

**How to Overcome Frustration?  
The Influence of Frustration on Motivational Orientation and  
Motivational Intensity**

Inaugural-Dissertation  
zur Erlangung der Doktorwürde der  
Philosophischen Fakultät II  
der  
Julius-Maximilians-Universität Würzburg

vorgelegt von  
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Würzburg, 2007

## **Acknowledgments**

While working on my thesis I was supported by many people whom I would like to express my thanks to. First and foremost, I would like to express my gratitude to my supervisor Fritz Strack, who greatly influenced my way of thinking about psychological processes. You gave me the opportunity to pursue my own interests and at the same time were always prepared to give me valuable advice. Thank you very much indeed! I would like to express my great thankfulness to Roland Deutsch, who introduced me to psychological science. Your support in completing this thesis by discussing numerous questions, providing valuable suggestions, and commenting on parts of a previous draft of his dissertation was essential. My gratitude also goes to my colleagues Katja Stork and Atilla Höfling, who shared with me from the very beginning the ups and downs of completing a PhD. I want to especially thank Atilla for commenting on parts of a previous draft of my dissertation. A special thanks goes to Beate Seibt for her valuable ideas that led to study 4 of this thesis. And I am grateful to all my other colleagues for providing helpful suggestions to my work. My thankfulness also goes to Roland Neumann who agreed to review the final draft of my thesis. Moreover, I am grateful to Rita Frizlen for her indispensable help in organizing the work behind this thesis. Thank you also for your encouragement! My sincere thanks go to my student assistants Georg Förster, Christine Linkert, Frederic Naujoks, Verena Faust, Claudia Petersen and Susanne Köhler. Your help was essential in completing my doctoral program! I am also thankful to Viola Rost for proofreading despite the short deadline.

My profound gratitude goes to my parents, Marianne and Fritz, and to my brother Christoph. Your support, your affection, and your confidence created the ground structure that I could always rely on. I am deeply grateful to Jörg. You carried me through writing this thesis with your calmness, your warmth, and your humour.

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## INTRODUCTION

Imagine a young man looking forward to his first date with a woman he fancies. He promises to pick her up with his car and to invite her to dinner. It's half an hour before their date and he is leaving his apartment in order to arrive in time. He gets into his car and tries to start the engine. But it doesn't start. He tries again and again, but the engine only howls. He frowns, sweats and then hits the steering wheel, while at the same time imagining the waiting woman and wishing to get to her in time.

The described situation is an example of frustration, which is defined as the unexpected blockage of an anticipated goal attainment (Berkowitz, 1989; Dollard, Miller, Doob, Mowrer, & Sears, 1939). Since the early beginnings of learning theory (Hull, 1934; Pavlov, 1927), frustration has been in the center of research interest in various domains of psychology, for example social psychology (e.g., Berkowitz, 1989), neuropsychology (e.g., Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003), or animal research (for a review see Papini & Dudley, 1997). The consequences of frustration and its underlying mechanisms are to a great extent well understood. However, as the analysis of the present thesis will reveal, there are at least two unresolved issues. The first issue concerns the motivational orientation<sup>1</sup> elicited by frustration. While it is clear that appetitive stimuli activate an approach orientation and aversive stimuli activate an avoidance orientation, the relationship between frustration and motivational orientations is rather obscure. Second and related to this point, the mechanisms by which goal striving in the face of obstacles is accomplished are explained incompletely. In other words, it is not particularly clear how motivational intensity changes after frustration. Two major types of positions have been advanced in literature to answer these questions. Simply speaking, one position claims that frustration elicits an approach motivation as long as control beliefs are high. Thus, the function of approach motivation is to maintain goal striving. The other position claims that frustration elicits an avoidance orientation accompanied by high arousal. In this view, goal striving is strengthened as a function of arousal. The latter position is supported by considerable evidence mainly from animal research (e.g., Amsel, 1992; Gray, 1987; Papini & Dudley, 1997). In contrast, scientists examining human beings as participants argue in favor of a frustration-approach relation (e.g., Carver, 2004; Harmon-Jones & Allen, 1998). However, supporting evidence is missing. In particular, research with human beings has only investigated variables of motivational intensity (e.g., task interest) that cannot be interpreted in terms of motivational orientation.

In an overview, empirical evidence concerning how frustration influences motivational orientation and motivational intensity is rather scarce. Moreover, theoretical integration of the underlying processes is missing up to now. To provide a better understanding of the consequences of frustration, the present thesis applies a two-system model of social behavior (Reflective-Impulsive Model [RIM], Strack & Deutsch, 2004) to the situation of frustration. From the assumptions of the RIM the following propositions will be derived with respect to the elicitation of a motivational orientation and the change of motivational intensity.

First, I propose that frustration activates an avoidance orientation irrespective of its controllability. This hypothesis is based on the assumption of the RIM that the perception of negative valence immediately elicits an avoidance orientation in an impulsive system of

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<sup>1</sup> The terms *motivational orientation* and *motivational system* will be used interchangeably in the first sections of this thesis. Later, the differences between the theoretical positions using these terms will become clear.

information processing. In the above example, the young man would be in an avoidance orientation regardless of whether he believes he could still get to his date in time.

Concerning the second question, I propose that goal striving is maintained in the face of obstacles by two mechanisms. A basic motivational mechanism called *intending* keeps goal-relevant schemata activated as long as the goal has not yet been reached. Thus, the activation of behavioral schemata is maintained despite frustration, resulting in the facilitation of that behavior. In the above example, the behavioral schema of turning the key to start the engine will be kept activated, resulting in repeated execution. Second, decisions about goal pursuit are construed in a reflective system of information processing. In particular, based on appraisals of controllability and goal expectancy a decision is made whether goal pursuit is continued (by engaging more effort or changing the means) or abandoned. This decision influences the activation of respective behavioral schemata. In the above example, the young man may appraise the likelihood that the engine will start based on his previous experience. This appraisal results in a decision about continuing goal pursuit (i.e., starting the engine) by trying again or applying different means (e.g., using a jumper cable) or giving up. Of course, this reasoning may extend to all levels of the goal hierarchy, for instance getting to the date by different means (e.g., public transport) or giving up.

To summarize, according to the position advanced in this thesis, frustration elicits an avoidance orientation irrespective of control appraisals. Goal striving in the face of obstacles is accomplished through the activation of specific behavioral schemata, which depend on control appraisals. Thus, the elicitation of a motivational orientation is assumed to be a function of immediate valence, whereas change of motivational intensity is assumed to be a function of appraisal processes.

The analysis of frustration in general and its relation to approach and avoidance motivation in particular is relevant for several reasons. Most important, research on the relationship between frustration and motivational orientation will provide new theoretical insights. First, it will lead to a better understanding of the processes underlying frustration and motivational maintenance. Second, because the predictions derived from current theories of approach-avoidance motivation are contradicting with respect to frustration, investigating frustration will promote the development of approach-avoidance models. Beyond the theoretical significance, it is important to fully understand the mechanisms underlying frustration because of practical reasons. Given the ubiquity of frustration in all areas of personal and social life and the severe consequences of frustration on, for instance, social interactions (e.g., relation between economic indicators and lynching, Hepworth & West, 1988) or job performance (e.g., Spector, 1978), profound knowledge about frustration will provide the basis for practical applications in various contexts.

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## THEORETICAL PART

Since early learning research (Hull, 1934) and the pervasive work on the frustration-aggression link by the Yale-group (Dollard et al., 1939), frustration has been investigated very extensively in various domains of psychology (e.g., Berkowitz, 1989; Papini & Dudley, 1997). Despite this great expenditure, it is still unclear whether frustration evokes approach or avoidance motivation, and which role motivational orientations play in changes of motivational intensity (i.e., goal striving). It has been proposed that frustration evokes an approach motivation when it is appraised as controllable (e.g., Carver, 2004; Harmon-Jones & Sigelman, 2001). This approach motivation is assumed to help in overcoming the obstacle and in reaching the goal (i.e., to boost motivational intensity). However, a review of the research on the consequences of frustration (first section of the theoretical part) will reveal that the empirical evidence for a frustration-approach relation is rather unclear. Moreover, research rather suggests that arousal and control beliefs contribute to motivational intensity (e.g., Amsel, 1992; Wortman & Brehm, 1975). The second section of the theoretical part will examine models of approach-avoidance motivation with respect to their predictions concerning the relation between frustration and approach-avoidance motivation. Two different types of models will be identified. Whereas the first type proposes superordinate goals (approach vs. avoidance goals) as determinants for approach-avoidance motivation and predicts a frustration-approach relation (e.g., Carver, 2004), the second type advances stimulus valence (positive vs. negative) as the determinant for approach-avoidance motivation and predicts a frustration-avoidance relation (e.g., Gray, 1987). A review of relevant research will reveal that the latter proposition receives more empirical support – but unfortunately mainly from animal research. Overall, the reviews will unveil that previous empirical evidence is too inconclusive to provide satisfying answers, and that theoretical integration of the different findings is missing up to now. Therefore, in the last section, a dual-system model (RIM, Strack & Deutsch, 2004) is introduced and applied to describe the influence of frustration on motivational orientation and motivational intensity. I will argue that this model can explain and integrate previous findings on frustration. The theoretical part concludes with hypotheses that can be derived from the assumptions of the RIM, and that will be tested in the empirical part.

### Frustration and its Consequences

#### *What is Frustration?*

One of the first scientific definitions of frustration was advanced by Dollard and his colleagues (Dollard et al., 1939). According to the authors, frustration is an unexpected obstacle blocking the attainment of an anticipated gratification. Slightly different, in learning psychology the term frustration was used for the case of unexpected reward omission. This means that “an appetitive reinforcer is not presented (or is reduced in magnitude or quality) even though there are signals for its impending presentation” (Papini & Dudley, 1997, p. 175). Operationalizations of frustration in animal research included reward omissions as well as placement of a barrier between reward and animal (as it was introduced by Hull, 1934), which more closely resembles Dollard’s definition. Whereas these definitions focus on the features of the situation, Amsel defined frustration as a “temporary state that results when a response is nonreinforced (or nonrewarded in more natural language in the appetitive case)

in the presence of a reward expectancy” (Amsel, 1992, p.1; see also Amsel & Rousell, 1952). To summarize, the term frustration has either been used to label a situation or to describe the internal state that is elicited by this situation. I prefer to use the definition that applies to the situation because the internal state is the variable under investigation. In particular, the present thesis is based on Dollard’s definition of frustration as an obstacle blocking goal pursuit, since in research with human beings this definition was constitutive (see Berkowitz, 1989).

Which psychological processes does this definition imply? First, it must be assumed that the individual engages in goal directed behavior. Since the definition focuses on blocking the attainment of gratification, it implies that the individual pursues an approach goal. Second, an obstacle that blocks the attainment of the goal is present in the situation. This is a stimulus that is opposed to the individual’s goal, which implies that it contains a negative valence. That may induce an avoidance goal in the individual with respect to the obstacle (i.e., causing the obstacle to be removed). Overall, the situation of frustration implies a goal hierarchy with at least two levels, namely a superordinate approach goal (i.e., reaching the gratification) and a subordinate avoidance goal (i.e., removing the obstacle). In most situations the obstacle is present in the situation and thus immediately perceivable, whereas the goal is only represented in memory<sup>2</sup>. As will be outlined in the second section, this difference is crucial for the prediction of whether frustration elicits an approach or avoidance motivation. The third dimension underlying the definition of frustration is attribution. As the definition states that an external event prevents the individual from reaching the goal, the impairment of goal pursuit must be attributed externally. Fourth, the definition of frustration does not address the role of beliefs concerning overcoming the obstacle (i.e., controllability) and reaching the goal (i.e., goal expectancy) (cf. secondary appraisals, Lazarus, 1991). Consequently, depending on features of the situation or the individual, high or low appraisals of controllability and goal expectancy may be apparent.

In conclusion, an essential characteristic of frustration is the goal hierarchy consisting of a superordinate approach goal and a subordinate avoidance goal. As will be discussed later, depending on whether models of approach-avoidance motivation focus on the superordinate or the subordinate goal, differential predictions regarding the effect of frustration on motivational orientation are made. Furthermore, the definition of frustration allows for variability along the appraisal dimensions controllability and goal expectancy. Theories on the effects of frustration on motivation consider control appraisals as crucial determinants of motivation (e.g., Carver, 2004; Wortman & Brehm, 1975). Therefore, in order to understand the effects of frustration it is necessary to understand how control appraisals influence different parameters of motivation.

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<sup>2</sup> Of course, there are also cases of goal pursuit where the goal is not only represented in memory, but immediately perceivable in the situation, in particular when the goal is very concrete (e.g., eating a cake) as compared to more abstract goals (e.g., performing well in an exam).



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*Anger and Aggressive Behavior*

One of the most prominent research on frustration is the work on the frustration-aggression link launched by Dollard and colleagues (Dollard et al., 1939) and further advanced by Berkowitz (1989). The review presented here will not trace the development of different formulations of the frustration-aggression link, but briefly summarize what we know up to now about the effects of frustration on aggression.

Numerous studies suggest that frustration evokes anger and leads to an inclination to behave aggressively (for a review of the frustration-aggression link see Berkowitz, 1989). Appraisals of legitimacy, justification, and arbitrariness of frustration have been identified as moderating conditions (Burnstein & Worchel, 1962; Cohen, 1955; Kulik & Brown, 1979; Pastore, 1952; Rule, Dyck, & Nesdale, 1978). Such appraisals reduce anger and aggression, but do not eliminate these effects as compared to a control group (Dill & Anderson, 1995). Thus, even if nobody can be blamed for an action, the mere experience of having a goal blocked gives rise to aggression. This finding supports Berkowitz' model of anger and aggression generation that states that negative valence without the mediating role of appraisals is sufficient to activate aggressive behavior tendencies (Berkowitz, 1990, 2000; Berkowitz & Harmon-Jones, 2004). Further support for these positions comes from recent research that applied a two-system perspective on anger and aggression (Krieglmeyer, Strack, & Wittstadt, 2007). The authors demonstrated that intention attribution influenced aggressive behavior only if participants' cognitive resource were not depleted. In a second study, intention attribution moderated overt aggressive behavior, but not aggressive tendencies measured by an implicit measure. These results suggest that aggression is evoked automatically, and that appraisals moderate overt behavior only when enough cognitive resources are available.

The implications of the above research for the present thesis are twofold. First, the findings indicate that activation of behavior schemata and appraisal processes are two independent processes. Applied to frustration, this suggests that the negative quality of an obstacle automatically activates respective behavior schemata, whereas depending on cognitive resources, appraisals of controllability and goal expectancy influence overt behavior.

To elaborate the second implication a short digression is necessary. Anger and aggression have often been related to approach motivation (Harmon-Jones, 2003; Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001). Thus, if frustration automatically evokes anger and aggression, and anger and aggression are associated with approach motivation, then the conclusion seems plausible that frustration elicits an approach orientation. However, it is not yet clear whether anger and aggression are only and purely approach motivated. In aggression research, different forms of aggressive behavior are distinguished that closely resemble the distinction between approach and avoidance motivated behavior. In particular, whereas one form of aggression (i.e., predatory attack, proactive aggression) focuses on rewards and is accompanied by feelings of exhilaration, another form of aggression (i.e., affective defensive, reactive aggression) is elicited by negative events and accompanied by feelings of anger (Crick & Dodge, 1996; Hubbard et al., 2002; Weinschenker & Siegel, 2002). The first form of aggression is motivated by the anticipation of positive events and is thus probably approach motivated. Conversely, the latter form is motivated by negative events making it probably avoidance motivated. Importantly, only the latter form has been found to be accompanied by anger (Hubbard et al., 2002). Furthermore, it has been argued that an avoidance motivation (i.e., tendency to increase the distance between me and an object) can be realized by withdrawal as well as by

aggression (Gray, 1987; Strack & Deutsch, 2004). Thus, in this definition aggression is avoidance motivated. Moreover, a recent study demonstrated that idiosyncratic anger stimuli (names of persons who have angered the participants in their private life) facilitate avoidance behavior (Krieglmeyer & Deutsch, 2007). To summarize, evidence suggest that anger and aggression are associated with an avoidance motivation – at least under certain circumstances. Consequently, a frustration-aggression link does not imply a frustration-approach link. Thus, more research is needed to clarify under which conditions anger and aggression are associated with an approach or with an avoidance motivation.

### *Hemispherical Lateralization*

Research on hemispherical lateralization is relevant for the relation of frustration to motivational orientation and motivational intensity, respectively, because several findings show that the prefrontal regions of the brain are asymmetrically involved in emotion and motivation. However, because the exact nature of the relations is still unclear, conclusions cannot be drawn yet. Nevertheless, the research and its implications shall be outlined here. In particular, two different explanations of hemispherical lateralization will be discussed.

One explanation argues that hemispherical lateralization represents motivational orientation (e.g., Harmon-Jones & Allen, 1998). The authors base their work on previous research that has shown that the left-prefrontal cortex is related to positive affect and approach motivation, and that the right-prefrontal cortex is related to negative affect and avoidance motivation (Davidson, 1995; Davidson, Ekman, Saron, Senulis, & Friesen, 1990; Sutton & Davidson, 1997). Extending this work, they showed that the left-prefrontal cortex is also involved in dispositional and situational induced anger and aggression (Harmon-Jones, 2004a, 2004b; Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001). Also, anger induced by a frustrating situation has been shown to be associated with an increase in relative left-prefrontal activity (Harmon-Jones et al., 2003). According to the authors, these findings demonstrate that hemispherical lateralization reflects motivational orientation rather than valence, because anger and aggression are related to approach motivation. Given this explanation, one may conclude that frustration elicits an approach motivation, because it leads to an increase of left-prefrontal activity. However, there are two limitations to this conclusion. First, as argued in the last section, anger and aggression are not necessarily associated with approach motivation. Thus, the authors' premise of an anger-approach relation is not tenable, which challenges the conclusions concerning the meaning of relative left-prefrontal activation. Second, a study by Harmon-Jones et al. (2003) shows that frustration causes increased left-hemispherical activation only when it can be overcome. In particular, participants of this study were college students who were against a tuition increase at their university. One group was informed that tuitions would definitely be increased at their university (i.e., low coping group). Another group was informed that a tuition increase was under consideration and that they could sign a petition against it (i.e., high coping group). Thus, both groups were frustrated<sup>3</sup> but differed with respect to their coping potential. It turned out that the high coping group exhibited greater left frontal activity than the low coping group. Moreover, in the high coping group, but not in the low coping group, left frontal activity was related to anger and coping behavior. A similar finding was obtained by using another anger-inducing situation and manipulation of

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<sup>3</sup> Of course, to interpret this manipulation as frustration one must assume that participants who were against a tuition increase have the goal to keep tuitions stable.

approach-related action expectation (Harmon-Jones, Lueck, Fearn, & Harmon-Jones, 2006). In sum, these findings suggest that not frustration and anger in general but expectation of *doing something* is related to left prefrontal activation. This suggests that controllable frustration elicits an approach motivation.

The second explanation of hemispherical lateralization suggests a relation to motivational intensity independent of motivational orientation (Wacker, Heldmann, & Stemmler, 2002). In particular, the authors assume that the left anterior region of the brain is involved in behavioral activation – irrespective of motivational direction –, whereas the right anterior region of the brain is involved in behavioral inhibition. Based on Gray's BIS/BAS-model (Gray & McNaughton, 2000) the authors assume that behavioral inhibition is caused by a conflict between approximately equally activated and mutually incompatible goals. The result is an interruption and/or inhibition of goal directed behavior. Wacker et al.'s (2002) findings confirmed their reasoning. Specifically, by employing an imagery procedure they showed that the experience of goal conflict led to higher relative right prefrontal activity, whereas the imagination of action irrespective of direction (approach or avoidance) led to higher relative left prefrontal activity. Thus, these data suggest that hemispherical lateralization represents motivational intensity rather than motivational orientation.

In conclusion, present evidence is inconclusive with respect to the relation of hemispherical lateralization and motivation. If the first explanation is true and activation of the left hemisphere reflects approach motivation, then the findings of a relation between frustration and left-prefrontal activity (Harmon-Jones et al., 2003) suggest that frustration elicits approach motivation. If, however, the second explanation is true and activation of the left hemisphere reflects motivational intensity (i.e., behavioral activation of both directions), then these findings suggest that controllability of frustration causes an increase in motivational intensity irrespective of direction (approach or avoidance).

