participants were lead to expect their test performance to be inconsistent (Exp. 3).

A possible limitation of the McConnell et al. experiments is that they refer only to self-evaluations on specific dimensions and not to general self-esteem. However, according to bottom-up models of self-evaluation (Chap. 2.2), specific self-evaluations should influence self-esteem. Thus, McConnell et al.'s (2002) results do suggest that judgments of one's general self-esteem may be influenced by on-line judgments. Moreover, their research suggests an individual difference variable that may moderate this influence (stability of the to-be-judged self-attributes). This finding is taken up again in the General Discussion section (Chap. 7.3).

To summarize, it is conceivable that judgments that are spontaneously formed on the basis of incoming information (i.e., on-line judgments) can lead to changes in self-esteem. To date, McConnell et al. (2002) have provided the strongest evidence for effects of on-line judgments on self-evaluations. However, because this study used specific self-evaluations rather than self-esteem as dependent variables, it still has to be demonstrated whether on-line judgments can influence self-esteem.

3.4 Conclusion

In total, research leaves little doubt that self-esteem can be manipulated in the short run. It has been assumed herein that these effects are mediated by at least one of the following psychological processes: self-knowledge activation, affect induction, and on-line judgments. The preceding chapters focused on studies explicitly designed to explore the role of these processes in self-esteem change. It turned out that some of the reviewed studies may have confounded at least two of the mentioned processes and therefore are not conclusive as to which mechanism drove the observed effects. From the few studies ruling out the possibility of such confounds, those focusing on affect (Brown & Mankowski, 1993; Cunningham, 1988; Ikegami, 2002; Smith & Petty, 1996) yielded statistically nonsignificant findings for the most part, whereas those focusing on knowledge accessibility (Andersen & Williams, 1985; Jones et al., 1981; Rhodewalt & Agustsdottir, 1986; Schlenker et al., 1994) yielded statistically significant findings for the most part. Thus, the role of self-knowledge activation in short-term changes in self-esteem has been demonstrated more compellingly than the role of affect. However, the effects of self-knowledge activation proved robust only under specific circumstances, namely when participants had been induced a self-presentation goal. The only study in which such a goal was not induced – and affective mediation and demand effects were ruled out – yielded no significant effects (Schlenker et al., 1994). Thus, it seems that experimentally induced self-knowledge activation has its strongest impact on self-esteem if participants either (a) are unaware of the external events causing the self-knowledge activation or (b) have a justification for the use of the consciously activated self-knowledge (e.g., because they consider the self-knowledge as representative for their selves or are committed to the goal that the self-knowledge activation serves). Moreover, because no study has unequivocally demonstrated knowledge accessibility effects on global (not composite) self-esteem, it is not clear whether the knowledge activation hypothesis holds true for general self-esteem rather than for a more specific construct assessed uniquely by composite self-esteem scales (cf. Chap. 2.2.3).

As to the third process discussed above, on-line judgments, only indirect evidence is available. In particular, to date, only one study has been published that was explicitly designed to explore the role of on-line judgments in self-evaluation (McConnell et al., 2002). Although this study showed that on-line judgments can indeed affect self-evaluations, this finding is only tentatively relevant to the present research. The reason is that the dependent variable was a specific self-evaluation rather than general self-esteem. Thus, the plausible hypothesis that on-line judgments can affect self-esteem has yet to be tested.

In addition, the preceding chapters suggest that the simultaneous manipulation of self-related imagery and affect is well suited to manipulate self-esteem (Chap. 3.1.2, 3.2). However, as will become clear in the following, manipulating self-esteem via affect induction (alone or in combination with other methods) is

problematic if the research goal is to explore the consequences of self-esteem. To anticipate, affect may cause spurious effects involving self-esteem or overshadow existing effects of self-esteem.

In light of these problems of affect induction, the method proposed in this thesis was designed to minimize effects on affect. Specifically, it was designed to influence self-esteem only via self-knowledge activation. This should occur such that participants do not become aware of the cause of the knowledge activation. As just mentioned, it is still an open question whether self-knowledge activation occurring under these circumstances is sufficient to change self-esteem. Therefore, besides the (pragmatic) goal to demonstrate that the proposed method does affect self-esteem, the present research has the (theoretically significant) goal to demonstrate the mediating role of self-knowledge activation in this effect.

4 Available methods for manipulating self-esteem as an independent variable

Like the preceding chapter, this one reviews previous experimental research on self-esteem change. However, it looks at this research from a different angle. Whereas the preceding chapter had a theoretical focus, this chapter has a methodological focus. Specifically, in the following, the common experimental procedures that have been shown to affect self-esteem in previous research are evaluated with respect to the goal to manipulate self-esteem as an independent variable. Chapter 4.1 provides an extensive discussion of success/failure induction. In Chapter 4.2, alternative methods are discussed, with special emphasis on subliminal manipulations.

4.1 *Success/failure induction as the prevalent method*

Almost all previous researchers who tried to manipulate self-esteem as an independent variable induced success and/or failure experiences for this purpose. The chapter provides an overview of the effectiveness of success/failure induction as a self-esteem manipulation and discusses the problems associated with method.

4.1.1 Principle of the method and overview of findings

The idea that success experiences increase self-esteem whereas failure experiences decrease it has a long tradition (James, 1890; see Chap. 2.1). As already mentioned, this idea has been frequently taken up in empirical studies. Specifically, almost all researchers who tried to manipulate self-esteem as an independent variable used success/failure induction (e.g., Arndt & Greenberg, 1999; Aronson & Mettee, 1968; Deaux, 1972; Golin, Harman, Klatt, Munz, & Wolfgang, 1977; Greenberg et al., 1992; Greenberg, Pyszczynski, Solomon, Pintel, Simon, & Jordan, 1993; McFarlin & Blascovich, 1982; McMillen & Austin, 1971; McMillen et al., 1977; Nisbett & Gordon, 1967; Sigall & Gould, 1977; Walster, 1965, 1970).⁶ Moreover, many researchers used success/failure induc-

⁶ The only exception within my knowledge is a study by Meijboom et al. (1999). They manipulated self-esteem with a combination of knowledge retrieval (specifically, retrieval of a failure experience) and the supraliminal (1500 ms) presentation of negative self-related sentences (e.g., „I'm useless“, „I'm a failure as a person“). The control group received neither treatment. As expected, participants in the experimental group reported significantly lower self-satisfaction after the manipulation than participants in the control group. However, Meijboom et al.'s method has the disadvantages that it (a) is blatant and hence may create demand characteristics and (b) had strong effects on mood and depressive feelings in their study and hence may generally lead to affective confounds. Because of these disadvantages, Meijboom et al.'s method does not seem

(Footnote continued on next page)

tion to manipulate self-esteem as a dependent variable, usually testing hypotheses about moderators of the effects (e.g., Brown & Dutton, 1995; Esses, 1989; Gollob & Dittes, 1965).

How can success/failure induction affect self-esteem? All of the three basic processes addressed in Chapter 3 provide an explanation. That is, for one, a success or failure experience can instigate an on-line judgment. Immediately after the experience, persons may automatically judge themselves in the light of the experience. For example, after a negative feedback on an intelligence test, a person may automatically conclude that he or she has low intelligence or that he or she is a loser in general (for evidence, see Brown, 1998). This may decrease self-esteem. Furthermore, success and failure may cause positive and negative affect, respectively, which may color self-esteem via affect-as-information effects. Finally, success and failure may activate positive and negative self-knowledge, respectively. This should result in corresponding self-esteem shifts according to the knowledge activation hypothesis.

Because success/failure induction can affect self-esteem simultaneously via three routes, one may expect that its effects are rather robust. To test this conjecture, I conducted a comprehensive search for published experiments in which success and/or failure was induced and self-esteem was measured afterwards. This search identified 48 relevant experiments (see Chap. 9.1.3, Tab. A3 for the search strategy and the description of the experiments). These experiments suggest that success/failure induction is indeed an effective means of manipulating self-esteem. In most experiments (39 of 48), success increased, and/or failure reduced, self-esteem least in some of the experimental conditions. In 15 of these experiments, the effect was moderated by another variable (among others, initial self-esteem in 5 experiments; e.g., Baumgardner et al., 1989, Exp. 4; Brown & Dutton, 1995, Study 1 & 2; opportunity to evaluate the feedback; Baumgardner et al., 1989, Exp. 4; Greenberg & Pyszczynski, 1985; prejudice of evaluator; Crocker et al., 1991, Exp. 2; expected feedback valence; Harvey & Clapp, 1965; self-awareness; Ickes et al., 1973, Exp. 3). In 5 of these 15 experiments, the moderator even reversed the effect so that self-esteem was lower after success and/or higher after failure (Baumgardner et al., 1989, Exp. 4; Crocker et al., 1991; Greenberg & Pyszczynski, 1985; Ickes et al., 1973, Exp. 3; Jones, Brenner, & Knight, 1990). Moreover, 9 experiments yielded only effects that were statistically nonsignificant (e.g., Brown & Gallagher, 1991, Study 1; Esses, 1989, Exp. 1 & 2; Nisbett & Gordon, 1967).

The statistical significance versus nonsignificance of the results does not depend on the type of manipulation used. Among the 9 experiments that yielded only nonsignificant results, success/failure was induced with bogus feedback in 6 experiments (Crocker et al., 1991, Exp. 1; Esses, 1989, Exp. 1 and 2; Nisbett

preferable over feedback manipulations. Thus, this method is not discussed further in this thesis.

& Gordon, 1967; McFarlin & Blascovich, 1981; Solway & Fehr, 1969), with a manipulation of task difficulty in 2 experiments (Stotland, Thorley, Thomas, Cohen, & Zander, 1957; Brown & Gallagher, 1991, Study 1) and with imagined feedback in 1 experiment (Baldwin & Sinclair, 1996, Study 2). For the 39 experiments that yielded significant results, the corresponding figures are 25, 5, and 8, respectively; in one experiment, another manipulation was used (Leary, Tambor et al., 1995, Study 3). The proportion of experiments using a feedback manipulation virtually does not differ between experiments with statistically nonsignificant and significant results (67% and 64%, respectively), Fisher's exact $p = 1.00$.

Also the type of self-esteem measure does not seem to matter for the statistical significance of the results. Of the 11 nonsignificant findings that were reported for either a composite or a global measure (rather than for a combination of both types of measures), 4 referred to a global measure (Baldwin & Sinclair, 1996, Study 2; Crocker et al., 1991, Exp. 1; Harvey & Clapp, 1965; Nurius & Markus, 1991, Exp. 2), and 7 referred to a composite measure (e.g., Brown & Gallagher, 1991, Study 1; Esses, 1989, Exp. 1 & 2; Solway & Fehr, 1969). For the 42 significant effects that were reported for either a composite or a global measure, the corresponding figures are 13 (e.g., Greenberg et al. 1992, Exp. 1 & 3; Koper et al., 1993, Exp. 1 & 2; Nurius & Markus, 1990, Exp. 1) and 29 (e.g., Baumgardner et al., 1989, Exp. 3 & 4; Leary, Tambor et al., 1995, Study 1 & 2; Nurius & Markus, 1991, Exp. 1-3), respectively. The proportions of global measures are rather similar for nonsignificant and significant findings (37% and 31%, respectively).⁷

In total, it seems that success/failure manipulations are very effective in producing self-esteem differences. The effect had usually the direction one would expect on intuitive grounds: Success increased self-esteem and/or failure decreased it. Although several studies identified moderators of this effect, most studies found main effects of success/failure induction. Thus, the effects of this method on self-esteem seem to be robust. Nevertheless, for a number of reasons, success/failure induction appears problematic when the goal is to investigate the consequences of self-esteem. The next chapter explains this.

4.1.2 Criticism of the method

This chapter highlights several problems of success/failure induction with respect to the goal to manipulate self-esteem as an independent variable. Whereas some of these problems can be avoided (demand characteristics and domain specificity of the effects), others are inevitable (affective side-effects;

⁷ A test for statistical significance of the difference with Fisher's Exact Probability Test or a chi-square test was not possible because some experiments contributed findings to both self-esteem categories (global and composite). Thus, the data points were not independent, violating an assumption of the mentioned tests.

defensive reactions; effects only on subjective state but not trait self-esteem). The latter problems suggest that success/failure induction are not an appropriate tool for research aimed at exploring the consequences of self-esteem. In the following, the mentioned problems are explained in detail.

Demand characteristics

The problem of demand characteristics (Orne, 1962) results from the common blatantness of success/failure induction. For example, when participants receive explicit feedback, are instructed to imagine success or failure, or have to perform a performance task that turns out to be difficult or easy, it may be easy for them to guess the purpose of the study. Hence, when participants report high (low) self-esteem after success (failure) induction, this might reflect conformity with the assumed purpose of the study rather than true self-esteem change.

One way to reduce the likelihood of such demand effects is to make participants believe that the initial task (actually, the success/failure induction) and the subsequent self-ratings belong to independent studies. Another possibility is to probe participants for suspicion after the experiment and to exclude those that uttered suspicion. Twenty-one of the experiments listed in Table A2 used at least one of these methods. Eighteen of them are among the 39 experiments in which the manipulation had a statistically significant and congruent effect at least under certain circumstances (i.e., self-esteem was higher after success and/or lower after failure then); the remaining 3 are among the 9 experiments that yielded other (specifically, only nonsignificant) results. The proportions of studies controlling for suspicion (46% and 33%, respectively) do not differ statistically significantly between the two subsets of experiments, Fisher's exact $p = .71$. The tendency of the difference is even contrary to what one would have expected for the case that demand effects occurred: The proportion of controlled studies is higher in studies with statistically significant congruent effects than in the other ones. Thus, demand characteristics do not seem to have inflated the number of reviewed studies that revealed congruent effects of feedback. Hence, the present criticism does not challenge the above conclusions regarding the effectiveness of success/failure manipulations.

Domain specificity of the effects

Wells and Marwell (1976) discuss another problem of success/failure induction, the domain specificity of the effects. In particular, they argue that feedback pertaining to a specific dimension (e.g., social perception ability; Cunningham, 1988) affects self-evaluations only on that dimension (for a similar argument, see Wylie, 1968, pp. 772-777). However, this problem may be less severe than Wells and Marwell seem to assume. For one, many studies using domain specific success/failure induction do not support Wells and Marwell's conjecture. Of 37 the experiments in Table A3 in which domain specific success/failure was induced, 28 revealed a statistically significant effect. That is, it seems indeed possible to manipulate general self-esteem with domain specific

success/failure manipulations.

Moreover, a remedy against the domain specificity of feedback may be to give feedback that pertains to one's personality as a whole. Table A3 shows that in all of the 10 experiments in which such global personality feedback was given (e.g., Bramel, 1962; Greenberg et al., 1992, 1993), a self-esteem was observed. Hence, like demand effects, domain specificity of the effects of success/failure induction appears avoidable and only a minor problem for experimental research on the consequences of self-esteem.

Affective side-effects

A more serious problem is that success/failure manipulations are likely to influence not only self-esteem but also affective states. Numerous studies have shown that feedback can elicit emotions such as pride and shame (e.g., Brown & Marshall, 2001; McFarland & Ross, 1982) and can lead to strong mood shifts (e.g., Cunningham, 1988; Forgas & Fiedler, 1996; Heatherton & Polivy, 1991, Study 4; Nurius & Markus, 1990). These affective side-effects can influence the dependent variables of a study independently of self-esteem. This, in turn, can lead to false conclusions about the effects of self-esteem. To illustrate this, imagine the following study:

The research goal is to find out whether low self-esteem causes aggression. Self-esteem is manipulated by means of positive versus negative feedback. It turns out that participants are less aggressive after positive than negative feedback. In theory, this hypothetical finding can reflect the effects of affect as well as self-esteem. If researchers do not take this into account in interpreting the results, they may overestimate the influence of self-esteem on aggression. They may even assume an influence of self-esteem that either (a) does not exist or (b) has the direction opposite to the actual influence. Case (a) would be possible if only affective state influenced aggression whereas self-esteem did not. Case (b) would be possible if the effect of self-esteem on aggression were positive (for a discussion of this possibility, see Baumeister et al., 1996; Kaplan, 2001) but were overruled by the effects of affective state.

This fictitious example shows that in general, affective side-effects of success/failure manipulations can invite false conclusions regarding both the direction and the size of the effects of self-esteem. To be sure, to the extent that confounds of success/failure manipulations can be reliably measured, their influence can be statistically controlled by means of mediator analyses (Baron & Kenny, 1986). However, proper mediator analyses require that the potential mediator variables are assessed between the manipulation and the actual dependent measures. This causes further problems, for example:

- The effect of the manipulation may dissipate while participants complete the measures referring to the potential mediators.
- The measures referring to the potential mediators may draw participants' attention to the subjective effects of the manipulation. This increases the likelihood of corrective or defensive reactions (e.g., Berko-

witz & Troccoli, 1990).

- Especially if the measures referring to the potential mediators provide participants with an opportunity to express their values or attitudes or to present themselves in a positive light, the measurement of the mediators may provide an opportunity for self-affirmation (cf. Steele, 1988). This can eliminate the effects of the success/failure induction (Fein & Spencer, 1997).

Thus, controlling for affective side-effects afterwards is only the second-best solution. It is preferable to try to avoid them.

Defensive reactions

Another problem of success/failure induction is that it can trigger defensive reactions. These reactions are more plausible, and have more often been reported, in the case of success than in the case of failure. Accordingly, research has documented numerous defensive reactions against experimentally induced failure experiences, for example:

- questioning the accuracy of negative feedback (Britt & Crandall, 2000; Freeman, 1973)
- self-serving attributions (Zuckerman, 1979)
- denial (Crary, 1966),
- activation of feedback-inconsistent self-knowledge (Dauenheimer, 2002; Dodgson & Wood, 1998),
- compensatory self-enhancement on non-feedback-dimensions (Britt & Crandall, 2000; Brown & Smart, 1991; Eisenstadt, Leippe, & Rivers, 2002)
- changing one's current level of self-definition (personal vs. collective) after negative feedback (Mussweiler, Gabriel, & Bodenhausen, 2000)
- reducing the subjective importance of the attributes to which negative feedback refers (Eisenstadt et al., 2002),
- viewing negative feedback as pertaining to a specific or nondiagnostic rather than a global or diagnostic domain (Kurman, 2003; Greve & Wentura, 2003).
- derogating the feedback giver (Baumgardner et al., 1989)

Together, this research demonstrates that defensive reactions can refer either to domains unrelated to the failure domain (e.g., Brown & Smart, 1991; Britt & Crandall, 2002; Dodgson & Wood, 1998; Eisenstadt et al., 2002) or to the failure domain itself (e.g., Crary, 1966; Dauenheimer, 2002; Swann et al., 1987). In either case, provided that self-esteem depends on specific self-evaluations, self-esteem may either remain the same (resulting in a null effect of the failure induction) or change in the direction opposite to the valence of the threatening event (resulting in an incongruent or contrast effect).

Whereas this research has focused on defensive reactions against failure rather than against success, Swann (1987, 1990) argued that defensive reactions can be directed against success as well. He assumed that this is due to persons'

pervasive striving for a consistent self-image. Hence, both failure and success experiences should trigger defensive reactions insofar as these experiences challenge persons' habitual self-image. Indeed, several studies have shown that persons defend against (e.g., are unwilling to accept) positive feedback under certain circumstances (e.g., Dauenheimer, Stahlberg, & Petersen, 1999; Swann et al., 1987; Stahlberg, Petersen, & Dauenheimer, 1999).

In light of these findings, one may wonder why success/failure manipulations did have a congruent effect on self-esteem so often (see Chap. 4.1.1.). At least three explanations are possible.

First, because defensive reactions appear more plausible, and have more often been documented, in the case of failure than of success, the frequently observed differences between success and failure conditions may have been driven mainly by the success condition. Four experiments listed in Table A3 meet the preconditions for a test of this proposition in that they (a) included a neutral condition in addition to success and failure conditions and (b) revealed statistically significant effects between at least two conditions (Brown & Gallagher, 1991, Study 2; Eagly & Whitehead, 1972; Nurius & Markus, 1990, Exp. 1 & 3). Neither experiment revealed the predicted asymmetry. In one experiment, even the reverse tendency emerged, that is, only failure but not success had an effect on self-esteem (Nurius & Markus, 1990, Exp. 3). In the other three experiments, self-esteem in the control condition was at an intermediate level as compared with the success and failure conditions. Thus, there is no evidence that defensive reactions weaken the effects of failure on self-esteem more strongly than the effects of success (but see Freeman, 1973, who found such an asymmetry for effects on specific self-evaluations). The available research is more supportive of the proposition that success and failure have similarly strong effects on self-esteem.

A second explanation for the obvious effectiveness of success/failure induction as a self-esteem manipulation is that the mentioned defensive reactions usually are not sufficient to protect general self-esteem. Indeed, most researchers studying defensive reactions measured only the reactions themselves (e.g., information search, evaluation of the accuracy of the feedback, knowledge activation) but did not assess the self-esteem effects of these reactions (for exceptions, see Baumgardner et al., 1989; Britt & Crandall, 2000; Greenberg & Pyszczynski, 1985). Hence, it cannot be ruled out that in most studies that documented defensive reactions, the manipulation did affect participants' self-esteem in a congruent manner. In this case, the defensive reactions may have only weakened but not completely eliminated this effect or may have been independent of the effects on self-esteem. For example, self-serving attribution of a failure (e.g., „It was bad luck“) may serve as a rationalization, which occurs only at the cognitive level, whereas at the same time, the failure experience may cause negative, self-esteem relevant emotions such as disappointment or shame. These emotions may effectively decrease self-esteem. Swann et al. (1987) found evidence for such a dissociation between cognitive and affective reactions. These researchers

gave positive and negative feedback and found noncongruent, arguably defensive, effects reactions at the cognitive level (e.g., on ratings of feedback accuracy) and congruent effects at the affective level.

A third explanation is that defensive reactions do not occur spontaneously but only when participants are given an opportunity to do so (e.g., the opportunity to rate the accuracy of feedback or to indicate their attributions of their success/failure). In other words, it may be that defensive reactions do not occur unless they are assessed (for a related argument, see Swann, 1987). Three experiments listed in Table A3 are relevant to this issue. In these experiments, participants were required to evaluate the success/failure inducing event before indicating their self-esteem (Baumgardner et al., 1989, Exp. 4; Britt & Crandall, 2000; Greenberg & Pyszczynski, 1985). Of interest, under these conditions, self-esteem either changed in a success/failure incongruent manner or did not change at all. This suggests that the assessment of defensive reactions can modulate the effects of success and failure on self-esteem. This provides tentative support for the present argument.

To summarize, research has identified a large number of defensive reactions against success/failure induction. In light of these findings, the robustness of the effects of success/failure induction on self-esteem is striking. Possible explanations for this robustness are that defensive reactions (a) are primarily directed against failure so that the observed effects were driven mainly by the success (rather than failure) condition, (b) are generally not strong enough to eliminate feedback effects on self-esteem, or (c) occur only if they are triggered by specific questions or experimental manipulations (e.g., an opportunity to evaluate the feedback). Explanation (a) contradicts the available evidence and hence appears less plausible than the other two explanations.

Even if defensive reactions do not impair the effects of a manipulation on self-esteem [as suggest by the aforementioned case (b)], they are problematic in that they may be confounded with the self-esteem manipulation. Thus, like the affective side-effects discussed above, they may dilute the actual consequences of self-esteem or suggest spurious effects. For example, recall the fictitious experiment that has the goal to explore the consequences of self-esteem on aggression and uses false feedback to manipulate self-esteem. If it turns out that negative versus positive feedback leads to more aggressive behavior (and even if affect can be ruled out to be the mediator), it would be unclear whether this is a consequence of low self-esteem or of compensatory self-enhancement tendencies triggered by the negative feedback. If one overlooks the latter possibility, the results may lead to an overestimation of the role of self-esteem in aggressive behavior.

Effects restricted to subjective state (rather than trait) self-esteem

A problem related to the issue of defensive reactions – and perhaps the most severe one in the present context – is that success/failure induction may cause self-esteem changes that participants consciously perceive as reactive and

temporary (for a similar criticism, see Brown & Dutton, 1995; Wells & Marwell, 1976, pp. 217-220). That is, after the manipulation, participants may be aware of a threat to or boost of their usual or habitual self-esteem. In this case, success/failure induction would not only change the level but also the subjective quality of self-esteem – namely, from subjectively spontaneous and typical to subjectively boosted or threatened. Thus, in the terminology introduced in Chapter 2.3, the manipulation would pertain only to subjective state self-esteem but not to subjective trait self-esteem. Support for this conjecture comes from Kernis and Johnson (1990), who found that feedback affected participants' subjectively momentary self-evaluations more strongly than their subjectively typical self-evaluations.

It follows that results obtained with success/failure manipulations should be generalized only to situations in which persons are aware of a recent boost of, or threat to, their self-esteem (e.g., after having received a good grade at an exam, having been rejected by a potential dating partner, or having been praised by a job supervisor). However, such results cannot be necessarily generalized to situations in which persons are not aware of recent self-esteem boosts or threats but consider their current self-esteem level as their habitual or typical one. Situations of the latter type may be quite common though. In particular, they may be characteristic for studies in which participants' only task is to complete personality scales – that is, in correlational studies. When participants are asked to fill out self-esteem scales without prior manipulation, most participants may indicate their habitual level of self-esteem. As a consequence, the findings obtained in correlational studies may reflect a qualitatively different type of self-esteem than the findings obtained in success/failure experiments. Thus, success/failure induction may be an inappropriate method for elucidating the causal relations underlying the results of correlational self-esteem studies.

In accordance with this argument, some studies revealed that feedback had effects that contradicted correlational findings involving self-esteem. For example, Lesser and Abelson (1959) found that positive feedback – given in order to raise self-esteem – increased influencability as compared with negative feedback. However, in the same study (like in several others, see McGuire, 1968, pp. 1159-1160), measured self-esteem was negatively related to influencability. Further, several researchers found that measured self-esteem was related to risk aversion (e.g., Rosenberg & Owens, 2001), whereas Baumeister et al. (1993) found that negative feedback increased the occurrence of risky behaviors (among persons with high initial self-esteem).

Of course, many researchers were aware of the described effects of success/failure induction and used this method with the explicit goal to study the effects of subjectively threatened/boosted (rather than subjective trait) self-esteem (e.g., Arndt & Greenberg, 1999; Lesser & Abelson, 1959; Walster, 1965, 1970). Nevertheless, the problem of how to explore the nomological network around nonthreatened/nonboosted (i.e., subjective trait) self-esteem remains. As already mentioned (and explained in detail in the next chapter), a promising way

to solve this problem is to use a manipulation that affects self-esteem unobtrusively.

To summarize the present chapter, the most severe problems of success/failure manipulations are that they may (a) have side-effects such as mood shifts and defensive reactions and (b) cause self-esteem changes that participants perceive as temporary and reactive. These problems render success/failure induction problematic when the goal is to explore the consequences of self-esteem (especially of subjective trait self-esteem). The next chapter addresses the question of whether other available methods for self-esteem manipulation are better suited for this purpose.

4.2 Possible other methods

In principle, any of the manipulations used in previous experimental research on self-esteem change (see the introduction to Chap. 3) can be used to manipulate self-esteem as an independent variable. Thus, one could suggest that researchers interested in the consequences of self-esteem should try to manipulate this variable through social comparison, thought listing, self-presentation tasks, self-related imagery, mood induction via music, and so on. However, in general, these manipulations seem to suffer from similar problems as success/failure induction. For one, manipulations shown to affect self-esteem in previous research are usually blatant (except those described below). Blatant means that participants are able notice that the manipulation does something to their self-esteem. As a consequence, those manipulations may pertain only to subjective state self-esteem but not to subjective trait self-esteem. Moreover, like success/failure induction, many of the self-esteem manipulations used in previous research may lead to confounds. For example, imagery and thought-listing may elicit emotions or influence mood (see Chap. 3.2), and social comparison and self-presentation may activate social orientations such as competition or conformity. These confounds may suggest spurious effects or overshadow existing effects, as illustrated above with regard to the side-effects of success/failure induction.

A way to circumvent these problems may be to use subliminal stimulation to manipulate self-esteem. Subliminal stimulation means that stimuli are presented so briefly that the person cannot perceive them consciously but nevertheless processes their meaning (for a more detailed definition, see the introduction to Chap. 5). In theory, subliminal stimulation is preferable over blatant manipulations of self-esteem for two reasons. First, subliminal stimulation appears suited to influence subjective trait self-esteem and not only subjective state self-esteem. The reason is that the unobtrusiveness of the manipulation may prevent participants from recognizing an external influence on their self-esteem. As a consequence, participants may consider their current level of self-esteem as their habitual one, despite the fact (unknown to them) that it has been manipulated. Second, because participants are not aware of a threat to or boost of their self-

esteem, defensive reactions and affective side-effects may be weaker than in the case of blatant manipulations. In the following, previous studies are discussed that show that either self-esteem or domain specific self-evaluations can be manipulated with subliminal stimulation.

To begin with, Baldwin et al. (1990, Exp. 2) exposed catholic participants to a subliminally presented picture of either the pope or an unfamiliar other. Both persons had a scowling facial expression on the respective picture. After the manipulation, participants' self-evaluations in the domain of competency were lower in the pope condition than in the unfamiliar-other condition. A parallel effect occurred on a self-report measure of anxiety. A surprising finding (not discussed by the authors however) was that no effect on self-rated morality occurred.

Because both faces (and not only the pope's) had a similarly negative expression, the results on competency ratings cannot be reduced to the induction of negative affect. Rather, descriptive processing (in particular, identification of the pope's face) must have been involved to some extent. Thus, the effects on the competency self-ratings are more likely to reflect knowledge activation or on-line judgments than affect-as-information effects. Nevertheless, the implausible null effect on the morality self-evaluation weakens the conclusiveness of the results.

In an attempt at conceptual replication, Baldwin (1994, Exp. 1) exposed participants subliminally to names of significant others whom the participants had previously described as rejecting or accepting. Subsequent self-evaluations (measured with the SSES) were statistically significantly lower in the rejecting-other than accepting-other condition. The effect was most pronounced on the Social Relationships subscale of the SSES and statistically nonsignificant on the Appearance and Performance subscales. Of importance, Baldwin found no statistically significant effect on mood, which was measured between the subliminal stimulation and the administration of the SSES. This finding makes on-line judgments or knowledge activation again appear more likely to be the mediators than affect-as-information effects. In general, the null effect on mood suggests that a subliminal self-esteem manipulation without side-effects on mood is possible.

In another relevant study, Sommer and Baumeister (2002, Exp. 1) exposed participants subliminally to words denoting acceptance (e.g., *welcome*, *attached*, *bonded*) or rejection (e.g., *ignored*, *dumped*, *abandoned*). Next, participants had to decide whether each of a number of positive and negative traits was self-descriptive or not. Participants with low initial self-esteem endorsed statistically significantly more positive relative to negative traits in the acceptance condition than in the rejection condition. The reverse, albeit statistically nonsignificant, tendency emerged for participants with high initial self-esteem. Of interest, for participants with high (low) self-esteem, the posttest self-esteem scores in the acceptance condition were lower than (about as high as) the scores in a third condition in which negative rejection-unrelated words (e.g., *destroy*, *disease*,

pain) had been presented. This suggests that like in the Baldwin (1994) and Baldwin et al. (1990) studies, the self-esteem effects were due to processing of descriptive stimulus information (i.e., on-line judgments or knowledge activation) rather than due to affect induction.

Finally, in a study conducted within a psychoanalytic theoretical framework, Schurtman et al. (1982) exposed participants to a subliminally presented message alluding to oedipal fantasies („Mommy and I are one”), using a procedure developed by Lloyd Silverman (see Silverman & Weinberger, 1985). In four sessions over two weeks, half of participants (inpatients in a rehabilitation center for alcoholics) were subliminally exposed to this message whereas the other participants were subliminally exposed to the control message „People are walking”. Among participants with initially low self-esteem, those exposed to the oedipal message showed statistically significantly greater pretest-posttest differences in self-esteem (measured with the Tennessee Self-Concept Scale; Fitts, 1965) than those exposed to the control message. For participants with initially high self-esteem, the treatment had no statistically significant effects.

Unlike in the studies by Baldwin and colleagues as well as Sommer and Baumeister, affect induction cannot be ruled out as an alternative explanation of the effects on self-esteem. The reason is that the experimental message has a more positive meaning than the control message. This argument obtains even if one questions Schurtman et al.’s assumption that participants encoded the meaning of the subliminally presented messages; in fact, there is no conclusive evidence that persons can extract the meaning of subliminally presented sentences beyond the meanings of the component words (Greenwald, 1992; see also Chap. 5.2.3.3). In any case, however, it is conceivable that the effects that Schurtman et al. observed have been driven by positive affect elicited by single words in the experimental message (*Mommy, I*).

Together, the studies by Baldwin (1994), Baldwin et al. (1990), Schurtman et al. (1982), and Sommer and Baumeister (2002) suggest that subliminal stimulation can affect self-esteem. The null effect on mood in Baldwin’s (1994) study even suggests that subliminal manipulations may have weaker affective side-effects than blatant manipulations such as success/failure induction. However, all these studies used only composite measures of self-esteem. Thus, effects of subliminal stimulation on global self-esteem have yet to be demonstrated.

Provided that the findings of these studies can be generalized to global self-esteem and hence to the construct of general self-esteem, it seems that subliminal stimulus presentations may be a useful tool for research on the consequences of self-esteem. However, with respect to this research goal, it does not seem advisable to use stimuli relating to social relationships like in the subliminal-stimulation studies described above. The reason is that such stimuli may cause specific emotions or activate specific descriptive concepts. For example, the scowling-pope prime in Baldwin et al.’s (1990) study may have activated concepts related to religion or elicited emotions like anxiety and guilt. In line with

the latter possibility, Baldwin et al. found that participants in the pope condition reported higher anxiety than participants in the control condition. In a study on the consequences of self-esteem, such side-effects are problematic because they may spill-over to the dependent variables and hence may lead to false conclusions regarding the role of self-esteem, analogously to the side-effects of success/failure induction (Chap. 4.1.2). A possible remedy against this problem is to use evaluative stimuli with a vaguer or broader meaning. This idea is elaborated on in the next chapter.

5 A new method for manipulating self-esteem as an independent variable: The Method for Subliminal Self-Esteem Manipulation (MSSM)

In this chapter, the MSSM is introduced as a new method for manipulating self-esteem. Like the methods used in the subliminal-priming studies discussed above (Baldwin, 1994; Baldwin et al., 1990; Schurtman et al., 1982; Sommer & Baumeister, 2002), the MSSM is built on the notion of unconscious perception. Hence, this notion is discussed before the method is described.

Claims for unconscious perception have been made more than a century ago (e.g., Peirce & Jastrow, 1884) and resurrected in the course of the New Look movement in the 1940s and 1950s (see Erdelyi, 1974). Nevertheless, the notion of unconscious perception is still controversial in research. This controversy mainly results from the fact that different researchers endorse different definitions of unconscious perception (for discussions, see Erdelyi, 1992; Greenwald, 1992; Reingold & Merikle, 1988). Depending on the respective definition, the available findings either do or do not demonstrate unconscious perception. For example, a very restrictive definition is Holender's (1986). He argued that a necessary criterion of unconscious perception is that the perceived stimuli do not affect intentional processes, including performance in forced-choice classification or forced-choice detection. This criterion is seldom met in research on unconscious perception. However, as others noted (e.g., Bargh & Chartrand, 2000), applying such restrictive criteria to the demonstration of unconscious perception means to define the latter out of existence because it is almost impossible to ensure that unconsciously processed information does not influence intentional processes in the end. Thus, in line with the influential articles by Marcel (1983) and Cheesman and Merikle (1986), a less restricted definition of unconscious perception is used in this thesis. Specifically, according to this definition, *a stimulus is perceived unconsciously if the person (a) encodes the meaning of the stimulus (as indicated by an influence of the stimulus on experience or behavior) but (b) is not able to consciously report that meaning.* Current research leaves little doubt that unconscious perception defined as this does exist (see Greenwald, 1992; Kihlstrom, 1999; also Chap. 6.1).

A term that is related to *unconscious* is *subliminal*. In this thesis, the term *subliminal* denotes a property of an event in the person's environment whereas the term *unconscious* denotes a property of a psychological process. Specifically, *subliminal* is defined herein as follows: *A stimulus is presented subliminally if it is presented under conditions that render conscious perception of the stimulus impossible.* In other words, a subliminally presented stimulus is one that cannot be perceived consciously regardless how hard the person tries. The subliminal presentation of a stimulus or of stimuli is called *subliminal stimulation* herein.

Furthermore, as a ramification of signal detection theory (Green & Swets, 1966), it is now commonly accepted in psychology that perceptual thresholds are gradual rather than abrupt (Greenwald, Draine, & Abrams, 1996; Macmillan & Creelman, 1991). In this respect, the term *subliminal* is somewhat misleading because it suggests a clear-cut threshold (in Latin: *limen*) below and above which perception is unconscious and conscious, respectively. In addition, perceptual thresholds can differ between persons. Therefore, unless the individual thresholds are known, researchers cannot be sure that their manipulations lead to unconscious perception among *all* participants. Rather, for some participants, the manipulation may be so strong that they perceive the stimuli consciously; for others, the same manipulation may be so weak that they do not perceive the stimuli at all; others (in the ideal case, the majority) may be in between so that they perceive the stimuli unconsciously. For these reasons, some researchers dealing with unconscious perception used the term *suboptimal* instead of *subliminal* (e.g., Murphy & Zajonc, 1993; Stapel et al., 2002). By the term *suboptimal*, these researchers wanted to emphasize that their manipulation is likely to cause unconscious perception in most instances but is unlikely to do so in all instances. Although this view is undoubtedly realistic, only the term *subliminal* is used in the following because it is still the more common term in research on unconscious perception (Greenwald et al., 1996).

Chapter 5.1 explains why and under what circumstances subliminal stimulation promises to be a better method for manipulating self-esteem than the common blatant manipulations described in Chapter 4. Chapter 5.2 presents three models of the functioning of the method and describes ways to test the models against each other.

5.1 Rationale for the MSSM

The discussion in Chapter 4 suggests that a method for manipulating self-esteem should fulfill at least two criteria to be preferable over the existing methods:

- (a) It should influence subjective trait self-esteem (and not only subjective state self-esteem).
- (b) It should have no (or only weak) side-effects (e.g., affect, defensive reactions).

As already mentioned, a way to fulfill both criteria may be to manipulate self-esteem through subliminal stimulation. One advantage of this procedure is that it reduces the likelihood of defensive reactions for which conscious processing of the crucial self-relevant information is necessary (e.g., attribution, questioning the accuracy of the information). Another advantage is that subliminal stimulation techniques can easily be framed as tasks that appear trivial and non-self-relevant (e.g., relaxation tasks, simple reaction tasks; Baldwin et al., 1990; Chartrand & Bargh, 1996). Because such a coverstory obscures the self-esteem relevance of the manipulation, participants may experience their self-

esteem after the manipulation as typical and context independent (although actually the reverse is true, provided that the manipulation is successful). In this case, the subliminal manipulation would affect subjective trait (and not only state) self-esteem. Moreover, a subliminal manipulation framed in the described way is less likely to cause demand effects than are blatant manipulations. A final advantage of subliminal stimulation over blatant methods is that promises to have weaker affective side-effects. This is suggested by Baldwin's (1994) finding that subliminal stimulation affected self-esteem without leading to corresponding mood shifts. Together, these arguments suggest that compared with blatant manipulations, subliminal stimulation may have fewer side-effects (in the form of defensive reactions and affect) and be more likely to influence subjective trait self-esteem. Thus, subliminal stimulation seems to fulfill the aforementioned two criteria.

What stimuli should be used in the subliminal stimulation? With respect to criterion (b), it seems advisable to use evaluative words with a broad meaning. Presumably, such words can activate general evaluative knowledge but do not necessarily elicit affect. Data from Stapel and Koomen (2000b, Study 2a) are supportive of this. These researchers exposed participants unobtrusively to the words *good* and *positive* versus *bad* and *negative*. Next, participants evaluated an ambiguous target person and indicated their mood. Mood did not differ between the priming conditions whereas target evaluation did. This suggests that global evaluative words can have effects on evaluative judgments without having effects on mood. Of course, in Stapel and Koomen's study, the effect on evaluative judgments may have been mediated by another mechanism than knowledge activation. The researchers did not investigate the mediating mechanism. Nevertheless, their findings do suggest that evaluative words with a broad meaning can have effects through another route than an affective one. As a consequence, such words are used in the MSSM. Specifically, this method uses the stimuli *good*, *great*, and *valuable* to increase self-esteem and *bad*, *lousy*, and *worthless* to decrease it. Hereinafter, these stimuli are called *positive primes* and *negative primes*, respectively. The term *valence primes* is used as a general label for these stimuli.

An arguable problem is that the valence primes may activate evaluative knowledge in general, not only evaluative self-knowledge. In this case, the effect may be diluted so that no or weak effects on self-esteem emerge. Moreover, the activation of non-self-relevant knowledge in addition to self-relevant knowledge may have unwelcome side-effects. Hence, the MSSM tries to tie the effects of the valence primes to self-knowledge by presenting them together with a self-referring word, called *self referent* hereinafter. Specifically, the self referent is the pronoun *I*. Several studies (Dauenheimer, 2002; Dijksterhuis et al., 1998; Mussweiler & Strack, 2000; Stapel & Tesser, 2001) suggest that pronouns of the first person singular (*I*, *me*) automatically activate some self-knowledge. Although these studies do not allow for conclusions as to what kind of self-knowledge the mentioned stimuli activate, it is plausible that these stimuli acti-

vate primarily self-knowledge that is already accessible to a certain degree, that is, chronically accessible. This argument is supported by studies that found that subtle knowledge activation manipulations effects were more pronounced for chronically accessible versus chronically nonaccessible self-knowledge (Bargh, Bond, Lombardi, & Tota, 1986; McKenzie-Mohr & Zanna, 1990; see Higgins, 1996).

An important notion is that a person's chronically accessible self-knowledge is probably both positive and negative. This is suggested by studies showing that the spontaneous self-related thoughts or self-descriptions of psychologically healthy individuals consist of 30 to 40 percent of negative elements and 50 to 60 percent of positive elements (Kendall, Howard, & Hays, 1989; Schwartz, 1986; Showers, 1992). Thus, the self referent may activate both positive and negative self-knowledge. This notion is pivotal for two of the models described later (affect model and knowledge activation model).

What happens if persons are shown the self referent simultaneously with a general evaluative word (like in the MSSM)? It is assumed here that the knowledge activation effects of both stimuli summate (Collins & Loftus, 1975). Hence, when a positive (negative) valence prime is presented together with the word *I*, the effects of the valence prime should pertain to the positive (negative) self-knowledge activated by the word *I*. As a consequence, the positive (negative) part of the self-knowledge activated by the word *I* should receive stronger activation than its negative (positive) part. As a consequence, provided that the knowledge activation hypothesis (Chap. 3.1) is correct, self-esteem should become more positive (negative). However, if the valence primes are presented without a self referent, their effects may pertain to whatever knowledge is accessible, not only to self-knowledge. In this case, the effects of the valence primes may be more diluted, and self-knowledge may receive less activation in total, than if a self referent is presented in addition to the valence primes. Thus, the effects of the valence primes on self-knowledge accessibility and hence on esteem should be more pronounced if the primes are paired with a nonself referent than if they are not (for a more detailed account, see Chap. 5.2.1).

One goal of the experiments described later (Chap. 6) was to test whether the self referent does indeed moderate the effects of the MSSM. Specifically, two of the experiments (Exp. 1 and 2) were designed to explore whether the effects of the MSSM are weaker when the self referent is replaced by a non-self-referring stimulus, which is called *nonself referent* hereinafter. Moreover, one of these two experiments was designed to test whether the effects of the MSSM are indeed mediated by knowledge activation.

In particular, this second experiment should rule out two alternative explanations. The first of these alternative explanations, called *affect model* hereinafter, holds that (a) the valence primes elicit diffuse (positive vs. negative) affect and (b) the self referent intensifies this affective state. The latter may then influence self-esteem via affect-as-information effects (Chap. 3.2). Although affective influences on self-esteem have not yet been demonstrated compellingly, it

would be premature to conclude that they do not occur at all. The number of stringent tests of the hypothesis that affective states influence self-esteem is too small to justify such a conclusion (Chap. 3.2).

The second alternative explanation, called *conditioning model* hereinafter, holds that the simultaneous presentation of the positive (negative) primes and the self referent may strengthen the associations between positive (negative) valence and the self in long-term memory. Thus, the model assumes that the MSSM causes evaluative conditioning (cf. De Houwer, Thomas, & Baeyens, 2001). To the extent that current self-esteem reflects the strength of valence–self associations, that sort of conditioning should increase (decrease) self-esteem.

Both models are explained in detail in Chapter 5.2. It will become clear there that both the affect model and the conditioning model are compatible with the prediction of an interaction between valence (positive vs. negative) x referent (self vs. nonself) that follows also from the knowledge activation model. Thus, if one observes this interaction, additional tests will be necessary to determine which one(s) of the three models is (are) correct. The next chapter describes how this can be done.

To summarize, the MSSM consists of the simultaneous subliminal presentation of (a) positive versus negative words with a general meaning (*good, great, valuable* versus *bad, lousy, worthless*) and (b) a self referent (the pronoun *I*). This method was designed to influence self-esteem through the selective activation of positive versus negative self-knowledge. However, at least two other mediating mechanisms are possible: affect (more specifically, affect-as-information effects) and evaluative conditioning. The next chapter deals with these three mediating mechanisms more in detail.

5.2 Models of the functioning of the MSSM

This chapter describes three models of the functioning of the MSSM. At first, the knowledge activation model is explained (Chap. 5.2.1). This model is partly built on the knowledge activation hypothesis (see Chap. 3.1). Chapter 5.2.2 deals with the affect model. This model is built on the notion discussed in that self-esteem is a function of affective states (see Chap. 3.2). Chapter 5.2.3 presents the conditioning model. This model is built on the notion (not discussed herein before) that self-esteem can change due to evaluative conditioning. Chapter 5.2.4 summarizes (a) the assumptions of the models and (b) the predictions that were tested in the present research.

5.2.1 Knowledge activation model

The knowledge activation hypothesis has already been discussed in Chapter 3.1. The present chapter presents a detailed model that is partly built on this hypothesis. In addition, the model borrows from Bower's (1981, 1991) affective–semantic network model of memory. This model is one of the so-called *associative network* (or *spreading-activation*) *models* (e.g., Anderson & Bower, 1973;

Bower, 1981, 1991; Collins & Loftus, 1975; Higgins, Bargh, & Lombardi, 1985). The core assumptions of these models can be summarized as follows:

Human memory consists of units or nodes that are connected with each other. The nodes represent stored pieces of information (e.g., schemas, scripts, or autobiographical episodes). Necessary condition for a node to influence current mental processing is that the node is activated. This activation can be intentional (e.g., one tries to remember a specific autobiographical episode) or unintentional (e.g., automatic activation of an autobiographical episode after perception of a relevant cue). The stronger the activation of a node, the higher the likelihood that the information stored in the node influences mental processing. Furthermore, if the activation of the node reaches a certain level (i.e., exceeds a certain threshold), activation spreads to all other nodes to which the node is connected. Hence, to be able to predict which other nodes can be activated as a consequence of the activation of one node, one has to make assumptions as to which nodes are associated with this node in memory. For example, under the assumption that the concepts *car*, *city*, and *shopping* are associated with each other in a person's memory, activation of the concept *car* should activate the concepts *city* and *shopping*, provided that the activation of *car* exceeds the threshold for the spread of activation to the two other nodes.

An assumption that is particularly important in the present context is that the activation from two nodes summates (Collins & Loftus, 1975; for supportive evidence, see Balota & Paul, 1996; Klein, Briand, Smith, & Lamothe, 1988). That is, if two nodes are activated simultaneously, the activation spreads through the associative networks of each node and summates at the intersection of the networks. Thus, the nodes belonging to both networks receive particular strong activation. For example, if in a person's memory, the concept *tree* is associated with the concepts *town* and *nature*, then the simultaneous activation of *town* and *nature* will activate the concept *tree* more strongly than will the activation of *town* or *nature* alone.

Bower's affective-semantic network model makes several additional assumptions. In his seminal article on this model, Bower (1981) assumed that some nodes in the network represent emotions. In particular, he assumed that „each distinct emotion such as joy, depression, or fear has a specific node or unit in memory that collects together many other aspects of the emotion that are connected to it by associated pointers“ (p. 135). To illustrate this, suppose a person who has frequently experienced failures at school tests, which made him or her ashamed and angry. As a consequence, the person has built up associative links between the nodes representing the concepts *school*, *poor grades*, *shame*, and *anger*. In this case, (above-threshold) activation of each of these nodes will activate all other nodes. For example, inducing shame will activate the concepts *school* and *poor grades*, thus increasing the probability that the person will recall failures at specific school tests. Conversely, making the person reminiscent of his or her school days will activate the concept *poor grades* and elicit the feelings of shame and anger.