### *Goal Striving*

How does goal striving after frustration change? In other words, how does frustration affect motivational intensity? Typical measures of motivational intensity are effort (i.e., how much one invests in the task), persistence (i.e., how long one works on the task), and performance (i.e., quality of result) (cf. Reeve, 2005). Research suggests that arousal as well as control beliefs contribute to changes of motivational intensity after frustration. Based on animal research, Amsel proposed in his frustration theory that goal striving is strengthened through arousal (Amsel, 1992, 1994; Amsel & Rousell, 1952). In human research, Wortman and Brehm (1975) proposed an integrative model of reactance theory and learned helplessness by suggesting control beliefs as a mediating mechanism to changes of goal striving. In what follows, both theories will be outlined.

### *Arousal and Goal Striving*

Amsel and Roussel (1952) introduced the frustration theory to describe findings from animal learning research. A main assumption states that frustrative nonreward elicits an aversive motivational state, called primary frustration<sup>4</sup>. This state can be characterized as an avoidance motivation that is accompanied by high arousal. Arousal is assumed to increase the vigor of ongoing instrumental behavior (cf. Hull, 1966; Zajonc, 1965). Thus, according to Amsel's theory, frustration leads to an increase of goal striving due to the increased arousal induced by frustration. First evidence came from studies with rats. For example, Amsel and Roussel (1952) reported that rats run faster in a runway to a second goal box after a nonrewarded trial as compared to a rewarded trial. Thus, frustration enhanced instrumental behavior of running to a goal box. The assumption that arousal mediates this effect has been supported by lesion studies of the amygdala (Henke & Maxwell, 1973), a structure involved in arousal increase as a reaction to negative stimuli (Berntson, Bechara, Damasio, Tranel, & Cacioppo, 2007).

Amsel's assumptions were later tested on human beings. Thereby, it was demonstrated that frustration operationalized as unexpected nonreward leads to an increase of galvanic skin response, which is a physiological measure of emotional arousal (Weil & Katkin, 1969). Moreover, unexpected nonreward was shown to increase the vigor of instrumental behavior, measured by response force of lever pressing (Ditkoff & Ley, 1974). The effect of frustration on arousal and response vigor was later replicated and extended by Otis and Ley (1993) by demonstrating a relationship between intensity of arousal and response vigor. Unfortunately, no mediation analysis was conducted. Such an analysis would have provided convincing evidence for the assumption that the increase of goal striving is mediated by arousal. Besides arousal, control beliefs have been shown to play a role in the effects of frustration on goal striving. In particular, Libb and Serum (1974) report that frustration leads to faster responses in a button-pressing task among participants with an internal locus of control (i.e., individuals who generally perceive events as controllable by themselves) as compared to participants with an external locus of control (i.e., individuals who generally perceive events as controlled by external factors).

The relationship of arousal and motivational intensity was also demonstrated in an unrelated line of research that investigated not frustration but difficulty (Brehm & Self, 1989). Although difficulty can arise due to several factors, frustration can be conceived of as one case of increased difficulty. Brehm and Self (1989) reviewed several studies that demonstrate that cardiovascular arousal and intensity of behavior increase with difficulty – unless difficulty is so high that the task is impossible to solve.

In sum, the above findings suggest that an increase of motivational intensity is associated with high arousal. Unfortunately, there is only little evidence regarding the mediational role of arousal. Thus, it is unclear whether arousal indeed is a causal factor in increasing motivational intensity. Furthermore, since only little studies have been conducted with humans as participants, it is still questionable whether the findings from animal research can be fully generalized to humans.

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<sup>4</sup> There are also other assumptions that are very important for learning psychology but not for the present thesis.

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*Control Beliefs and Goal Striving*

Wortman and Brehm (1975) aim at explaining the influence of uncontrollability on motivational intensity. Uncontrollability is the experience of outcomes that are not contingent to behavior. For instance, uncontrollability in a problem-solving task is feedback (i.e., success or failure) that is not contingent to actual performance. Since frustration can be described as a situation where behavior does not lead to the expected outcome because of an external cause (i.e., obstacle), it is a special case of uncontrollability. Whereas in general, noncontingency between behavior and outcome can be due to several causes (e.g., lack of ability, bad luck) in frustration noncontingency between behavior and outcome is attributed to an external cause (i.e., obstacle). Thus, the work of Wortman and Brehm (1975) is in part relevant for research on frustration. Wortman and Brehm's theory integrates reactance theory (Brehm, 1966) and the learned helplessness model (Seligman, 1975), which make different predictions regarding reactions to uncontrollability. According to reactance theory, experience of uncontrollability evokes attempts to restore control, resulting in increased goal striving. In contrast, the learned helplessness model predicts that experiences of uncontrollability lead to typical helplessness effects like passivity, depression and cognitive dysfunction. Wortman and Brehm (1975) solve this apparent contradiction by suggesting that control beliefs are a crucial factor influencing the effects of uncontrollability on motivation and emotion. As long as control beliefs are high, loss of control threatens control beliefs and therefore enhances the motivation to restore control. If people become convinced that control over the outcome is not possible (for instance through high amount of failure experiences), attempts to exert control will be stopped. The consequence is learned helplessness with its detrimental effects on motivation and cognitive functioning.

Consistent with this reasoning, it has been shown that after few exposures to uncontrollable outcomes (i.e., noncontingent feedback on a problem solving tasks) participants exhibited better performance and higher persistence (i.e., reactance effect), whereas after prolonged exposure participants exhibited worse performance and less persistence (i.e., helplessness effect) (Roth & Kubal, 1975). These effects were replicated and extended by Pittman and Pittman (1979), by demonstrating that after few exposures to uncontrollable outcomes, feelings of hostility emerged, whereas after high exposures to uncontrollable outcomes, feelings of depression emerged. Moreover, the authors found that reactance and helplessness effects were more pronounced for individuals who have high internal control beliefs than for individuals who have high external control beliefs. This is consistent with an earlier finding that individuals with high internal control beliefs report to strive more after frustration than individuals with high external control beliefs (Brissett & Nowicki, 1973). Further research highlighted the moderating role of attributions. In particular, a decrease in motivational intensity after high exposure to uncontrollable outcomes was found only when failure was attributed internally. When failure was attributed externally, motivational intensity even increased after high uncontrollability (Tennen & Eller, 1977). Unfortunately, control beliefs were not measured in this study. Thus, it is unclear, whether and how control beliefs influenced motivational intensity.

Research from developmental psychology suggests that emotional responses mediate effects of frustration on motivational intensity. Among infants, individual differences in emotional reactions to frustration predicted individual interest in a subsequent task (Lewis, Sullivan, Ramsay, & Alessandri, 1992). In particular, infants who reacted with anger to frustration showed more interest and enjoyment in a subsequent task than infants who reacted with sadness. Unfortunately, this finding is difficult to interpret because it is unclear which aspects of the emotional states (control appraisals? arousal?) were responsible for the

change in task interest. A study conducted by Mischel and Masters (1966) with children surprisingly suggests that low beliefs of goal expectancy increase task interest after frustration. In particular, children who were frustrated by the interruption of a film and were informed that it was impossible to resume the film found the film more interesting than children who were informed that continuing to watch the film was very likely. Thus, children who had low control appraisals evidenced higher task interest.

In sum, although it is clear that control appraisals as well as arousal play a role in the effects of frustration on motivational intensity, the nature of the relation as well as the underlying mechanisms and the interaction of these factors is still not satisfyingly understood. In particular, the interplay of rather cool appraisal processes and rather hot emotional processes is not clear yet. Nevertheless, the present picture suggests that control must be possible in order that goal striving is maintained after frustration. In addition, arousal increases the intensity of motivation.

### *Interim Conclusion*

This section provided an overview of research on the consequences of frustration. A particular focus was put on possible implications for the relationship between frustration and motivational orientation and motivational intensity, respectively. Specifically, it was explored how much support the proposition receives that controllable frustration evokes an approach motivation, which helps to overcome frustration (e.g., Carver, 2004). No single study has been found that investigated the effect of frustration on clear-cut measures of approach-avoidance orientation. Although some variables have been studied that may be associated with motivational orientation (i.e., anger, aggression, hemispherical lateralization), conclusions cannot be drawn, because the nature of the relation is ambiguous. Concerning motivational intensity, arousal and control beliefs have been studied as factors mediating the effect of frustration on goal striving. No single study has been found that demonstrated increased approach motivation as a mediating mechanism.

Furthermore, the review revealed several open questions concerning the consequences of frustration. Most importantly, theoretical integration of the different lines of research is missing at present. Moreover, there is no clear-cut empirical evidence concerning the effects of frustration on motivational orientation. Furthermore, the role of control beliefs in frustration is still unclear because control beliefs were mainly studied in situations that did not involve external attributions as is typical for frustration. Taken together, to date research does not provide satisfying answers to the questions which motivational orientation is elicited by frustration and how motivational intensity changes after frustration.

### Approach-Avoidance Motivation

Several theorists from different disciplines proposed that emotion and behavior is carried by two motivational systems (i.e., an approach and avoidance system) or motivational orientations (i.e., towards approach or avoidance) (Cacioppo, Priester, & Bernston, 1993; Carver & Scheier, 1990; Davidson et al., 1990; Gray, 1987; Higgins, 1997; Lang, Bradley, & Cuthbert, 1990; Miller, 1944; Neumann, Förster, & Strack, 2003; Strack & Deutsch, 2004). Despite this general accordance, the theories differ in one important aspect: Some of these theories focus on goal-directed behavior and propose that the direction of the goal (moving towards something desired vs. moving away from something undesired) determines which motivational system will be activated (Carver & Scheier, 1990, 1998; Higgins, 1997, 1998). This conceptualization implies that the activation of a motivational system is rather stable. Particularly, once a goal has activated one of the two systems, it will prevail throughout the whole episode of goal pursuit and direct emotions and behavior. In contrast, the other theory type focuses on spontaneous reactions and proposes that motivational orientations are a function of the valence of an immediately perceived stimulus (Gray, 1987; Lang et al., 1990; Neumann et al., 2003; Strack & Deutsch, 2004). Specifically, the perception of positive stimuli elicits an approach orientation and the perception of negative stimuli elicits an avoidance orientation. Hence, motivational orientations can switch rapidly between approach and avoidance depending on the environment and the focus of attention. This mechanism may help organisms to behave successfully in a rapidly changing environment.

For many situations these two types of theories don't make different predictions. For example, when reactions to positive and negative stimuli are investigated, valence of present stimuli and direction of the goal activated by these stimuli (approach or avoidance goal) are confounded. However, when it comes to examining frustration these theories make different predictions. As outlined in the first part of this thesis, the situation of frustration is characterized by a goal-hierarchy with a superordinate approach goal (i.e., anticipated gratification) and a subordinate avoidance goal (i.e., obstacle). Thus, according to the first theory type the activation of approach motivation would prevail despite the appearance of obstacles, whereas the latter theory type would predict a rapid switch to avoidance motivation. Unfortunately, except for animal research that support the latter position, substantial empirical evidence is lacking. Hence, to date it is unclear, how different levels of goal hierarchies interact with motivational orientations of approach and avoidance. In what follows, research on approach-avoidance motivation will be reviewed structured by the distinction elaborated above.

#### *Goal State as a Determinant for Approach-Avoidance Motivation*

In describing approach-avoidance motivation, some scientists focus on the compatibility between goals and approach-avoidance motivation (Carver, 2001; Carver & Scheier, 1990, 1998; Higgins, 1997, 1998). According to Carver and Scheier's theory, an approach system directs behavior towards incentives, and an avoidance system directs behavior away from threats. In a similar vein, Higgins proposed in his regulatory focus theory that people can adopt a promotion focus, in which they focus on approaching a desired end state, or a prevention focus, in which they focus on avoiding an undesired end state. These theories suggest that the represented goal state determines which system or focus will be activated and then regulates emotion and behavior. Despite this agreement, the theories differ with

respect to the consequences of progress feedback. Whereas the regulatory focus theory assumes that people are sensitive to compatible feedback (i.e., in a promotion focus success feedback, in a prevention focus failure feedback), Carver and Scheier's self-regulation theory proposes that incompatible feedback (i.e., less progress than expected) increases the activation of a motivational system. These assumptions are particularly relevant for the situation of frustration, since obstacles can be conceived of as incompatible feedback during goal pursuit. In what follows, Higgins' regulatory focus theory and then Carver and Scheier's model will be outlined, and respective empirical findings will be reviewed.

### *Promotion-Prevention Focus*

According to Higgins (1997), promotion-prevention focus (i.e., approach-avoidance motivation) determines strategies of goal pursuit and emotional reactions to success and failure. These assumptions are supported by an overwhelming amount of studies (e.g., Crowe & Higgins, 1997; Förster, Higgins, & Bianco, 2003; Higgins, Shah, & Friedman, 1997; Shah, Higgins, & Friedman, 1998; for a review see Werth & Förster, 2007). Most of these studies investigated regulatory focus as an independent variable. However, since the present thesis is particularly interested in changes of approach-avoidance motivation as a dependent variable, the present review will focus on studies that explored how strength of approach-avoidance motivation is affected by goals and progress feedback (Förster, Grant, Idson, & Higgins, 2001; Förster, Higgins, & Idson, 1998). In particular, pressure of arm flexion and extension was used as a measure of motivational strength. This measure bears on the notion that the flexor muscle is activated during approach movements (pulling something towards the self), and the extensor muscle is activated during avoidance movements (pushing something away from the self) (cf. Cacioppo et al., 1993). A series of studies demonstrated that promotion focus enhances the strength of arm flexor pressure, whereas prevention focus enhances strength of arm extensor pressure as people get closer to the goal (Förster et al., 1998). Moreover, type of feedback (success vs. failure) affected the relationship between focus and motivational strength (Förster et al., 2001). Failure and success feedback was manipulated by telling participants that they performed in the first half of an anagram task above or below the criterion for getting an extra dollar (i.e., promotion focus) or losing a dollar (i.e., prevention focus) of their compensation. Motivational strength was then measured in the second half of the anagram task. It turned out that in a promotion focus success feedback, and not failure feedback, increased the strength of arm flexor pressure (i.e., approach), whereas in a prevention focus failure feedback, and not success feedback, increased strength of arm extensor pressure (i.e., avoidance).

Overall, intensity of approach-avoidance motivation depends on the compatibility between focus (promotion/approach or prevention/avoidance) and feedback of goal progress. In particular, approach motivation is increased by success feedback, whereas avoidance motivation is increased by failure feedback. Applied to the situation of frustration, this finding may suggest that obstacles (i.e., failure feedback) on approach goals may neither affect approach motivation nor avoidance motivation. People may just be blind for obstacles. However, this is only a speculation since relevant research is lacking.

### *Self-Regulation Systems of Approach and Avoidance*

In their model of approach-avoidance motivation, Carver and Scheier apply a feedback loop perspective on goal pursuit (Carver, 2001; Carver & Scheier, 1990, 1998). The approach and avoidance systems are conceived of as feedback loops that monitor progress



toward a desired goal (e.g., incentive) or away from an antigoal (e.g., threat), respectively. Specifically, the rate of progress is compared against a reference rate. A discrepancy between actual progress and expected progress manifests itself subjectively as affect. The function of affect is to regulate behavior such that the person mobilizes more effort or disengages from further effort (Carver, 2004). Based on Higgins' regulatory focus theory (Higgins, 1997), Carver proposes that the direction of the goal (approach or avoidance) determines, which emotion emerges in case of success and failure. In particular, achievement of an approach goal leads to elation, and failure at an approach goal leads to sadness. Conversely, achievement of an avoidance goal leads to relief, and failure at an avoidance goal leads to fear. Thus, elation and relief inform the person that the goal has been reached and that she can stop goal pursuit, whereas sadness and fear inform the person that goal pursuit has been failed and that she better disengage from this goal and choose an alternative goal. Expanding Higgins' regulatory focus theory, Carver (2004, 2006) also integrates the emotion anger. He proposes that anger arises if obstacles block the pursuit of an approach goal. Moreover, "the lagging of progress, or the affect thereby created, is assumed to prompt enhanced exertion, in an effort to catch up." (Carver, 2004, p. 16). Thus, the function of anger is to engage more effort (i.e., to enhance approach behavior), in order that obstacles can be overcome.

In conclusion, Carver's position contains two main hypotheses. First, negative affect as a response to frustration (i.e., anger) is supposed to stem from the approach system. Second, obstacles are assumed to increase the engagement of the approach system. Regarding the first hypothesis, Carver (2004) reports two experiments showing that negative feelings are predicted by dispositional approach motivation. In particular, the higher the dispositional approach motivation, the more sadness and anger participants reported after being frustrated or imagining a provocative scenario. Concerning the second hypothesis that obstacles increase the engagement of the approach system, Carver refers to studies demonstrating the effect of frustration on performance and hemispherical lateralization, respectively. In particular, frustration has been shown to lead to more engagement in a subsequent task, depending on whether frustration evokes anger as compared to sadness (Lewis et al., 1992). Furthermore, frustration leads to a relative increase of left prefrontal activity, if there is a possibility to cope with the obstacle (Harmon-Jones et al., 2003). As I have already discussed in the first part of this thesis, these findings cannot be interpreted as an increase of approach motivation, because the dependent variables are not clear indicators of approach motivation. First, engagement in a task reflects motivational intensity, but not motivational orientation. Second, an unequivocal interpretation of hemispherical lateralization is to date not possible, because research is not yet conclusive whether hemispherical lateralization reflects motivational orientation or motivational intensity.

To sum up, according to the theories outlined in this section, the represented goal (approach or avoidance goal) determines the activation of a motivational system. As a consequence, the systems generate different strategic means to reach the goal as well as different emotions. The description of motivational systems as regulative systems implies that the activation of a motivational system is rather stable throughout the whole episode of goal pursuit. Despite this general accordance in regulatory control, there is disagreement concerning the influence of goal progress feedback. Research on regulatory focus theory demonstrated that compatibility between focus and feedback leads to an increase of motivation. In other words, the current focus is blind for incompatible feedback. This may suggest that frustration (i.e., negative feedback while being in an approach motivation) does not affect motivation. In contrast, Carver's model proposes that incompatible feedback (i.e.,

lack of progress) enhances approach motivation as long as control appraisals are high. Hence, frustration can increase approach motivation. However, to my knowledge, evidence supporting this assumption has not been published yet.

### *Stimulus Valence as a Determinant for Approach-Avoidance Motivation*

Besides the above cited theories, there is a second type of approach-avoidance models that concentrate on the immediate perception of positive and negative stimuli as determinants for the activation of a motivational system (Gray, 1987; Lang et al., 1990; Neumann et al., 2003; Strack & Deutsch, 2004). According to these models, evaluation of objects and behavior towards these objects are linked very tightly. Motivational systems or motivational orientations are conceived of as mechanisms that provide a quick pathway from perception to behavior. This mechanism may serve the function to prepare the organism for appropriate behavioral reactions in a quickly changing environment, and thus to promote his survival.

In what follows, two different lines of research will be described: One line resides in the realm of social cognition research, whereas the other line stems from biopsychological and animal research. As different as these two lines of research are with respect to the theoretical background and the research methods, the findings imply similar conclusions regarding frustration and motivational orientation. Therefore, they are summarized within the same section. First, work from the realm of social cognition research is summarized that demonstrates that the perception of valenced stimuli results in the activation of a compatible motivational orientation. Second, Gray's theory on approach-avoidance motivation (Gray, 1987; Gray & McNaughton, 2000) and respective research from animal studies is reviewed that demonstrates that frustration activates an avoidance motivation.

### *Social Cognition Research on Approach-Avoidance Orientations*

The research described in this section is based on the assumption that perception and behavior are linked very tightly. In particular, in a first step environmental stimuli are evaluated automatically, and then in a second step, congruent motivational orientations are elicited automatically, which results in the facilitation of respective behavior (e.g., Neumann et al., 2003). In what follows, first research on evaluation and then research on behavior activation will be summarized and related to frustration.

*Automatic Evaluation.* Environmental stimuli subjected to evaluation can either contain an intrinsic (i.e., fixed) valence or a motivational valence that depends on the current goal of the perceiver (cf. Moors & De Houwer, 2001). Depending on the type of valence, different mechanisms of evaluation have been proposed. Stimuli containing an intrinsic valence are assumed to be represented in an associative network together with their associated evaluation. Thus, upon perceiving the object in the environment the associated evaluation is activated automatically through spreading activation. Consistent with this assumption, an impressing amount of research demonstrates that the evaluation of objects in our environment occurs very quickly and independent of an evaluation intention (e.g., Bargh, Chaiken, Gøvdender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; De Houwer, Hermans, & Spruyt, 2001; Fazio, 2001; Fazio, Jackson, Dunton, & Williams, 1995;

Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Hermans, De Houwer, & Eelen, 1994; Murphy & Zajonc, 1993).

Contrary to stimuli containing an intrinsic valence, the evaluation of stimuli containing a motivational valence cannot be represented in an associative network because the valence is not stable but depends on current goals. For instance, a locked door may be per se a neutral object, thus containing no intrinsic valence. However, depending on the goal of the perceiver (e.g., wanting to leave the room because of being locked in or wanting to stay in the room protected from an intruder) an object can adopt a positive or negative valence. How are stimuli then evaluated that have adopted a positive or negative valence due to their significance in motivational processes? At least two mechanisms are thinkable, a comparison process and a creation of a temporary tag in short term memory (cf. Moors & De Houwer, 2001). The comparison process involves an appraisal process that compares the goal state with the actual state. If there is a match between these two states, the actual state will be evaluated as positive. If there is a mismatch, the actual state will be evaluated as negative. Another possible mechanism proposes that a temporary tag between the goal representation and a positive evaluation may be created in short term memory when a goal is being set. Thus, upon encountering the goal state, the associated positive evaluation will be activated. At first glance it may seem that the comparison mechanism is more complex and thus takes more time. Yet, a series of studies conducted by Moors and colleagues (Moors & De Houwer, 2001, 2005; Moors, De Houwer, & Eelen, 2004) demonstrates that the comparison mechanism can proceed very fast, and is initiated even without the intention to evaluate.

How does the distinction between intrinsic and motivational valence relate to frustration? Remember that frustration is defined as an obstacle blocking the attainment of an anticipated gratification. According to this definition, frustration can involve both, stimuli containing intrinsic valence as well as stimuli carrying motivational valence. For instance, if a person is looking forward to receiving a certain letter and doesn't find it in her mailbox in the morning, then only motivational valence plays a role<sup>5</sup>. Appearance of the letter would match the person's goals and thus have a positive motivational valence. Consequently, non-appearance of the letter conveys a negative motivational valence. Furthermore, depending on the obstacle blocking goal attainment, stimuli containing negative intrinsic valence can also be involved in situations of frustration. For instance, if a child doesn't win a race because another child has tripped him such that he has fallen down, then the obstacle probably takes on a negative intrinsic valence (i.e., painful stimulation). Through these examples it becomes clearer that both intrinsic as well as motivational valence can play a role in frustration. As research has already demonstrated the automatic nature of intrinsic as well as motivational valence evaluations, it is probable that the valence of obstacles appearing during goal pursuit is also evaluated quite automatically.

*Automatic Behavior Activation.* Does evaluation immediately result in the activation of motivational orientations? Numerous studies have demonstrated that the perception of intrinsic valence automatically activates compatible approach-avoidance tendencies. However, concerning motivational valence, the picture is less clear. In what follows, research on the behavioral effects of intrinsic valence will be summarized, followed by research on the behavioral effects of motivational valence.

In a pioneering study, Solarz (1960) let his participants move cards with words mounted on a movable stage either towards themselves or away from themselves. In one condition

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<sup>5</sup> Assuming that the concept letter does not contain an intrinsic valence.

participants were instructed to move cards with positive words towards themselves, and to move cards with negative words away from themselves (i.e., compatible condition). In the other condition, participants received opposite instructions (i.e., incompatible condition). It turned out that participants performing compatible movements were faster than participants performing incompatible movements. This finding was replicated by Chen & Bargh (1999) by employing a paradigm, where participants had to evaluate words appearing on a computer screen with joystick movements of pulling or pushing. Again, compatible responses (positive-pull, negative-push) were executed faster than incompatible responses (positive-push, negative-pull). Moreover, in a subsequent study the authors demonstrated that this effect does not depend on the intention to evaluate the words. In particular, when participants were instructed to respond with joystick movements upon the mere appearance of a word on the screen, the same results were obtained. Thus, the activation of motivational orientations towards approach and avoidance occurs independent of a conscious intention to process evaluative meaning. Since then, the joystick approach-avoidance task has been employed successfully in various studies in social psychology, clinical psychology, and personality psychology (Duckworth, Bargh, Garcia, & Chaiken, 2002; Fishbach & Shah, 2006; Marsh, Ambady, & Kleck, 2005; Neumann, Hulslenbeck, & Seibt, 2004; Rinck & Becker, 2007; Schnabel, Banse, & Asendorpf, 2006). Moreover, with other measures of approach and avoidance behavior similar effects have been found (Castelli, Zogmaister, Smith, & Arcuri, 2004; Puca, Rinkenauer, & Breidenstein, 2006; Roelofs, Elzinga, & Rotteveel, 2005; Rotteveel & Phaf, 2004).

Further research investigated the underlying mechanism of behavior facilitation more closely. Several studies demonstrated that not specific movements but the representation of the reaction as approach or avoidance is crucial. In other words, what matters is whether participants represent the response as a mean to decrease (i.e., approach) or increase (i.e., avoidance) the distance between themselves and an object. For example, approach and avoidance responses have been operationalized by moving a manikin on the screen (De Houwer, Crombez, Baeyens, & Hermans, 2001). In particular, participants moved a manikin towards a word or away from a word by pressing the up and down buttons of the keyboard. Depending on the position of the manikin on the screen (i.e., above or below the word) up or down responses meant approach or avoidance responses. Employing other measures that bear on the same logic, Markman and Brendl (2005) as well as Seibt, Neumann, Nussinson, and Strack (2007) also demonstrated that representation of distance regulation and not the concrete movement is crucial. Taken together, research indicates that stimuli containing an intrinsic valence immediately activate a predisposition to decrease or increase the distance to a target. Thus, intrinsic valence results in the elicitation of a motivational orientation.

How does motivational valence translate into behavior? Unfortunately, research on this question is quite equivocal. Moors and De Houwer (2001) demonstrated in one study that evaluation of motivational valence immediately results in the activation of compatible behavior tendencies. In this study, participants had to move a manikin towards or away from a word that indicated motivational valence (i.e., success or failure). It turned out that approach behavior was facilitated when the word indicated success, whereas avoidance behavior was facilitated, when the word indicated failure. This finding thus supports the notion that evaluation of motivational valence immediately results in the elicitation of a compatible motivational orientation. But one must be cautious with this statement as a final conclusion, because a series of studies conducted by Rothermund (2003b) shed another light on the effects of motivational valence. Applying a somewhat different paradigm than Moors and De Houwer, Rothermund demonstrated that success and failure feedback facilitates incongruent responses. Specifically, in a modified affective priming paradigm success

feedback facilitated responses to negative targets and failure feedback facilitates responses to positive targets. Although the author concentrated on attention allocation effects in his explanation, the findings can also be interpreted as response facilitation. How can this divergence be explained? As the paradigms differ in many respects there is no definite answer. A crucial difference concerns the interstimulus interval between motivational valence and response signal. Rothermund employed a longer interstimulus interval (750 ms) than Moors and De Houwer (0 ms). Thus, one possibility is that the time course plays an important role in the pathway from evaluation of motivational valence to behavior.

In sum, the present evidence suggests that intrinsic as well as motivational valence is processed quite automatically and results immediately in the activation of a compatible motivational orientation. What does this imply for frustration? As the research on automatic behavior activation only studied reactions to simple stimuli, it is unclear whether the findings can be generalized to frustration. Remember that frustration is characterized by a goal hierarchy consisting of a superordinate approach goal and a subordinate avoidance goal induced by the obstacle. It is still unclear how such a complex structure of representations affects elicitation of behavioral reactions. In other words, it has not yet been investigated how superordinate goals moderate evaluations of and behavioral responses to stimuli on a subordinate level.

### *Gray's Theory of Approach-Avoidance Motivation*

In what follows, Gray's model of approach-avoidance motivation (Gray, 1987; Gray & McNaughton, 2000) and empirical evidence will be summarized. To my knowledge, this is the only research that aimed at directly investigating the effects of frustration on approach-avoidance motivation. However, empirical evidence stems only from animal studies. Nevertheless, the findings are considered as highly relevant for the present thesis.

Gray proposed a model of three motivational systems that control behavior as a reaction to environmental stimuli (Gray, 1987, 1994; Gray & McNaughton, 2000). By categorizing environmental stimuli, Gray distinguishes presence and absence of reward and punishment<sup>6</sup>. Hence, one can encounter reward, nonreward (i.e., frustration), punishment, and nonpunishment. Which systems are activated by which stimuli? Basically, stimuli that are in their essence positive (i.e., reward and nonpunishment) activate the behavioral approach system (BAS), which controls all forms of approach behavior (e.g., approach, consummatory responses). Conversely, stimuli that are in their essence negative (punishment and nonreward) activate the fight/flight/freezing system (FFFS), which controls all forms of avoidance behavior (e.g., withdrawal, aggression, freezing). Thus, according to Gray frustration activates an avoidance motivation (i.e., FFFS-system) and results in avoidance behavior. The third system, the behavioral inhibition system (BIS) is activated whenever a conflict between approximately equally activated and incompatible goals is existent. As this system is not relevant for frustration, it will not be outlined in detail here.

Gray basically posits that "fear = frustration" (Gray, 1987, p.184) by saying that nonreward activates the same system as punishment. Animal research provides a vast amount of evidence supporting this hypothesis (for a review see Gray, 1987). Basically, three strategies have been employed to test this hypothesis. First, it was demonstrated that

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<sup>6</sup> Also, conditioned/unconditioned and novel/familiar stimuli are distinguished. But for the purpose of the present thesis, these dimensions can be disregarded.

frustration facilitates learning of avoidance reactions. From these findings it was concluded that frustration induces an aversive state the animal is motivated to escape. If one considers avoidance motivation as an aversive motivational state, these findings suggest that frustration elicits an avoidance motivation. Second, by making use of learning theory it was demonstrated that learning effects acquired in a frustration procedure transfer to punishment procedures and vice versa. The logic behind this strategy is as follows: If frustration is motivationally the same as punishment, then it should lead to the same effects as punishment does. In other words, frustration and punishment should be interchangeable in learning experiments. The third strategy used drugs that are known to reduce fear reactions (e.g., alcohol and amytal). These drugs were demonstrated to be capable of reducing frustration reactions as well. It would go beyond the scope of this thesis to review all experiments that demonstrated the similarity between frustration and punishment (for a review see Gray, 1987; Papini & Dudley, 1997). Exemplarily, for each strategy one experiment will be described. One of the first experiments employing the first strategy was conducted by Adelman and Maatsch (1956). In one of these experiments rats were trained to traverse a runway to get food at the goal box. In extinction trials (i.e., frustrative nonreward) the animals were given the opportunity to escape from the goal box by jumping to a platform located above the goal box. The animals learned the jumping response as fast as a second group of animals that were rewarded for the jumping response, and faster than a control group that never had received a reward in the goal box or on the platform. This finding was interpreted as evidence that frustration induced an avoidance motivation, which facilitated learning of avoidance behavior. Employing the second strategy, the so-called blocking effect was used in an experiment to demonstrate the similarity between punishment and frustration (Dickinson & Dearing, 1979). The blocking effect means that a stimulus that has already been paired with an unconditioned stimulus blocks the pairing of another stimulus with the unconditioned stimulus. The procedure goes as follows. First, a stimulus (e.g., tone) is paired with an unconditioned stimulus (e.g., shock). Then a second stimulus (e.g., light) is paired with the compound of tone and shock. As a result, the animal does *not* learn the second pairing. This effect is interpreted that in the second pairing phase the tone already completely predicts the shock, so that the light has no predictive power any more and is thus not conditioned. In an extension of this paradigm, in the second pairing phase other unconditioned stimuli varying in similarity to the first unconditioned stimulus have been used. The more similar the second unconditioned stimulus is to the first unconditioned stimulus, the stronger the blocking effect is. Thus, by using this procedure one can assess the degree of similarity between two stimuli. This was employed to test the similarity between frustration and punishment (Dickinson & Dearing, 1979). In this experiment the rats first learned that a light signaled nonreward (i.e., frustration). In a second phase, the light was presented with a tone followed by a shock. If the tone is not conditioned to the shock, then it can be concluded that nonreward and shock are highly similar. Indeed, this was the finding, which suggests that frustration and punishment are very similar stimuli. By using the third strategy, drugs that reduce fear responses (e.g., amytal) were demonstrated to reduce avoidance responses to frustration as well (Gray, 1987). In particular, if the drug was administered to the rats before extinction trials (i.e., frustration trials) they jumped slower out of the frustrating situation than a control group<sup>7</sup>. This finding was interpreted as evidence that amytal reduces avoidance responses to frustration by presumably reducing the

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<sup>7</sup> To demonstrate that amytal does not decrease jumping speed in general, a second control group was rewarded for jumping out of the goal box. Contrary to the frustration group, amytal injections increased jumping speed in this group.

aversiveness of frustration. Together with the finding that the drug also reduces fear responses, this supports the assumption of a fundamental similarity between frustration and punishment.

To summarize, animal research provides ample evidence supporting the assumption that frustration activates the same system as punishment does. Gray calls this system the fight/flight/freezing system. In the terminology advanced in the present thesis, this is an avoidance motivation. Unfortunately, it is unclear whether these findings of a frustration-avoidance link can be generalized to human beings.

### *Interim Conclusion*

In the previous section, research was reviewed that is relevant for the questions of how frustration affects motivational orientation and motivational intensity. In what follows, an interim conclusion will be drawn with respect to the proposed theoretical mechanisms and the empirical grounding.

Models of approach-avoidance motivation propose very different mechanisms underlying the processes of approach and avoidance. Accordingly, these models suggest different effects of frustration on approach-avoidance motivation. The models conceiving of approach-avoidance motivation as regulative systems that are activated by a superordinate goal suggest either no effect of frustration (e.g., Förster et al., 2001) or an increase of approach motivation (e.g., Carver, 2004). However, empirical evidence supporting the latter position could not be found. In contrast, models that focus on immediate perceptual input suggest that frustration activates an avoidance orientation due to the negativity of the obstacle. However, evidence supporting this assumption stems only from animal research. Thus, in reference to the first main question of the present thesis concerning the effects of frustration on motivational orientation, conclusive evidence from human research is missing.

Similarly, knowledge about how frustration affects motivational intensity is rather limited, as outlined in the first part of this thesis. Furthermore, no theoretical integration exists of the processes leading to the various consequences of frustration. Up to now, theories on frustration concentrated on the very specific effects they wanted to study, for instance anger and aggression. However, the understanding of frustration would be certainly promoted if its consequences can be predicted by one single model. Moreover, such an approach would be very parsimonious because the processes that underlie the influence of frustration on various outcomes can be described by proposing a small number of assumptions. For this purpose, the present thesis applies a dual-system model of social behavior (Strack & Deutsch, 2004) to frustration. As it will be outlined in the next section, the assumptions advanced in this dual-system model allow for a thorough description of how frustration affects motivational orientation and motivational intensity.

### A Two-Systems Perspective on Frustration

In what follows, a dual-system model (Strack & Deutsch, 2004) is applied to the situation of frustration with the purpose of explaining the effects of frustration on motivational orientation and motivational intensity by one single model. First, basic propositions of this model will be described. Then, hypotheses with respect to frustration will be derived.

*The Reflective-Impulsive Model*

The RIM (Strack & Deutsch, 2004) explains behavior as a joint function of two interacting systems, an impulsive system and a reflective system. These systems operate according to different computations, but run in parallel and interact in the course of processing. Whereas the reflective system influences behavior via decisions based on facts and values, the impulsive system elicits behavior through associative links and motivational orientations.

The impulsive system is conceived of as a long-term memory in the form of an associative network (cf. Smith, 1998). Perceptual features, behavioral programs, and valence form associative clusters as a function of frequency and recency of joint activation. If one part of the cluster is activated, activation spreads to the other parts. Thus, by encountering an object (e.g., doorknob) motor programs associated with the representation of this object (e.g., grasping) are activated. If the activation exceeds a certain threshold, the behavior is executed.

Most important for the present thesis is the assumption that the impulsive system can be oriented towards approach or avoidance. A motivational orientation is conceived of as preparedness for two fundamental types of reactions: decreasing the distance to an object (approach) or increasing the distance to an object (avoidance). Distance increase can be accomplished either by moving away from the object or by causing the object to be removed (i.e., aggression) (cf. fight/flight system, Gray, 1987). A motivational orientation is elicited by (a) processing positive or negative information, (b) experiencing positive or negative affect, (c) perceiving approach or avoidance, or (d) executing approach or avoidance behavior. According to the principle of compatibility, processing information, experiencing affect, and executing behavior are facilitated if they are compatible with the prevailing motivational orientation. Thus, positive valence is linked to approach, and negative valence is linked to avoidance.

Furthermore, impulsive processes are fast, can proceed in parallel and do not require cognitive capacity for their operation. Consequently, the main function of the impulsive system is to quickly generate appropriate reactions to suddenly occurring demands from the environment and to simplify cognitive processing by providing schemata that have developed through automatization. These advantages, however, entail some disadvantages: The impulsive system cannot flexibly combine concepts by applying abstract relations, but instead is dependent on associative clusters that develop only slowly through repeated coactivation. In particular, the impulsive system cannot form a judgment with a truth value (e.g., This *is* a tree.) or apply a negation (e.g., This *is not* an apple.) as has been demonstrated by Deutsch, Gawronski, and Strack (2006). Moreover, the impulsive system cannot apply the concept of time. Thus, it cannot represent what will be the case in the future, but is driven by immediate perceptual input.

Whereas the impulsive system is specialized in generating quick responses towards the present environment, and therefore lacks flexibility and analytical competencies (i.e., representing truth, negations, and time), the features of the reflective system are complementary. The reflective system can re-represent what is activated in the IS in a symbolic format and flexibly combine the re-representations by applying abstract relations like truth, negation, or time. Thus, the reflective system generates propositional judgments and draws inferences by using stored knowledge. Contrary to impulsive processes, reflective processes require cognitive capacity, operate slowly, and depend on intentions.



Most important for the present thesis, the reflective system generates a decision about the desirability and feasibility of a particular action based on knowledge about values and facts. Thus, goals are set in the reflective system. Thereby, a behavioral intention is created which activates appropriate behavioral schemata in the impulsive system. Note that here the reflective system interacts with the impulsive system. Most importantly, the activation of goal-relevant schemata is maintained until the goal has been reached. Then the activation is turned off (cf. Förster, Liberman, & Higgins, 2005; Rothermund, 2003a). This mechanism is called *intending*. Thus, following goal-setting in the reflective system, a rather automatically operating process called intending is started that keeps goal-relevant schemata activated until the goal has been reached.

The impulsive and the reflective system can run in parallel. Whereas the impulsive system is always operating, the reflective system only operates if an intention and sufficient cognitive capacity is present. Arousal is assumed to influence impulsive as well as reflective processes, but in a different way. Because operations of the reflective system depend on cognitive resources, a curvilinear relation between arousal and reflective functioning is proposed, with best functioning at an intermediate level of arousal (cf. Yerkes & Dodson, 1908). In contrast, associative processes in the impulsive system are strengthened with increasing arousal (cf. Hull, 1966; Zajonc, 1965)

How do the two systems interact? Most importantly, the reflective system is able to generate an intention that stands in opposition to behavioral schemata activated in the impulsive system by immediate perceptual input. For example, the perception of a cake may immediately activate an approach orientation and the behavioral schema of eating in the impulsive system. Given enough cognitive capacity, the reflective system can generate a behavior intention (e.g., I will eat fruits instead of this cake.) that is in line with personal values and goals (e.g., dieting). Then, this intention activates the appropriate behavioral schemata in the impulsive system, which in turn leads to overt behavior.