In a revision of this model, Bower (1991) assumed that there can be also more general memory representations of affect – two nodes denoting positive and negative valence in general. These nodes are activated whenever a negative or positive belief or emotion is activated. Moreover, these nodes are linked to all other nodes that represent content with positive and negative valence, respectively. Thus, in the mentioned example, the concept *poor grades* can activate not only nodes representing the emotions of shame and anger but also the negative valence node. The latter node, in turn, can activate nodes that represent information with negative valence. Thus, in general, a stimulus can activate memories that are semantically unrelated to it but have the same valence as the stimulus.

In the following, Bower's (1991) ideas are applied to the MSSM. Figure 1 displays the specific model that can explain how the MSSM affects self-esteem via spreading activation in an affective-semantic network. To become familiar with the model, the reader may first look at the boxes in Panel 1 below the headline „a) Positive priming“. The boxes represent selected components of participants' long-term memory. These components are labeled „self node“, „positive node“, „negative node“, „positive self-knowledge“, and „negative self-knowledge“.⁸ The self node represents the general notion of the self. The positive and negative nodes (together referred to as *valence nodes* hereinafter) represent the general notions of good and bad, respectively. As explained in Chapter 5.2, positive and negative self-knowledge in the model denotes self-knowledge that is chronically accessible rather than *all* available positive and negative self-knowledge. Thus, the model rests on the assumption that both negative and positive self-knowledge is chronically accessible (for supportive evidence, see Kendall et al., 1989; Schwartz, 1986; Showers, 1992).

Furthermore, the present model assumes that the self referent of the MSSM activates the self node, whereas the positive and negative primes of the MSSM activate the positive and negative node, respectively. Activation can spread from the self to both positive and negative self-knowledge and from either valence node to self-knowledge with the same valence. Thus, if the self node is activated, both positive and negative self-knowledge is activated, and if the positive (negative) node is activated, positive (negative) self-knowledge is activated. An important tenet of the model is that if both the self node and a valence node are activated, the activation spreading from these two nodes to self-knowledge summates. Hence, both negative and positive self-knowledge is activated in this

⁸ Both positive and negative self-knowledge in the model should be conceived of as consisting of multiple nodes, each of which (a) represents a single chronically accessible self-related information with positive or negative valence. Because the content of activated self-knowledge is irrelevant to the predictions derived in the following, the nodes representing positive and negative information are not differentiated further here.

case but self-knowledge with the same valence as the activated valence node is activated more strongly than self-knowledge with the opposite valence.

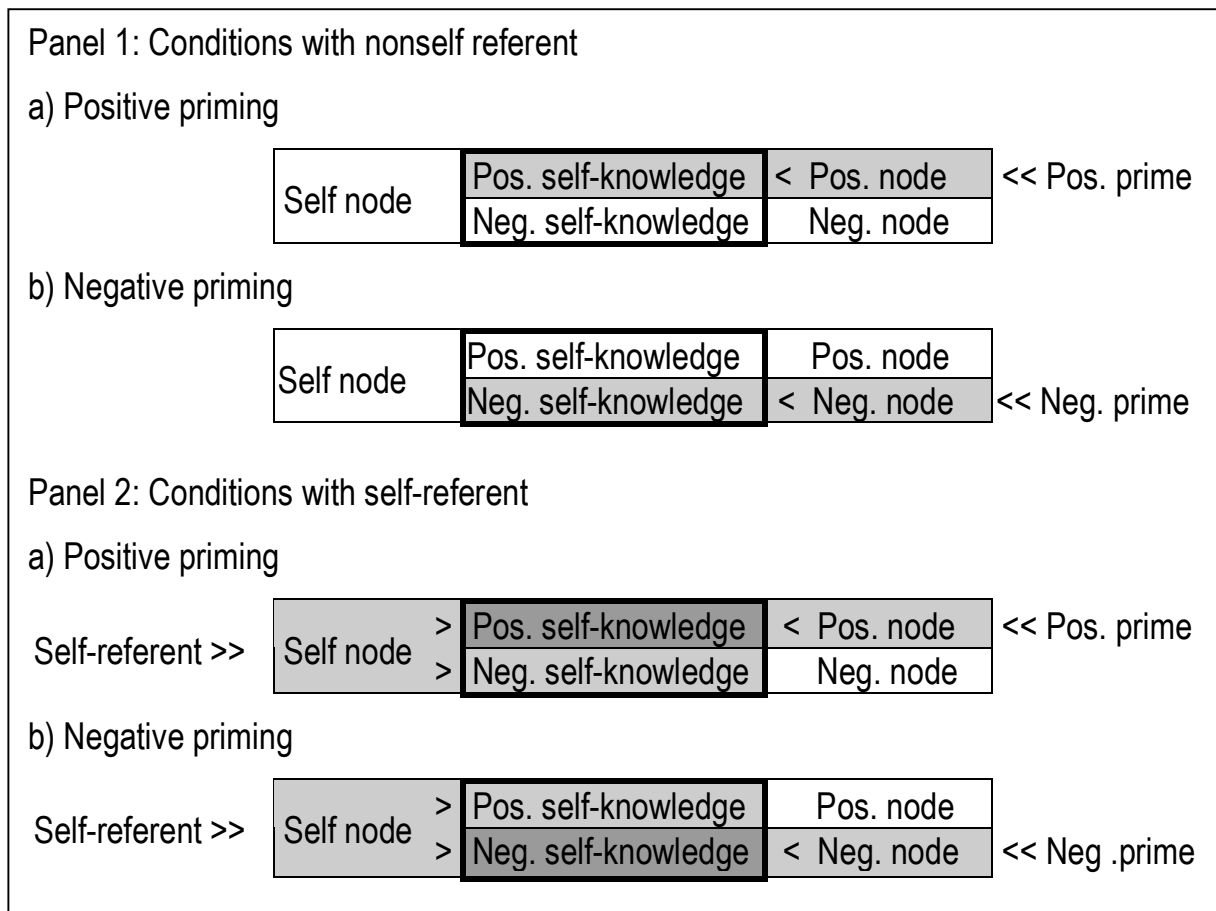


Figure 1. Functioning of the MSSM according to the knowledge activation model. Each box denotes a component of long-term memory. Horizontally adjacent boxes share associative links through which activation can spread. No, bright, and dark shading of boxes indicates no, medium, and strong activation, respectively. The memory components that can directly influence self-esteem are framed with a bold line. Single arrows (<, >) indicate the spread of activation within long-term memory. Double arrows (<<, >>) indicate excitation by external stimuli. Pos.: Positive. Neg.: Negative.

Figure 1 illustrates these dynamics. The first panel in Figure 1 refers to the case that the valence primes are presented without a self referent. The figure shows that after positive priming (i.e., presentation of the positive prime), positive self-knowledge is more strongly activated than negative self-knowledge, whereas the reverse is true after negative priming. The second panel refers to the case that the valence primes are paired with the self referent. The self referent always activates positive and negative self-knowledge. Therefore, on average, the activation of both negative and positive self-knowledge is stronger than in the corresponding conditions without self referent. Note, however, that the self referent only adds a constant to the effects of the valence primes on self-knowledge activation and hence does not affect the differences (in the activation

of positive vs. negative self-knowledge) that the valence primes cause.

How can the described processes influence self-esteem? The knowledge activation model makes two relevant assumptions. The first assumption corresponds to the knowledge activation hypothesis (Chap. 3.1): Self-esteem is a function of the level of activation of positive relative to negative self-knowledge. That is, the stronger the activation of positive relative to negative self-knowledge, the higher self-esteem.

The second assumption is that the activation of positive and negative self-knowledge has to exceed a certain threshold to influence self-esteem. Thus, the level of this threshold determines whether the self referent can or cannot moderate the effect of the valence primes on self-esteem. If the threshold is so high that the summated effects of self referent and valence primes on self-knowledge activation cannot overcome it, there will be no effect on self-esteem. If the threshold is so low that the effects of the valence primes alone on self-knowledge activation can overcome it, the valence primes will have a congruent effect on self-esteem. In this case, the self referent will not moderate this effect but will add only a constant, which does not have consequences for the effects of the valence primes. This means that Figure 1, self-esteem differs between positive and negative priming to the same extent in Panel 1 and Panel 2.

Things are different if that the threshold is intermediate such that the combined activation by the referent and a valence prime, but not the activation by a valence prime alone, is above the threshold. In this case, the additional activation by the self referent is necessary for the positive (negative) primes to cause an above-threshold activation of positive (negative) self-knowledge. This means that in Figure 1, only the activation pattern depicted in Panel 2 will lead to a self-esteem change then. Specifically, only the dark shaded boxes in Figure 1 denote activation levels then that are above the threshold and hence influence self-esteem; however, the bright shaded boxes denote activation levels that are below the threshold and hence irrelevant to self-esteem (like the nonshaded boxes). Thus, in the case of an intermediate threshold, the valence primes will affect self-esteem only if they are accompanied by a self referent.

Which of the three mentioned threshold levels (low, medium, or high) is most likely? Unfortunately, this cannot be determined in advance. Although assumptions regarding activation thresholds are common in associative network models (see Higgins, 1996), these assumptions are only qualitative. No associative network model has been proposed to date that would permit quantitative predictions regarding activation levels or thresholds. Even worse, no method is available that would allow one to quantify both activation levels and thresholds in the same metric. Even if such a method existed, individual pretesting of all participants would be necessary to determine the thresholds. Therefore, it is not possible here to derive predictions as to whether the activation threshold of participants' self-knowledge is below or above the potential activation elicited by the stimuli of the MSSM. This can be determined only a posteriori. Neverthe-

less, as explained in the following chapters, the knowledge activation model does allow for predictions by which it can be tested against the other models.

5.2.2 Affect model

The affect model assumes that (a) the self referent and the valence primes elicit affective states (i.e., mood or emotions; Forgas, 1992; Chap. 3.2) and (b) self-esteem is a function of affective states. Although previous studies bearing on tenet (b) have mostly yielded null findings (Chap. 3.2), too few studies are available to rule out an influence of affective states on self-esteem with sufficient confidence. Remember that one study did provide compelling evidence for such an influence (Brown & Mankowski, 1993, Exp. 2). Thus, the affect model deserves testing, although it does not seem as plausible in light of previous research as the knowledge activation model.

The affect model shares some of its tenets with the knowledge activation model. Specifically, like the knowledge activation model, it (a) is grounded on the notion of an associative network consisting of a self node, a positive node, and a negative valence node, (b) holds that the valence primes of the MSSM activate the valence nodes whereas the self referent of the MSSM activates the self node, and (c) assumes that thresholds play a crucial role.

In addition, the affect model makes three assumptions that are not part of the knowledge activation model. First, it assumes that the activation of the valence nodes causes affect. By contrast, the knowledge activation model assumes that the activation of the valence nodes mediates between the valence primes and self-knowledge activation without necessarily eliciting affect. Thus, according to the knowledge activation model, it is irrelevant whether the valence primes elicit affect. However, this effect of the valence primes is crucial according to the affect model.

Second, the affect model holds that the self referent can activate the valence nodes. This can occur via direct connections between the self node and the valence nodes or indirectly through activation of evaluative self-knowledge. Which is the case, is not of interest here. The only essential implication for present purposes is that the self referent activates both the negative and positive node. This assumption is plausible in view of the already cited studies showing that persons' current self-related thoughts are both positive and negative (e.g., Showers, 1992). Additional support comes from a study that showed that the self was evaluated (mildly) ambivalently in a sample of university students (Gramzow, Sedikides, Panter, & Insko, 2000). This suggests that in general, the self may indeed be associated with both negative and positive valence. Hence, the presentation of a self referent may indeed activate both valence nodes. Like the first additional assumption of the affect model, this second one does not contradict the knowledge activation model. The latter is mute as to whether the self referent activates the valence nodes or not.

Third, the affect model holds that self-esteem is a function of the activation of the valence nodes (rather than of the activation of self-knowledge). The

higher the activation of the positive relative to the negative node, the higher self-esteem. That is, according to the affect model, self-esteem is directly influenced by affect and not via the activation of either stored self-knowledge or any other content of long-term memory. Specifically, the model assumes that affect influences self-esteem through its informational value; that is, affect-as-information effects occur (Schwarz & Clore, 1983; Clore et al., 2001; Chap 3.2). Unlike the two preceding assumptions of the affect model, this one is at odds with the knowledge activation model, which holds that self-esteem reflects only accessible self-knowledge. According to the knowledge activation model, affect that does not change self-knowledge accessibility should not influence self-esteem. According to the affect model, however, affect can have effects independently from self-knowledge accessibility.

Figure 2 illustrates how the affect model explains the interplay of the valence primes on the one hand and the self referent on the other. To stress the common features between the affect model and the knowledge activation model, all elements of Figure 2 are taken from Figure 1. Only the cells representing self-knowledge have been omitted because, as already mentioned, their activation is not relevant to the predictions of the affect model.

Like in the knowledge activation model, the notion of a threshold (for effects of node activation on self-esteem) is essential. In the affect model, this threshold is the one between the valence nodes (rather than self-knowledge) and self-esteem. The assumptions concerning the role of the threshold are in principle the same as in the knowledge activation model. If the threshold is so high that the summated activation by the self referent and either the positive or negative prime cannot overcome it, no effect on self-esteem occurs. If the threshold is so low that the activation by either the positive or negative prime alone can overcome it, the effects of the valence primes on self-esteem will occur regardless whether the self referent is presented or not. In this case, the activation patterns depicted in both Panel 1 and Panel 2 in Figure 2 lead to changes in self-esteem. Like in the knowledge activation model, the self referent matters only if the threshold is intermediate such that the combined activation by the referent and either valence prime – but not the activation by either valence prime alone – is above the threshold. Under these conditions, the additional activation caused by the self referent is necessary for the positive (negative) valence prime to cause above-threshold activation of the positive (negative) node. As a consequence, the valence primes can affect self-esteem only if they are accompanied by a self referent. This means that in Figure 2, only the dark shaded boxes denote activation levels that influence self-esteem. The nonshaded and bright shaded boxes denote activation levels that are below the threshold and hence do not influence self-esteem. Thus, in the case of an intermediate threshold, only the activation patterns depicted in Panel 2 lead to a change in self-esteem.

Like in the case of the knowledge activation model – and for the same reasons –, it is not possible to rule out one of these three cases a posteriori. In par-

ticular, it is not possible to predict how strongly the MSSM activates the valence nodes relative to the threshold. This can only be inferred a posteriori.

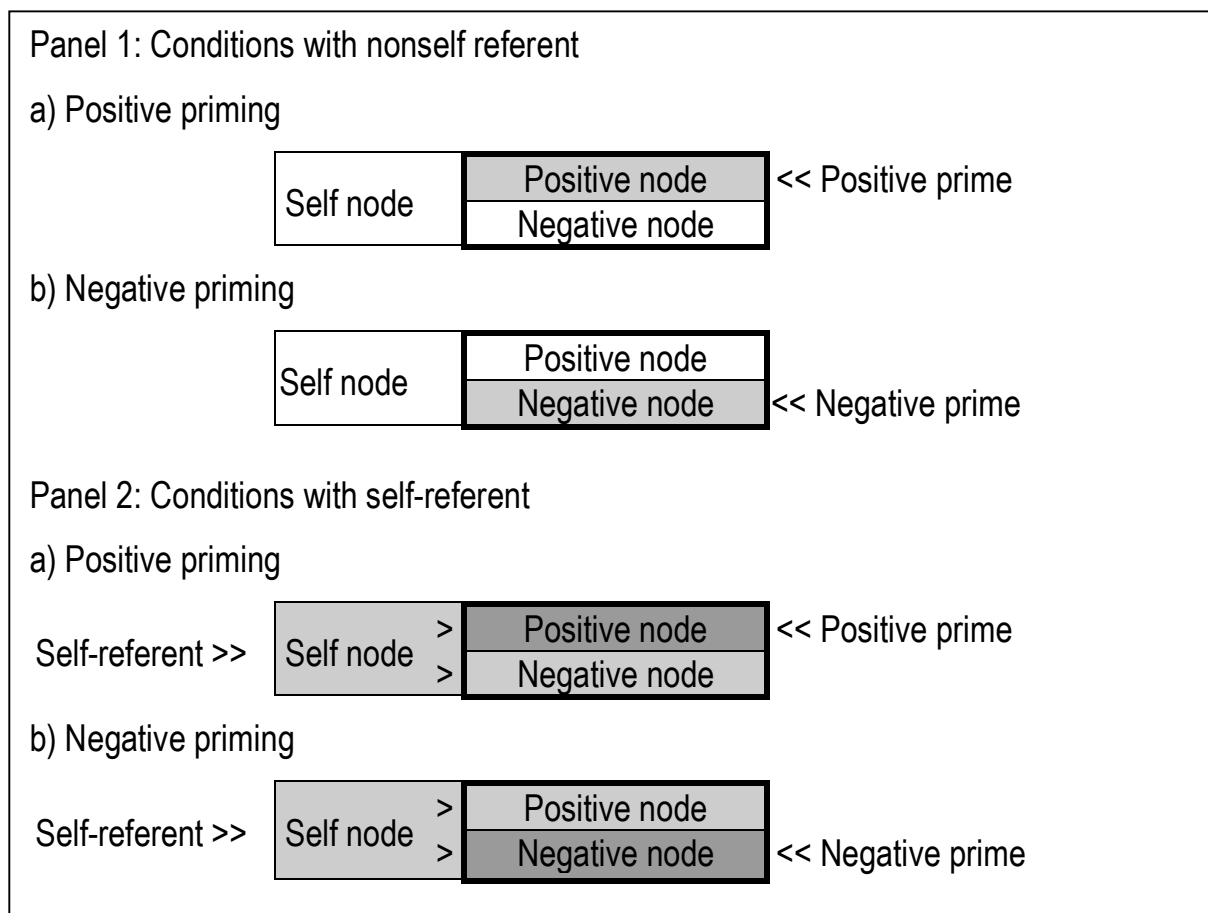


Figure 2. Functioning of the MSSM according to the affect model. Each box denotes a component of long-term memory. Horizontally adjacent boxes share associative links through which activation can spread. No, bright, and dark shading of boxes indicates no, medium, and strong activation, respectively. The memory components that can directly influence self-esteem are framed with a bold line. Single arrows (<, >) indicate the spread of activation within long-term memory. Double arrows (<<, >>) indicate excitation by external stimuli.

A way to test the affect model against the knowledge activation model is to use another target than the self. If the effects of the MSSM are indeed mediated by affect-as-information effects, the MSSM should have an impact on the evaluation of other targets as well. This should be particularly true for unfamiliar targets. Forgas' (1995, 1999) reviews suggest that the evaluation of unfamiliar objects is more likely to be influenced by the judge's current affective state (via affect-as-information effects) than is the evaluation of familiar objects (such as the self). Therefore, on the basis of the affect model, it is predicted that if the valence primes influence self-esteem, they will influence the evaluation of an unfamiliar target as well.

The knowledge activation model makes a different prediction. According to this model, the MSSM never affects the evaluation of an unfamiliar target. The

reason is that the model assumes that activation of target-relevant knowledge is the only mechanism that mediates the effects of the MSSM. By definition, no knowledge about unfamiliar targets is stored in memory. Hence, neither the self referent nor the valence primes can activate target-related knowledge in the case that the target is unfamiliar. As a consequence, neither the self referent nor the valence primes can influence the evaluation of the target then.

5.2.3 Conditioning model

The notion of conditioning, which underlies the model proposed in this chapter, has been taken up seldom in self-esteem research. The few exceptions are described later in this chapter. Before that, a brief introduction into conditioning research is given, with special emphasis on the role of consciousness in conditioning (Chapter 5.2.3.1). Next, Chapter 5.2.3.2 explains the predictions of the conditioning model. Finally, Chapter 5.2.3.3 presents a model that (a) makes the same predictions as the conditioning model but (b) is discarded because it is less plausible.

5.2.3.1 Principle of the model and overview of relevant research

Definition and forms of conditioning

Conditioning is a form of learning. Learning implies a change in the structure and/or content of long-term memory. Thus, the conditioning model assumes that the MSSM has an effect on hard-wired memory structures. This is a crucial difference from the two models described in the preceding chapters. These models deal only with temporary changes in activation patterns in memory and view the hard-wired structure of memory as stable. In the terminology introduced in the preceding chapters, the knowledge activation and affect models explain how activation spreads from one node to another via given associative links whereas the conditioning model explains how these links themselves can change.

The standard paradigm of conditioning research has been introduced by Pavlov (1927). In this paradigm, a stimulus (so-called conditioned stimulus, CS) is repeatedly paired with another stimulus (so-called unconditioned stimulus, US). If the conditioning procedure is successful, reactions previously shown toward the US and not toward the CS (so-called unconditioned reactions, UR) will be shown also toward the CS (so-called conditioned reactions, CR). This outcome is called Pavlovian conditioning, classic conditioning, signal or contingency learning (denoting that subjects learn that the CS announces or indicates the presence of the US), or associative learning (denoting that subjects learn to associate the UR with CS). This variety of terms indicates that there is a variety of theoretical accounts of conditioning effects. Hence, to date, the precise mechanism underlying conditioning in humans is not well understood (Lovibond & Shanks, 2002). However, the notion that conditioning effects pertain to structures of long-term memory rather than to temporary activation patterns is widely accepted. This is the crucial feature of conditioning for present purposes.

Because the precise process by which long-term memory is changed is not relevant to the hypotheses derived in the following, this issue is not discussed further here.

Most previous conditioning studies have used behavioral or physiological reactions as UR (e.g., avoidance behavior, eye blink). Over the last three decades, a special type of conditioning, called *evaluative conditioning*, has received growing attention in research. Evaluative conditioning denotes the case that both UR and CR are evaluative reactions. A classic study on evaluative conditioning has been conducted by Staats and Staats (1957). They found that nonsense words (CS) paired with either positive or negative words (US) acquired the valence of the latter (UR) as measured by participants' ratings (CR). Although this study has methodological shortcomings (above all, demand characteristics; Page & Kahle, 1976), recent research has demonstrated compellingly that self-reported evaluations can indeed be changed through conditioning (for a review, see De Houwer et al., 2001). Accordingly, several researchers argued that conditioning plays a crucial role in attitude formation (e.g., Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992; Olson & Fazio, 2001; Walther, 2002).

Assumptions and criticism of the conditioning model

Evidently, the MSSM bears a superficial resemblance to a conditioning procedure. In the terminology of conditioning research, the valence primes of the MSSM are the US, their evaluation is the UR, the self referent is the CS, and self-esteem is the CR. Hence, the MSSM might have conditioning effects, that is, it might change the strength of the association between self and valence. This would be an example of evaluative conditioning. To the extent that current self-esteem reflects the self-valence association, self-esteem should change in the direction of the valence of the US. These assumptions regarding the effects of the MSSM are referred to as the *conditioning model* hereinafter.

The conditioning model has the advantage that offers a more parsimonious explanation of the possible effects of the MSSM than do the two other models described so far. Yet, the conditioning model has the disadvantage that it appears less plausible than these models – namely, when one takes in to account several crucial differences between the MSSM and the methods common in conditioning research. These differences suggest that one should be skeptical about the possibility to change self-esteem through conditioning.

One of these differences is that conditioning researchers usually present US and CS supraliminally rather than subliminally. In the case of nonevaluative conditioning, awareness of the contingency of US and CS seems to be even necessary for conditioning effects (Lovibond & Shanks, 2002). However, some studies suggest that awareness of the crucial US-CS relation is not or less necessary for evaluative conditioning. In particular, researchers (a) found evaluative conditioning effects among participants who were not aware of the contingency (i.e., who could not remember with sufficient confidence that US and CS were paired) (e.g., Baeyens, Eelen, Van den Bergh, & Crombez, 1990; Olson &

Fazio, 2001), (b) obtained no or negative correlations between awareness and strength of evaluative conditioning effects (Baeyens, Hermans, & Eelen, 1993; Hammerl & Grabitz, 2000), and (c) observed that distraction increased the effect (Walther, 2002, Exp. 5).

Most interesting in the present context are evaluative conditioning studies that circumvented contingency awareness by means of subliminal stimulus presentations. De Houwer et al. (2001) cite Niedenthal (1990) and Krosnick et al. (1992) as examples. Niedenthal and Krosnick et al. found that subliminally presented evaluative stimuli influenced the evaluation of novel cartoon characters and photographs of unfamiliar persons, respectively. However, because these researchers varied the valence of the US between participants and did not test for the stability of the effects, the observed effects may well have been due to affect induction rather than associative learning (for a similar criticism, see De Houwer et al., 2001; Lovibond & Shanks, 2002). More convincing evidence for subliminal evaluative conditioning comes from De Houwer, Baeyens, and Eelen (1994) and De Houwer, Hendrickx, and Baeyens (1997), who varied the valence of the US within participants. In three experiments together, they found that subliminally presented evaluative words influenced the evaluation of neutral words with which they had been paired. However, De Houwer et al. (1997) reported two unsuccessful replications in addition and found that the mean effect across all five experiments was rather weak ($r = .21$).