### *Application to Frustration*

In what follows, propositions of the RIM will be applied to the situation of frustration. Thereby, hypotheses with respect to two main questions will be deduced. The first question concerns the motivational orientation elicited by frustration. The second question regards the mechanisms by which goal striving in the face of obstacles is maintained.

As it was outlined at the beginning of the theoretical part, frustration is characterized by a superordinate approach goal (i.e., reaching a gratification) and a subordinate avoidance goal (i.e., removing an obstacle). Whereas in most situations the obstacle is immediately present in the situation, the goal is only represented in memory. According to the RIM, immediate perceptual input drives processes of the impulsive system. In particular, evaluation of environmental stimuli elicits a compatible motivational orientation. Consequently, the negative valence (intrinsic and motivational) of the immediately perceivable obstacle is assumed to elicit an avoidance orientation in the impulsive system. This implies that superordinate goals do not moderate this process. In particular, obstacles are assumed to elicit an avoidance orientation irrespective of whether the person is pursuing an approach or avoidance goal. Note that this hypothesis is contrary to the conceptualization of approach-avoidance motivation as regulative systems (Carver, 2004; Higgins, 1998), which assumes an interaction of the represented goal state and progress feedback.

Furthermore, because a motivational orientation is elicited very fast in the impulsive system, appraisals that are based on reflective processes are assumed to not moderate the

elicitation of a motivational orientation. With respect to frustration, appraisals of controllability and goal expectancy play a crucial role. Since such appraisals require reflective processes, because they imply a future perspective, they are assumed to not moderate the elicitation of a motivational orientation. Note that this reasoning is contrary to Carver's (2004) model that proposes that approach motivation particularly increases when the obstacle is appraised as controllable.

The hypothesis that motivational orientations follow the compatibility principle allows for a further prediction. Because executing incompatible responses costs cognitive resources (cf. Förster & Stepper, 2000; Förster & Strack, 1996), responding with approach behavior to frustration should consume cognitive resources. Consequently, fewer resources are available for processing information that is relevant for goal pursuit, resulting in impaired goal achievement. Therefore, I propose that avoidance behavior, as a response to frustration is functional in the sense that it leaves cognitive resources free for goal pursuit. Note that this is contrary to the proposition that an approach motivation is functional for goal pursuit because it increases the engagement of effort (Carver, 2004).

By which mechanism is goal striving accomplished in the face of obstacles? According to the RIM, an intending mechanism keeps goal-relevant behavioral schemata activated until the goal has been reached. Then the activation is turned off. Thus, it is expected that the activation of behavioral schemata is maintained in the face of obstacles, resulting in an increased likelihood that the blocked behavior is executed again. In addition, the reflective system generates a behavioral decision that is based on value and expectancy. In particular, appraisals of controllability and goal expectancy (cf. secondary appraisal, Lazarus, 1991) enter the decision process. Based on such appraisals an individual decides to continue or to disengage from goal striving. Moreover, based on knowledge about means-ends relationships, alternative strategies may be chosen. Depending on the behavioral decision, appropriate behavioral schemata are activated or turned off in the impulsive system. Thus, if the person decides to continue goal striving by engaging more effort, activation of the blocked behavioral schemata will be maintained. However, if the person decides to quit goal pursuit completely or to employ different means, activation of the blocked behavioral schemata will be turned off.

Furthermore, arousal is assumed to influence these processes. Yet, since arousal will not be investigated in the experimental part, this will be outlined only briefly. Arousal may stem from various psychological and physiological sources, including motivationally relevant events like frustration. For the present thesis it is important, how arousal affects impulsive and reflective processes of motivational intensity. As arousal is assumed to strengthen associative processes, activation of goal-relevant behavioral schemata increases with arousal, resulting in higher persistence. Furthermore, as very high levels of arousal diminish reflective processing, appraisal processes are impaired.

In sum, goal striving is assumed to be maintained by two interacting processes. The mechanism of intending keeps behavioral schemata activated despite the appearance of obstacles. In addition, appraisal-based behavioral decisions moderate the activation of behavioral schemata. Whereas the first mechanism operates rather automatically, appraisals and decisions are reflective processes and therefore require time and cognitive resources. Importantly, contrary to Carver (2004) it is *not* assumed that an approach motivation helps to overcome obstacles.

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## Hypotheses and Outlook on the Experiments

Based on the above reasoning, the following hypotheses are advanced. Concerning motivational orientation it is assumed that due to the compatibility principle, frustration elicits an avoidance orientation. This hypothesis was tested in *Experiments 1 to 3* by adopting a motivational variation of an approach-avoidance task introduced by Chen and Bargh (1999). In this task, participants carry out approach and avoidance behaviors as a reaction to positive and negative words. In the motivational variation employed in this thesis, the task was embedded in a performance test, with which trials could be created resulting in frustration. As a comparison condition, trials that resulted in success were included. Thus overall, participants responded with approach and avoidance behavior to trials of frustration and success. Besides the general question of motivational orientation elicited by frustration, *Experiments 1 to 3* were designed to examine some further aspects. Particularly, *Experiment 1* was devised to explore the time course of motivational orientation elicitation. Because studies on motivational valence revealed different effects on behavior depending on the interstimulus interval (Moors & De Houwer, 2001; Rothermund, 2003b), it is relevant to investigate the time course relation of frustration and motivational orientation. For this purpose, participants in one condition of *Experiment 1* had to respond immediately upon the occurrence of frustration and success with approach and avoidance behavior. In a second condition the response signal appeared with a delay of 1000 ms. Thereby, how long the elicitation of a motivational orientation is maintained could be tested. In *Experiment 2*, the generality of the effect was examined by assigning participants a superordinate avoidance goal. While the definition of frustration only allows for the blocking of approach goals, the predictions derived from the RIM also apply for superordinate avoidance goals. Thus, the same effect was expected irrespective of the superordinate goal participants pursued. *Experiment 3* was designed to more thoroughly explore the effect of motivational valence. In particular, in *Experiments 1 and 2* the frustration manipulation included the presentation of the verbal feedback “too slow”. It is probable that this expression carries a negative intrinsic valence, which might drive the effect on approach-avoidance behavior. In *Experiment 3* frustration feedback was given in a more symbolic way. Herewith, the influence of intrinsic valence could be ruled out.

As outlined in the last section, the compatibility principle implies that executing incompatible behavior consumes cognitive resources. Applied to frustration, the execution of incompatible behavior as a response to obstacles is predicted to impair goal pursuit. Conversely, executing compatible responses should be functional, in the sense that it saves cognitive resources and thereby improves goal pursuit. This hypothesis was tested in *Experiment 4* by invoking a different version of the above described motivational approach-avoidance task. In particular, speed of goal achievement was assessed after participants had to carry out approach or avoidance behaviors towards obstacles. As a comparison condition, speed of goal achievement was assessed after participants executed approach or avoidance behaviors towards helpful events (i.e., hints for goal task) that happened during goal pursuit.

Concerning motivational intensity, I propose that goal striving is affected by two mechanisms. First, a rather automatically operating intending mechanism keeps behavioral schemata activated despite frustration. Second, a mechanism based on appraisals of controllability and goal expectancy generates a decision with respect to continuing or quitting goal pursuit. *Experiments 5 and 6* tested these hypotheses by employing two different operationalizations of controllability and two different measures of goal striving.

In *Experiment 5*, controllability was manipulated by varying agent-means relations (Skinner, 1996). In particular, the extent to which means to overcome the obstacle were

available was manipulated. As a measure of goal striving, decisions to put more effort in the task (i.e., to use the means to overcome the obstacles) were assessed. Thus, this experiment measured rather reflective behavior.

In *Experiment 6*, controllability was manipulated by varying agent-ends relations (Skinner, 1996). In particular, the extent to which participants could produce the desired outcome (i.e., overcome the obstacle) was manipulated. As a measure of goal striving, the activation of behavioral schemata that were a means to overcome the obstacle were assessed by measuring response facilitation (i.e., latency of behavior execution). Thus, this experiment measured rather impulsive behavior.

Furthermore, *Experiments 5* and *6* were devised to explore the moderating role of personality factors. In particular, dispositional approach motivation (BAS sensitivity, Carver & White, 1994) was assessed in both experiments, and control beliefs (Krampen, 1991; Rotter, 1966; Schwarzer, 1994) and action-state orientations (Kuhl & Beckmann, 1994) were measured exclusively in Experiment 6. The hypotheses regarding the relation of personality factors to frustration reactions will be outlined in detail in the respective sections in the empirical part.

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## EMPIRICAL PART

### Experiment 1

According to the assumptions advanced in this thesis, the valence of immediate perceptual input should elicit a compatible motivational orientation. Because frustration is assumed to be negative, it should elicit an avoidance orientation. This hypothesis is tested against the assumptions proposed by Carver (2004, 2006). According to Carver, frustration enhances approach motivation, thereby helping to engage effort to overcome obstacles. To test these hypotheses, the effect of frustration on the facilitation of approach-avoidance behavior was compared with the effect of success on the facilitation of approach-avoidance behavior. For this purpose, a paradigm was employed that allows for testing the automatic activation of behavioral tendencies. In particular, a motivational variation of the approach-avoidance task introduced by Chen and Bargh (1999) was developed and administered as an affective Simon task (De Houwer et al., 2001). In the original approach-avoidance task, participants respond to positive and negative words with approach and avoidance movements by pulling a joystick towards themselves and pushing a joystick away from themselves, respectively. Thereby, whether word valence activates compatible behavior tendencies automatically in the sense of fast and efficiently can be tested (cf. Moors & De Houwer, 2006). When participants are instructed to respond according to an arbitrary nonaffective feature (e.g., color) instead of word valence, this task is called an affective Simon task (De Houwer et al., 2001). Thereby, whether word valence activates compatible behavior tendencies even if participants do not have the intention to process word valence can be tested.

For the purpose of the present thesis, a motivational variation of this task was adopted. Unlike in the classic variation, participants had to respond with approach-avoidance movements to stimuli containing motivational valence, particularly frustration and success. How were these events created? Participants were told that they would have to complete an achievement test, which consisted of a series of letter searching trials. In every trial they had to find a target letter within some letter rows and indicate its position (upper or lower rows) by pressing an appropriate key within a certain time limit. After completion of each searching trial feedback was given: If the correct key was pressed within the time limit positive feedback appeared. If a wrong reaction was given or the time limit was exceeded a negative feedback appeared. The feedback was surrounded by a colored frame, which served as a response signal. In particular, participants had to respond with joystick movements of approach (i.e., pull towards) or avoidance (i.e., push away) according to frame color. Then the next searching trial started. In a third of the trials, frustration was caused by temporarily deactivating the response keys, which the letter position had to be indicated with. Hence, participants typically would press the correct key a couple of times until the time limit was exceeded without getting the anticipated positive feedback. To sum up, in every trial participants had to perform two different reactions, a keypress as a response to the target letter and an approach-avoidance movement as a response to the feedback. Like in an affective Simon task, approach-avoidance reactions had to be executed according to an arbitrary stimulus feature (i.e., frame color). Thus, task completion did not require processing the motivational valence of the feedback. This allowed for testing whether motivational valence activates behavior tendencies fast, efficiently, and independent of processing intentions.

A problem of using joystick movements as a measure for approach-avoidance is that the default initiation time of approach and avoidance responses is unknown. Due to participants' posture, different enervation times for flexor and extensor muscles, or other unknown influences, it is probable that one movement is executed faster than the other. To obtain a baseline measure of approach-avoidance responses that can serve as a reference point, approach-avoidance responses to neutral stimuli were assessed in separate blocks.

A further aim of the study was to examine the time course of behavioral activation. Previous studies showed that motivational valence activates compatible responses when measured immediately (e.g. Moors & De Houwer, 2001). In contrast, at a delayed point of measurement time, activation of incompatible responses was found (Rothermund, 2003b). Unfortunately, it is difficult to compare these findings because the employed paradigms differed in many aspects (e.g., nature of feedback and response). Therefore, it is relevant to investigate the time course of motivational orientation elicitation within the same paradigm. For this purpose, stimulus onset asynchrony (SOA) was manipulated between participants. In one group the response signal (i.e., colored frame) appeared together with the feedback of motivational valence (SOA = 0 ms). In a second group the response signal appeared 1000 ms after the feedback of motivational valence (SOA = 1000 ms). As SOA was manipulated for exploratory reasons, no hypotheses were developed for the long SOA-group.

### *Hypotheses*

Based on the above reasoning it was expected that frustration activates an avoidance orientation, which results in the facilitation of avoidance behavior. Conversely, success should activate an approach orientation, which should result in the facilitation of approach behavior. As a reference point, approach-avoidance tendencies towards neutral stimuli were assessed. To obtain a measure of behavioral facilitation, approach-avoidance indices for all types of stimuli were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses. Thus, the more easily approach behavior (as opposed to avoidance behavior) is carried out, the more positive the index is. This approach-avoidance index was used in all experiments reported in this thesis.

As a manipulation check of frustration induction, self-reported emotions were assessed. It was expected that frustration would lead to an increase of anger (cf. Berkowitz, 1989). Other negative emotion (fear and sadness) and positive emotions (happiness) were not expected to increase due to frustration.

- H 1.1 Frustration results in a more negative approach-avoidance index as compared to neutral stimuli.
- H 1.2 Success results in a more positive approach-avoidance index as compared to neutral stimuli.
- H 1.3 Self-reported anger increases, whereas other emotions (fear, sadness, happiness) do not increase.

### *Design*

The hypotheses were tested using a 3 (motivational valence: success vs. frustration vs. neutral) x 2 (response: approach vs. avoidance) x 2 (SOA: 0 vs. 1000 ms) x 2 (response assignment: blue-approach/yellow-avoidance vs. yellow-approach/blue-avoidance) factorial mixed design with the factors motivational valence and response varied within subjects.

### *Method*

#### *Participants*

A total of 35 students<sup>8</sup> (20 female) of the University of Würzburg enrolled in different majors (excluding psychology) took part in the study in sessions up to two persons at the same time. Participants received €5 as compensation.

#### *Procedure*

At the beginning of the experiment participants were asked to fill out an emotional state questionnaire. They had to indicate to what extent they currently felt a particular emotion on a scale ranging from 1 (*not at all*) to 7 (*very much*). Presented emotions were anger, sadness, fear, happiness, and some filler emotions.<sup>9</sup> Then, the motivational Simon task was started. During the task participants had to wear earplugs. This was done as a measure of precaution that participants would not become aware of the other participant's frustration. After completion of the motivational Simon task, participants had to fill out the emotional state questionnaire again. At the end, participants were debriefed and paid.

#### *Materials*

For the motivational Simon task, 15 different letters were used as target stimuli<sup>10</sup>. For each letter two letter-search pictures were created consisting of three letter rows above and three letter rows below a horizontal line in the middle (see Figure 1). The target letter was located above or below the line, respectively. Feedback pictures were created by placing the German expressions "correct", "wrong", or "too slow" in the middle of the letter-search picture and a yellow or blue frame around the picture. All stimuli were presented in white font color on a black background. All experiments reported in this thesis were run on IBM compatible PC's. Participants' responses were recorded using a standard keyboard and a joystick (Logitech Attack 3) connected to the USB port. The Medialab/DirectRT bundle (Empirisoft.com) was used as experimental software.

#### *Motivational Simon Task*

Participants read that they had to perform an achievement-concentration test, which consisted of a series of letter searching trials. They were asked to complete as many searching trials as possible in a fixed time period of 15 minutes. To boost participants' motivation to perform well they were informed that in previous tests students' average performance consisted of 80 correctly completed trials. Different from instructions, the test consisted of 90 trials, which had to be finished regardless of how much time it took. The

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<sup>8</sup> Due to computer problems the baseline approach-avoidance data from one participant and the emotion and demographical data from three participants were lost.

<sup>9</sup> For an overview of all emotions see Appendix A.

<sup>10</sup> For an overview of stimuli see Appendix A.

experimenter told participants that in previous sessions the joystick keys sometimes hadn't worked properly. But this time everything should be working fine. If not, they should not stop but continue with the task and do as best as they can. This instruction was given to prevent participants from interrupting the task and to provide them with a plausible explanation for the defective keys.

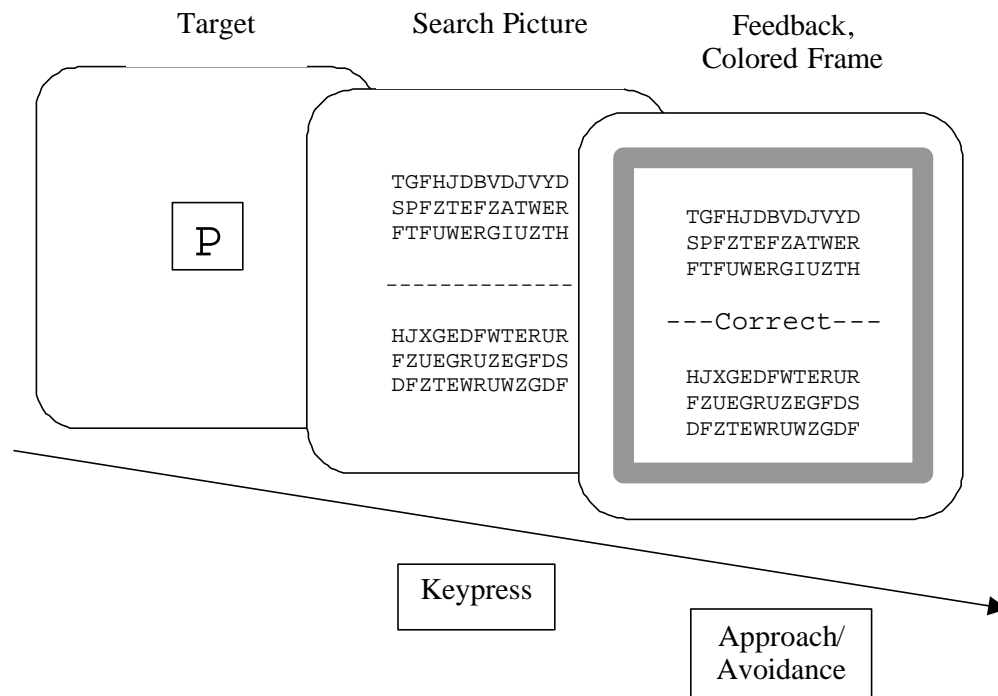


Figure 1: Sequence of a trial with success feedback.

Each of the test trials started with the presentation of a target letter for 1500 ms (see Figure 1). Immediately thereafter, a letter-search picture appeared for max 5000 ms. Participants had to indicate by pressing one of two keys at the joystick, whether the target letter was located in the upper or lower half. After participants' response or after the time limit had exceeded, feedback was presented. If participants located the letter correctly within the time limit, the feedback "correct" was shown in the center of the screen. If they responded incorrectly or too late, the feedback "wrong" or "too slow" appeared, respectively. Depending on SOA conditions, a colored frame appeared simultaneously with the feedback or with a delay of 1000 ms. According to the color (yellow vs. blue), participants had to execute approach (i.e., pull towards) or avoidance (i.e., push away) movements. Then, all stimuli were deleted from the screen. In case of a wrong approach-avoidance response an error feedback appeared for 1500 ms. The intertrial interval was 2000 ms. One third of the searching trials (30 trials) led to frustration. In these trials successful behavior was prevented by temporarily deactivating the response keys. Hence, participants typically would press the correct key a couple of times without getting the anticipated positive feedback. 1500 ms after the first keypress the feedback "too slow" appeared. Success and frustration trials were varied in random order. The total of 90 trials were divided into three blocks with 30 trials each.



Between the blocks, participants had to complete trials, which consisted of solely approach-avoidance reactions to colored frames without searching for a letter. These trials were included to obtain a baseline measure of approach-avoidance reactions. Each block contained 20 trials. A trial started with the presentation of “XXX” for 500 ms to focus participants’ attention. Then a colored frame (yellow or blue) appeared surrounding the fixation stimuli. Participants had to respond to the frame with approach-avoidance movements. In case of a wrong reaction, an error feedback was presented for 1500 ms. The intertrial interval was 1000 ms.

Prior to the test trials, participants could practice the task in two practice blocks. In the first practice block, solely approach-avoidance responses to colored frames were practiced in a total of 20 trials. This block was identical to the baseline blocks administered between test blocks. In the second practice block, the combined task of letter searching and approach-avoidance reactions was practiced in a total of 20 trials. These trials were identical to the test trials with two exceptions: No frustration trials were included and the time limit for searching was 7000 ms.

## Results

### *Approach-Avoidance Index*

From the test trials of the motivational Simon task only approach-avoidance responses to successfully solved letter searching trials (85.2% of solvable trials) and to frustration trials were analyzed. From the test and the baseline trials incorrect joystick responses (3.1%) and responses with latencies lower than 300 ms and higher than 4000 ms (1.1%) were excluded. In addition, latencies above and below three standard deviations of the individual mean value were excluded (1.5%). Approach-avoidance indices for all types of motivational valence (success, neutral, frustration) were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses. Thus, the more easily approach behavior (as opposed to avoidance behavior) is carried out, the more positive the index is. The indices were submitted to an Analysis of Variance (ANOVA) for repeated measures with motivational valence as within factor and SOA as between factor<sup>11</sup>. As expected, motivational valence influenced the approach-avoidance index,  $F(2,64) = 8.92, p < .001$  (see Figure 2). The approach-avoidance index was positive for success ( $M = 56.99, SD = 68.30$ ) and negative for frustration ( $M = -37.23, SD = 140.57$ ). For neutral stimuli the approach-avoidance index was in between ( $M = 24.53, SD = 38.96$ ). Simple comparisons revealed significant differences between all stages: As compared to neutral stimuli the approach-avoidance index was more positive for success,  $t(32) = 2.47, p = .019$ , and more negative for frustration,  $t(32) = 2.46, p = .019$ . Neither the main effect of SOA,  $F(1,32) = 2.28, p = .14$ , nor the interaction of motivational valence and SOA,  $F(2,64) = 1.42, p = .25$ , was significant.

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<sup>11</sup> In a preliminary analysis, the response assignment was entered as a between-participants factor. As only the main effect of this factor, but no interaction effects were significant, the factor was dropped for further analyses. See Appendix A for means and the ANOVA table.

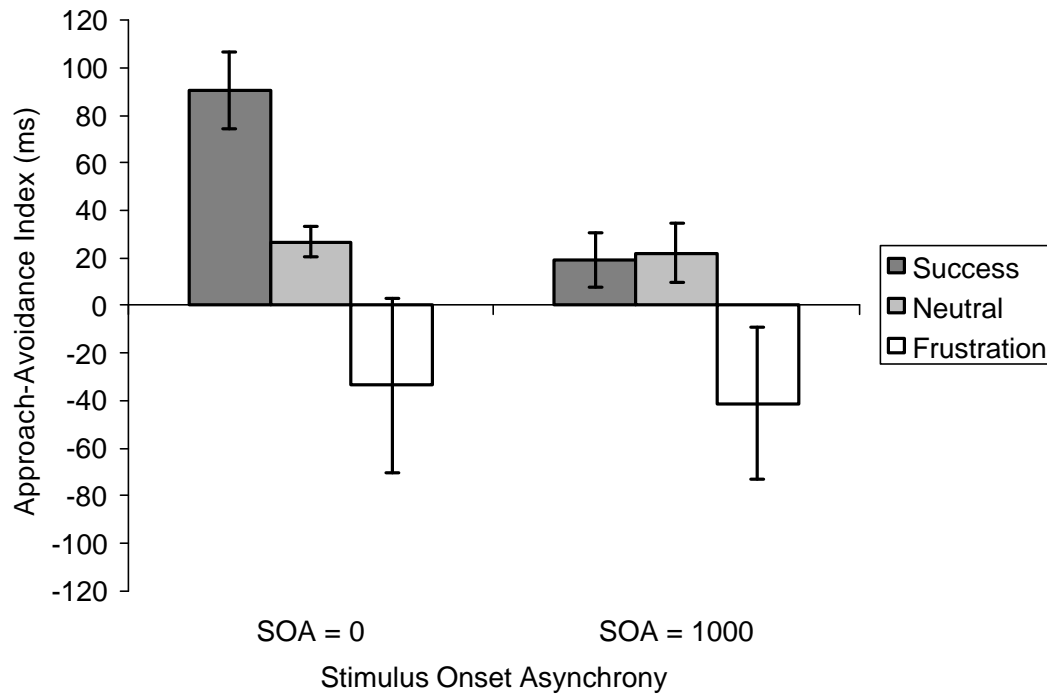


Figure 2: Mean approach-avoidance index as a function of motivational valence and stimulus onset asynchrony. Higher values indicate stronger approach tendencies. Error bars represent standard errors.

### Emotions

The ratings on the emotion items anger, sadness, fear and happiness administered before and after the motivational Simon task were submitted to a 2 (time) X 4 (emotion) X 2 (SOA) ANOVA for repeated measures with SOA as a between factor. As expected, only subjective anger increased during the task, whereas the other emotions decreased or did not change. This result is reflected in a significant interaction of time and emotion,  $F(3,90) = 9.30$ ,  $p < .001$ . Simple comparisons indicate that anger increased ( $M_{pre} = 1.53$ ,  $SD_{pre} = 0.95$ ,  $M_{post} = 2.53$ ,  $SD_{post} = 1.74$ ),  $t(30) = 3.79$ ,  $p = .001$ , sadness decreased ( $M_{pre} = 2.03$ ,  $SD_{pre} = 1.36$ ,  $M_{post} = 1.66$ ,  $SD_{post} = 1.04$ ),  $t(30) = 2.19$ ,  $p = .036$ , fear did not change ( $M_{pre} = 1.41$ ,  $SD_{pre} = 0.91$ ,  $M_{post} = 1.25$ ,  $SD_{post} = 0.92$ ),  $t < 1$ , and happiness decreased ( $M_{pre} = 4.00$ ,  $SD_{pre} = 1.23$ ,  $M_{post} = 3.56$ ,  $SD_{post} = 1.52$ ),  $t(30) = 3.02$ ,  $p = .005$ . Additionally, the ANOVA revealed a main effect of emotion,  $F(3,90) = 29.96$ ,  $p < .001$ , indicating that overall happiness was higher than negative emotions. No other effect was significant (all  $F$ 's  $< 1$ ).

### Discussion

The results of Experiment 1 strongly confirm the hypotheses. As expected, frustration facilitates avoidance tendencies (Hypothesis 1.1), and success facilitates approach tendencies (Hypothesis 1.2). Moreover, anger increased considerably during the task, whereas sadness, fear and happiness did not change or even decreased (Hypothesis 1.3). This pattern bolsters the hypothesis that frustration elicits an avoidance orientation, and that an avoidance orientation can go along with subjective anger. One limitation of this conclusion is that

avoidance behavior and subjective anger were measured at different points in time. In particular, avoidance orientation was measured with respect to micro occurrences (i.e., frustration trials), whereas emotions were measured with respect to changes during the entire task. Yet, because the main goal of the study was to assess immediate behavior reactions, and because it seemed impracticable to measure subjective anger after every trial, this asymmetry was accepted. Moreover, it seems very unlikely that other factors than the defective keys were responsible for the pattern of emotion change (i.e., increase of anger and decrease of sadness and happiness). In sum, the results provide evidence for a fundamental link between negativity and the motivational orientation of avoidance.

Furthermore, statistic analyses revealed that approach-avoidance tendencies were basically the same at both SOAs. However, an inspection of the means of approach-avoidance indices reveals that the approach-avoidance index of success decreased with time ( $M_{\text{soa}=0} = 90.40$  vs.  $M_{\text{soa}=1000} = 19.39$ ). To explain this effect, one can only speculate. Possibly, positive affect decays faster than negative affect. However, more research would be needed to test this explanation. Most importantly for the present thesis, the approach-avoidance index of frustration was comparably negative at both SOAs ( $M_{\text{soa}=0} = -33.64$  vs.  $M_{\text{soa}=1000} = -41.26$ ). This finding strongly supports the assumption that frustration elicits an avoidance orientation. Interestingly, Rothermund's (2003) finding that motivational valence facilitates incongruent responses at long SOAs were not replicated. Since Rothermund interprets his finding as an attention effect it seems very probable that incongruency effects of motivational valence are restricted to measures of attention allocations (see also Gawronski, Deutsch, & Strack, 2005). Further research is needed to explore the differences and similarities between attention allocation and behavior activation elicited by motivational valence.

The baseline measure of approach-avoidance tendencies towards neutral stimuli revealed a positive approach-avoidance index. Thus, at neutral conditions approach behavior is initiated faster than avoidance behavior. It is unclear, whether physiological or psychological processes lead to this approach bias. Importantly, this finding makes clear that by interpreting approach-avoidance indices, the zero point cannot be taken as a reference point. Thus, only relative comparisons between different conditions are valid.

The next experiment was devised to explore the generality of the link between negativity and avoidance orientation. In particular, the study aimed at replicating the effect with a superordinate avoidance goal.

## Experiment 2

The aim of Experiment 2 was to examine the generality of the relation between frustration and avoidance motivation. According to the assumptions advanced in this thesis, immediate perceptual input should drive motivational orientations. Thus, in the context of frustration this effect should be independent of superordinate goals. In particular, frustration of an approach goal as well as frustration of an avoidance goal is expected to elicit an avoidance orientation. Although the definition of frustration includes only approach goals, from the perspective of the RIM, there is no theoretical reason why obstacles to an avoidance goal should act differently. Thus, Experiment 2 was designed to test the effect of frustration on approach-avoidance tendencies by assigning participants a superordinate avoidance goal.

What emotion will be elicited by the frustration of an avoidance goal? Whereas Carver (2004) proposes that anger is an emotion that stems from approach motivation, a recent analysis of anger-related appraisals suggests that the experience of goal obstacle is sufficient to elicit anger (Kuppens, Van Mechelen, Smits, & De Boeck, 2003). Following this analysis, it was assumed that the frustration of an avoidance goal will evoke anger as well.

A further aim of the study was to compare the behavioral effect of frustration with the behavioral effect of stimuli solely carrying intrinsic valence. In particular, whether the effect of frustration resembles the effect of negative words on facilitation of avoidance tendencies in quantity was explored. For this purpose, positive and negative words were presented in the baseline trials administered between the test blocks. Previous findings (e.g., Chen & Bargh, 1999) were expected to be replicated by showing that stimuli containing intrinsic valence activate compatible behavior tendencies. Concerning the comparison of the magnitude of the effect of motivational and intrinsic valence, no hypotheses were developed, because this question was investigated for exploratory reasons.

### *Hypotheses*

In general, a replication of the results from Experiment 1 was expected. In particular, frustration was predicted to facilitate avoidance behavior, whereas success was predicted to facilitate approach behavior. In addition to Experiment 1, approach-avoidance reactions to stimuli containing intrinsic valence were assessed. It was expected that positive and negative words activate compatible behavior tendencies. Furthermore, self-reported emotion change was hypothesized to replicate the results from Experiment 1.

- H 2.1 Frustration results in a more negative approach-avoidance index as compared to success.
- H 2.2 Negative words result in a more negative approach-avoidance index as compared to positive words.
- H 2.3 Self-reported anger increases, whereas other emotions (fear, sadness, happiness) do not increase.

### *Design*

The experiment consisted of a 2 (type of valence: motivational vs. intrinsic) x 2 (valence: positive vs. negative) x 2 (response: approach vs. avoidance) x 2 (response assignment) mixed design with the factors type of valence, valence and response varied within subjects.

### *Method*

#### *Participants*

Participants were 24 students (15 female) of different majors (excluding psychology) at the University of Würzburg. Up to two persons took part at the same time. Participants received €6 as compensation. One participant was excluded from the analysis, because he performed extremely badly in the searching task (more than four standard deviations below the mean performance). Because this may either indicate that this person was not motivated at all or that she did not understand the task, the premises to test the hypotheses were not fulfilled. In sum, a total of 23 participants were analyzed.

#### *Procedure*

The procedure was the same as in the Experiment 1.

#### *Materials*

The stimuli for the motivational Simon task were the same as in Experiment 1 with one exception: The letter-search pictures consisted of only two letter rows, one above and one below the line in the middle. Positive and negative words for the measure of the effect of intrinsic valence were selected from a standardized list of words published by Klauer and Musch (1999).<sup>12</sup>

#### *Motivational Simon Task*

Like in Experiment 1, participants were told that they had to perform an achievement-concentration test, where they had to complete as many searching trials as possible within 12 minutes<sup>13</sup>. Furthermore, to induce an avoidance motivation, participants were told that they had to repeat the whole test, if they performed below the performance criterion of 80 correctly completed trials. This was supposed to induce an avoidance motivation, because the task was very strenuous and it would probably be aversive to do it once again. After finishing the task, participants were not asked to do it again.

The test trials of the motivational Simon task were identical to Experiment 1 with one exception: Because the letter-search picture was less complex, the time limit to find the letter was decreased to 4000 ms. The baseline trials between the test blocks were different from Experiment 1, as positive and negative words were included. Each trial started with three X in the center of the screen for 500 ms, followed by a blank screen for 200 ms. Then a positive or negative word surrounded by a yellow or blue frame appeared. Participants had to respond with approach-avoidance reactions according to frame color. They were instructed

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<sup>12</sup> For a list of all words see Appendix B.

<sup>13</sup> The time limit was decreased to 12 minutes as compared to Experiment 1, because the task was easier than in Experiment 1 due to the reduced amount of distracters in the search picture.

to ignore the words in the center. In case of a wrong response, error feedback was presented for 1500 ms. The intertrial interval was 1000 ms.

The first practice block (solely approach-avoidance reactions) was identical to the blocks of baseline trials that were administered between the test blocks. The second practice block of letter searching combined with approach-avoidance reactions was the same as in Experiment 1 with one exception: Because the letter-search picture was less complex, the time limit to find the letter was decreased to 5000 ms.

## Results

### *Approach-Avoidance Index*

From the test trials of the motivational Simon task only approach-avoidance responses to successfully solved letter searching trials (92.0% of solvable trials) and to frustration trials were analyzed. From the test and the baseline trials incorrect joystick responses (4.1%) and responses with latencies lower than 300 ms and higher than 4000 ms (0.6%) were excluded. In addition, latencies above and below three standard deviations of the individual mean value were excluded (1.8%). Approach-avoidance indices for all types of stimuli (success, frustration, positive words, and negative words) were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses. The indices were submitted to an ANOVA for repeated measures with type of valence and valence as within factors<sup>14</sup>. As expected, valence influenced the approach-avoidance index,  $F(1,22) = 17.96$ ,  $p < .001$  (see Figure 3). Additionally, the interaction between type of valence and valence was significant,  $F(1,22) = 13.77$ ,  $p = .001$ . Simple comparisons revealed that the approach-avoidance index was influenced by motivational valence,  $t(21) = 4.46$ ,  $p < .001$ . In particular, the approach-avoidance index was positive for success ( $M = 52.44$ ,  $SD = 64.03$ ) and negative for frustration ( $M = -73.08$ ,  $SD = 149.05$ ). Intrinsic valence, however, did not affect the approach-avoidance index,  $t(21) = .95$ ,  $p = .35$ . The main effect of type of valence was not significant,  $F(1,22) = 1.20$ ,  $p = .29$ .

### *Emotions*

The ratings on the emotion items anger, sadness, fear and happiness administered before and after the motivational Simon task were submitted to a 2 (time) X 4 (emotion) ANOVA for repeated measures. As expected only subjective anger increased during the task, whereas the other emotions decreased or did not change. This result is reflected in a significant interaction of time and emotion,  $F(3,66) = 5.57$ ,  $p = .002$ . Simple comparisons indicate that anger increased ( $M_{pre} = 1.61$ ,  $SD_{pre} = 0.72$ ,  $M_{post} = 2.30$ ,  $SD_{post} = 1.30$ ),  $t(22) = 2.15$ ,  $p = .043$ , sadness did not change ( $M_{pre} = 2.17$ ,  $SD_{pre} = 1.19$ ,  $M_{post} = 1.96$ ,  $SD_{post} = 0.88$ ),  $t < 1.5$ , fear did not change ( $M_{pre} = 1.39$ ,  $SD_{pre} = 0.58$ ,  $M_{post} = 1.26$ ,  $SD_{post} = 0.69$ ),  $t < 1.5$ , and happiness decreased slightly ( $M_{pre} = 3.91$ ,  $SD_{pre} = 1.08$ ,  $M_{post} = 3.52$ ,  $SD_{post} = 1.12$ ),  $t(22) = 1.90$ ,  $p = .071$ . Additionally, the ANOVA revealed a main effect of emotion,  $F(3,66) = 35.12$ ,  $p < .001$ , indicating that overall happiness was higher than negative emotions. The main effect of time was not significant ( $F < 1$ ).

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<sup>14</sup> In a preliminary analysis, the response assignment was entered as a between-participants factor. As no relevant effect or interaction was significant, the factor was dropped for further analyses. See Appendix B for means and the ANOVA table.



*Figure 3.* Mean approach-avoidance index as a function of type of valence and valence. Higher values indicate stronger approach tendencies. Error bars represent standard errors.

### *Discussion*

The results from Experiment 2 fully replicate the findings from Experiment 1 and further bolster the hypothesis of a basic link between negativity and avoidance behavior. As expected, frustration activated avoidance tendencies even when participants pursued a superordinate avoidance goal (Hypothesis 2.1). Thus, these findings support – together with the results of Experiment 1 – the assumption that immediate perceptual input drives motivational orientations independent of superordinate goals. One limitation of this conclusion is that superordinate goals were not manipulated in one single study. However, since a null effect of superordinate goals was expected (i.e., no interaction of superordinate goals and motivational valence), comparing the effects of both superordinate goals in one study would not have yielded greater insight. Importantly and consistent with predictions, the data of both studies revealed a significant effect of motivational valence on approach-avoidance tendencies.

Furthermore, in line with Hypothesis 2.3, frustration caused exclusively an increase of anger but not of fear or sadness. This result provides evidence for the assumption that goal obstacles evoke anger irrespective of the direction of the pursued goal. This finding disproves the assumption that anger only stems from approach motivation (Carver, 2004; Harmon-Jones, 2003).

Unfortunately, previous findings of behavioral activation by positive and negative words (e.g., Chen & Bargh, 1999; De Houwer et al., 2001) could not be replicated. Thus Hypothesis 2.2 cannot be confirmed. A possible explanation may lay in the characteristics of

the task. Participants had to respond according to the color of the frame that surrounded the word. As the frame was rather big and the lines were quite distant from the word, it is probable that participants' focus of attention was not directed at the words. Supportive of this reasoning is research on affective priming that demonstrated that attention is required to process word valence (De Houwer & Randell, 2002; Spruyt, De Houwer, Hermans, & Eelen, 2007). Moreover, one study conducted by Rotteveel and Phaf (2004) suggests that attention is required for evaluation resulting in activation of behavioral tendencies. Given these findings, it is not surprising that word valence did not result in the activation of compatible behavior tendencies.

Against the background of the null effect of intrinsic valence, it seems even more considerable that motivational valence affected behavior tendencies so strongly. Probably, motivational valence grabs attention so that it is processed irrespective of whether attention is diverted away by the response signal. This reasoning is in line with recent findings in the realm of attention research demonstrating that motivation (i.e., goals) grabs attention (Moskowitz, 2002).

One can criticize Experiments 1 and 2 in that motivational and intrinsic valence was confounded in success and frustration trials. In particular, the feedback expressions for success ("correct") and frustration ("too slow") may carry intrinsic valence. Thus, it cannot be ruled out that solely intrinsic valence boosted the effects on approach-avoidance tendencies. This seems very unlikely, given the finding that in the blocks, in which only positive and negative words were presented, intrinsic valence did not affect approach-avoidance behavior. Nevertheless, it is relevant to test the effect of frustration on behavior tendencies under conditions of only motivational valence being present. For this purpose, Experiment 3 was designed.



### Experiment 3

The aim of the Experiment 3 was to test if frustration activates avoidance tendencies even when intrinsic valence of feedback was eliminated. For this purpose, feedback about success and frustration was provided in an intrinsically neutral way. Instead of presenting verbal feedback like “correct” or “too slow”, after each trial the target letter that had to be searched was shown in the center of the screen as a signal for success. In the case of frustration nothing appeared. This feedback procedure was supposed to depict frustration as an event of goal nonattainment at the best. As a baseline measure, participants had to respond with approach-avoidance behavior to the same letter stimuli in a block that was not part of the achievement task. Thus, in this block the stimuli did not signal success or frustration. Thereby, the impact of these stimuli on behavioral tendencies could be tested as a function of the motivational relevance of these stimuli.