Thus, in total, studies on evaluative conditioning with subliminally presented US yielded inconsistent results. Moreover, only few such studies have been published. The paucity and inconsistency of the pertinent findings does not permit firm conclusions. The most optimistic conclusion that seems justified in light of these findings is that subliminal evaluative conditioning is possible but that its effects are elusive. Thus, it is unclear whether and under what circumstances the MSSM in particular will have such effects.

Another crucial difference between the MSSM and previous conditioning research concerns the nature of the CS. Almost all previous studies on (evaluative as well as nonevaluative) conditioning used unfamiliar stimuli as CS. By contrast, the self is a very familiar object. Moreover, it is already associated with reactions of the same type that should be conditioned to it (namely, evaluative reactions). Thus, in particular, the present conditioning model assumes that evaluative conditioning can occur with a CS for which an evaluation is already available. Arguably, a change in existing evaluative links requires more powerful conditioning procedures than the procedures that have been used in evaluative conditioning research to date. Especially subliminal evaluative conditioning procedures seem to have rather weak effects (De Houwer et al., 1994, 1997). Thus, one may reasonably doubt that the effects of the MSSM are strong enough to change persons' existing self-valence associations.

Previous attempts to change self-esteem through conditioning

The above arguments notwithstanding, claims for conditioning effects on self-esteem have already been made (Baccus et al., 2002; Dijksterhuis, 2002). The relevant research has not been mentioned herein before because it used rather unusual self-esteem measures with yet unclear validity. However, that research deserves a closer look in the present context.

In particular, the relevant research consists of two experiments reported by Baccus et al. (2002) and four experiments reported by Dijksterhuis (2002). In all of these experiments, participants were presented positive versus neutral stimuli that were paired with self-relevant stimuli. In particular, the respective stimuli were smiling versus neutral faces and idiosyncratic data of the participants (e.g., name, date of birth) in the Baccus et al. studies and positive (e.g., *intelligent*, *friendly*) versus neutral trait words and the pronoun *I* (in Dutch) in the Dijksterhuis studies. Baccus et al. presented the stimuli supraliminally during an alleged computer game in their two experiments. Dijksterhuis used two other methods. In his Experiment 1, he presented the trait words supraliminally and the word *I* subliminally during a lexical decision task. In Experiments 2 to 4, he used a procedure similar to the MSSM, presenting all stimuli subliminally during a reaction task.⁹

Another similarity between the experiments of Baccus et al. (2002) on the one hand and Dijksterhuis (2002) on the other is that they used the same two implicit measures of self-esteem as dependent variables. For one, these researchers used Greenwald and Farnham's (2000) modification of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT is a reaction task designed to unobtrusively measure the positivity of the associations of one concept as compared with another concept. Greenwald and Farnham's modification is designed to measure the evaluative associations of the concept *self* as compared with *nonself*. Moreover, Baccus et al. and Dijksterhuis used the name-letter liking technique developed by Nuttin (1985). This technique requires participants to evaluate each letter of the alphabet. Self-esteem is operationalized as the evaluation of a participant's own initials relative both to both (a) his or her evaluation of all letters not included in his or her name and (b) the evaluation of the same letters by all participants who did not have those letters in their names (for applications of this measure, see Kitayama & Karasawa, 1997; Koole, Dijksterhuis, & Van Knippenberg, 2001; Nuttin, 1985, 1987).

Baccus et al. (2002) as well as Dijksterhuis (2002) found in their experiments that their manipulations changed the scores of these implicit measures. In addition, Baccus et al. measured posttest self-esteem on a common composite measure (the SSES) in their Experiment 2. They found no effects of their procedure on this measure. Baccus et al. as well Dijksterhuis concluded from their

⁹ It should be noted that the MSSM and Dijksterhuis' method were developed independently from each other.

respective findings that conditioning can change implicit self-esteem. In addition, Baccus et al. concluded that conditioning is more easy with implicit than explicit self-esteem.

However, these findings have to be interpreted with caution. There are several reasons for this. Foremost, it is not clear what the implicit measures used by these researchers actually measure. Several studies showed that correlations between these implicit measures on the one hand and common explicit self-esteem measures such as the Rosenberg scale on the other are usually low (r s between .00 and .30; Bosson, Swann, & Pennebaker, 2000; Greenwald & Farnham, 2000; Greenwald & Nosek, 2001). Moreover, to date, no research on the consequences of implicit self-esteem assessed with the name-letter measure is available, and only one study is available that investigated a possible consequence of implicit self-esteem assessed with the IAT (Greenwald & Farnham, 2000, Exp. 3). This study found that IAT scores predicted reactions to success/failure in a similar manner as one would have expected for explicitly measured self-esteem (i.e., high versus low self-esteem functioned as a buffer against the aversive psychological consequences of failure). Together, these findings suggest that there is some overlap in the phenomena tapped by explicit and the two mentioned implicit self-esteem measures. However, the overlap seems to be small in magnitude. Thus, implicit and explicit self-esteem measures seem to assess different things for the most part. The nature of this difference is yet unclear (see also Bosson et al., 2000). Hence, the findings of Baccus et al. and Dijksterhuis are not necessarily relevant to the present research (as well as to the bulk of self-esteem research), which is concerned with explicit (rather than implicit) self-esteem.

A weakness specifically of Dijksterhuis' (2002) experiments is that the results can be explained alternatively on the basis of the affect and knowledge activation models presented above. In each of Dijksterhuis' experiments, either valence was constant (i.e., positive) and self-reference of the additional stimuli was varied (*I* vs. *XXX*), or the latter was constant (i.e., *I*) and valence was varied (positive vs. neutral). It is conceivable that both the positive trait words and the word *I* that were used in these experiments elicited mostly positive affect.¹⁰ Thus, in each experiment, there would have been one condition in which more

¹⁰ This argument implies that the self is evaluated positively on average. Evidence for this comes from two sources at least. The first source consists of the already cited studies showing that mentally healthy persons report mostly (about two thirds) positive self-related thoughts on average (e.g., Showers, 1992). The second source consists of studies showing that most persons' self-evaluations are positive in absolute terms (see Baumeister, Tice, & Hutton, 1989; Brown, 1993, 1998). Note that the present argument does not contradict the assumption of the affect and knowledge-activation models that the self is associated with *both* positive and negative valence. Even if a person's average self-view is positive on average, it can nevertheless be negative to some extent and hence ambivalent in total.

positive affect was elicited than in the other. According to the affect model, this positive affect may have directly influenced what the implicit self-esteem measures used by Dijksterhuis assessed. Moreover, the simultaneous presentation of the word *I* and positive trait words may have activated positive self-knowledge more strongly than negative self-knowledge, whereas the presentation of either the word *I* or a positive trait word paired with a neutral stimulus may have activated either no self-knowledge or both negative and positive self-knowledge similarly strong. According to the knowledge activation model, this can explain why self-esteem changed only in the *I* plus trait conditions but not in the other conditions of Dijksterhuis' experiments.

A remarkable feature of Baccus et al.'s (2002) research is that they could rule out these alternative interpretations of their findings. In their experiments, all participants were shown the same stimuli (smiling vs. frowning vs. neutral faces, which were paired with self-related vs. non-self-related words); only the covariation of the stimuli was manipulated. Specifically, in the experimental condition, only a smiling face appeared after each self-related word, and a smiling, frowning, or neutral face appeared after each non-self-related word; in the control condition, a smiling, frowning, or neutral face appeared after each self-related word as well as after each non-self-related word. Thus, the number of positive, neutral, and negative stimuli shown was held constant across conditions. Therefore, the observed differences in posttest implicit self-esteem between the experimental conditions are likely to reflect the effects of stimulus covariation and hence do seem to indicate conditioning (rather than affect-as-information or knowledge activation) effects.

However, a unique problem of Baccus et al.'s (2002) research is that their results are inconsistent. The manipulation affected the IAT scores in Experiment 1 but not in Experiment 2. In Experiment 2, only the effect on name-letter evaluation was statistically significant (which was not measured in Exp. 1). This suggests that the findings may not be robust.

Another problematic feature of Baccus et al.'s (2002) research is that the meaning of the null effect on the explicit self-esteem measure is ambiguous. At least three interpretations of this finding are possible. The first possibility – which is Baccus et al.'s only interpretation of this finding – is that their explicit measure referred to a sort of self-esteem that cannot be changed through conditioning. Baccus et al. speculated that in general, implicit self-esteem is more likely to change through unconscious processes such as associative learning than is explicit self-esteem. However, conclusive evidence bearing on this assumption is not available. A second possibility is that Baccus et al.'s manipulation pertained only to self-evaluation in the social domain. This might have resulted from the fact that they used smiling faces as stimuli, which may have functioned as indicators of social acceptance (Leary, 2000). As a consequence, there may have been an effect only on the Social subscale of the SSES, like in Baldwin's (1994) research (see Chap. 4.2). Baccus et al. did not report analyses for the subscales of the SSES so that this explanation cannot be tested here. A third expla-

nation is that the null effect on explicit self-esteem may be due to insufficient test power. Because Baccus et al. did not report the mean scores for self-esteem, it is not clear whether there was at least a tendency in the expected direction. To conclude, Baccus et al.'s nonsignificant finding for explicit self-esteem is ambiguous. In particular, there are plausible alternatives to Baccus et al.'s interpretation that explicit self-esteem is less responsive to conditioning than is implicit self-esteem.

In the present context, the most important implication of Baccus et al.'s (2002) research is that it demonstrates that it is possible to alter scores on implicit self-esteem measures through conditioning. Thus, provided that implicit and explicit measures of self-esteem partly tap the same phenomena, also explicit self-esteem might be changed through conditioning. As just explained, the nonsignificant effect that Baccus et al. reported for explicit self-esteem does not contradict this possibility (contrary to the researchers' own interpretation of this effect).

Unlike Baccus et al.'s (2002) experiments, Dijksterhuis' (2002) experiments do not provide compelling evidence for conditioning effects but are open to the alternative explanation that affect induction or selective activation of self-knowledge caused the effects. Thus, his findings do not support the notion of conditioning effects on self-esteem.

Conclusion

Given (a) the paucity and inconclusiveness of the available research on subliminal conditioning effects on self-esteem and (b) the theoretical arguments against such effects, the conditioning model of the functioning of the MSSM appears rather speculative. However, there is some evidence that conditioning effects can (a) occur with subliminally presented stimuli (De Houwer et al., 1994, 1997) and (b) pertain to implicit measures of self-esteem (Baccus et al., 2002). Thus, it might be that the MSSM has conditioning effects. One goal of the present research was to test this. This was done by pitting the conditioning model against both the knowledge activation model and the affect model. The next chapter presents the hypotheses by which this was done.

5.2.3.2 Test of the conditioning model against the knowledge activation and affect models

The conditioning model partly makes the same predictions as the affect and knowledge activation models. To begin with, for the case that the self is both referent and target, the conditioning model predicts that self-esteem is higher in the positive versus negative condition (i.e., it predicts a congruent effect). The other two models predict the same for the case that the threshold for effects on self-esteem is at an intermediate or low level.

The overlap in the predictions of the models is smaller for the already described case that a nonself object is used as target. The conditioning model predicts that the effects of the MSSM are limited to the self and do not pertain to

objects not associated with the self (called *nonsel self object* hereinafter). Thus, for the case that a nonself object is the target, the conditioning model predicts a null effect. This prediction is identical to the prediction derived from the knowledge activation model for the same case under the assumption that the nonself object is unfamiliar. The affect model, however, makes a different prediction. It predicts a valence congruent effect on evaluation of the nonself object, provided that (a) the nonself object is unfamiliar and (b) there is a congruent effect on self-esteem. Thus, there is a pattern of results (valence congruent effect on self-esteem, null effect on evaluation of the nonself target) that would contradict one of the three alternative models but that would still be in line with two of the models. If this pattern of results is observed, it will be necessary to pit the conditioning against knowledge activation model.

This can be done by replacing the self referent of the MSSM by a nonself referent. If one adds this to the design that has already been developed for the competitive test of the affect and knowledge activation models, then a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) x 2(target: self vs. nonself) design results, with the same unfamiliar object as nonself referent and nonself target. This design permits a test of all three models against each other. This becomes evident when one looks at the predictions of the three proposed models for the nonself referent conditions. An implication of the conditioning is that the valence primes will have an effect only if target and referent denote either the same object or closely associated objects (cf. Walther, 2002). Hence, according to this model, in the nonself referent conditions, the valence primes should affect only the evaluation of the nonself object and should not affect self-esteem. That is, as to the nonself referent conditions, the conditioning model predicts a valence congruent effect on the evaluation of the nonself target and a null effect on self-esteem.

The knowledge activation model makes a different prediction. According to this model, a null effect should result in any case if the nonself object is both referent and target. The reason is basically the same as for the case that the self is referent and the nonself object is target: Because no knowledge about the (unfamiliar) nonself object is stored in memory, neither the valence primes nor the nonself referent can activate target-relevant knowledge. Hence, the primes cannot affect the evaluation of the nonself object.

Analogously, the knowledge activation model assumes that the nonself referent is irrelevant if the self is target. The reason is that because of its unfamiliarity, the nonself referent cannot activate any knowledge in general and hence no target-relevant (i.e., self-) knowledge in particular. Thus, only the valence primes can affect self-esteem in this case. As explained above, the effects of the valence primes depend on the threshold for knowledge activation effects on self-esteem. Therefore, both a null effect and a valence congruent effect are possible. Because the threshold cannot be determined a priori, both predictions are equally plausible. To summarize, for the nonself referent conditions, the knowledge activation model predicts a null effect on evaluation of the nonself target

and either a null effect or a valence congruent effect on self-esteem.

The predictions mentioned so far are already sufficient to test the three models against each other. Nevertheless, for sake of completeness, let us look at the predictions of the affect model for the nonself referent conditions. According to the affect model, the effects of the MSSM depend on (a) the thresholds for effects on self-esteem and on evaluations of the nonself target and (b) the valence of the nonself object. A valence congruent effect on self-esteem (the evaluation of the nonself target) should occur if at least one valence node receives sufficient activation from the corresponding valence prime and the nonself referent to overcome the threshold for effects on self-esteem (the evaluation of the nonself target). If this is not the case, a null effect should occur. Again, because the level of the threshold is unknown, all these cases appear equally likely.

5.2.3.3 An alternative model based on the notion of on-line judgments

There is another, intuitively appealing model that leads to the same predictions as the conditioning model. This model is called *on-line judgment model* hereinafter. It holds that participants combine the referent prime and the valence primes into a sentence denoting an attribute of the referent. That is, if a self referent is presented together with the valence primes, participants should unconsciously construct phrases such like „I am good“ or „I am bad“ from the presented stimuli. Next, participants may unconsciously conclude from these phrases that their self-esteem is high and low, respectively. This would be an example of an on-line judgment (Chap. 3.2). Thus, like the three models proposed above, the on-line judgment model predicts a valence-congruent effect on self-esteem for the case that the self is both referent and target.

The predictions by the on-line judgment model for the other conditions of the mentioned 2 x 2 x 2 design are identical to those by the conditioning model. According to on-line judgment model, if the self is referent but not target, the encoded phrases should be irrelevant to the target (because they refer to the self, not the target). Hence, a null effect should occur. Analogously, if a nonself referent is used, participants should construct sentences of the type „(nonself object) is good“ versus „(nonself object) is bad“. This should influence the evaluation of the nonself object (again via an on-line judgment) but not self-esteem (because the encoded phrases refer to the nonself referent, not to the self). That is, a valence congruent effect and a null effect should occur, respectively. Thus, altogether, the on-line judgment model makes the same predictions as the conditioning model. Hence, the 2 x 2 x 2 design described in the preceding chapter does not allow for a competitive test of the two models.

However, a severe disadvantage of the on-line judgment is that it is empirically (even) less supported than the conditioning model. In particular, previous research failed to demonstrate that participants can encode multiple subliminally presented words as a single sentence. Greenwald (1992) suggested that the best way of testing for this possibility would be to pit the effects of the whole sen-

tence and its component words against each other. Only one such test has been reported to date (Greenwald and Liu, 1985, cited in Greenwald, 1992). In this experiment, participants were subliminally exposed to two-word sentences that had partly the opposite, partly the same evaluative meaning than their component words. Examples of sentences were „enemy loses“ or „friend wins“. The positive versus negative effects of the stimuli were measured with response times in a classification task that asked participants to indicate the valence of a series of positive or negative target words. If participants encoded the meaning of the sentences, both of the mentioned sentences should have positive effects. If participants encoded only the meaning of the component words without combining them into a sentence, „enemy loses“ should have a negative effect, whereas „friend wins“ should have a positive effect. Only the latter prediction was supported. Thus, the results do not support the proposition that persons can construct sentences from two subliminally presented words. Because other studies bearing on this issue are not available, the on-line judgment model of the functioning of the MSSM appears even more speculative than the conditioning model. Hence, the latter is preferred here as a basis for predicting the effects of MSSM, and the role of on-line judgments in the effects of the MSSM is not discussed further in this thesis.

5.2.4 Summary

The method proposed herein, the MSSM, consists of the subliminal presentation of general evaluative words that are shown simultaneously with a self-referring word. As explained above, the MSSM may influence self-esteem through at least three processes: knowledge activation, affect, and conditioning. These processes are not mutually exclusive. For example, it is conceivable that the MSSM affects self-esteem through both affect induction and knowledge activation.

The MSSM was designed with respect to the goal to affect self-esteem primarily through self-knowledge activation. The preceding chapters have shown that a possibility to find out whether this is indeed the dominant mediating process is to conduct an experiment with a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) x 2(target: self vs. nonself) design. In this experiment, nonself referent and nonself target refer to the same unfamiliar object, and target evaluation is the dependent variable.

Table 1 summarizes the predictions for this design. As can be seen, all models have in common that they predict a congruent effect of the valence primes in the self referent/self target condition. Of course, each model allows for the alternative prediction that a null effect emerges in this condition. According to the affect and knowledge activation models, this should happen if the intensity of the stimulus presentation is too low to overcome the thresholds for effects on self-esteem; according to the conditioning model, this should happen if the stimuli fail to affect self-valence associations. In either case, the question of what mediates the self-esteem effects of the MSSM would be meaningless.

Hence, the predictions for the nonself target conditions and the self-target/ nonself referent condition presuppose that a congruent effect does occur in the self-target/self-referent condition.

Another prediction consistently made by all models is that the valence primes may not affect self-esteem if the valence primes are not paired with a self referent. According to the affect and knowledge activation models, this should happen if the valence primes alone are not sufficient to overcome the threshold for effects on self-esteem; according to the conditioning model, this should happen in any case if no self referent is presented.

Table 1.

Overview of alternative models of the functioning of the MSSM

Name of model (in parentheses: assumed mechanism mediating the effects of the MSSM)	Predicted effects of the valence primes on evaluative judgments			
	Self as target		Nonself object as target	
	Self as referent	Nonself object as referent	Self as referent	Nonself object as referent
Knowledge activation model (spreading activation; target evaluation based on accessible target-related information)	Congruent effect	Null effect or congruent effect	Null effect	Null effect
Affect model (spreading activation; target evaluation based on affect)	Congruent effect	Null effect or congruent effect	Congruent effect	Null effect or congruent effect
Conditioning model (change in the association be- tween referent and valence in long-term memory; target evaluation based on this associa- tion)	Congruent effect	Null effect	Null effect	Congruent effect

Note. The predictions presuppose that (a) the same nonself object is used as referent and target and (b) the nonself object is unfamiliar for the participants. Congruent effect: more positive evaluation after the presentation of the positive primes than after the presentation of the negative primes.

Thus, all models suggest that the self referent may be necessary for the MSSM to affect self-esteem. The first experiment reported in the following was designed to test this prediction. Therefore, the design of this experiment consisted only of the self-target conditions shown in Table 1. That is, it had a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) design.

The second experiment reported in the following pitted all three models against each other. Its design comprised all conditions depicted in Table 1. Thus, it had a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) x (target: self vs. nonself) design. Because no two models predict the same pattern of results for all of these conditions, the experiment was suited to reveal whether one of the three postulated processes, and which one, dominated over the others.

6 Experiments

This chapter starts with a discussion of two issues referring to (a) technical details of the MSSM and (b) the measurement of self-esteem as dependent variable (Chap. 6.1). In Chapters 6.2 through 6.5, four experiments are reported that were designed to (a) test whether the MSSM influences scores on self-esteem scales (Exp. 1-3), (b) elucidate the underlying psychological mechanisms (Exp. 2), (c) explore side-effects on mood (Exp. 1), and (d) test a causal hypothesis regarding self-esteem (Exp. 4).

6.1 *General operationalization issues and overview of experiments*

Before the validation of the MSSM, two issues need to be solved:

- Which of the available paradigms for subliminal stimulation is suited best for presenting the stimuli of the MSSM?
- Which self-esteem measure is suited best for demonstrating the validity of the MSSM?

This chapter provides an answer to either question (Chap. 6.1.1 and 6.1.2). In addition, it gives an overview of the present experiments (Chap. 6.1.3).

6.1.1 **Stimulus presentation in the MSSM: foveal or parafoveal?**

In most contemporary studies on unconscious perception, one of two experimental paradigms is used. They are called *foveal-priming paradigm* and *parafoveal-priming paradigm* hereinafter. These paradigms differ in the duration of stimulus presentation and the location of the stimuli.

In the foveal-priming paradigm, the stimuli are presented foveally at durations between 4 and 30 ms in the center of the person's visual field, that is, in the so-called foveal area (e.g., Baldwin et al., 1990; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Kunst-Wilson & Zajonc, 1980). Usually, the foveal area is in the attentional focus of the person. Thus, presenting stimuli in this area ensures that they receive maximum attention. This, in turn, ensures that they can be detected even at short presentation durations. Note that attention does not necessarily lead to awareness. Rather, attention can facilitate processing also of stimuli that are not consciously recognized (Naccache, Blandin, & Dehaene, 2002). Evidently, the foveal-priming paradigm exploits this facilitating effect of attention.

The parafoveal-priming paradigm (e.g., Bargh & Pietromonaco, 1982; Chartrand & Bargh, 1996) is designed to circumvent the person's attention rather than to exploit it. Parafoveal means that the stimuli are presented at a certain distance (2 to 6 degrees) from the center of the person's visual field. In this area, the so-called parafoveal area, stimuli do not receive enough attention to be consciously perceived but do receive enough attention to be encoded (Chartrand & Bargh, 1996; Rayner, 1978). Because it takes at least 100 ms until

the eye moves into the direction of a parafoveally presented stimulus (Bargh & Chartrand, 2000), words can be presented for the same time in the parafoveal area without being consciously perceived. Thus, this paradigm allows for a longer presentation of verbal stimuli than the foveal-priming paradigm. This longer presentation time can compensate for the smaller amount of attention that parafoveally presented stimuli receive as compared with foveally presented ones. Thus, parafoveal priming may have effects that are at least equally strong as the effects of foveal priming. In fact, a research overview by Greenwald and Abrams (2000) suggests that the effects of parafoveal priming (with backward masking) usually last longer than the effects of foveal priming (with both forward and backward masking).

Because of the arguably stronger effects of parafoveal priming, the present research employed a parafoveal priming paradigm in applying the MSSM. In particular, the procedure developed by Bargh and Pietromonaco (1982) was adapted. Chapter 6.2 describes this procedure more in detail.

6.1.2 Measurement of self-esteem

To give the effects of the MSSM a maximum chance to be detected, the initial test of the method should use a self-esteem measure that is particularly sensitive to short-term fluctuations of self-esteem. As Heatherton and Polivy (1991) note, most self-esteem measures were not designed for this purpose but were intended to be trait measures. To illustrate the consequences of this, Heatherton and Polivy (1991) cite examples of studies that did not find self-esteem changes on established scales after exposing participants to ego-threatening events (McFarlin & Blascovich, 1981; Nisbett & Gordon, 1967). However, as noted above in Chapters 3 and 4, several studies did find effects on subjective-trait measures after such manipulations (e.g., effects of autobiographical recall on the Rosenberg scale: Levine et al., 1994; effects of social comparisons on the Coopersmith scale: Morse & Gergen, 1970; effects of feedback on the Rosenberg scale: Greenberg et al., 1992). Yet, the manipulations in these studies were usually supraliminal and rather intensive (e.g., feedback, intensive imagery, social comparisons in a real-life setting). Subliminal stimulation may have weaker effects in general. Therefore, it seemed advisable to rely on a more change sensitive measure in the present research.