A further aim of this study was to test participants’ attributions of the frustrating situation. Because the definition of frustration implies external attributions of the obstacle, attributions were assessed after completing the task.

#### *Hypotheses*

Following the above reasoning, the appearance vs. non-appearance of a letter was predicted to only result in the activation of approach-avoidance tendencies if letter appearance signals success or frustration. Furthermore, the replication of previous findings on self-reported emotions was expected. Finally, attribution ratings were expected to reveal higher external than internal attributions.

- H 3.1 In the motivational task, non-appearance of a letter (i.e., frustration) results in a more negative approach-avoidance index as compared to appearance of a letter (i.e., success).
- H 3.2 In the non-motivational task, letter appearance does not affect the approach-avoidance index.
- H 3.3 Self-reported anger increases, whereas other emotions (fear, sadness, happiness) do not increase.
- H 3.4 Frustration is attributed more externally than internally.

#### *Design*

The experiment consisted of a 2 (letter appearance: yes vs. no) x 2 (task: motivational vs. non-motivational) x 2 (response: approach vs. avoidance) x 2 (response assignment) mixed design with the factors letter appearance, task, and response varied within subjects.

#### *Method*

##### *Participants*

Participants were 24 students (19 female) of different majors (excluding psychology) at the University of Würzburg. One participant was excluded from the analyses because his approach-avoidance index deviated more than three standard deviations from the mean

approach-avoidance index. Because this may indicate that he had problems with handling the joystick, his data were considered invalid. Thus, a total of 23 participants were analyzed. Up to two persons took part at the same time. Participants received € as compensation.

### *Procedure*

The procedure was the same as in the previous experiments with the following exception. At the end, participants were asked to answer two questions concerning their attributions<sup>15</sup>. They had to indicate on 9-point scales to which extent they attributed failure internally, and to which extent they attributed failure externally. At the end participants were debriefed and paid.

### *Materials*

The stimuli for the motivational Simon task were the same as in Experiment 2 with one exception: Feedback to the searching task was not given through the presentation of words, but through symbols<sup>16</sup>. In case of correct responses, the target letter appeared in the center of the screen. In case of wrong or too slow reactions (including frustration trials) no symbol appeared, instead only the colored frame appeared.

### *Motivational Simon Task*

Like in Experiment 2, participants read that they had to perform an achievement-concentration test, where they had to complete as many searching trials as possible within 12 minutes. To boost participants' motivation, they were instructed that they would get two cinema coupons if they completed more than 70 searching trials correctly. To further boost their motivation, they were informed that the average student performance consisted of 87 correctly completed trials. Thereby, the performance criterion for the cinema coupon should seem easy.

The test trials of the motivational Simon task were identical to Experiment 2 with the following exceptions: First and most importantly, feedback to the searching task was given by showing a target letter or not (see section *Materials*). Second, the time limit for a searching trial consisted of 5000 ms<sup>17</sup>. Third, between the test blocks no baseline measure of approach-avoidance tendencies was administered. Instead, participants had to complete a non-motivational task after the test. This task consisted of 40 trials, wherein participants had to respond with approach-avoidance reactions to the same letter stimuli that were used in the motivational task. Each trial started with the presentation of a stimulus (letter with colored frame vs. only colored frame). Immediately after participants' response, all stimuli were deleted from the screen. The intertrial interval was 1000 ms.

As in the previous experiments, participants practiced the task in two blocks. In the first practice block, only approach-avoidance responses to colored frames were practiced in a total of 20 trials. These trials were identical to the non-motivational trials administered after the test blocks. In the second practice block, letter searching combined with approach-avoidance reactions was practiced. This block was identical to the second practice block from Experiment 2 with the exception that letter stimuli were presented as success and failure feedback like in the test trials.

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<sup>15</sup> For exact formulation of the questions see Appendix C.

<sup>16</sup> See Appendix C for an example.

<sup>17</sup> The time limit was increased from 4000 to 5000 ms. as compared to Experiment 2 to make sure that participants would not fail due to the difficulty of the task but only due to the defective keys.

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## Results

### *Approach-Avoidance Index*

From the test trials of the motivational Simon task, only approach-avoidance responses to successfully solved letter searching trials (80.9% of solvable trials) and to frustration trials were analyzed. From the test and the baseline trials, incorrect joystick responses (3.1%) and responses with latencies lower than 300 ms and higher than 4000 ms (0.1%) were excluded. In addition, latencies above and below three standard deviations of the individual mean value were excluded (1.4%). Approach-avoidance indices for all types of stimuli were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses. The indices were submitted to an ANOVA for repeated measures with letter appearance and task as within factors<sup>18</sup>. The approach-avoidance index was influenced by letter appearance,  $F(1,22) = 15.17$ ,  $p = .001$  (see Figure 4). But more importantly and consistent with predictions, this main effect was qualified by an interaction of letter appearance and task,  $F(1,22) = 5.28$ ,  $p = .031$ . Simple comparisons revealed that in the motivational task the approach-avoidance index was influenced by letter appearance,  $t(22) = 3.33$ ,  $p = .003$ . In particular, the approach-avoidance index was more positive when a letter appeared (i.e., success) ( $M = 47.08$ ,  $SD = 90.85$ ) than when no letter appeared (i.e., frustration) ( $M = -18.15$ ,  $SD = 98.69$ ). In the non-motivational task, however, letter appearance did not affect the approach-avoidance index,  $t < 1$ .

### *Emotions*

The ratings on the emotion items anger, sadness, fear and happiness administered before and after the achievement task were submitted to a 2 (time) X 4 (emotion) ANOVA for repeated measures. As expected only subjective anger increased during the task, whereas the other emotions decreased or did not change. This result is reflected in a significant interaction of time and emotion,  $F(3,66) = 4.83$ ,  $p = .004$ . Simple comparisons indicate that anger increased ( $M_{pre} = 1.61$ ,  $SD_{pre} = 1.12$ ,  $M_{post} = 2.39$ ,  $SD_{post} = 1.50$ ),  $t(22) = 2.08$ ,  $p = .050$ , sadness did not change ( $M_{pre} = 1.70$ ,  $SD_{pre} = .88$ ,  $M_{post} = 1.65$ ,  $SD_{post} = .83$ ),  $t < 1$ , fear did not change ( $M_{pre} = 1.57$ ,  $SD_{pre} = 0.84$ ,  $M_{post} = 1.30$ ,  $SD_{post} = 0.77$ ),  $t(22) = 1.66$ ,  $p = .110$ , and happiness decreased slightly ( $M_{pre} = 4.65$ ,  $SD_{pre} = 1.03$ ,  $M_{post} = 4.26$ ,  $SD_{post} = 1.25$ ),  $t(22) = 1.90$ ,  $p = .071$ . Additionally, the ANOVA revealed a main effect of emotion,  $F(3,66) = 63.13$ ,  $p < .001$ , indicating that overall happiness was higher than negative emotions. The effect of time was not significant ( $F < 1$ ).

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<sup>18</sup> In a preliminary analysis, the response assignment was entered as a between-participants factor. As only the main effect of this factor, but no interaction effects were significant, the factor was dropped for further analyses. See Appendix C for means and the ANOVA table.



Figure 4: Mean approach-avoidance index as a function of task and letter appearance. Higher values indicate stronger approach tendencies. Error bars represent standard errors.

#### Attributions

To test whether participants attributed their failure more externally than internally, a *t* test for paired samples with the within factor attribution locus was conducted. As expected, participants attributed task failure more externally ( $M = 7.26$ ,  $SD = 1.76$ ) than internally ( $M = 2.39$ ,  $SD = 1.56$ ). This result was reflected in a highly significant effect of attribution locus,  $t(22) = 9.05$ ,  $p < .001$ .

#### Discussion

The results from Experiment 3 confirm previous findings by showing that frustration activates an avoidance orientation (Hypothesis 3.1) and evokes anger but not fear or sadness (Hypothesis 3.3). By using symbolic feedback (letter appearance) it could be ruled out that the effect of frustration on approach-avoidance tendencies is driven only by the intrinsic valence of feedback. Moreover, the stimuli used as symbolic feedback did not activate approach-avoidance tendencies when they were presented in a non-motivational task (Hypothesis 3.2). Thus, this pattern of results provides good evidence for the hypothesis that evaluation of motivational valence results in the activation of compatible behavior tendencies.

One may criticize that the symbolic feedback may have acquired an intrinsic valence during the task through associative learning. According to this reasoning, the repeated

pairing of letter appearance with success and letter non-appearance with frustration may have caused a link between valence and the representation of letter appearance in an associative network. However, if this were the case one would have expected an effect in the non-motivational task as well, because the non-motivational task was administered after the motivational task. However, this was not the case. Thus, it seems more likely that in the motivational task evaluation of motivational valence took place and resulted in the activation of behavioral tendencies. Note that we don't know by which process motivational valence was evaluated by the participants. It is possible that a temporary tag between the feedback stimulus (announced at the beginning of a trial as target letter) and its meaning was created in short term memory before each trial. It is also possible that a comparison process of goal state and actual state occurred as has been demonstrated by Moors and colleagues (Moors & De Houwer, 2001, 2005; Moors et al., 2004). Because it is not the purpose of this thesis to explore the nature of the evaluation process, but the effect of a special case of motivational valence (i.e., frustration) on motivation and behavior, a thorough analysis of this issue goes beyond the scope of this work.

A further aim of Experiment 3 was to investigate participants' appraisals. Consistent with expectations, frustration was attributed more externally than internally (Hypothesis 3.4).

## Experiment 4

Experiments 1 to 3 demonstrated that frustration activates avoidance behavior. This finding supports the assumption that negative motivational valence and avoidance behavior are compatible. If this assumption is correct, then this should not only be reflected in faster avoidance reactions after frustration, but also in performance benefits in a second task. That should be due to the fact that executing compatible behavior saves cognitive resources, whereas executing incompatible behavior consumes cognitive resources (Förster & Stepper, 2000; Förster & Strack, 1996). Applied to frustration, I assume that the execution of approach-avoidance behavior towards obstacles that appear during goal pursuit influences achievement of the goal. In particular, if participants react with avoidance behavior towards obstacles, goal achievement should then be facilitated. In contrast, if participants react with approach behavior, goal achievement should be impaired.

To test these hypotheses, the motivational Simon task was adapted in the following way. In contrast to the previous experiments, participants did not execute approach-avoidance movements after completion of a trial, but towards obstacles that appeared during the trial. Thus, performance in the letter search task could be measured after participants had executed approach-avoidance reactions towards obstacles. In a comparison condition, performance was measured after participants executed approach-avoidance reactions towards stimuli that were helpful for goal achievement. In particular, during searching trials a white square with a colored frame appeared, covering the letter-search picture. Motivational valence of this square (obstacle/negative vs. helpful/positive) was manipulated between blocks. In the negative block, the square made letter search more difficult because it shortened the available time for searching. In the positive block, the white square signaled the appearance of a hint for the searching task. When the white square appeared, participants had to respond to it with approach-avoidance movements in order to continue with searching for the letter. As main dependent variable, performance in the letter search task was analyzed as a function of motivational valence of the square (positive vs. negative) and behavior executed towards the square (approach vs. avoidance).

### *Hypotheses*

According to the above reasoning, performance in the letter search task should depend on the motivational valence of the square (positive vs. negative) and the behavior executed towards the square (approach vs. avoidance). If the compatibility assumption is correct, then performance should be better if motivational valence and behavior are compatible. Thus, if the square acts as an obstacle and therefore carries negative valence, performance in the letter search task was expected to be better when participants reacted with avoidance towards the square as compared to when they reacted with approach. Conversely, if the square signals a hint and therefore carries a positive motivational valence, performance in the letter search task was expected to be better when participants reacted with approach towards the square as compared to when they reacted with avoidance.

Besides performance in the letter search task, also approach-avoidance responses towards the square were assessed. This was done to test whether the squares carry the expected motivational valence. In sum, the following hypotheses were developed.

- H 4.1 The approach-avoidance index is more positive for squares carrying positive motivational valence than for squares carrying negative motivational valence.

- H 4.2 If the square carries negative motivational valence, performance in the letter search task is better if the response to the square was avoidance as compared to approach.
- H 4.3 If the square carries positive motivational valence, performance in the letter search task is better if the response to the square was approach as compared to avoidance.

### *Design*

The hypotheses were tested using a 2 (motivational valence: positive vs. negative) x 2 (square response: approach vs. avoidance) x 2 (response assignment) x 2 (order of blocks: positive motivational valence first vs. negative motivational valence first) factorial mixed design with the factors motivational valence and response varied within subjects.

### *Method*

#### *Participants*

Participants were 23 students (8 female) of different majors (excluding psychology) at the University of Würzburg. Up to three persons took part at the same time. Participants received a bar of chocolate as compensation. One participant was excluded from the analysis because of his poor performance in the searching task.<sup>19</sup> Thus, a total of 22 participants were analyzed.

#### *Procedure*

At the beginning, participants had to rate their present mood on a 9-point scale. Then the motivational Simon task was started. After completion of the task participants rated their mood again. Finally, they were thanked and gratified with a bar of chocolate.

#### *Materials*

For the task the same target and searching stimuli were used as in Experiment 1 (six letter rows in the search picture). One additional target letter and two corresponding search pictures were added. Two white squares with a yellow or blue frame, respectively, were used as stimuli for the approach-avoidance response. In the condition *positive motivational valence*, the search pictures that appeared after the square contained a hint for the searching task (see Figure 5) by increasing the size of the target letter as compared to the distracters. As feedback stimuli the German words for “correct”, “wrong” and “too slow” were used.

#### *Motivational Simon Task*

Participants read that they had to complete a concentration task, which measures persistence as well as flexibility. The test would take eight minutes with a break after four minutes. Their task was to complete as many trials as possible in this time. To boost participants' motivation to perform well, they learned that the average student performance

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<sup>19</sup> There were no searching responses within the time limit after approach reactions to the square carrying negative motivational valence. Thus, this participant would have been excluded automatically from the ANOVA for repeated measures anyways.

consisted of 58 correctly completed trials, and that they would get a cinema coupon if they outperformed this standard.

The two test blocks consisted of 32 trials each. In 20 trials of each block a square appeared during searching, whereas 12 trials were solely searching trials. These baseline trials were included, because the motivational valence of the square was assumed to be stronger if a neutral comparison standard was available. A trial started with the presentation of a target letter for 1500 ms, after which the search picture appeared. In the baseline searching trials, participants had 4000 ms to find the letter. After a reaction or after 4000 ms the corresponding feedback appeared (“correct”, “wrong”, or “too slow”). In the square trials, the search picture appeared for 500 ms and was then immediately covered by a white square with a yellow or blue frame (see Figure 5). Participants had to respond with approach or avoidance reactions towards the square according to the frame color. When the reaction was false, failure feedback appeared for 1000 ms, and the next trial started. In case of a correct approach-avoidance response, the search picture appeared again for maximal 2000 ms. Since this was a limited amount of time, the square was supposed to act as an obstacle and to carry a negative motivational valence. In a second block, the square signaled a hint for the searching task. In particular, after approach-avoidance reactions had been executed towards the square, the letter-search picture appeared with the target letter printed bigger than the distracters. Because this would facilitate goal achievement, the square was supposed to carry a positive motivational valence. After participants had pressed a key according to the target position, or after the time limit had exceeded, corresponding feedback appeared (“correct”, “wrong”, or “too slow”) for 1000 ms. After 2000 ms the next trial started. A random order of trials was produced for each block with the restriction that no more than four square trials followed in succession. This order was administered to all participants.

Prior to test trials, participants could practice the task in three practice blocks: First, they practiced the searching task without time pressure in a total of four trials. Each trial started with a target letter for 1500 ms, followed by a search picture. After a response was given, the corresponding feedback (*correct* or *wrong*) appeared for 1000 ms. After 2000 ms, the next trial started. In the second practice block, participants practiced solely approach-avoidance reactions in a total of 16 trials. In each trial, a white square with a yellow or blue frame appeared until a response was given. In case of a wrong response, failure feedback appeared. The intertrial interval was 1000 ms. In the third practice block, participants practiced the combined task. Depending on the condition *order of blocks*, participants practiced the task they would have to complete first (positive motivational valence first vs. negative motivational valence first). This practice block consisted of seven trials with three mere searching trials and four square trials. The presentation time of the stimuli was the same as in the test blocks.



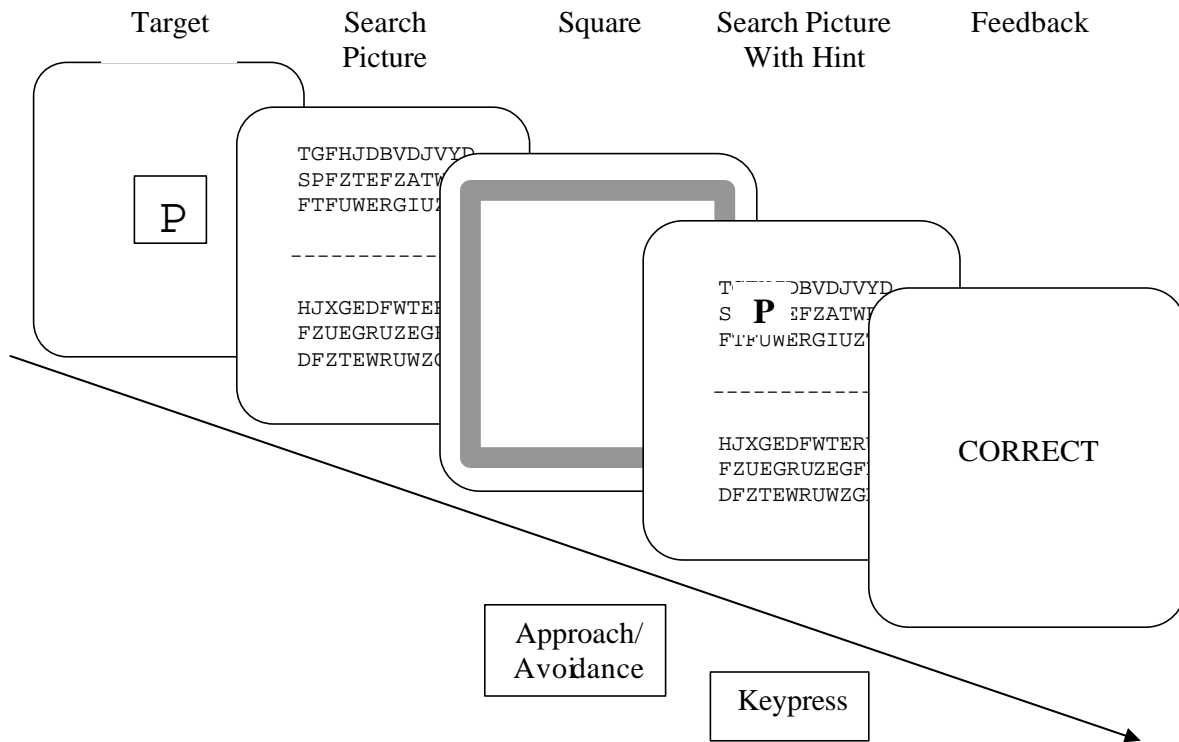


Figure 5: Sequence of a square trial with positive motivational valence.

## Results

### Approach-Avoidance Index

To investigate whether the square indeed conveyed a motivational valence, it was tested whether the meaning of the square influenced approach-avoidance responses. For the analysis of approach-avoidance responses, incorrect joystick responses (3.1%) and latencies above and below two standard deviations<sup>20</sup> of the individual mean value were excluded (0.9%). Approach-avoidance indices for positive and negative motivational valence were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses. The indices were submitted to an ANOVA for repeated measures with motivational valence as within factor<sup>21</sup>. Consistent with predictions, the approach-avoidance index was influenced by motivational valence,  $F(1,21) = 6.11$ ,  $p = .022$ . The approach-avoidance index was more positive for positive motivational valence trials ( $M = 51.23$ ,  $SD = 115.34$ ) than for negative motivational valence trials ( $M = -3.97$ ,  $SD = 75.94$ ).