Heatherton and Polivy's (1991) SSES seemed appropriate in this respect. This measure was designed for detecting short-term fluctuations of self-esteem. The SSES consists of 20 items tapping specific self-evaluations in various domains. The items were selected from Fleming and Courtney's (1984) and Pliner, Chaiken, and Flett's (1990) modifications of the Janis-Field scale. The standard instruction of the SSES emphasizes that the items should be answered with respect to how participants feel at the moment. Thus, in the present terminology, the scale refers to subjective state self-esteem.

On the basis of oblique factor analyses, Heatherton and Polivy (1991, Study 1) divided the SSES into three correlated subscales, which they labeled Appear-

ance (sample item: „I am satisfied with my body weight“), Performance (sample item: „I feel that I have less scholastic ability right now than others“, reverse coded), and Social Relationships (sample item: „I feel inferior to others at this moment“, reverse coded). Because in that study, the subscale scores were strongly correlated ($r_s > .50$) and the internal consistency of the total scale was high ($\alpha = .92$), it seems justified to use the SSES as an indicator of general self-esteem. Heatherton and Polivy themselves as well as other researchers (e.g., Baldwin, 1994; Ikegami, 2002) did use the SSES for this purpose.

In a series of studies (Studies 3-5), Heatherton and Polivy found expectation consistent changes on the total scores of the SSES after self-esteem relevant events such as feedback and psychotherapy. The effects were strongest on the subscales referring to the same domain as the events (e.g., on the performance subscale after feedback on an academic test). Other researchers have also found expectation-consistent effects of self-esteem manipulations on the SSES (e.g., Baldwin, 1994; Ikegami, 2002). Together, these studies attest to the validity of the SSES as a measure of context determined short-term changes of self-esteem. Hence, the SSES was used herein in the initial test of the MSSM (Exp. 1). The extent to which the results can be generalized across self-esteem measures was explored in the next experiments (Exp. 2 and 3).

6.1.3 Overview of experiments

In the following, results from four experiments are presented. *Experiment 1* (Chap. 6.2) had a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) between-participants design. Its main goal was to test for the Valence x Referent interaction predicted by all the models presented in Chapter 5.2. A second goal was to explore whether the MSSM affected mood. Thus, a mood measure was included as an additional dependent variable. A third goal was to explore whether the MSSM had differential effects on the subscales of the self-esteem measure used.

Experiment 2 (Chap. 6.3) had the goals to replicate the findings for self-esteem from Experiment 1 and to explore the processes mediating these effects. Specifically, the models described in Chapter 5.2 were tested against each other. The same manipulation as in Experiment 1 was used. The first the dependent variable was self-esteem, which was measured with another scale than in Experiment 1. The second dependent variable was the evaluation of the nonself referent. Both variables were measured with comparable scales. Thus, there was a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) x 2(target: self vs. nonself) mixed design with repeated measurement on the last factor. The predictions tested are those described in Table 1 (Chap. 5.2).

The goal of *Experiment 3* (Chap. 6.4) was to replicate the effects of the MSSM on yet another self-esteem measure. Specifically, the dependent measure was Fleming and Courtney's (1984) self-esteem scale (called *Fleming–Courtney scale* hereinafter). This is a composite measure, which includes four domain specific scales alongside a global scale similar to the Rosenberg scale. Thus, by

means of this measure, it was possible to both replicate the domain specific effects from Experiment 1 and 2 and explore the effects on global self-esteem. This is important in the light of the conclusion from Chapter 2.2.3 that only findings obtained with both global and specific self-esteem measures can be viewed as involving general self-esteem. Moreover, because most items of the Fleming–Courtney scale require judgments that are generalized across time and situations, the scale measures subjective trait self-esteem. Hence, the experiment was suited to explore whether the MSSM affected subjective trait (and not only state) self-esteem. The design of the experiment was one-factorial (valence: positive vs. negative, with the self as referent in either condition).

Experiment 4 had the goal to explore whether the MSSM affected self-esteem per se and not only self-reports of self-esteem. To this end, a plausible hypothesis about the effects of self-esteem was tested. The same manipulation as in Exp. 3 was used. Next, a failure experience was induced. Participants' attributions of the failure constituted the dependent variable. Previous research has shown that persons with high self-esteem attribute own failure in a more self-serving manner than do persons with low self-esteem. If (a) self-esteem is the cause of these attributional tendencies and (b) the MSSM affects self-esteem, then participants' failure attribution should be more self-serving in the positive condition than in the negative condition of this experiment. This finding would both demonstrate a causal role of self-esteem in attribution and – more important in the present context – suggest that the MSSM is a manipulation of genuine (rather than only self-reported) self-esteem.

6.2 Experiment 1

This experiment tested for the Valence x Referent interaction postulated by all three models introduced above. Moreover, the experiment explored the effects of the MSSM on mood and specific self-evaluations.

6.2.1 Participants and design

One-hundred and six students from several faculties of the University of Mannheim participated in the study and were randomly assigned to the cells of a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) design. Participants received sweets for compensation. Two participants were dropped because they were not native speakers of German, leaving 104 participants (47 women, 57 men) for the analyses described below.

6.2.2 Apparatus and materials

The procedure by which the adjectives and the referent were presented was adapted from Chartrand and Bargh (1996, Exp. 2). It took the form of an alleged vigilance task, which was performed at the computer. The program for the task had been written with MEL 2 Professional software. Participants were seated in front of 38 cm/60 Hz monitors so that the distance between their eyes and the

middle of the screen was approximately 50 cm when they sat upright in their chair, as they were instructed to do. This ensured that the valence primes and the referent stimuli appeared in the appropriate positions of participants' visual field.

All letters presented during the task were white capital letters appearing on a black background. Throughout the task, an asterisk was presented in the middle of the screen. Participants were told to focus their gaze on the asterisk all the time. The adjectives and referent words appeared in the area between 2 and 5 cm around the asterisk. This area corresponded to participants' parafoveal visual field if they sat at the described distance from the screen. Like in Chartrand and Bargh's (1996) research, each word was presented for 60 ms and then masked for another 60 ms by a meaningless string composed of eight consonants (e.g., *JZPBLKDF*). Also like in Chartrand and Bargh's research, word and mask appeared in one of four positions that were equidistant from the fixation point at angles of 45, 135, 225 and 315 degrees. The computer program randomly selected one of the positions for each trial. A difference from Chartrand and Bargh's research is that whereas they presented only one word in each trial, two words were presented in each trial in the present experiment. One word was the valence prime and the other word was the referent. The referent was always presented in the next line centered below the valence prime.

In the self condition and nonself condition, the referent was *ich* (the German word for „I“) and *Leo*, respectively. Leo is a male first name that is rare but commonly known in Germany. Hence, the stimulus *Leo* appeared likely to denote an unfamiliar and non-self referring object for participants, as the purpose of the experiment required. In the positive and negative condition, the adjective paired with the referent in each trial was one of the German words *gut*, *toll*, and *wertvoll* („good“, „great“, and „valuable“) and one of the German words *schlecht*, *mies*, and *unnütz* („bad“, „lousy“, and „worthless“), respectively. Each word was shown 25 times in either condition. Word presentation order was randomized for each participant.

Participants' task was to indicate whether the stimuli – allegedly „flashes“ – had appeared on the left or right side of the screen. Immediately after the participant pressed a response key, the asterisk disappeared for 500 ms. The next flash appeared after 1000, 1500, 2000, or 2500 ms. The computer program randomly selected the time span for each trial.

6.2.3 Procedure

Up to six participants were run simultaneously. When entering the laboratory, participants were greeted by the experimenter and learned that they would take part in two unrelated studies. The experimenter told them that the first study would deal with reaction ability and would consist of a computer task whereas the second one would deal with students' personality and would require filling out a questionnaire. Then the experimenter asked participants to sit down in front of a computer and to move their chairs to the positions marked with stripes

on the floor. These were the positions where participants looked at the screen from the distance required for parafoveal perception of the presented word as explained above. The experimenter explained that keeping one's chair on this position was necessary because all participants should have the same distance from the screen. When participants' chairs were in the correct position, the experimenter asked them to read the instructions on the screen and then to begin with the task.

The instruction on the screen informed participants that they were going to perform a reaction task (see Chap. 9.2, for the wording of the instruction as well as for all other materials used in this experiment and the following ones). The instruction told them that during this task, an asterisk would be presented in the middle of the screen and that participants should focus their gaze on the asterisk throughout the task. Moreover, the instruction explained that flashes would briefly appear at randomly selected places around the asterisk and that participants' task was to indicate as fast as possible whether the flash appeared on the right or left side of the screen. For this purpose, they should press the letter key *E* (marked with a red sticker) if the flash appeared on the left side and the letter key *I* (marked with a blue sticker) if the flash appeared on the right side. Moreover, the instruction emphasized that because the location of the flashes cannot be predicted, participants would be able to react most quickly if they kept their eyes focused on the asterisk all the time. Finally, participants were instructed to place their index fingers on the letter keys *E* and *I*, to sit upright and not to move their chairs, and to press the space bar when they were ready.

After participants had pressed the space bar, the reaction task started. Participants took about 4 minutes to complete the 75 trials. On the final screen, participants were thanked for their participation in the reaction study and were told to give the experimenter a sign. Then they received a questionnaire from the experimenter and filled it out at their work-place.

The questionnaire started with a mood scale consisting of three 9 point scales anchored with *At this moment I am in a bad mood* versus *in a good mood*, *At this moment I am feeling happy* versus *feeling sad* (reverse coded) and *At this moment I am feeling good* versus *feeling bad* (reverse coded). In a study by Ricketta and Dauenheimer (in press), the scale was highly reliable ($\alpha = .93$) and revealed hypothesis consistent effects of an unobtrusive priming manipulation. This suggests that the scale is valid and rather sensitive to subtle mood manipulations.

The SSES followed. Like in Heatherton and Polivy's (1991) research, the instruction for the SSES read that each item should be answered with regard to how participants felt at the moment. Each item had to be answered on a 5 point Likert scale. Participants took about three minutes to complete the scale. Next, participants had to indicate whether they had a relative or an acquaintance with the name *Leo*.

Three open questions concerning the nature of the experiment followed on the questionnaire. Specifically, participants were asked to write down (a) what

they thought the purpose of the reaction time task and the questionnaire was, (b) whether and how the reaction time task had influenced them in completing the questionnaire, and (c) what they thought the flashes in the reaction time task actually had been; they should describe as precisely as possible what they had seen. Next, participants provided demographic data and indicated whether they had learned to speak German before the age of six. The answer to this question should indicate whether participants were native speakers of German or not. As already mentioned, data from participants answering „no“ to this question were excluded from analyses. Finally, participants were thanked, debriefed, and dismissed.

6.2.4 Results

All p values reported in the following are two-tailed. Results with $p \leq .05$ and $.10$ are labeled *significant* and *marginally significant*, respectively.

The answers to the awareness check questions on the questionnaire indicated that no participant (a) guessed the aim of the experiment correctly or (b) reported to have been influenced by the reaction time task in a way that would have indicated awareness of the true purpose of the experiment. Moreover, no participant reported to have seen the correct words presented during the task. Instead, almost all participants reported to have seen nothing particular or only letters in the flashes. Only 12 participants claimed to have seen specific words, and those words were neither semantically nor orthographically related to the actual words. This suggests that the perception of the stimuli of the MSSM was indeed unconscious. Furthermore, all participants answered „no“ to the question whether they had an acquaintance or a relative with the name *Leo*. In addition, an inspection of the lists on which participants confirmed the receipt of their compensation for participation revealed that none of them had this name. Together, this suggests that the stimulus *Leo* was indeed a nonself referent and denoted a rather unfamiliar person or object for all participants.

The average scores of the mood scale ($\alpha = .92$) and the SSES ($\alpha = .85$) were entered into separate 2 (valence) \times 2 (referent) ANOVAs. The effects for mood were far from significance, $F_s < 0.04$, $p_s > .86$. As Table 2 shows, the mood scores were almost identical in all four cells.

With respect to self-esteem, the main effects of valence or referent were nonsignificant, $F_s(1, 100) < 2.70$, $p_s > .10$. The predicted Valence \times Referent interaction was significant, $F(1, 100) = 4.16$, $p = .04$. Pairwise contrasts revealed that self-esteem was significantly higher after positive than negative adjectives in the self-referent condition, $t(50) = 2.37$, $p = .02$, but not in the nonself referent condition, $t(50) = 0.33$, $p = .64$. Thus, the valence primes affected self-esteem only when they were paired with *I* but not when they were paired with *Leo*.

Table 2 shows that the means were about equally high in the Leo/positive, Leo/negative, and self/positive conditions and were markedly lower in the self/negative condition. Accordingly, the self/negative condition differed at least marginally significantly from the Leo/negative and Leo/positive conditions,

$t(52) = 2.18, p = .03$ and $t(52) = 1.66, p = .10$, respectively. The self/positive condition did not differ significantly from the Leo/negative or Leo/positive conditions, $t_s < .75, p_s > .45$.

Table 2

Mood and self-esteem by valence and referent (Experiment 1)

Adjective Valence	Mood			Self-Esteem		
	Referent		Total	Referent		Total
	<i>I</i>	<i>Leo</i>		<i>I</i>	<i>Leo</i>	
Negative	6.45 (1.52)	6.44 (1.56)	6.44 (1.53)	3.64 (0.61)	3.94 (0.38)	3.78 (0.53)
Positive	6.44 (1.48)	6.53 (1.47)	6.49 (1.46)	4.01 (0.50)	3.90 (0.54)	3.95 (0.52)
Total	6.45 (1.49)	6.48 (1.50)	6.46 (1.49)	3.80 (0.59)	3.92 (0.46)	3.87 (0.53)

Note. Standard deviations in parentheses. Ns per cell range from 24 to 28. Scale range is 1-9 for mood and 1-5 for self-esteem.

Additional 2(valence) x 2(referent) ANOVAs were conducted on the mean scores of the Appearance, Performance, and Social Relationships subscales of the SSES (alphas = .69, .81, and .75, respectively). Valence had a significant main effect on the performance subscale, $F(1, 100) = 3.91, p = .05$, but not on the two other subscales, $F_s < 1.32, p_s > .27$. As Table 3 shows, the main effect on the Performance subscale had the expected direction (higher scores in the positive condition). Furthermore, the referent did not have a significant main effect on the Performance and Social Relationships subscales, $F_s(1, 100) < 0.38, p_s > .54$, but had a marginally significant main effect on the Appearance subscale, $F(1, 68) = 2.56, p = .08$, which yielded a higher score in the Leo condition than the self condition (Table 3). Finally, the Valence x Referent interaction was marginally significant for the Appearance subscale, $F(1, 100) = 3.00, p = .09$, and the Performance subscale, $F(1, 100) = 3.73, p = .06$, and nonsignificant for the Social Relationships subscale, $F(1, 100) = 1.88, p = .17$.

Pairwise contrasts revealed that valence did not have significant effects in the Leo condition for any of the three subscales, $t_s(40) < 1.22, p_s > .46$. In the self condition, valence had at least marginally significant and expectation consistent effects on the Appearance subscale, $t(38) = 1.88, p = .06$, and the Performance subscale, $t(38) = 2.95, p = .01$, but not the Social Relationships subscale, $t(38) = 0.77, p = .44$. Thus, in total, the manipulation had its strongest effect on the Performance subscale, a weaker but marginally significant effect on the Appearance subscale, and a clearly nonsignificant effect on the Social Relationships subscale.

Table 3

Scores on the subscales of the State Self-Esteem Scale by valence and referent (Experiment 1)

Adjective valence	Appearance subscale			Performance subscale			Social Relationships subscale		
	Referent		Total	Referent		Total	Referent		Total
	<i>I</i>	<i>Leo</i>		<i>I</i>	<i>Leo</i>		<i>I</i>	<i>Leo</i>	
Negative	3.45 (0.65)	3.93 (0.58)	3.70 (0.66)	3.70 (0.72)	4.09 (0.76)	3.90 (0.76)	3.71 (0.73)	3.88 (0.51)	3.81 (0.63)
Positive	3.84 (0.68)	3.86 (0.53)	3.85 (0.60)	4.32 (0.61)	4.10 (0.75)	4.21 (0.68)	3.88 (0.61)	3.66 (0.66)	3.77 (0.64)
Total	3.64 (0.68)	3.90 (0.55)	3.77 (0.63)	4.00 (0.73)	4.09 (0.74)	4.05 (0.73)	3.79 (0.68)	3.78 (0.59)	3.79 (0.63)

Note. Standard deviations in parentheses. *Ns* per cell range from 24 to 28. Scale range is 1-5.

6.2.5 Discussion

The results of Experiment 1 are conclusive in several respects. First, they suggest that the MSSM can indeed affect self-esteem and that the findings indicate that the self referent does matter for this effect. In particular, pairwise contrasts revealed that valence had a statistically significant effect on self-esteem only when the adjectives were combined with the word *I* and not when they were combined with the word *Leo*. Both effects together accounted for a statistically significant interaction between referent and valence. Thus, the interaction that all three models described in Chapter 5 predicted did emerge.

Second, the results suggest that the MSSM is more effective in decreasing rather than increasing self-esteem. This is suggested by the fact that self-esteem was almost identical in the self/positive, Leo/positive, and Leo/negative conditions and was markedly lower in the self/negative condition. Because this asymmetry was not predicted, it is discussed later (Chap. 7), after additional evidence bearing on the direction of the effects has been presented.

Another third finding is that the MSSM had clearly no effect on mood. This resembles Baldwin's (1994) finding that subliminally presented stimuli influenced self-esteem but not mood. Thus, the MSSM may indeed avoid confounding mood and self-esteem.

Finally, the experiment provided initial insights into the domain specificity of the effects. An analysis of the scores of the three subscales of the SSES revealed that the valence primes in the self condition had their strongest effects on the Performance subscale, smaller effects on the Appearance subscale and almost negligible effects on the Social Relationships subscale. Like the effects on the total scale, the effects on the Performance and Appearance subscale seemed to have been stronger in the negative versus positive direction. Because no hypotheses concerning the domain specificity of the effects had been formulated,

this pattern of results is not yet interpreted here. Again, this is done later (Chap. 7), after the results of additional domain specific analyses have been reported.

6.3 Experiment 2

The purpose of this experiment was twofold. First, it should replicate the Valence x Referent interaction for self-esteem from Experiment 1. Second, it should explore the psychological processes underlying this interaction. To this end, the evaluation of the nonself referent was included as an additional dependent variable alongside self-esteem. As explained in Chapter 5.2, this enabled a competitive test of the three models introduced above.

6.3.1 Participants and design

Seventy students from several faculties of the University of Mannheim participated in the study and were randomly assigned to the cells of a 2(valence: positive vs. negative) x 2(referent: self vs. nonself) x 2(target: self vs. nonself) design with repeated measurement on the last factor. Participants received sweets for compensation. Eight participants were dropped because they were not native speakers of German, leaving 62 participants (52 women, 10 men) for the analyses reported in the following.

6.3.2 Apparatus, materials, and procedure

Everything was identical to Experiment 1 with the following exceptions. First, instead of the mood scale and the SSES, participants completed two other scales. The first scale was designed to measure the evaluation of the nonself referent *Leo* and the second one was designed to measure self-esteem. In particular, the instruction for the *Leo* evaluation scale read: „The goal of this study is to find out what associations particular first names have. Each participant is to evaluate a single first name, which has been randomly assigned to him/her. Please indicate for each of the following personality characteristics how strongly you associate it with the first name *Leo*.“ The instruction for the self-esteem scale read: „Please evaluate yourself with regard to the following characteristics. Please indicate for each of the following personality characteristics to what extent it applies to yourself in your opinion.“ After either instruction, the same 11 trait words followed, accompanied by 9-point rating scales anchored with *totally applicable* and *not at all applicable*. The order of the trait words differed between the scales. The trait words were selected from several semantic differentials used as measures of general self-esteem in previous studies (Julian, Bishop, & Fiedler, 1966; Leary, Tambor, et al., 1995). The words were selected such that they pertained to the same domains as the SSES: appearance (*attractive, likable, repulsive*), performance (*incompetent, self-confident, smart, successful*), and social relationships (*charming, impolite, unfriendly, withdrawn*). This should facilitate a comparison between the domains-specific self-evaluations measured in Experiment 1 and 2.

6.3.3 Results

In their answers to the question referring to the purpose of the experiment, four participants uttered suspicion that they had been exposed to subliminally presented words during the reaction task. The data of these participants were excluded from the further analyses. The remaining participants did not utter awareness of the true purpose of the experiment. Moreover, in their answers to the question what the flashes in the reaction time task represented, two participants guessed that the word *Leo* accompanied by an adjective had been presented. One of these participants was among the four participants who were excluded due to their answer to the first question. The data from the other participant were also excluded from analyses. No other participant reported to have recognized concrete words. In total, the sample for the following analyses comprised 57 participants. If the data of the 5 participants excluded due to their awareness check answers were included, this would not change the pattern of results.

Again, an inspection of the lists on which participants confirmed the receipt of their compensation for participation revealed that none of them had the name *Leo*. This suggests that the stimulus *Leo* was a nonself referent for all participants. However, about a quarter (13) of the participants answered „yes“ to the question of whether they had an acquaintance or a relative with the name *Leo*. Remember that in Experiment 1, no participant gave this answer. Informal comments by some participants (orally after the experiment or written on the questionnaire) suggested an explanation for this difference. Specifically, these participants reported to have thought of Leo Kirch when answering „yes“ to this question. Leo Kirch was the owner of one of the largest media companies in Germany, which went bankrupt in the time span (about one year) between Experiment 1 and 2. This event received a lot of attention in the mass media. Maybe most if not all participants who indicated to know a person called *Leo* had this prominent figure in mind when they gave their answer. In this case, the stimulus *Leo* would still have denoted an object less familiar than and not associated with the self for those participants because it is unlikely that one of the participants had a personal relationship with Leo Kirch. Thus, *Leo* would have still been an appropriate nonself referent then.

To explore whether familiarity with the nonself referent made a difference, the same analyses were conducted once for all participants and once for a subsample comprising those who did not report to know a person called *Leo*. The patterns of results were similar, with the effects generally being less significant in the subsample. Hence, in the following, only the results for all participants are described in detail. The results from the analyses for the subsample are described in detail only insofar as they differ markedly from the results for the total sample.

The ratings for *Leo* and the self were coded so that a higher rating indicated a more positive evaluation. The average scores (alphas = .68 and .77, respectively) were entered into a 2(valence: positive vs. negative) x 2(referent: self vs.

Leo) x 2(target: self vs. *Leo*) ANOVA, with repeated measurement on the last factor. A significant main effect for target emerged, $F(1, 52) = 6.99, p = .01$. The self was evaluated more positively than *Leo* ($M = 6.77, SD = 1.06$ and $M = 6.26, SD = 1.01$, respectively). The other main effects and interactions were nonsignificant, with the strongest tendency emerging for the crucial Valence x Referent x Target interaction, $F(1, 52) = 2.04, p = .16$.

Because there were specific hypotheses about the differential effects on self-esteem versus *Leo* evaluation, separate 2(valence) x 2(referent) ANOVAs on *Leo* evaluation and self-esteem were conducted. The ANOVA for *Leo* evaluation yielded clearly nonsignificant findings, $F_s < .03, p_s > .89$. As Table 4 shows, the means were virtually identical in all cells. When the data of the 13 participants who reported to know a person called *Leo* were discarded, the results were essentially the same, $F_s < .65, p_s > .42$.

Table 4

Evaluation of the Nonself referent (Leo) and Self-Esteem by Valence and Referent (Experiment 2)

Valence	Leo Evaluation			Self-Esteem		
	Referent		Total	Referent		Total
	<i>I</i>	<i>Leo</i>		<i>I</i>	<i>Leo</i>	
Negative	6.30 (0.79)	6.24 (1.25)	6.27 (1.02)	6.33 (0.84)	6.97 (1.25)	6.62 (1.08)
Positive	6.24 (0.84)	6.25 (1.15)	6.25 (1.01)	7.09 (0.85)	6.60 (1.26)	6.85 (1.07)
Total	6.27 (0.84)	6.24 (1.18)	6.26 (1.01)	6.71 (0.91)	6.77 (1.24)	6.74 (1.07)

Note. Standard deviations in parentheses. N_s per cell range from 13 to 15. Scale range is 1-9.