<sup>20</sup> In contrast to the Experiments 1 to 3, 2 SD were set as criterion because the distribution of response latencies exhibited a lower standard deviation ( $SD = 263.80$ ) than in the previous experiments (e.g.,  $SD = 402.38$ ). An ANOVA with response latencies corrected with the criterion of 3 SD revealed basically the same pattern of results.

<sup>21</sup> In a preliminary analysis, response assignment and order were entered as between-participants factors. As only the main effect of response assignment and no other relevant effect or interaction were significant, these factors were dropped for further analyses. See Appendix D for means and the ANOVA table.

*Performance in the Later Search Task*

The main question was, whether performance in the letter search task differed as a function of square meaning (positive vs. negative motivational valence) and response to the square (approach vs. avoidance). Latencies of correct letter responses were used as an indicator for performance<sup>22</sup>. These response latencies were submitted to an ANOVA for repeated measures with motivational valence and square response as within factors<sup>23</sup>. As expected, performance was a function of motivational valence and square response (see Figure 6). This result was reflected in a significant interaction of motivational valence and square response,  $F(1,21) = 19.42, p < .001$ . Simple comparisons indicate that performance after a square with negative motivational valence depended on the reaction towards the square,  $t(21) = 3.61, p = .002$ . In particular, participants made faster correct decisions, when they had responded to the negative square with avoidance behavior ( $M = 1108.52, SD = 225.26$ ) as compared to approach behavior ( $M = 1269.02, SD = 252.09$ ). The opposite was true for performance after a square with positive motivational valence,  $t(21) = 2.96, p = .008$ . In particular, participants made faster correct decisions, when they had responded to the positive square with approach behavior ( $M = 685.96, SD = 100.84$ ) as compared to avoidance behavior ( $M = 723.58, SD = 84.56$ ). Furthermore, the ANOVA yielded a main effect of motivational valence,  $F(1,21) = 108.73, p < .001$ , and a main effect of square response,  $F(1,21) = 6.67, p = .017$ .

*Discussion*

The results strongly confirm the hypotheses. First, a replication of the finding that motivational valence results in the activation of compatible behavior tendencies was possible (Hypothesis 4.1). This replication is even more considerable as motivational valence was operationalized in a different way than in the previous experiments.

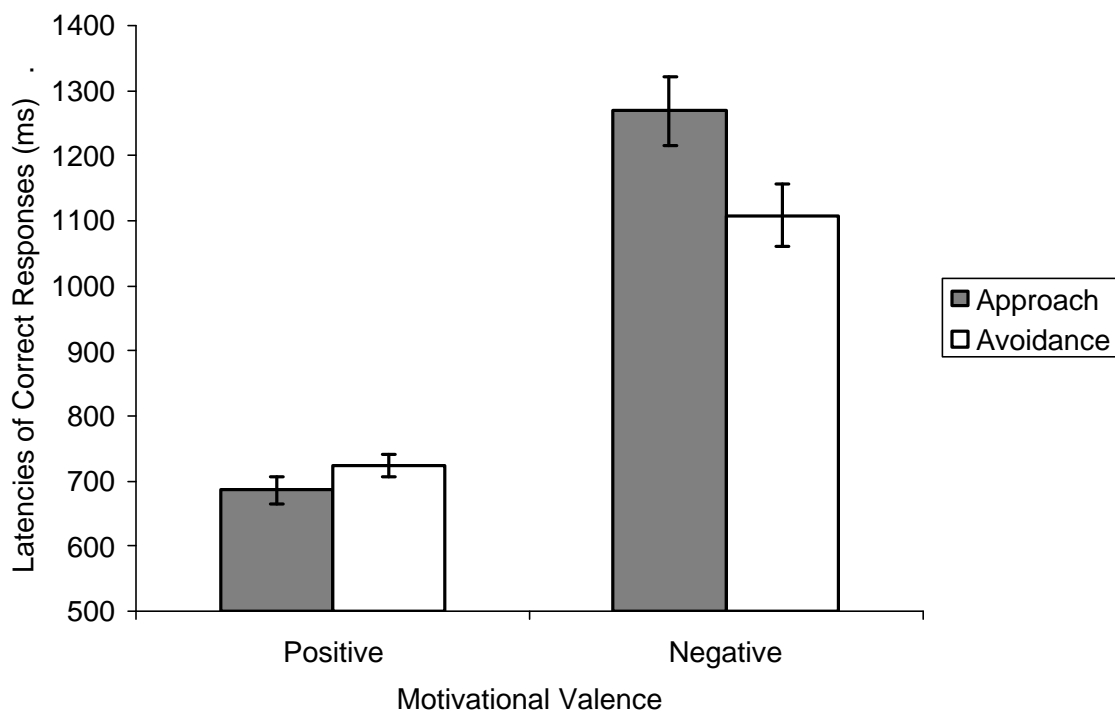
Moreover and most importantly, performance was shown to be a function of the compatibility between motivational valence and behavior. In particular, performance was better when participants responded to a stimulus carrying negative motivational valence with avoidance behavior as compared to approach behavior (Hypothesis 4.2). Conversely, performance was better when participants responded to a stimulus carrying positive motivational valence with approach behavior as compared to avoidance behavior (Hypothesis 4.3). These findings strongly confirm the assumption that the compatibility principle also applies for the situation of frustration. In particular, performing incompatible behavior impairs performance in a subsequent task. The demonstration of this effect in the realm of frustration is especially considerable because a widespread position states that approach motivation as a reaction to frustration is functional with respect to goal achievement because it strengthens goal striving (e.g., Carver, 2004). However, this experiment demonstrates that an avoidance orientation is functional because it presumably conserves cognitive resources that may be needed for goal striving. A similar finding was

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<sup>22</sup> In additional analyses speed and accuracy of reactions were analyzed separately. These analyses revealed the same pattern of results, yet more pronounced in the speed parameter. As a thorough analysis of speed-accuracy trade-offs would go beyond the scope of this thesis, it will not be discussed further.

<sup>23</sup> In a preliminary analysis, the factor *order of blocks* was entered as between-participants factors. As no relevant effect or interaction were significant, this factor was dropped for further analyses. See Appendix D for means and the ANOVA table.

obtained by Riskind (1984), although he interprets his findings differently. Participants in this study experienced success or frustration in a first task, and were then asked to adopt an upright or slumped body posture. Thus, participants' posture was either compatible or incompatible with their emotional state. Then, mood, success expectations for, and actual persistence in a second task were measured. Participants in the incompatible condition felt more depressed, had lower hope for success, and persisted less in the second task than participants in the compatible condition. Given that body postures can induce a motivational orientation (see Neumann et al., 2003; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005), this finding demonstrates that it is not an approach orientation that increases motivation but the compatibility of the motivational orientation and the actual situation.



*Figure 6:* Mean latencies of correct responses in the letter search task as a function of motivational valence and square response. Error bars represent standard errors.

### Experiment 5

How can motivational intensity be maintained, when obstacles impair goal pursuit? According to the reasoning presented in the theoretical part, appraisals of controllability and goal expectancy influence goal striving but not motivational orientation. In particular, appraisals are assumed to determine reflective decisions of how much effort is engaged to overcome the obstacles. Contrary to that, other scientists argue that an approach motivation serves to engage effort in goal pursuit (Carver, 2004).

To test these assumptions, controllability was manipulated in the present Experiment. For this purpose, the paradigm employed in Experiments 1 to 3 was modified in the following way. Additional trials were offered to participants by which they could recompense frustration trials. As a manipulation of controllability, frequency of offers was manipulated between participants. Thus, according to the classification of control constructs provided by Skinner (1996), agent-means relations were manipulated. Agent-means relations describe the extent to which particular means are available for the agent. In particular, in the high controllability group enough additional trials were offered so that the goal could be achieved despite frustration. Contrary, in the low controllability group not enough additional trials were offered. Goal striving was measured by assessing the relative frequency of decisions in favor of additional trials.

A further aim of the study was to explore the influence of interindividual differences in approach motivation measured by the BAS scales that have been developed by Carver and White (1994). According to the authors, BAS sensitivity reflects proneness to engage in goal directed behavior towards rewards. Thus, BAS sensitivity reflects motivational intensity with respect to positive end-states. Consequently, it was predicted that BAS sensitivity relates to goal striving when the goal was an approach goal, but not to the motivational orientation elicited by frustration. These hypotheses were tested against Carver's model (2004) that implies that people high in approach motivation react with stronger approach motivation to frustration.

#### *Hypotheses*

Based on the above reasoning, motivational valence was predicted to activate compatible behavior tendencies irrespective of the controllability manipulation. However, goal striving measured by relative frequency of decisions for additional trials (in order to recompense for frustration) was hypothesized to be influenced by the controllability manipulation. Higher BAS sensitivity was expected to lead to stronger goal striving, but not to approach motivation following frustration. Like in Experiments 1 to 3, frustration was expected to increase anger, but not other negative or positive emotions. Furthermore, frustration was hypothesized to be attributed more externally than internally.

- H 5.1 Frustration results in a more negative approach-avoidance index as compared to success irrespective of controllability.
- H 5.2 Goal striving (relative frequency of decisions for additional trials) is higher in the high controllability condition than in the low controllability condition.
- H 5.3 BAS sensitivity is positively related to goal striving, and unrelated to the frustration approach-avoidance index.

- H 5.4 Self-reported anger increases, whereas other emotions (fear, sadness, happiness) do not increase.
- H 5.5 Frustration is attributed more externally than internally.

### *Design*

The experiment consisted of a 2 (motivational valence: success vs. frustration) x 2 (controllability: high vs. low) x 2 (response: approach vs. avoidance) x 2 (response assignment) mixed design with the factors motivational valence and response varied within subjects.

### *Method*

#### *Participants*

Participants were 62 students (47 female) of different majors (excluding psychology) at the University of Würzburg. Up to two persons took part at the same time. Participants received €6 as compensation. Three participants were excluded from the analysis because their relative frequency of decisions to take an additional trial was more than two standard deviations below the group mean<sup>24</sup>. This was taken as an indicator that these participants were either not motivated at all or that they did not understand the meaning of the additional trial. In sum, a total of 59 participants were analyzed.

#### *Procedure*

The procedure was the same as in Experiment 3 with some exceptions. Locus of attribution was assessed more differentiated (cf. Roseman, Antoniou, & Jose, 1996). In particular, participants had to indicate on 9-point scales to which extent they attributed failure to the circumstances, to the self or to another person. Additionally, appraisal of controllability was assessed on a 9-point scale<sup>25</sup>. To measure goal expectancy, participants had to estimate their performance in the letter search task by indicating how many trials they solved correctly. The German version of the BIS/BAS questionnaire (Strobel, Beauducel, Debener, & Brocke, 2001) was administered at the end of the study. Unfortunately, the reliability of the BIS/BAS scales was not fully satisfying. Respective Cronbach's alphas were .71 for BAS drive, .66 for BAS fun seeking, .69 for BAS reward responsiveness, and .82 for the entire BAS scale.

#### *Materials*

The stimuli for the motivational Simon task were the same as in Experiment 3. As an offer of additional trials after failure, the German question "Additional trial?" appeared on the screen with the instructions which key participants had to press if they wanted to choose the additional trial or refuse it (see Figure 7). In case of a decision for the additional trial, the German words "next trial = additional trial" appeared on the screen.

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<sup>24</sup> Two of them never took an additional trial. The other person decided only once for an additional trial.

<sup>25</sup> For exact formulation of the questions see Appendix E.

*Motivational Simon Task*

The motivational Simon task was basically the same as in Experiment 3. Different from Experiment 3, participants were instructed that they had to complete a total 90 letter searching trials. To boost their motivation to perform well, they read that upon correct completion of 75 trials they would take part in a lottery of cinema coupons. Furthermore, they were informed that the average student performance consisted of 83 solved trials. This information should let the goal of 75 trials appear achievable. Most importantly, participants were instructed that in the test phase they could make use of joker trials. In particular, after failure they would be asked if they wanted an additional trial to get a chance to recompense the failure (see Figure 7). They also learned that the joker trial would not be offered always after a failure. Thus, at the beginning they were unclear about the frequency of offers, but over the course of the task they would learn the proportional frequency. The frequency of offers was varied between participants: In the low controllability group, an additional trial was offered in 50% percent of frustration trials (=15 trials). In the high controllability group, an additional trial was offered in 90% percent of frustration trials (=27 trials). In case of an offer, participants could decide if they wanted to take or refuse the additional trial by pressing the appropriate keys. If they decided in favor of the additional trial the German words “next trial = additional trial” appeared on the screen for 1500 ms.

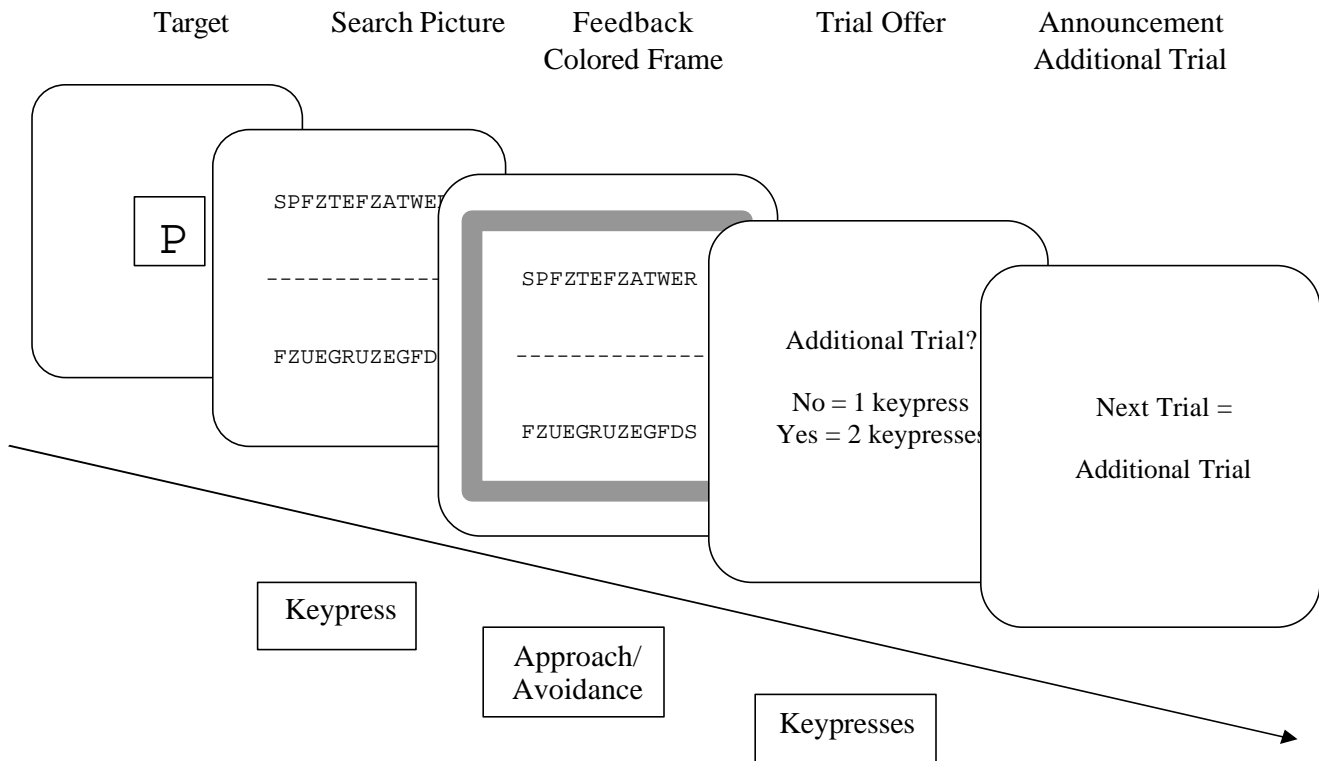


Figure 7: Sequence of a frustration trial with the offer of an additional trial.

Like in Experiments 1 to 3, the test consisted of 90 trials with 30 frustration and 60 solvable trials. To hold the amount of trials constant among controllability conditions and independent of participants' decisions for joker trials, the additional trial actually was a

normal trial. However, to create the impression that taking the additional trial helps, the additional trial was never a frustration trial. A random order of trials was produced with the restriction that a frustration trial was always followed by a solvable trial. This order was administered to all participants.

As in Experiments 1 to 3, participants first practiced the approach-avoidance reactions and then the combined task of letter searching and approach-avoidance reactions. These two practice blocks were identical to the practice blocks of Experiment 3.

### *Results*

To test the hypotheses, first the effectiveness of the controllability manipulation was examined by analyzing appraisals of controllability and goal expectancy. Then, approach-avoidance tendencies and goal striving were analyzed separately. Afterwards, approach-avoidance indices of frustration trials and goal striving was compared within a single analysis. At last, emotions and attributions were analyzed.

#### *Appraisals of Controllability and Goal Expectancy*

To test whether the manipulation of controllability was successful, appraisals of controllability and goal expectancy (performance estimates) were analyzed with *t* tests for independent samples<sup>26</sup>. As expected, ratings of controllability were higher in the high controllability group ( $M = 5.19, SD = 1.89$ ) as compared to the low controllability group ( $M = 4.30, SD = 2.91$ ), yet only marginally significant<sup>27</sup>,  $t(43) = 1.37, p = .089$ . Similarly, participants in the high controllability group gave higher goal expectancy estimates ( $M = 71.52, SD = 15.20$ ) than in the low controllability group ( $M = 64.39, SD = 13.73$ ),  $t(55) = 1.84, p = .036$ . Furthermore, appraisals of controllability and goal expectancy were slightly related. This relation is reflected in a small but significant correlation,  $r = .28, p = .035$ .

#### *Approach-Avoidance Index*

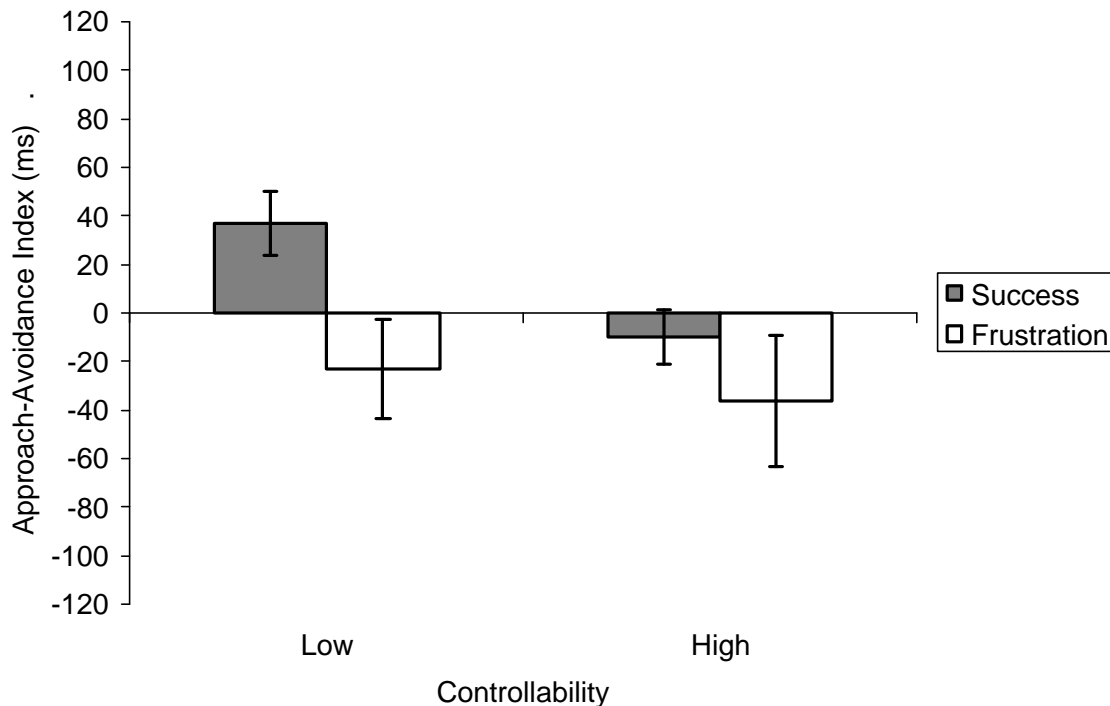
From the test trials of the motivational Simon task only approach-avoidance responses to successfully solved letter searching trials (98.1% of solvable trials) and to frustration trials were analyzed. From the test trials, incorrect joystick responses (1.9%) and responses with latencies lower than 300 ms and higher than 4000 ms (0.2%) were excluded. In addition, latencies above and below three standard deviations of the individual mean value were excluded (1.9%). Approach-avoidance indices for success and frustration were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses.