The ANOVA for self-esteem revealed nonsignificant main effects, $F_s < 0.51, p_s > .47$. The predicted Valence x Referent interaction was significant, $F(1, 53) = 4.08, p = .05$. Pairwise contrasts showed that valence had a significant effect on self-esteem in the self condition, $t(28) = 2.48, p = .02$, but not in the *Leo* condition, $t(25) = 0.76, p = .45$. The pattern of means resembled the results of Experiment 1 (Tab. 4). A difference is that in the present experiment, a slight contrast effect in the *Leo* condition emerged. Thus, self-esteem tended to be higher in the self/positive than *Leo*/positive condition. Explorative analyses showed that neither the self/positive condition nor the self/negative condition differed significantly from the *Leo*/positive or *Leo*/negative condition with regard to self-esteem, $t_s < 1.62, p_s > .11$.

When the data from the 13 participants who reported to know a person called *Leo* were discarded, the Valence x Referent interaction for self-esteem was not significant any more, $F(1, 40) = 1.47, p = .23$. Rather than showing a slight contrast tendency, the self-esteem scores in the *Leo* conditions were al-

most equal then (negative condition: $M = 6.97$, $SD = 1.30$; positive condition: $M = 6.92$, $SD = 0.95$; $n = 12$ each), $t(22) = 0.10$, $p = .92$. In the self conditions, however, there was still a clear assimilation effect (negative condition: $M = 6.20$, $SD = 0.79$, $n = 11$; positive condition: $M = 6.90$, $SD = 0.89$, $n = 9$), $t(18) = 1.87$, $p = .08$. Moreover, the self/negative condition differed marginally significantly from both the Leo/negative and Leo/positive conditions, $t(21) = 1.70$, $p = .10$ and $t(21) = 1.99$, $p = .06$, respectively, whereas the self/positive condition did not differ from either Leo condition, $ts < .15$, $ps > .88$.

Like in Experiment 1, the domain specificity of the effects on self-evaluation was explored. For this purpose, analyses were carried out at item level. Table 5 displays the results for the self-referent condition. The strongest effects emerged on the items *likable*, *smart*, and *incompetent* ($ps < .10$). Weaker effects ($ps < .30$) occurred for the items *repulsive*, *successful*, *self-confident*, and *impolite*. The weakest effects emerged on the items *unfriendly*, *attractive*, *charming*, and *withdrawn* ($ps > .44$). In general, the effects on the performance-related items (*smart*, *incompetent*, *successful*, *self-confident*) were more consistent and on average stronger than the effects on the items that referred to the physical or social domain (*likable*, *repulsive*, *impolite*, *unfriendly*, *attractive*, *charming*, *withdrawn*). In the Leo condition, valence had a significant effect only on the item *withdrawn*, $t(25) = 2.31$, $p = .03$. The evaluation on this item was more positive after negative than positive priming, that is, showed a contrast effect, $M = 7.08$, $SD = 2.53$, and $M = 5.14$, $SD = 1.79$, respectively. The effects on the other items were nonsignificant, $ts < 1.24$, $ps > .22$.

When the data of the 13 participants who reported to know a person called *Leo* were discarded, the results at item level remained essentially the same. Although in the Leo condition, the contrast effect on the Leo-evaluation item *withdrawn* was still significant, $M = 7.33$, $SD = 2.46$, and $M = 5.42$, $SD = 1.78$, $t(22) = 2.19$, $p = .04$, the differences on the other items in the Leo condition were less pronounced in the subsample ($ts < 0.82$, $ps > .42$) than in the total sample. This resulted in the already mentioned absence of a contrast tendency on the total scale in the subsample.

6.3.4 Discussion

The results of Experiment 2 have a number of important implications. First, the experiment replicated the Valence x Referent interaction from Experiment 1. Again, the valence primes had an assimilative effect on self-esteem when they were paired with a self referent but had no significant effect when they were paired with a nonself referent. Thus, the self referent does seem to be necessary for the MSSM to have effects on self-esteem.

Second, the results are relevant to the issue of the direction of the effects. At first glance, the direction of the effects on self-esteem is less clear than in Experiment 2. The positive and negative primes seem to have had equally strong effects because self-esteem in the self/positive and self/negative conditions (7.09 and 6.33, respectively) was almost equidistant from the average of the Leo con-

ditions (6.77). However, unlike in Experiment 1, valence produced a slight contrast tendency in the Leo conditions. This tendency seems to have resulted from some participants' familiarity with the nonself referent. When the data of the participants who reported to have been familiar with the nonself referent were discarded, the pattern from Experiment 1 replicated: Only in the self/negative condition (and not in the self/positive condition), self-esteem differed markedly from the average of the Leo conditions. Moreover, for these participants, in both experiments, self-esteem was almost identical in the non-self/negative and non-self/positive conditions. Thus, if one looks only at participants for whom the stimulus *Leo* denoted an unfamiliar person – and for whom the Leo conditions are probably better suited as a control condition than for the other participants –, the findings from Experiment 1 and 2 consistently suggest that the manipulation is more effective in the negative versus positive direction. Possible reasons for this asymmetry are discussed in Chapter 7.

Table 5

Effects of valence on specific self-evaluations in the self condition, ordered by significance (Experiment 2)

Trait	Valence		Significance	
	Negative	Positive	<i>t</i> (28)	<i>p</i>
Likable	6.13 (1.73)	7.47 (1.19)	2.46	.02
Smart	6.07 (1.71)	7.33 (1.05)	2.45	.02
Incompetent (R)	6.13 (2.45)	7.53 (1.68)	1.83	.08
Repulsive (R)	7.33 (1.95)	8.20 (0.86)	1.57	.13
Successful	5.67 (1.59)	6.40 (1.30)	1.38	.17
Self-confident	6.07 (1.75)	6.80 (1.26)	1.32	.20
Impolite (R)	7.07 (1.39)	7.60 (1.30)	1.09	.29
Unfriendly (R)	6.67 (2.19)	7.20 (1.61)	0.76	.45
Attractive	5.87 (1.25)	6.27 (2.19)	0.62	.54
Charming	6.67 (1.29)	7.00 (1.60)	0.63	.54
Withdrawn (R)	5.93 (2.58)	6.20 (2.01)	0.32	.75

Note. Means with standard deviations in parentheses. Scale range is 1-9. R: reverse coded.

Third, like Experiment 1, the present experiment provided insights into the domain specificity of the effects. Analyses at item level revealed that the self/positive and self/negative conditions had stronger effects on self-evaluations related to performance than on self-evaluations related to the social or physical domain. This replicates the domain specific findings from Experiment 1. Chapter 7 provides a detailed discussion of the domain specificity of the effects of the MSSM.

Finally, the results shed light on the mediating mechanism. In Chapter 5.2, three alternative mediating mechanisms have been proposed: knowledge activation, affect, and conditioning. The observation that the priming procedure had clearly no effects on Leo evaluation contradicts both the affect model and the conditioning model but is in line with the knowledge activation model. Hence, the significant effects on self-esteem in this experiment are more likely to result from activation of evaluative self-knowledge than from either affective influences or changes of associative links in long-term memory. Thus, from a theoretical perspective, the arguably most interesting property of Experiment 2 from a theoretical perspective is that it adds to the support for the knowledge activation hypothesis (see Chap. 3.1).

6.4 Experiment 3

The goal of this experiment was to explore whether (a) the effects in the self condition of Experiments 1 and 2 replicated for judgments of subjective trait rather than state self-esteem and (b) the MSSM affected global self-esteem in addition to composite self-esteem.

6.4.1 Participants and design

Fifty students from various faculties of the University of Mannheim participated in the study and were randomly assigned to the experimental conditions (valence: positive vs. negative). Participants received sweets as compensation. Two participants were dropped because they were not native speakers of German, leaving 48 participants (25 women, 23 men) for the analyses reported below.

6.4.2 Apparatus, materials, and procedure

The manipulation was identical to the self condition of Experiment 2. That is, all participants were presented with the self referent and either negative or positive words. Next, participants completed Fleming and Courtney's (1984) self-esteem scale. This scale is a modification of the Janis–Field scale. The Fleming–Courtney scale consists of 36 items that, like the items of the SSES, mostly refer to specific domains. On the basis of factor analyses, Fleming and Courtney identified five subscales: Self-Regard (sample item: „Do you ever think you are a worthless individual?“, reverse coded), Social Confidence (sample item: „How often are you troubled with shyness?“, reverse coded), School

Abilities (sample item: „In turning in a major assignment as a term paper, how often do you feel you did an excellent job on it?“), Physical Abilities (sample item: „Have you ever thought of yourself as physically uncoordinated?“, reverse coded), and Physical Appearance (sample item: „How confident are you that others see you as being physically appealing?“). As mentioned in Chapter 2.2.2, these subscales correspond to the self-concept domains postulated by Shavelson et al. (1976). Because the Self-Regard subscale is a global scale as defined in Chapter 2.2.1, the Fleming–Courtney scale had the advantage that it allowed to explore the effects of the MSSM on global and composite self-esteem simultaneously. Moreover, the Fleming–Courtney scale was designed as a measure of subjective trait self-esteem. Accordingly, almost all items explicitly require judgments that are generalized over time and situations (e.g., „How often do you ...“; „Have you ever...“). Thus, the Fleming–Courtney scale had the additional advantage that it allowed to explore whether the MSSM affected subjective trait self-esteem.

Answers had to be given on 7-point scales. On average, participants took about five minutes to complete the scale. Finally, participants answered the same awareness check questions as in Experiment 1 and 2 and provided demographic data.

6.4.3 Results and discussion

The results of the awareness check questions were basically the same as in Experiment 1. No participant guessed the true purpose of the reaction task or was able to report a correct word presented during this task. Only one participant reported to have seen a concrete word at all.

Scores of the total Fleming–Courtney scale and its subscales were averaged. Table 6 shows the reliabilities and the results by experimental condition. The manipulation had a significant effect on the total scale, $p = .03$. As expected, the score was higher in the positive versus negative condition. From the five subscales, the strongest effects emerged on the School Abilities subscale, $p = .02$, followed by the Self-Regard and Social Confidence subscales, $p = .03$ and $.08$, respectively. The effects on the Physical Abilities and Physical Appearance subscales were nonsignificant, $p = .18$ and $.34$, respectively. On each subscale, the difference between the conditions had the same direction as on the total scale. Moreover, the average across the items of the four domain specific scales (labeled *Composite Self-Esteem* in Table 6) differed significantly between the experimental conditions, $p = .03$. Thus, like in Experiments 1 to 3, the MSSM affected composite self-esteem. An explorative analysis revealed that the correlation between the Self-Regard subscale and Composite Self-Esteem was $.79$. The correlation corrected for unreliability was $.89$.

Together, the present findings extend those from Experiments 1 and 2 in several respects. First, they suggest that the effects of the MSSM are not restricted to subjectively momentary self-esteem. Rather, the MSSM can affect also self-esteem judgments that are generalized over time from participants' per-

spective. In the terminology introduced in Chapter 2.3, the MSSM can affect subjective trait self-esteem as well as subjective state self-esteem.

Table 6
Results for the Fleming–Courtney scale and its subscales (Experiment 3)

Scale	Alpha	Valence		Total	Significance	
		Negative (<i>n</i> = 25)	Positive (<i>n</i> = 23)		<i>t</i> (46)	<i>p</i>
Total scale	.94	4.39 (0.97)	4.99 (0.81)	4.68 (0.94)	2.31	.03
Subscales						
Self-Regard	.86	4.91 (1.42)	5.68 (0.91)	5.28 (1.25)	2.24	.03
Physical Appearance	.79	4.59 (1.27)	4.93 (1.14)	4.75 (1.21)	0.97	.34
School Abilities	.78	3.93 (0.98)	4.64 (1.01)	4.27 (1.04)	2.46	.02
Physical Abilities	.77	4.68 (1.33)	5.21 (1.31)	4.94 (1.33)	1.36	.18
Social Confidence	.87	4.16 (1.14)	4.74 (1.06)	4.44 (1.26)	1.81	.08
Composite Self-Esteem	.91	4.26 (0.91)	4.83 (0.84)	4.53 (0.91)	2.22	.03

Note. Standard deviations in parentheses. Scale range is 1-7. Significance refers to the difference between the valence conditions. Composite self-esteem: average across the items of the Physical Appearance, School Abilities, Physical Abilities, and Social Confidence subscales.

Second, the significant effect on the Self-Regard subscale suggests that the MSSM affects not only global but also composite self-esteem. However, this conclusion has to be considered tentative. The reason is that global and composite self-esteem were very strongly correlated in this study (corrected $r = .89$, 79% explained variance). As mentioned in Chapter 2.2.3, the mean corrected correlation between global and composite self-esteem in previous research was .67 (45% explained variance). Thus, the correlation obtained in this experiment appears extraordinarily strong. A possible reason is that the items of the global scale and the composite scale were intermixed in this experiment whereas they typically were presented separately in the experiments reviewed in Chapter 2.2.3. The intermixed item presentation may have fostered a halo effect such that participants interpreted the global items in light of the items of the composite measure and vice versa (Marsh & Yeung, 1999). In particular, self-knowledge that is activated by the former items may influence participants' answers on the latter items and vice versa. Hence, the correlation between global and composite self-esteem may have been lower if the items of these two scales

had been presented separately rather than intermixed (Marsh & Yeung, 1999). In this case, the global scale and the composite scale may have assessed constructs that were more distinct from each other than in the case of intermixed items. Therefore, unless it has been shown that the MSSM can affect global self-esteem also under these conditions, the present results regarding global self-esteem should be interpreted with caution.

A third noteworthy outcome of Experiment 3 is that the above analyses at subscale level replicated the finding from Experiments 1 and 2 that the effects were stronger on items related to achievement than on items related to physical appearance or social relationships. Thus, this tendency seems to be robust. Possible causes and consequences of this tendency are discussed in Chapter 7.

Together, Experiments 1, 2, and 3 provide evidence for the effectiveness of the MSSM across different types of self-esteem (subjective state vs. trait, global versus composite). Moreover, the effects seem to last several minutes at least. This was the time that participants took to complete the self-esteem scales in those experiments. In theory, a time span in this order should be long enough to permit the investigation of short-term consequences of self-esteem. The next experiment was such an investigation.

6.5 Experiment 4

Wells and Marwell (1976) noted that a self-esteem manipulation does not prove successful unless it affects other manifestations of self-esteem besides self-reports of this variable. In particular, a manipulation may change the subjective meaning of the response alternatives of a self-esteem scale (Wells & Marwell, 1976, p. 212; see Mussweiler & Strack, 2000, for an empirical demonstration). In this case, the manipulation may influence self-reports of self-esteem but not self-esteem per se. The present experiment was designed to rule out this alternative interpretation of the results of Experiments 1 through 3.

In particular, this experiment was designed to explore whether the MSSM affected a phenomenon that is likely to be a consequence of self-esteem: self-serving bias. This term denotes the pervasive tendency to attribute own failures (successes) more (less) to external than to internal causes (for reviews, see Blaine & Crocker, 1993; Campbell and Sedikides, 1999; Zuckerman, 1979) and more (less) to unstable than to stable causes (e.g., Feather, 1987; Menapace & Doby, 1976). A number of studies have shown that self-serving bias is more pronounced among people with high as opposed to low self-esteem (e.g., Feather, 1987; Fitch, 1970; Swann et al., 1987; Tennen, Herzberger, & Nelson, 1987). In a meta-analysis of this research, Campbell and Sedikides (1999) found that persons with high global self-esteem showed a strong self-serving bias ($d = 1.05$, $k = 4$) whereas persons with low global self-esteem showed no self-serving bias ($d = -0.07$, $k = 4$). Therefore, the relation between self-esteem and self-serving bias appears strong.

In all previous studies on this relation, however, self-esteem was only a

measured variable. The following experiment was intended to replicate this relation by manipulating self-esteem. In particular, participants had to complete the same reaction task as in Experiment 3 (with self/negative and self/positive as the experimental conditions). Next, they received negative feedback allegedly on their performance on the task. After the feedback, participants had the opportunity to attribute their alleged failure in a self-serving manner. It was predicted that attributions were more self-serving in the self/positive versus self/negative condition. This result would suggest that (a) self-esteem is indeed a cause of the frequently observed differences in self-serving bias among low versus high self-esteem people and – most important – (b) the MSSM affects self-esteem per se and not only reports of it.

6.5.1 Participants and design

Twenty-eight students from several faculties of the University of Mannheim participated in the study and were randomly assigned to the two experimental conditions (valence: positive vs. negative). Participants received sweets as compensation. Three participants were dropped because they were not native speakers of German. Thus, data from 25 participants (12 women, 13 men) were analyzed, 13 of whom were in the negative condition and 12 in the positive condition.

6.5.2 Apparatus, materials, and procedure

Up to four participants were run simultaneously. The experimenter told them that they were to complete a reaction task and then to fill out a questionnaire. They were seated in front of computer monitors like in Experiments 1 through 3. The instruction on the screen informed participants that they would perform a reaction task and receive feedback on their performance immediately thereafter. The instruction announced that the feedback would be based on both speed and accuracy of the responses. The subsequent instructions and the reaction task were the same as in the previous experiments. After the last trial, a message that announced the feedback appeared on the screen. The message stated that currently the computer was (a) computing a single reaction ability score from the speed and accuracy of the participant's responses and (b) comparing this score to data from a representative sample of over 1,000 German university students who had completed the same task. The message announced that after having pressed the space bar, participants would learn how good their performance was in comparison with that sample of peers. Next, all participants received the same negative feedback, which read: „Regarding your reaction ability, you are among the worse 35 to 40 per cent of the German students. Thus, your reaction ability is clearly below average“. The final statement on the screen asked participants to turn over and complete the questionnaire that was on their desk.

On the questionnaire, participants had to indicate to what extent they attributed their test performance to ability and to chance. These two items denote at-

tribution options that are extreme with regard to the self-relevance of the induced failure: The ability item refers to an attribution of the failure to internal and stable factors whereas the chance item refers to an attribution to external and unstable factors. Thus, self-serving bias would be evident to the degree that participants attribute more to luck than to ability. Specifically, the attribution scale consisted of the question: „To which causes do you trace back your good or bad performance in the reaction task?“, followed by the statements: „I trace my result back to my reaction ability“ and „I have simply had good luck or bad luck“. Each statement was accompanied by a 9-point scale anchored with *completely disagree* and *completely agree*. Answers were coded from 1 to 9 so that higher scores indicated stronger attribution to the respective factor.

Having responded to the attribution items, participants answered the same awareness check questions and were asked to provide demographic data like in the previous experiments. On the last page of the questionnaire, participants were thanked, debriefed, and excused in written form.

6.5.3 Results and discussion

Similarly to the previous experiments, stimulus presentation in the context of the MSSM proved to be unobtrusive. No participant guessed the true nature of the reaction task or was able to report a correct word presented during this task. Like in the previous experiments, only few (4) participants stated to have seen any words. Moreover, participants' answers on the awareness check items provided no evidence that they were suspicious of the bogus nature of the feedback.

The difference between chance and ability attribution constituted the indicator of self-serving bias. A positive score indicated a higher attribution on chance than on ability and hence denoted a self-enhancing attributional pattern; a negative score indicated a self-deprecating pattern. As expected, the indicator of self-serving bias was positive in the positive valence condition ($M = 1.00$, $SD = 4.47$) and negative ($M = -2.54$, $SD = 3.28$) in the negative valence condition. This difference was significant, $t(23) = 2.27$, $p = .04$. Thus, participants attributed the failure in a more self-enhancing manner in the positive versus negative condition.

Explorative analyses for the single attribution items revealed that the difference in self-serving bias was largely due to the chance attribution, which was higher after the presentation of positive ($M = 5.50$, $SD = 2.71$) than negative ($M = 2.62$, $SD = 1.89$) adjectives, $t(23) = 3.10$, $p = .01$. The ability attribution differed slightly between conditions in the reverse direction ($M = 4.50$, $SD = 2.32$ and $M = 5.15$, $SD = 2.44$, respectively), although the difference was nonsignificant, $t(23) = 0.69$, $p = .50$.

To conclude, the prediction was confirmed. Participants who had been exposed to positive adjectives attributed an alleged failure in a manner that was typical for persons with high self-esteem, whereas participants who had been exposed to negative adjectives attributed the failure in a manner that was typical

for persons with low self-esteem. This finding suggests that the MSSM affects self-esteem per se and not only reports of it. Therefore, the MSSM seems suited for the study of short-term consequences of self-esteem.

In addition, the present results are the first experimental evidence that self-esteem causes (rather than only correlates with) self-serving bias in attribution. Thus, this experiment illustrates how the MSSM can be used to test hypotheses about the consequences of self-esteem.

7 General Discussion

The four experiments reported in Chapter 6 attest to the validity of the MSSM as a self-esteem manipulation. The subliminal presentation of positive versus negative adjectives paired with the pronoun *I* influenced scores on several self-esteem measures (Exp. 1-3). Specifically, the effect emerged for subjective state (Exp. 1) as well as trait self-esteem (Exp. 3) and for composite (Exp. 1-3) as well as global self-esteem (Exp. 3). In addition, no effects on self-reported mood (Exp. 1) and on the evaluation of an unfamiliar target (Exp. 2) were evident. Furthermore, the MSSM was shown to have effects on a possible consequence of self-esteem, self-serving bias (Exp. 4). Thus, the effects do not seem to be confined to self-esteem judgments but seem to be substantive in nature. Finally, the awareness checks in all experiments revealed that the manipulation was indeed unobtrusive in general. Almost no participant guessed the purpose of the manipulation or reported to have recognized one of the stimuli.

Although these findings are encouraging, further tests of the MSSM are needed before the method can be recommended for experimental self-esteem research without limitations. The reason is that there are still open questions regarding (a) the underlying mechanisms of the effects, (b) formal features of the effects (e.g., duration), (c) moderators of the effects, and (d) side-effects. These issues are addressed in Chapters 7.1 through 7.3. Suggestions for further research follows in Chapter 7.4.

7.1 *Mechanisms underlying the observed effects*

How does the MSSM work? The knowledge activation model described in Chapter 5.2.1 fits the present findings best. Specifically, of the three models described in Chapter 5.2, it is the only one that can explain the pattern of results that emerged in the crucial Experiment 2. To reiterate, the knowledge activation model explains the results of the present experiments on the basis of the following assumptions:

- Self-esteem is a function of the currently accessible self-knowledge.
- Only self-knowledge whose accessibility exceeds a certain threshold can influence self-esteem.
- Global positive and negative stimuli activate (i.e., increase the accessibility of) self-knowledge with positive and negative valence, respectively.
- Global self-related stimuli activate both positive and negative self-knowledge.
- If the evaluative stimuli are presented alone, their effects are not strong enough to shift the activation of self-knowledge above the threshold.
- Only if the effects of the evaluative stimuli combine with the effects of the self referent, activation of self-knowledge overcomes the threshold.

This is always self-knowledge with the same valence as the evaluative stimuli.

It follows from these assumptions that (a) self-esteem is more positive after the presentation of positive versus negative stimuli if they are accompanied by a self referent and (b) no effect on self-esteem emerges after the presentation of positive versus negative stimuli if they are not accompanied by a self referent. This is precisely what was observed in Experiments 1 and 2. Experiment 2 also ruled out two alternative explanations, which were based on the affect model and the conditioning model. Thus, it seems that at least in these experiments, the processes described in the knowledge activation model dominated over the processes described in the other models (i.e., affect-as-information effects according to the affect model, conditioning according to the conditioning model).

However, at the present stage of testing the MSSM, it would be premature to rule out the other models completely. There are at least three reasons for this.

First, the evidence supporting the knowledge activation model and contradicting the other models comes only from one experiment. Clearly, replications of this experiment are needed before general conclusion can be drawn.

Second, the findings observed in this experiment might be specific for the nonself object or for the dependent measures used. For example, one could argue that for some reasons, the name *Leo* or names in general are immune against the effects of the MSSM. Moreover, one could argue that the adjective list used in this experiment was more sensitive to changes in self-evaluations than in evaluations of the name *Leo* or of names in general. Although these conjectures are speculative, the present data cannot rule out them. Hence, replications of Experiment 2 with other scales and another nonself objects are necessary.

Third, the evidence supportive of the knowledge activation model consists of null effects (namely, the null effects on self-evaluation in the nonself referent conditions and on *Leo* evaluation in the nonself referent and self referent conditions). Null effects, however, are notoriously ambiguous. Above all, one could argue that the experiment did not have enough power to detect the relevant effects.¹¹ A counter-argument is that in the three conditions for which the knowledge activation model predicted null-effects – either unequivocally (in the self referent/nonself target and nonself referent/nonself target conditions) or optionally (in the nonself referent/self target condition) –, the observed effects were indeed around zero and clearly nonsignificant. However, in the only condition for which the knowledge activation model predicted an effect unequivocally (the self referent/self target condition), a strong and significant effect did emerge. Thus, in the conditions with nonsignificant findings, there is not even a tendency that would suggest that one of the other models holds true instead of, or in addi-

¹¹ For example, the probability that the *t* tests used in Experiment 2 would have detected a true effect of the size $d = 0.50$ was only about 25% (Faul & Erdfelder, 1992).

tion to, the knowledge activation model. That is, the observed pattern of results fits remarkably well – and only – with the latter.

Nevertheless, it is advisable to complement the present research by crucial experiments in which difference (rather than null) hypotheses derived from the knowledge activation model are tested. In Chapter 7.4, specific suggestions for such crucial experiments are made. In total, unless more evidence bearing on the processes mediating the effects of the MSSM is available, the present conclusion that knowledge activation is the dominant mediating process is only preliminary.

Note that knowing the mechanisms that mediate the effects of the MSSM is relevant not only to theorizing on self-esteem but also to the application of the MSSM as a research tool. The reason is that the underlying mechanisms determine practically relevant phenomena such the duration of the effects or side-effects. For example, conditioning should have more stable effects on self-esteem than knowledge activation or affect-as-information effects. Further, if affect-as-information effects constitute the underlying mechanism, this implies that the MSSM induces affective states whereas this is not necessarily the case with the alternative mechanisms.

7.2 Formal features of the effects

The MSSM is designed for use in experimental research on the consequences of self-esteem. With respect to this goal, several formal features of the effects of the MSSM are important, including the size, duration, direction, and domain specificity of the effects. These features are discussed in turn.

7.2.1 Size, duration, and direction of the effects

The *size* of the effects of the MSSM turned out to be medium to strong according to Cohen's (1988) convention. Specifically, the size of the effects of valence on self-esteem in the self condition of Experiments 1, 2, and 3 was $d = 0.67$, 0.94 , and 0.68 , respectively. Experiment 4 suggests that the effects of the MSSM can be strong enough to allow for the detection of consequences of self-esteem.

With regard to the *duration* of the effect on self-esteem, Experiments 1 through 3 suggest that the effect lasts 3 to 5 minutes at least. This was the time between the completion of the reaction task and the completion of the self-esteem scales in these experiments. The maximum duration of the effects has not been explored here. Srull and Wyer (1979, 1980) found that the unobtrusive presentation of trait words influenced judgments of an ambiguous target person 24 hours later. Recently, Sohlberg and Birgegard (in press) reported evidence that subliminal exposure to an affect-laden message („Mommy and I are one”, cf. Silverman & Weinberger, 1985) had effects even several weeks later. Thus, also the MSSM might have persistent effects.

As to the *direction* of the effects, the present experiments tentatively suggest that the effects of the MSSM are stronger in the negative than positive di-

rection. Experiment 1 revealed that self-esteem was lowest in the self/negative condition and equally high in the other conditions. The tendency replicated in Experiment 2 for a subsample matched to the sample of Experiment 1 with regard to familiarity with the nonself referent. Clearly, this asymmetry needs to be replicated before it can be considered a robust finding. However, an interesting parallel is that Vallacher et al. (2002) revealed the same tendency with a blatant manipulation of self-knowledge accessibility (see Chap. 3.1.2). This suggests that the positive–negative asymmetry observed in Experiments 1 and 2 may reflect a general tendency. Hence, it makes sense to think about possible reasons for this asymmetry.

One possible reason is that a ceiling effect occurred. This would have been the case if (a) participants' initial self-esteem had been so high already that it could not be enhanced any more by the MSSM and/or (b) the response alternatives of the self-esteem scales had been less suited to indicate a change in the positive versus negative direction. Fortunately, the present data allow for a test of this ceiling-effect explanation. If a ceiling effect occurred in the self/positive conditions, the distribution of individual scores in these conditions should be skewed. An inspection of the individual scores revealed that they were distributed approximately symmetrically around the mean in the self/positive conditions of Experiments 2 and 3 but were indeed skewed in Experiment 1 (with fewer cases above than below the mean). Accordingly, skewness was -1.82, -0.82, and -0.68 for the self/positive condition in Experiments 1, 2, and 3, respectively. The distributions in the self/negative conditions were not markedly skewed in any experiment (skewness < 0.93). Thus, a ceiling effect may have caused the seeming positive-negative asymmetry in Experiment 1; however, it seems unlikely to have done so in Experiment 2. Of interest, the theoretical range of the scales was larger in Experiments 2 (i.e., 1-9) and 3 (i.e., 1-7) than in Experiment 1 (i.e., 1-5). This difference in scale range may be the reason why the distributions were less skewed in Experiments 2 and 3 than in Experiment 1.

Because the ceiling-effect explanation is inconsistent with the data from Experiment 2, another explanation appears more plausible, namely, that the positive versus negative primes per se had effects of different intensity. Although the valence primes were semantic opposites (*good* vs. *bad*, *valuable* vs. *worthless*, *great* vs. *lousy*), it is conceivable that the positive words received less attention or elicited less extreme affect than the negative words. This argument is in line with studies suggesting that negative information generally receives more weight in cognitive, affective, or motivational processing than does positive information (see Rozin & Royzman, 2001; Taylor, 1991). Of particular interest is the study by Dijksterhuis and Aarts (2003), which showed that under subliminal presentation conditions, negative stimuli are encoded more accurately than are positive stimuli. This processing advantage may have rendered the negative versus positive primes of the MSSM more effective.

7.2.2 Domain specificity of the effects

The issue of the domain specificity of the effects of the MSSM was investigated in Experiments 1 to 3. Because a robust but unpredicted tendency emerged in these experiments, the domain specificity of the effects deserves a particularly thorough discussion.

Dependent variables in Experiments 1 to 3 were composite scales consisting of items pertaining to the achievement, social, and physical domain. Thus, these experiments were suited to detect differential effects of the self/negative and self/positive conditions on self-evaluations in these domains. All three experiments revealed that valence had a stronger effect on achievement-related items than on items related to social relationships or the physical domain.

How can one explain this unpredicted pattern? One explanation is that students frequently receive achievement-related feedback during their studies (above all, in the form of grades). Hence, students are likely to develop a chronic expectation that their academic performance is evaluated at some time in the proximate future. This expectation alongside the experience of previous evaluations may weaken students' confidence in their achievement-related self-views and/or cause a general preparedness to revise these self-views. As a consequence, when students have to judge their abilities referring to achievement (especially academic achievement, like in the present experiments), they may refrain from retrieving stored judgments but may construct the required judgments on the basis of an extensive memory search. This argument is in line with McConnell et al.'s (2002) finding that participants made more memory-based (versus on-line) judgments of a self-attribute when they expected this attribute to be unstable rather than stable (see Chap. 3.3). Memory-based judgments, however, are more easily influenced by knowledge accessibility manipulations than are on-line judgments (Fiedler, 1990; Forgas, 1995). Provided that the effects of the MSSM are indeed mediated by self-knowledge accessibility, it follows that the MSSM should exert a particularly strong influence on achievement-related self-evaluations. Further, it seems plausible that students expect or actually receive social and physical abilities less often than achievement feedback. This can explain why self-evaluations related to social and physical abilities were affected less strongly by the MSSM than were achievement-related self-evaluations in the present research.

A second explanation for the obviously strong malleability of achievement-related self-evaluations is built on the assumption that students have more available self-knowledge in the achievement domain than in other domains. Again, this assumption is very plausible given that students frequently receive feedback regarding their academic achievement, whereas they are likely to receive less or even no feedback regarding other domains. Because of this difference in availability of achievement-related versus other self-knowledge, the MSSM may activate more knowledge referring to the achievement domain than to other domains. This can explain the domain specific effects observed in the present research under the assumption that self-esteem is a function not only of the va-

lence but also of the amount of activated self-knowledge.

A third explanation is that achievement-related self-knowledge has a higher chronic accessibility than other self-knowledge. In this case, in contrast to the explanation just put forward, accessibility rather than availability would account for the domain specificity of the effects. In general, differences in accessibility can have two causes: population characteristics and situational characteristics.

As to population characteristics, it is likely that among students, achievement-related self-knowledge is activated more often than other types of self-knowledge. This may be due to the same factors that have been proposed to influence availability (frequent performance feedback, chronic evaluation expectations). Frequent activation of achievement-related self-knowledge, however, is likely to increase its chronic accessibility (cf. Higgins, 1996). Furthermore, several researchers found that subtle knowledge accessibility manipulations had more pronounced effects on chronically accessible than on non-accessible concepts (e.g., Bargh, Bond, Lombardi, & Tota, 1986; McKenzie-Mohr & Zanna, 1990; see Higgins, 1996). Thus, as a consequence of its higher chronic accessibility, achievement-related versus other self-knowledge may be affected more strongly by the MSSM.

Possible situational characteristics that may account for the particularly strong effects on achievement-related self-evaluations include properties of (a) the MSSM and (b) the institutional context where the present experiments were conducted. As to (a), the framing of the manipulation as a performance (specifically, reaction) task may have selectively activated achievement-related self-knowledge. As to (b), the fact that the present experiments were conducted in the rooms of an institution that participants probably associated with the concept of achievement (i.e., a university) may have increased the accessibility of achievement-related self-knowledge. As a consequence of either (a), (b), or both, the knowledge activation effects of the MSSM may have been more pronounced on achievement-related rather than other self-knowledge.

An issue related to the issue of the domain specificity of the effects is whether the MSSM affects global self-esteem rather than only composite self-esteem. Whereas effects on specific self-evaluations and composite self-esteem were explored and found in three experiments (Exp. 1-3), effects on global self-esteem were explored in only one experiment (Exp. 3). Although this experiment did show a significant effect on global self-esteem, it is conceivable that the mode of item presentation (namely, intermixed with specific self-evaluation items) had inflated the effect (cf. Marsh & Yeung, 1999). Thus, it is necessary to explore whether global self-esteem is affected under other presentation conditions before firm conclusions regarding the effects of the MSSM on global self-esteem can be drawn.

7.3 Side-effects and the moderating role of personality characteristics

Two additional issues that are important from a practical perspective refer to (a) side-effects of the MSSM on other variables than self-esteem and (b) individual differences in responsiveness to the MSSM. Each of the following chapter addresses one of these issues.

7.3.1 Side-effects

In Chapter 4, it has been argued that side-effects constitute the major drawbacks of the previously available methods for manipulating self-esteem as an independent variable. Perhaps the most problematic one of these side-effects is mood induction. Especially if the dependent variable of an experiment is evaluative in nature (e.g., ingroup bias or evaluation of others), the mood and emotional consequences of the manipulation may influence these variables independently of self-esteem and thus either cause spurious effects or overshadow the true effects of self-esteem.

The present experiments suggest that the MSSM avoids confounding the manipulation of self-esteem and mood. This conclusion is predicated on two observations. First, mood was virtually identical in all experimental conditions of Experiment 1 whereas self-esteem significantly differed between them. Second, the manipulation significantly influenced participants' self-esteem but not the evaluation of an unfamiliar target (the name *Leo*) in Experiment 2. However, if the method had elicited mood, an effect on the evaluation of an unfamiliar target should have occurred (Forgas, 1995, 1999). Clearly, one should be cautious with generalizing these findings unless they have been replicated. Moreover, the present data cannot rule out the possibility that the stimuli affected specific emotions such as pride, shame, or anger.

Another possibility that has not been addressed in the present experiments is that the reaction task per se (and not only the stimuli presented) may have side-effects. As briefly mentioned in Chapter 7.2, this task may activate concepts or goals related to achievement. In addition, the task may elicit specific emotions. Informal comments by several participants during debriefing are revealing in this respect. For example, some said that they had found the task boring whereas others said that they had found the task enjoying and challenging. These impressions on the part of participants were not measured systematically in the present experiments. Hence, it is unclear whether these effects of the MSSM are systematically related to the experimental conditions. If so, they would be confounds and may cause similar problems as affective confounds. However, even side-effects that are not confounded with the self-esteem manipulation but occur in all experimental conditions to a similar degree would be disadvantageous. The reason is that such side-effects may (a) increase error variance and/or (b) constitute boundary conditions for the generality of the re-

sults (i.e., it might be mistaken to generalize the results to situations in which these side-effects do not occur).

7.3.2 Moderating role of personality characteristics

Although the role of personality characteristics in the effects of the MSSM has not been addressed in this research, it is likely that such moderator effects exist. In the following, three personality characteristics are discussed that appear particularly likely to influence persons' responsiveness to the MSSM.

One of these personality characteristics is *initial self-esteem*. There is ample evidence that persons with low versus high self-esteem are more malleable in many respects. For example, they respond more strongly to feedback (e.g., Brown & Dutton, 1995; Brown & Marshall, 2001; Dodgson & Wood, 1998; see also Tab. A3 in Chap. 9.1.3), placebo treatments (Brockner, 1984), persuasive communication (e.g., Lesser & Abelson, 1959), and mood induction (Smith & Petty, 1995). Given this generally high malleability of low self-esteem people, it may well be that they respond more strongly to the MSSM as well.

McConnell et al.'s (2002) research suggests another relevant personality characteristic: *subjective stability of self-esteem*. Remember that McConnell et al. found that feedback triggered on-line judgments referring to the self only if participants perceived the personal attributes to which the feedback pertained as stable. By contrast, if participants perceived the attributes as unstable, they tended to form judgments only when required to do so; that is, they made memory-based judgments (Chap. 3.3). This finding is plausible because with unstable attributes it would be unreasonable to construct judgments in advance and storing them in memory; the stored judgments may well be out of date when they are eventually retrieved. Thus, constructing such judgments only if necessary seems more efficient. This reasoning suggests that knowledge activation effects on self-esteem may be more pronounced for persons who perceive their self-esteem as unstable rather than stable. Provided that knowledge activation is the mechanism underlying the effects of the MSSM, this method should have stronger effects on persons with subjectively unstable rather than stable self-esteem.

However, not only subjective but also *objective stability of self-esteem* may moderate the effects of the MSSM. Kernis and Waschull (1995) defined persons with low (high) objective self-esteem stability as those showing strong (weak) day-to-day fluctuations in self-esteem. These authors argued that the self-esteem of persons showing strong versus weak self-esteem fluctuations is more contingent upon daily experiences of success and failure (for supportive evidence, see Crocker & Wolfe, 2001; Greenier et al., 1999). To be sure, it seems unlikely that the effects of the MSSM are mediated by success or failure experiences. The reason is that the MSSM neither provides explicit feedback nor includes a variation of task difficulty. Thus, if a person's self-esteem is highly contingent upon success and failure, this does not necessarily imply that the same person is particularly susceptible to the effects of the MSSM. However, it is conceivable that

analogously to chronic evaluation-expectations (see Chap. 7.2.2), objective self-esteem instability is associated with, or causes (via subjective self-esteem instability), a general propensity either to revise one's self-esteem judgments or to construct them in a memory-based manner. In either case, persons with objectively unstable versus stable self-esteem should respond more strongly to the MSSM, provided that this method has its effects through knowledge activation.

7.4 *Suggestions for future research*

The preceding chapters already hinted several topics for future research. For one, future research should further explore the *mechanisms mediating the effects of the MSSM*. Research along these lines could make an important theoretical contribution. As explained in Chapter 3, only few researchers have scrutinized the processes that underlie short-term shifts in self-esteem. Most self-esteem shifts that have been observed in previous experiments cannot be reduced to a single process unambiguously. Rather, several processes may have been confounded in those experiments. These processes include self-knowledge activation, affect as-information effects, and on-line judgments. The goal to demonstrate that one of these processes is sufficient to change self-esteem is worth pursuing on its own. The present Experiment 2 was designed with respect to this goal. Hence, conceptual replications of this experiment are worthwhile.

Like Experiment 2, these replications should pit knowledge activation explanation against other explanations. In doing so, researchers should try to test difference (rather than null) hypotheses derived from the knowledge activation model. For example, to test the knowledge activation model against the affect model, one could vary the instructions of the self-esteem scale used as dependent measure. In particular, some participants could be instructed to rely on their spontaneous self-related thoughts and imagery in judging their self-esteem whereas others could be instructed to rely on their current affective state (e.g., spontaneous feelings or gut reactions). If knowledge activation mediates the effects of the MSSM, the effects should be stronger among the former versus latter participants; if affect mediates the effects, the reverse should be true. In addition or alternatively, one could have some of the participants make their judgments under time pressure. As the studies by Sedikides (1995, Exp. 4) and Siemer and Reisenzein (1998) suggest, time pressure is detrimental to effects of self-knowledge activation but fosters affect-as-information effects. Thus, if the MSSM has weaker effects in the time pressure condition than in a control condition without time pressure, this would speak to knowledge activation as the mediating process. The reverse tendency would support the hypothesis that affect-as-information effects are the mediating processes.

In addition, the formal features of the effects of the MSSM deserve further study. For one, the *duration of the effects* should be explored. Because effects of subtle manipulations of judgments have been shown to last as long as 24 hours (e.g., Srull & Wyer, 1979), it seems advisable to explore the effects of the

MSSM over similar time intervals. Moreover, the *side-effects* of the MSSM should be scrutinized. First, this refers to the affective side-effects of the method. The present research addressed only effects on mood and used only one scale to measure it explicitly (Exp. 1). To rule out the possibility that the observed null effect on mood in Experiment 1 is specific to the scale used, replications with other mood scales are necessary, for example, with the 20-item Positive-Negative Affectivity Scale (Watson, Clark, & Tellegen, 1988). Moreover, it should be explored whether the MSSM has effects on affective states that are more specific than global mood. A well-known measure that seems suited for this purpose is the Multiple Affect Adjective Check-List (e.g., Zuckerman, Lubin, & Rinck, 1983). This 132-item measure assesses states of anxiety, depression and anger. Hence, this measure may enable a more differentiated analysis of the affective effects of the MSSM than did the mood measure used in Experiment 1. In addition, researchers should test for the cognitive and motivational side-effects mentioned in the preceding chapters. For example, it should be explored whether administration of the MSSM can affect motivational states such as boredom and achievement motivation. In general, to be able to detect side-effects that are caused by the constant features of the MSSM (e.g., the framing of the MSSM as a reaction task), researchers should use control conditions in which participants do not engage in the MSSM but complete only the dependent measures.

Another interesting issue for future research is to replicate the *positive-negative asymmetry* observed in Experiment 1 and 2 and to explore the causes of this phenomenon if it replicates. To assess the direction of the effects of the MSSM more precisely, researchers trying to replicate the asymmetry should assess individual base-line self-esteem and use change scores as dependent variables. If the asymmetry replicates under these circumstances, the next step would be to explore its causes. Possible causes have already been proposed in Chapter 7.2. For example, to test the proposition that persons pay more attention to the negative than positive primes of the MSSM, one could try to compensate for the relative lack of attention to the positive primes by presenting them at a longer duration than the negative primes. If this strengthens the effects of the MSSM in the positive direction and thus reduces the asymmetry, the attentional explanation would be supported. In general, researchers exploring the direction of the effects of the MSSM should take care that their self-esteem measures are not susceptible to ceiling effects. In the ideal case, the distribution of the individual self-esteem scores should be symmetrical in each experimental condition. The present research suggests that the Fleming–Courtney scale and the adjective list used in Experiment 2 are more likely to meet this criterion than is the SSES (see Chap. 7.2).

Furthermore, researchers should continue to study the *domain specificity of the effects* of the MSSM. The present research suggests that the effects are particularly strong on achievement-related self-evaluations. Both context and person variables may account for this tendency. To reiterate, one cause may be that

the institution where the experiments were conducted (a university) and/or the framing of the MSSM as a reaction task activated concepts related to achievement. In these cases, the effects of the MSSM may have been directed primarily at that self-knowledge and less at other (less strongly activated) self-knowledge. To test these hypotheses, one could try to replicate the results of Experiments 1 through 3 in a non-achievement related environment (e.g., in a student resident hall) or frame the task in non-achievement related terms (e.g., as a relaxation procedure; cf. Baldwin et al., 1990). If these modifications reduce the effect on the achievement-related self-evaluations relative to other domain specific self-evaluations, the above explanation for the domain specificity of the effects will be supported. Moreover, to explore the role of person variables (e.g., chronic accessibility, subjective attribute stability, or amount of available self-knowledge in a certain domain; see Chap. 7.2.1), one could compare the effects of the MSSM between populations that are likely to differ on those characteristics. For example, it is plausible that university students' self-knowledge in the domain of physical skills is on average less chronically accessible, less often evaluated, and less comprehensive than is professional sportsmen's self-knowledge in this domain; probably the reverse is true regarding self-knowledge in the domain of academic abilities. Therefore, if the present argument is correct, the MSSM should have weaker effects on self-evaluations regarding physical skills and stronger effects on self-evaluations regarding academic abilities in a sample of university students than in a sample of professional sportsmen.

Besides, more research on the *effects on global self-esteem* is needed. As explained in Chapter 2.2.3, such research is crucial for demonstrating that the MSSM affects general self-esteem. To avoid the problems associated with the item presentation format used in Experiment 3 (where global and specific self-evaluation items were intermixed), one should study the effects on global self-esteem by presenting the global items separately from the specific self-evaluation items or intermixing them with non-self-related items.

Last but not least, the MSSM may be used to *explore the consequences of self-esteem*. In theory, the MSSM is suited to explore the effects of self-esteem on any cognitive, affective, and behavioral process that can be measured in the laboratory. For example, one could manipulate self-esteem with the MSSM and then measure (a) propensity to aggression (e.g., measured with self-reports or symbolic aggressive behaviors; Dahlberg, Toal, & Behrens, 1998; Mussweiler & Foerster, 2000), (b) intergroup discrimination (e.g., assessed with source allocation tasks; Brewer & Silver, 1979), (c) propensity to drug abuse (e.g., operationalized as consumption of placebo drugs in the laboratory), or (d) performance in cognitive tasks (e.g., intelligence tests, standardized academic-achievement tests). In general, researchers using the MSSM in studies on the consequences of self-esteem should try to ensure that significant effects on the dependent measure reflect changes in self-esteem rather than other effects of the MSSM. To this end, they should measure and statistically control for affective states and other possible side-effects of the MSSM. In addition or alternatively, self-esteem

could be measured alongside the dependent variables and entered into mediator analyses (cf. Baron & Kenny, 1986; but see Chap. 4.1.2 for possible problems associated with the measuring of mediators).

7.5 Concluding remarks

The present research suggests that the MSSM is better suited for the experimental investigation of the consequences of self-esteem than is the common method of success/failure induction. The reason is that compared with the latter method, the MSSM appears more likely to affect subjective trait self-esteem (and not only subjective state self-esteem) and less likely to have side-effects such as mood shifts and defensive reactions. However, the present research has been only a first step in validating the MSSM. Before the usefulness of this measure for research practice can be judged firmly, additional studies on the effects of the MSSM have to be conducted. Moreover, especially from the perspective of research on the origins of self-esteem, the mechanisms mediating the effects of the MSSM deserve further investigation.

It is hoped that future research using the MSSM will help to solve some of the long-standing controversies about the consequences of self-esteem. For example, such research may provide the first experimental evidence that is relevant to the popular yet controversial assumption that low self-esteem causes problematic behaviors such as aggression, drug abuse, and intellectual underachievement (for discussions, see Baumeister, 1998; Mecca et al., 1989; National Association for Self-Esteem, 2000; Owens et al., 2001). In spite of weak or no empirical support, these and similar beliefs have influenced many practical interventions, especially in social work, psychotherapy, and school education (see Bednar & Peterson, 1996; Eggert et al., 1994; National Association for Self-Esteem, 2000; Owens et al., 2001). Thus, experimental tests of hypotheses about the consequences of self-esteem would be practically relevant in that they have the potential either to challenge or to strengthen the rationale behind those interventions.

8 References

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9 Appendix

9.1 Research overviews

9.1.1 Correlations between global and composite self-esteem (Table A1)

Study search strategy:

- To locate studies published before 1990, all relevant publications cited in Crandall (1973), Wylie (1974, 1989), and Blascovich and Tomaka (1991) were looked up.
- To locate studies published 1990 and later, a search in the database PsycLIT was conducted, using the keywords *self-concept* or *self-esteem* paired with one of the keywords *construct validity*, *congruent validity*, *multitrait AND multimethod*, *convergent validity*.
- Only published studies or unpublished studies cited in publications were considered. The latter studies were considered only if the cited information consisted at least of (a) the measures used, (b) the correlation coefficients, and (c) the sample size. Studies in which only specific self-evaluations rather than global or composite self-esteem were measured were not considered.

Table A1

Overview of correlations between global and composite self-esteem

No.	Study	N	Global self-esteem measure(s)	Composite self-esteem measure(s)	r
1.	Arndt & Greenberg (1999)	68	Own	SSES	.35
2.	Brown & Marshall (2001, Study 1)	178	RSE	TSBI	.65
3.	Brown & Marshall (2001, Study 2)	301	RSE	TSBI	.53
4.	Byrne (1983)	992	RSE	SEI	.59
5.	Crandall (1973)	300	RSE	SEI	.60
6.	Demo (1985)	35	RSE	SEI, own	.43
7.	Dutton & Brown (1997, Study 2)	136	RSE	own	.62
8.	Fleming & Courtney (1984)	259	JF, RSE	JF	.66
9.	Greenwald & Farnham (2000, Exp. 1)	145	RSE, own	SAQ, own	.43
10.	Greenwald et al. (1988)	101	RSE	TSBI	.59

<i>No.</i>	<i>Study</i>	<i>N</i>	<i>Global self-esteem measure(s)</i>	<i>Composite self-esteem measure(s)</i>	<i>r</i>
11.	Hamilton (1971)	70	own	JF	.60
12.	Heatherton & Polivy (1991, Study 2)	102	RSE	SSES	.72
13.	Hoge & McCarty (1984)	1510	RSE, SEI ^a	own	.36
14.	Leary, Tambor, et al. (1995, Study 5)	220	RSE	own	.75
15.	Lucas et al. (1996)	172	RSE	JF	.71
16.	Marsh (1986)	296	SDQIII Esteem	SDQIII	.65
17.	Marsh (1986)	171	SDQIII Esteem	SDQIII	.66
18.	Marsh (1986)	361	SDQIII Esteem	SDQIII	.70
19.	McIntire & Levine (1984)	238	Self-Assurance Scale ^b	TSBI	.25
20.	O'Brien (1985)	206	RSE	JF	.82
21.	Pelham & Swann (1989)	486	RSE	SAQ	.50
22.	Perlow (1992)	112	own	SEI, own	.73
23.	Robins et al. (2001, Study 1)	508	RSE, own	TSBI	.60
24.	Savin-Williams & Jaquish (1981, Study 3)	12	RSE	Lerner Self-Description Scale ^c	.72
25.	Van Tuinen & Ramanaiah (1979)	196	own	JF, SEI, TSCS	.62
26.	Watkins (1978)	235	own	own	.33

Note. RSE: Rosenberg (1965) Self-Esteem Scale. TSBI: Texas Social Behavior Inventory (Helmreich & Stapp, 1974). JF: Janis and Field (1959) Feeling of Social Inadequacy Scale. SAQ: Self-Assessment Questionnaire (Pelham & Swann, 1989). SDQIII: Self-Description Questionnaire III (Marsh et al., 1983). SEI: Self-Evaluation Inventory (Coopersmith, 1967). TSCS: Tennessee Self-Concept Scale (Fitts, 1965). ^aSelected items. ^bFrom the Self-Description Inventory (Ghiselli, 1971). ^cNo reference cited in the article.

9.1.2 Effects of affect induction on self-esteem (Table A2)

Study search strategy:

- All relevant publications cited in Sedikides (1992) and Sedikides and Green (2001) were looked up.
- A search in the database PsycInfo (publication years 1887 - 2002) with the keywords *self-esteem* paired with one of the keywords *mood induction* and *mood manipulation* was conducted.
- Only published studies were considered. Studies in which only specific self-evaluations rather than global or composite self-esteem were used as dependent variables were not considered.

Table A2

Overview of experimental studies on affective influences on self-esteem

<i>No.</i>	<i>Experiment</i>	<i>Mood induction procedure; conditions</i>	<i>Self-Esteem Measure</i>	<i>Directions of significant between-conditions differences in self-esteem</i>
1.	Brown & Mankowski (1993, Exp. 1)	Velten; PCN	trait ratings	P > C > N
2.	Brown & Mankowski (1993, Exp. 2)	Velten, music; PN	trait ratings	P > N
3.	Cunningham (1988)	films; PN	rating of self-satisfaction and of social perception skill	no significant difference
4.	Esses (1989, Exp. 1)	Velten, imagery referring to the self; PN	trait ratings	P > N (overall tendency, significance not reported)
5.	Esses (1989, Exp. 2)	Velten, imagery referring to the self; PN	trait ratings	no significant differences on almost all items
6.	Ikegami (2002, Exp. 1)	imagery referring to the self vs. not referring to the self; CN	SSES	C = N (non-self-referring mood-induction) > N (self-referring mood-induction)
7.	Ikegami (2002, Exp. 2)	imagery referring to the self vs. not referring to the self; CN	SSES	C = N (non-self-referring mood-induction) > N (self-referring mood-induction)

<i>No.</i>	<i>Experiment</i>	<i>Mood induction procedure; conditions</i>	<i>Self-Esteem Measure</i>	<i>Directions of significant between-conditions differences in self-esteem</i>
8.	Ikegami (2002, Exp. 3)	imagery referring to the self vs. not referring to the self; CN	SSES	C = N (non-self-referring mood-induction) > N (self-referring mood-induction)
9.	Levine et al. (1994)	imagery referring to the self; PN	RSE	P > N
10.	Nasby (1994)	Velten; PCN	trait endorsement	P > C > N
11.	Nasby (1996)	Velten; PCN	trait endorsement	P > C > N
12.	Sedikides (1994)	imagery referring to a friend; PCN	open self-descriptions, rated for valence by participants	P > C > N
13.	Sedikides (1995, Exp. 1)	imagery referring to a friend; PN	endorsement of behaviors indicative of valenced traits	P > N for peripheral traits; no significant difference for central traits
14.	Sedikides (1995, Exp. 2)	imagery referring to a friend; PN	trait ratings	P > N for peripheral traits; no significant difference for central traits
15.	Sedikides (1995, Exp. 3)	imagery referring to a friend; PN	trait ratings	P > N for peripheral traits; no significant difference for central traits
16.	Sedikides (1995, Exp. 4)	imagery referring to a friend; PN	trait ratings (only peripheral traits)	P > N
17.	Smith & Petty (1996, Exp. 2)	watching films; PN	RSE	no significant difference
18.	Smith & Petty (1996, Exp. 3)	reading stories; PN	RSE	no significant difference
19.	Turzo & Range (1991)	Velten; PCN	SEI	P > N (results for C not reported)
20.	Wright & Mischel (1982)	imagery referring to the self; PCN	trait ratings	P > C > N

Note. P, C, and N: positive-affect, control, and negative-affect condition, respectively. RSE: Rosenberg (1965) Self-Esteem Scale. SSES: State Self-Esteem Scale (Heather-ton & Polivy, 1991). SEI: Self-Esteem Inventory (Coopersmith, 1967).

9.1.3 Effects of success/failure induction on self-esteem (Table A3)

Study search strategy:

- All relevant publications cited in Brown (1998) and Wells and Marwell (1976) were looked up.
- A search in the electronic database PsycInfo (publication years 1887-2002) for the keyword phrase *self-esteem and feedback* was conducted.
- Only published studies were considered. Studies in which only specific self-evaluations rather than global or composite self-esteem were used as dependent variables were not considered.

Table A3

Studies on the effects of success/failure induction on self-esteem

No.	Experiment	Induction procedure; success/failure domain; conditions	Moderators studied	Self-esteem measure	Results	Cover-story; suspicion check
1.	Arndt & Greenberg, 1999, main study	feedback; whole personality; SC	reference vs. no reference to one's major in the feedback	1-item measure of self-feeling (g)	S > C, no moderator effect	no; no
2.	Arndt & Greenberg, 1999, supplemental study	imagined feedback; whole personality; SC	–	1-item measure of self-feeling (g); SSES	S > C on each measure	no; no
3.	Baldwin & Sinclair, 1996, Study 2	imagined feedback; social acceptance; SC	self-awareness	RSE (g)	no effect	no; no
4.	Baumgardner et al., 1989, Exp. 3	feedback; liking; SF	pre-SE, publicness of response to feedback	self-feelings ^a	S > F, no moderator effect	yes; no
5.	Baumgardner et al., 1989, Exp. 4	feedback; liking; SF	pre-SE, publicness and valence of response to feedback	self-feelings ^a	high pre-SE: no effect; low pre-SE: F > S after neg. (private or public), S > F after positive public (not private) response	yes; no

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/ failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
6.	Bramel, 1962	feedback; whole personality; SF	–	semantic differential	S > F	no; yes
7.	Brown & Dutton 1995, Study 1	task difficulty; integrative orientation; SF	pre-SE	self-feelings	S > F, stronger for low pre-SE	no; no
8.	Brown & Dutton 1995, Study 2	variation in task difficulty; integrative orientation; SF	pre-SE	self-feelings	S > F, stronger for low pre-SE	no; yes
9.	Brown & Gallagher, 1991, Study 1	variation in task difficulty, feedback; integrative orientation; SF	publicness of success/ failure	trait endorsement	no effect	no; no
10.	Brown & Gallagher, 1991, Study 2	variation in task difficulty; integrative orientation; SFC	publicness of success/ failure; pre-SE	trait endorsement	public condition: S > C > F, more pronounced for high pre-SE; private condition: no effect	no; yes
11.	Crocker et al., 1991, Exp. 1	feedback; essay-writing skill; SF	prejudice of evaluator	RSE (g)	No effect	no; yes
12.	Crocker et al., 1991, Exp. 2	feedback; liking; SF	race of participant, racial prejudice of evaluator	aggregated across RSE (g) and Janis & Field (1959)	for Whites: no effects; for Blacks: F > S if evaluator prejudiced; S > F if not ^b	no; yes
13.	Cunningham, 1988	feedback; person perception skill; SF	–	rating of self-satisfaction and of social perception skill	S > F	no; yes

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
14.	Eagly & Whitehead, 1972	feedback; social sensitivity; SFC	choice (receiving feedback vs. not) vs. no choice; prior or no prior information about feedback favorability	Berger's (1952) Self-Acceptance Scale	S > F, no moderator effect	yes; yes
15.	Esses, 1989, Study 1	feedback; impulsiveness vs. methodicality; SF	mood (manipulated)	trait ratings	no effect on almost all traits	no; no
16.	Esses, 1989, Study 2	feedback; impulsiveness vs. methodicality; SF	mood (manipulated)	trait ratings	no effect on almost all traits	no; no
17.	Fein & Spencer, 1997, Exp. 3	feedback; intelligence; SF	–	SSES	S > F	yes; yes
18.	Greenberg & Pyszczynski, 1985	feedback; social sensitivity; SF	public vs. private feedback; opportunity to evaluate the test on which feedback was given	Self-Valuation Triads (Gergen, 1962)	no evaluation opportunity: S > F for private, and F > S in for public, feedback; with evaluation opportunity: no effect	yes; yes
19.	Greenberg et al., 1992, Study 1	feedback; whole personality; SF	mortality salience	RSE (g)	S > F, no moderator effect	no; no
20.	Greenberg et al., 1992, Study 3	feedback; whole personality; SF	threat of an electric shock	global self-feeling (g)	S > F, no moderator effect	no; yes
21.	Greenberg et al., 1993	feedback; whole personality; SF	–	global self-feeling (g)	S > F	no; yes

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
22.	Harmon-Jones et al. 1997, Exp. 1	feedback; whole personality; SF	–	global self-feeling (g)	S > F	no; no
23.	Harvey & Clapp, 1965	feedback; whole personality; SF	expected valence of feedback	measure (g) after Dymond, 1953); composite measure	no effect on global measure; S > F on composite measure, stronger if valence expected	no; yes
24.	Heatherton & Polivy, 1991, Study 4	variation in task difficulty; logical thinking; FC	self-awareness	SSES	C > F, no moderator effect	no; no
25.	Ickes et al., 1973, Exp. 3	feedback; unfamiliar trait (surgency); SF	self-awareness	trait ratings	high self-awareness: S > F; low self-awareness: F > S ^b	yes; no
26.	Jones et al., 1990	feedback; convincingness of playing a negative role; SF	self-monitoring	Self-Valuation Triads (Gergen, 1962)	high self-monitoring: S > F; low self-monitoring: F > S	yes; no
27.	Koper et al., 1993, Exp. 1	feedback; basic academic abilities; SF	fairness of grading procedure	state version of RSE (g)	S > F, stronger for fair (vs. unfair) grading	no; no
28.	Koper et al., 1993, Exp. 2	feedback; basic academic abilities; SF	fairness of grading procedure; involvement	state version of RSE (g)	S > F, weaker for fair (vs. unfair) grading and high (vs. low) involvement	no; no
29.	Leary, Tambor, et al., 1995, Study 3	inclusion vs. exclusion from a laboratory work group; social acceptance; SF	–	self-feelings ^a	S > F	no; no

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/ failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
30.	Leary, Tambor, et al., 1995, Study 4	feedback; social acceptance; SF	–	ratings of 11 traits	S > F	no; no
31.	Leary et al., 1998, Exp. 1	imagined feedback; whole personality; SF	–	self-feelings; global self-feeling (g); SSES	S > F on each measure	no; no
32.	Leary et al., 1998, Exp. 2	imagined feedback; social acceptance; SF	pre-SE	self-feelings ^a ; global self-feeling (g); subjective self-esteem change	S > F on each measure, no moderator effect	no; no
33.	Leary et al., 1998, Exp. 3	imagined feedback; social acceptance; SF	pre-SE	self-feelings ^a ; global self-feeling (g); SSES	S > F on each measure, no moderator effect	no; no
34.	Leary et al., 1998, Exp. 4	feedback; social acceptance; SF	–	global self-feeling (g)	S > F	no; no
35.	Leary et al., 2001, Study 1	imagined feedback; social acceptance, leadership; SF	–	factor scores extracted from five different measures (global and composite)	S > F	no; no
36.	Leary et al., 2001, Study 2	imagined feedback; social acceptance, leadership; SF	SE responsiveness	factor scores extracted from five different measures (global and composite)	S > F, no moderator effect	no; no
37.	McFarland & Ross, 1982	feedback; social accuracy; SF	attribution of feedback (internal vs. external; manipulated)	self-feelings	internal attribution: S > F; external attribution: no effect	yes; yes

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/ failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
38.	McFarlin & Blascovich 1981	feedback; analogy solving skill; SFC	pre-SE	TSBI	no effect	yes; no
39.	Nezlek et al., 1997, Exp. 1	feedback; social acceptance; SF	depression	self-feelings ^a	depression: S > F, no depression: no effect	no; no
40.	Nezlek et al., 1997, Exp. 2	feedback; social acceptance; SF	pre-SE	self-feelings ^a	S > F, stronger for low pre-SE	no; no
41.	Nisbett & Gordon 1967	feedback; intelligence; SF	pre-SE	semantic differential; MMPI items	no effect on each measure	yes; no
42.	Nurius & Markus, 1990, Exp. 1	imagined situation; work and interpersonal relationships; SFC	–	RSE (g); endorsement of self-descriptors	S > C > F on each measure	no; no
43.	Nurius & Markus, 1990, Exp. 2	feedback; social acceptance; SF	–	shortened RSE (g); endorsement of self-descriptors	S > F for self-descriptor endorsement, no effect on RSE	no; yes
44.	Nurius & Markus, 1990, Exp. 3	imagined situation; social acceptance; SFC	–	endorsement of self-descriptors	S = C > F	no; no
45.	Solway & Fehr, 1969	feedback; spatial discrimination; SFC	–	discrepancy	no effect	no; no
46.	Stotland et al., 1957	variation in task difficulty; puzzle-solving; SF	group expectations concerning individual success	discrepancy	no effect	no; no
47.	Walster, 1965	feedback; whole personality; SF	–	trait ratings	S > F	yes; no

<i>No.</i>	<i>Experiment</i>	<i>Induction procedure; success/failure domain; conditions</i>	<i>Moderators studied</i>	<i>Self-esteem measure</i>	<i>Results</i>	<i>Cover-story; suspicion check</i>
48.	Ybarra, 1999, Exp. 1	variation in task difficulty; logical thinking; SF	–	self-feelings	S > F	no; no

Note. Results: directions of significant between-conditions differences in self-esteem. Cover-story; suspicion check: Entries *yes* and *no* indicate whether self-esteem was measured in an ostensibly unrelated study (entry before semi-colon) and whether participants were probed for suspicion (entry after semi-colon); *no* means *no/not stated*. S: success condition. F: failure condition. C: control condition (i.e., no or neutral feedback). (g): global measure; all other measures listed in the table are composite measures. pre-SE: pretest self-esteem. MMPI: Minnesota Multiphasic Personality Inventory. RSE: Rosenberg (1965) Self-Esteem Scale. SSES: State Self-Esteem Scale (Heatherton & Polivy, 1991). TSBI: Texas Social Behavior Inventory (Helmreich & Stapp, 1974). Discrepancy: discrepancy between actual self-image on the one hand and ideal, normative, or another type of self-image on the other. ^aScale from, or modified after, McFarland and Ross (1982). ^bSignificant interaction; significance of pairwise contrasts not reported.

9.2 Materials used in the experiments

In the following, the instructions and items used in the present experiments are presented in their original (i.e., German) wording.

9.2.1 Instruction for the reaction task (Experiments 1-4)

The instruction for the reaction task was the same in Experiments 1 through 4. It was given on the computer and read:

„Im folgenden sollen Sie eine Reaktionsaufgabe bearbeiten.
Während der Reaktionsaufgabe sehen Sie in der Bildschirmmitte einen Stern (*). Halten Sie Ihren Blick während der gesamten Aufgabe auf diesen Stern gerichtet. Um den Stern herum erscheinen in unregelmäßigen Zeitabständen sehr kurze Lichtblitze. Die Lichtblitze sind zufällig um den Stern herum verteilt. Ihre Aufgabe ist es, so schnell wie möglich auf jeden Lichtblitz zu reagieren. Geben Sie dazu an, ob der Blitz auf der linken oder rechten Bildschirmseite erschienen ist. Drücken Sie die rote Taste ('E'), wenn der Blitz auf der linken Bildschirmseite erschienen ist, und die blaue Taste ('I'), wenn der Blitz auf der rechten Bildschirmseite erschienen ist. Geben Sie Ihre Antwort so schnell wie möglich, nachdem Sie einen Blitz gesehen haben.
Da die Lichtblitze nur sehr kurz dargeboten werden, ist es durchaus möglich,

dass sie den einen oder anderen nicht entdecken. Drücken Sie deshalb die rote oder blaue Taste, wenn Sie längere Zeit (ca. 10 Sekunden) keinen Lichtblitz gesehen haben.

Da nicht vorhersehbar ist, wann und wo ein Lichtblitz erscheint, können Sie am schnellsten reagieren, wenn Sie Ihren Blick immer auf die Bildschirmmitte gerichtet lassen. Fixieren Sie daher während der ganzen Aufgabe den Stern in der Bildschirmmitte.

Die Aufgabe wird ca. drei Minuten dauern. Das Ende der Aufgabe sehen Sie am Bildschirm angezeigt.

Legen Sie nun Ihren linken Zeigefinger auf die rote Taste und Ihren rechten Zeigefinger auf die blaue Taste. Sitzen Sie während der gesamten Aufgabe möglichst aufrecht und verrutschen Sie Ihren Stuhl nicht. Die Aufgabe beginnt, wenn Sie die Leertaste drücken.“

9.2.2 Awareness checks and requests for personal information (Experiments 1-4)

In Experiments 1 through 4, the last page of the dependent variables questionnaire consisted of (a) three open questions that should assess awareness of the study purpose and (b) items referring to demographic information. In particular, participants read the following on the last page:

„Bitte beantworten Sie nun noch die folgenden Fragen. Diese beziehen sich auf Ihre Eindrücke beim Bearbeiten der Reaktionsaufgabe und des Fragebogens. Ihre Antworten sollen den beteiligten Forschern helfen, die Ergebnisse der bisherigen Untersuchungen angemessen zu interpretieren.

1. Was sollte Ihrer Meinung nach mit der Reaktionsaufgabe und den bisher bearbeiteten Fragen herausgefunden werden?
2. Hat die Reaktionsaufgabe Sie bei der Bearbeitung des Fragebogens beeinflusst? (Wenn ja:) Wie genau sah der Einfluss aus?
3. Haben Sie bei der Reaktionsaufgabe erkannt, was die Lichtblitze darstellten? Beschreiben Sie so genau wie möglich, was Sie erkannt haben.

Zuletzt einige Angaben zu Ihrer Person:

Geschlecht: männlich weiblich

Alter: _____

Studienfach: _____

Haben Sie vor Ihrem 6. Lebensjahr gelernt, Deutsch zu sprechen? ja nein

Die Untersuchung ist nun zu Ende. Vielen Dank für Ihre Mitarbeit!“

Each open question (no. 1-3) was followed by several blank lines.

9.2.3 Mood scale, State-Self-Esteem Scale, and familiarity check (Experiment 1)

The questionnaire of Experiment 1 started with the following instruction: „Bitte bearbeiten Sie die folgenden Fragen in der angegebenen Reihenfolge und

vollständig. Blättern Sie eine Seite erst um, wenn Sie alle Fragen auf der jeweiligen Seite beantwortet haben. Ihre Angaben werden streng vertraulich behandelt. Vielen Dank für die Mitarbeit!“

The mood scale followed. It read:

„Bitte geben Sie an, wie Sie sich gerade fühlen. Kreuzen Sie dazu in jeder Zeile das entsprechende Kästchen an. Ich bin ...

in sehr heiterer Stimmung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In sehr gedrückter Stimmung
sehr gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	sehr schlecht gelaunt
sehr niedergeschlagen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	sehr fröhlich“.

The SSES in my translation followed. It read (response scales between items omitted):

„Bitte geben Sie zu jeder folgenden Aussage an, inwieweit sie **in diesem Moment** auf Sie zutrifft.

Ich habe Zutrauen in meine Leistungsfähigkeit.

Ich fühle mich gehemmt.

Ich fühle mich im Vergleich zu anderen minderwertig.

Ich bin mit meinem Äußeren zufrieden.

Ich habe Angst, mich lächerlich zu machen.

Ich mache mir Sorgen darum, ob ich als erfolgreicher Mensch oder als Versager betrachtet werde.

Ich bin zufrieden damit, wie mein Körper aussieht.

Ich bin frustriert oder durcheinander wegen meiner Leistungen.

Ich habe den Eindruck, dass ich Schwierigkeiten habe, Dinge zu verstehen, die ich lese.

Ich habe das Gefühl, dass mich andere respektieren oder bewundern.

Ich bin unzufrieden mit meinem Körpergewicht.

Ich habe das Gefühl, dass ich mindestens so klug bin wie andere.

Ich ärgere mich über mich selbst.

Ich halte viel von mir selbst.

Ich mache mir Gedanken darüber, wie andere über mich denken.

Ich bin zuversichtlich, dass ich Dinge kapiere.

Ich finde mich unattraktiv.

Ich mache mir Sorgen wegen dem Eindruck, den ich gerade mache.

Ich habe das Gefühl, dass ich derzeit weniger für ein Hochschulstudium taugte als andere.

Ich habe das Gefühl, dass ich derzeit meine Sache nicht gut mache.“.

Each item was accompanied by the following response scale:

„trifft gar nicht zu trifft völlig zu“

After the SSES, the check for familiarity with the nonself referent followed. It read:

„Gibt es jemanden in Ihrem Bekannten- oder Verwandtenkreis, der Leo heisst? ja nein“.

9.2.4 Leo evaluation scale, self-esteem scale, and familiarity check (Experiment 2)

The questionnaire of Experiment 2 started with the Leo evaluation scale. The scale read (response scales between items omitted):

„In dieser Studie soll herausgefunden werden, welche Assoziationen bestimmte Vornamen wecken. Jede(r) Teilnehmer(in) soll einen einzigen Vornamen beurteilen, der ihm/ihr zufällig zugewiesen wird. Bitte geben Sie für jede der folgenden Persönlichkeitseigenschaften an, wie stark Sie diese mit dem Vornamen ‘Leo’ assoziieren.

Mit dem Vornamen ‘Leo’ assoziiere ich die Eigenschaft...

sympathisch

unhöflich

gescheit

erfolgreich

unfreundlich

selbtsicher

abstoßend

inkompetent

liebenswert

verschlossen

attraktiv“

After the scale, participants read the same familiarity-check question as in Experiment 1:

„Gibt es jemanden in Ihrem Bekannten- oder Verwandtenkreis, der Leo heisst? ja nein“.

The self-esteem scale followed on the next page. The scale read (response scales between items omitted):

„Bitte beurteilen Sie sich selbst auf den folgenden Eigenschaften. Geben Sie zu jeder Eigenschaft an, inwieweit Sie Ihrer eigenen Meinung nach auf Sie selbst zutrifft.

Ich bin...