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<sup>26</sup> As the hypotheses were directed one-tailed *t* tests were performed.

<sup>27</sup> Because of unequal variances revealed by the Levene-Test, statistics were adjusted.

*Motivational Valence and Controllability.* Approach-avoidance indices were submitted to an ANOVA for repeated measures with motivational valence as within factor and controllability as between factor<sup>28</sup>. As expected, the approach-avoidance index was only influenced by motivational valence,  $F(1,57) = 7.79$ ,  $p = .008$  (see Figure 8). In particular, the approach-avoidance index was positive for success ( $M = 11.74$ ,  $SD = 68.95$ ) and negative for frustration ( $M = -30.12$ ,  $SD = 131.96$ ). Neither the main effect of controllability,  $F(1,57) = 1.75$ ,  $p = .191$ , nor the interaction of controllability and motivational valence,  $F(1,57) = 1.18$ ,  $p = .282$ , was significant.



*Figure 8:* Mean approach-avoidance index as a function of motivational valence and controllability. Higher values indicate stronger approach tendencies. Error bars represent standard errors.

*BAS Sensitivity.* A further aim of this study was to explore the relation of BAS sensitivity to approach-avoidance tendencies of the frustration trials. As BAS sensitivity should reflect motivational intensity towards approach goals but not motivational orientation reactions to frustration, no relation was expected. To test this hypothesis, multiple regression analyses on frustration approach-avoidance indices were performed with BAS sensitivity, the between factor controllability and the interaction term entered as predictors. The approach-avoidance indices and the BAS-scales were z-standardized, and the factor controllability was dummy coded (Aiken & West, 1991; Cohen, Cohen, West, & Aiken,

<sup>28</sup> In a preliminary analysis, the response assignment was entered as a between-participants factor. As no relevant effect or interaction was significant, this factor was dropped for further analyses. See Appendix E for means and the ANOVA table.



2003). In particular, for each BAS scale (reward responsiveness, fun seeking, drive, entire BAS scale) one regression analysis was performed. In sum, all regression analyses revealed that BAS sensitivity did not affect frustration approach-avoidance tendencies (all  $F$ s < 2.5).

### *Goal Striving*

*Controllability.* To test whether goal striving was influenced by controllability, a  $t$  test on relative frequency of decisions for additional trials was performed<sup>29</sup>. As expected, participants in the low controllability group took fewer additional trials ( $M = 61.0\%$ ,  $SD = 34.9$ ) than participants in the high controllability group ( $M = 75.5\%$ ,  $SD = 22.0$ ),  $t(42) = 1.86$ ,  $p = .035$ .

According to the assumptions advanced in this thesis, the influence of the controllability manipulation on goal striving should be mediated by control and goal expectancy appraisals, respectively. To test these hypotheses, two mediation analyses were conducted following the suggestions from Baron and Kenny (1986). According to the authors, mediation can be confirmed, if (1) the independent variable (i.e., controllability) predicts the dependent variable (i.e., goal striving), (2) the independent variable predicts the mediator (i.e., control or goal expectancy appraisals), and (3) the mediator predicts the dependent variable controlling for the independent variable. These hypotheses were tested with the respective regression analyses for the possible mediators control appraisal and goal expectancy appraisal. According to the general pattern, both appraisals were confirmed as mediators<sup>30</sup>. In particular, controllability was related marginally significant to goal striving,  $\beta = .25$ ,  $F(1,57) = 3.74$ ,  $p = .058$ . Furthermore, controllability was slightly but not significantly related to control appraisals,  $\beta = .18$ ,  $F(1,55) = 2.01$ ,  $p = .162$ , and marginal significantly related to goal expectancy,  $\beta = .24$ ,  $F(1,55) = 3.40$ ,  $p = .071$ . At last, when controllability and control appraisal were entered as predictors in a regression analysis, control appraisal was strongly related to goal striving,  $\beta = .36$ ,  $F(2,56) = 8.61$ ,  $p = .005$ , whereas controllability did not predict goal striving any more,  $\beta = .18$ ,  $F(2,56) = 2.20$ ,  $p = .144$ . Similarly, when controllability and goal expectancy were entered as predictors in a regression analysis, goal expectancy was marginally significantly related to goal striving,  $\beta = .23$ ,  $F(2,54) = 2.95$ ,  $p = .029$ , whereas controllability did not predict goal striving any more,  $\beta = .16$ ,  $F(2,54) = 1.50$ ,  $p = .226$ . Thus, the general pattern indicates that control appraisals and goal expectancy mediated the effect of the controllability manipulation on goal striving.

*BAS Sensitivity.* To examine the relation between BAS sensitivity and goal striving, four regression analyses were conducted on relative frequency of decisions for additional trials. As predictors, a BAS scale (reward responsiveness, fun seeking, drive, entire BAS scale), the factor controllability and the interaction term were entered in the regression analysis. Unexpectedly, BAS sensitivity was not related to goal striving (all relevant  $F$ s < 2).

<sup>29</sup> As the hypothesis was directed, a one-tailed  $t$  test was performed. Because of unequal variances revealed by the Levene-Test, statistics were adjusted

<sup>30</sup> Although one regression analyses did not yield a significant effect, the general pattern was interpreted as in line with hypothesis. Because mediation analyses require large samples sizes, it was considered permissible to interpret almost significant effects.

*Comparison of Frustration Approach-Avoidance and Goal Striving*

The above analyses suggest that solely goal striving but not frustration approach-avoidance tendencies were affected by controllability. To further bolster this conclusion, the effect of controllability on goal striving and frustration approach-avoidance tendencies was tested by a single analysis. For this purpose, both dependent variables were z-standardized. Then, they were submitted to an ANOVA for repeated measures with the between factor controllability and the within factor type of measure. The predicted interaction of controllability and type of measure did not reach significance,  $F(1,57) = 2.27, p = .138$ . Furthermore, neither the main effect of controllability,  $F(1,57) = 1.37, p = .247$ , nor the main effect of type of measure was significant ( $F < 1$ ).

Because the predicted interaction did not reach significance, it seemed advisable to test the hypothesis that control appraisals affect goal striving but not frustration approach-avoidance tendencies more directly. For this purpose, the relation of control appraisals to type of measures was tested by a regression analysis. Following the recommendations for testing the influence of continuous variables in within-subjects designs (Judd, Kenny, & McClelland, 2001), a difference score was calculated by subtracting z-standardized frustration approach-avoidance indices from z-standardized relative frequencies of decisions for additional trials. This score was subjected to a regression analysis with z-standardized control appraisals as predictor. As expected, control appraisals predicted the difference score,  $\beta = .67, F(1,57) = 13.52, p = .001$ . Thus, control appraisals were differently related to goal striving and to frustration approach-avoidance tendencies. Simple regression analyses with control appraisals as predictor revealed that control appraisals were positively related to goal striving,  $\beta = .39, F(1,57) = 10.44, p = .002$ , and negatively related to frustration approach-avoidance tendencies,  $\beta = -.27, F(1,57) = 4.60, p = .036$ . Thus, the higher control appraisals, the stronger was goal striving, and the more negative was the frustration approach-avoidance index.

*Emotions*

The ratings on the emotion items anger, sadness, fear and happiness administered before and after the achievement task were submitted to a 2 (time) X 4 (emotion) X 2 (controllability) ANOVA for repeated measures. As expected, only subjective anger increased during the task, whereas the other emotions decreased or did not change. This result is reflected in a significant interaction of time and emotion,  $F(3,171) = 9.74, p < .001$ . Simple comparisons indicate that anger increased ( $M_{pre} = 2.05, SD_{pre} = 1.37, M_{post} = 2.80, SD_{post} = 1.57$ ),  $t(57) = 3.54, p = .001$ , sadness did not change ( $M_{pre} = 2.37, SD_{pre} = 1.54, M_{post} = 2.51, SD_{post} = 1.50$ ),  $t < 1$ , fear did not change ( $M_{pre} = 1.71, SD_{pre} = 0.89, M_{post} = 1.56, SD_{post} = 1.01$ ),  $t(57) = 1.11, p = .273$ , and happiness decreased ( $M_{pre} = 4.20, SD_{pre} = 1.45, M_{post} = 3.78, SD_{post} = 1.31$ ),  $t(57) = 3.02, p = .004$ . Additionally, the ANOVA revealed a main effect of emotion,  $F(3,171) = 39.56, p < .001$ , indicating that overall happiness was higher than negative emotions. No other effect was significant (all  $F$ s  $< 1$ ).

*Attributions*

To test participants' attributions for failure, an ANOVA for repeated measures with the within factor attribution locus (circumstances vs. self vs. other) and the between factor controllability was conducted. Participants attributed task failure more to the circumstances ( $M = 6.14, SD = 2.73$ ) than to self ( $M = 2.69, SD = 1.63$ ) or to another person ( $M = 1.98, SD = 2.05$ ). This result was reflected in a highly significant effect of attribution locus,  $F(2,114)$

= 53.75,  $p < .001$ . Simple comparisons indicate that attribution to circumstances was higher than to the self,  $t(58) = 6.93$ ,  $p < .001$  and higher than to another person,  $t(58) = 10.50$ ,  $p < .001$ . The ANOVA revealed no other significant effect (all  $F$ s < 1).

### *Discussion*

The results generally confirm the hypotheses. Most importantly, controllability influenced goal striving but not approach-avoidance tendencies. In particular, approach-avoidance indices were only affected by motivational valence (Hypothesis 5.1), whereas goal striving was affected by controllability (Hypothesis 5.2). Furthermore, the influence of controllability on goal striving was mediated by control appraisals. Finally, a test of the differential effects of control appraisals on goal striving and frustration approach-avoidance tendencies revealed a positive relation between control appraisals and goal striving, and a negative relation between control appraisals and frustration approach-avoidance tendencies. Thus, the higher control appraisal, the higher was motivational intensity and the greater was the avoidance orientation elicited by frustration.

Surprisingly, BAS sensitivity was not related to goal striving (Hypothesis 5.3). But consistent with predictions, BAS sensitivity was also not related to frustration approach-avoidance tendencies (Hypothesis 5.3). Replicating previous results, frustration was shown to increase anger but not other negative emotions (Hypothesis 5.4). Furthermore, frustration was attributed more to the circumstances than to the self or another person. This finding is generally in line with Hypothesis 5.5, which states that participants attribute failure more externally than internally. Moreover, the results reveal the specific external cause, namely the circumstances and not another person. This finding indicates that participants didn't blame the experimenter for the defective keys, but attributed frustration to technical problems.

One limitation of the present conclusions is that the effect of the controllability manipulation on control appraisals, goal expectancy, and goal striving was rather small. In particular, some of the predicted effects were only marginally significant. This indicates that the manipulation of controllability was rather weak, and that control appraisals were probably influenced by some other factors that were not measured in the present experiment (e.g., dispositional control beliefs). Nevertheless, using appraisals of controllability as a predictor for goal striving and frustration approach-avoidance tendencies, the results were as expected. This further bolsters the assumption that motivational intensity but not motivational orientation is a function of control appraisals.

Surprisingly, BAS sensitivity was not related to goal striving. This may indicate that despite the possible reward (i.e., cinema ticket), the task and the means to overcome frustration (i.e., taking additional trials) were not attractive for participants with a strong dispositional approach motivation. In particular, overcoming frustration implied that the subjective length of the task would be increased. This was considered as an appropriate operationalization of controllability, because in many real life situations overcoming obstacles implies making a detour, and goes along with costs. However, in this experiment the task per se was presumably not attractive and motivation was primarily maintained by a delayed reward (i.e., cinema coupon). Thus, the task can also be conceived of as a delay of gratification task (i.e., working longer on a boring task to get a reward) (cf. Metcalfe & Mischel, 1999). If this reasoning is correct, then factors like impulsiveness and self-regulation capacity may play a strong role (cf. Baumeister & Vohs, 2004) and override the effects of control appraisals and dispositional approach motivation. Therefore, the next

experiment was devised to examine another operationalization of controllability and overcoming obstacles that does not imply self-regulation and taking large costs.

## Experiment 6

The aim of Experiment 6 was to replicate the findings of Experiment 5 with another manipulation of controllability and another measure of goal striving. According to the reasoning advanced in the theoretical part, an intending mechanism secures that goal-relevant behavioral schemata are kept activated as long as the goal has not been reached yet, and as long as the goal is still maintained. Thus, reflective decisions about continuing goal pursuit based on control appraisals are expected to moderate the intending mechanism, and therefore to influence activation of behavioral schemata.

To test these assumptions, the paradigm employed in the previous experiments was modified in the following way. Participants could overcome frustration by repeatedly pressing the defective key. Controllability was manipulated by varying agent-ends relations (Skinner, 1996). Agent-ends relations describe the extent to which an agent can produce the desired outcome. In particular, in the high controllability group, keypressing led to success in most of the times, whereas in the low controllability group, keypressing led to success in fewer cases. To measure activation of behavioral schemata, latencies of keypressing were assessed. The logic behind this measure is the same as in other paradigms that measure response facilitation: the higher the activation of the behavior schema, the faster is the response.

Another aim of the experiment was to explore the impact of various personality traits that have been shown to relate to reactions to frustration. For this purpose, traits that were expected to relate to motivational intensity as well as traits that were expected to relate to motivational orientation were investigated. In particular, like in Experiment 5, dispositional approach motivation (BAS sensitivity, Carver & White, 1994) was measured. BAS sensitivity was expected to relate to motivational intensity but not to motivational orientation. Furthermore, control beliefs were assessed by two different scales, namely Krampen's scale of competence and control beliefs (Krampen, 1991) and Rotter's scale of locus of control (Rotter, 1966). Control beliefs were predicted to relate to motivational intensity, but not to motivational orientation. The same was expected for self-efficacy (Bandura, 1977; Schwarzer, 1994). Finally, action-state orientation was assessed. According to Kuhl (1981; Kuhl & Beckmann, 1994), state orientation but not action orientation leads to performance deficits in helplessness paradigms. Consequently, it was expected that action oriented participants exhibit stronger goal striving. Moreover, recent research on automatic affect regulation has shown that action oriented people are capable of automatically regulating their affect in an affective Simon task (Koole & Jostmann, 2004). These findings imply that action oriented people automatically down regulate the negative affect elicited by frustration. Therefore, it was expected that action oriented participants respond with less avoidance tendencies or even approach tendencies to frustration as compared to state oriented participants.

### *Hypotheses*

Based on the above reasoning, the following hypotheses were advanced.

- H 6.1 Frustration results in a more negative approach-avoidance index than success irrespective of controllability.
- H 6.2 Goal striving (mean latencies of keypressing) is stronger (i.e., faster keypressing) in the high controllability condition than in the low controllability condition.

- H 6.3 BAS sensitivity, control beliefs and self-efficacy are positively related to goal striving (i.e., negatively related to keypressing latencies), but unrelated to frustration approach-avoidance indices.
- H 6.4 Action oriented participants show less avoidance tendencies towards frustration and greater goal striving (i.e., faster keypressing) as compared to state oriented participants.
- H 6.5 Self-reported anger increases, whereas other emotions (fear, sadness, happiness) do not increase.
- H 6.6 Frustration is attributed more externally than internally.

### *Design*

The experiment consisted of a 2 (motivational valence: success vs. frustration) x 2 (controllability: high vs. low) x 2 (response: approach vs. avoidance) x 2 (response assignment) mixed design with the factors motivational valence and response varied within subjects.

### *Method*

#### *Participants*

Participants were 87 students (68 female) of different majors (excluding psychology) at the University of Würzburg. Up to two persons took part at the same time. Participants received €6 as compensation.

#### *Procedure*

The procedure was the same as in Experiment 5 with some exceptions. Appraisals of goal expectancy and controllability were assessed more differentiated than in the previous Experiment<sup>31</sup>. Goal expectancy was measured by one question concerning participants' feeling of goal reachability and by performance estimates. Controllability was measured by one question concerning participants' feeling of control and by two questions concerning participants' appraisals of behavior-outcome contingency. Like in Experiment 5, dispositional approach motivation was measured by the German version of the BIS/BAS scales (Carver & White, 1994; Strobel et al., 2001). Respective Cronbach's alphas were .74 for the drive scale, .68 for the fun seeking scale, .72 for reward responsiveness scale, and .80 for the entire BAS scale. At about four weeks after the study, participants were asked per phone call and email to fill out additional personality questionnaires via an online-survey<sup>32</sup>. Control beliefs were measured by two different questionnaires, in particular the questionnaire of competence and control beliefs (Krampen, 1991) and the German version of Rotter's locus of control questionnaire (Piontkowski & Ruppelt, 1981; Rotter, 1966). Reliability of Krampen's scale was good (alpha = .85), whereas Rotter's scale did not have satisfying reliability (alpha = .53). Self-efficacy (Bandura, 1977) was measured by a scale developed by Schwarzer (1994). Reliability of the self-efficacy scale was high (alpha = .82). Action-state orientation was measured by Kuhl's questionnaire (Kuhl & Beckmann, 1994).

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<sup>31</sup> See Appendix F for exact formulations.

<sup>32</sup> Six participants did not fill out the online-survey.

Two scales were administered, the failure related scale ( $\alpha = .70$ ) and the decision related scale ( $\alpha = .74$ ).

### *Materials*

The stimuli for the motivational Simon task were the same as in the Experiment 3. The online-survey was implemented with the web-software provided by Unipark (Unipark.de).

### *Motivational Simon Task*

Like in the previous experiment participants were asked to complete an achievement-concentration task that consisted of 90 letter-searching trials. They learned that the average student performance consisted of 83 solved trials and that they would take part in a lottery of cinema coupons upon correct completion of 75 trials. As in the previous experiments, the experimenter told participants that in former sessions the joystick keys sometimes hadn't worked properly, but this time everything should be working fine. Most importantly and different from other experiments, the experimenter told them that in case of not working joystick keys they should try to press the keys several times. Usually this would help. At any rate, they should not stop but continue with the task and do as best as they can. Between participants the frequency of how often additional keypressing led to success was varied. In the low controllability group repeated keypressing led to positive feedback in 20% of the frustration trials (= six trials, two in each block). In the high controllability group repeated keypressing led to positive feedback in 80% of the frustration trials (= 24 trials, eight in each block). Like in the previous experiments, participants had to respond to the feedback with approach-avoidance reactions. Most importantly and different from previous experiments, they had to additionally respond in the frustration trials during repeated keypressing with approach-avoidance reactions (see Figure 9). In particular, after some keypresses or after some while (in case they did not press any key), a yellow or blue frame appeared surrounding the letter rows. Between trials the amount of additional keypresses (one, two, or three) or time (two, four, or six sec) necessary for the frame to appear was varied. Participants had to respond with approach-avoidance movements according to the frame color. After their response the frame disappeared, and they could again press the key to indicate the letter position. The time limit for this last keypress was 2000 ms. After this last keypress or after the time limit had exceeded, feedback was given. If no key or the wrong key was pressed, a negative feedback appeared. If the correct key was pressed within the time limit, positive feedback appeared in 80% of the trials in the high controllability group and in 20% of the trials in the low controllability group. Like in the previous experiment, as positive feedback the target letter appeared surrounded by a colored frame. In case of negative feedback no target letter but only a colored frame appeared. Participants had to respond again with approach-avoidance reactions to the feedback. Taken together, in the success trials participants had to execute approach-avoidance reactions only once in response to the feedback. In the frustration trials, however, they had to execute approach-avoidance reactions twice, first during repeated keypressing, and second in response to the feedback. Yet, from the frustration trials, only the first approach-avoidance reactions while keypressing (i.e., while overcoming frustration) were analyzed.

As in the previous experiments, participants first practiced the approach-avoidance reactions and then the combined task of letter searching and approach-avoidance reactions. These two practice blocks were identical to the practice blocks of Experiment 5.

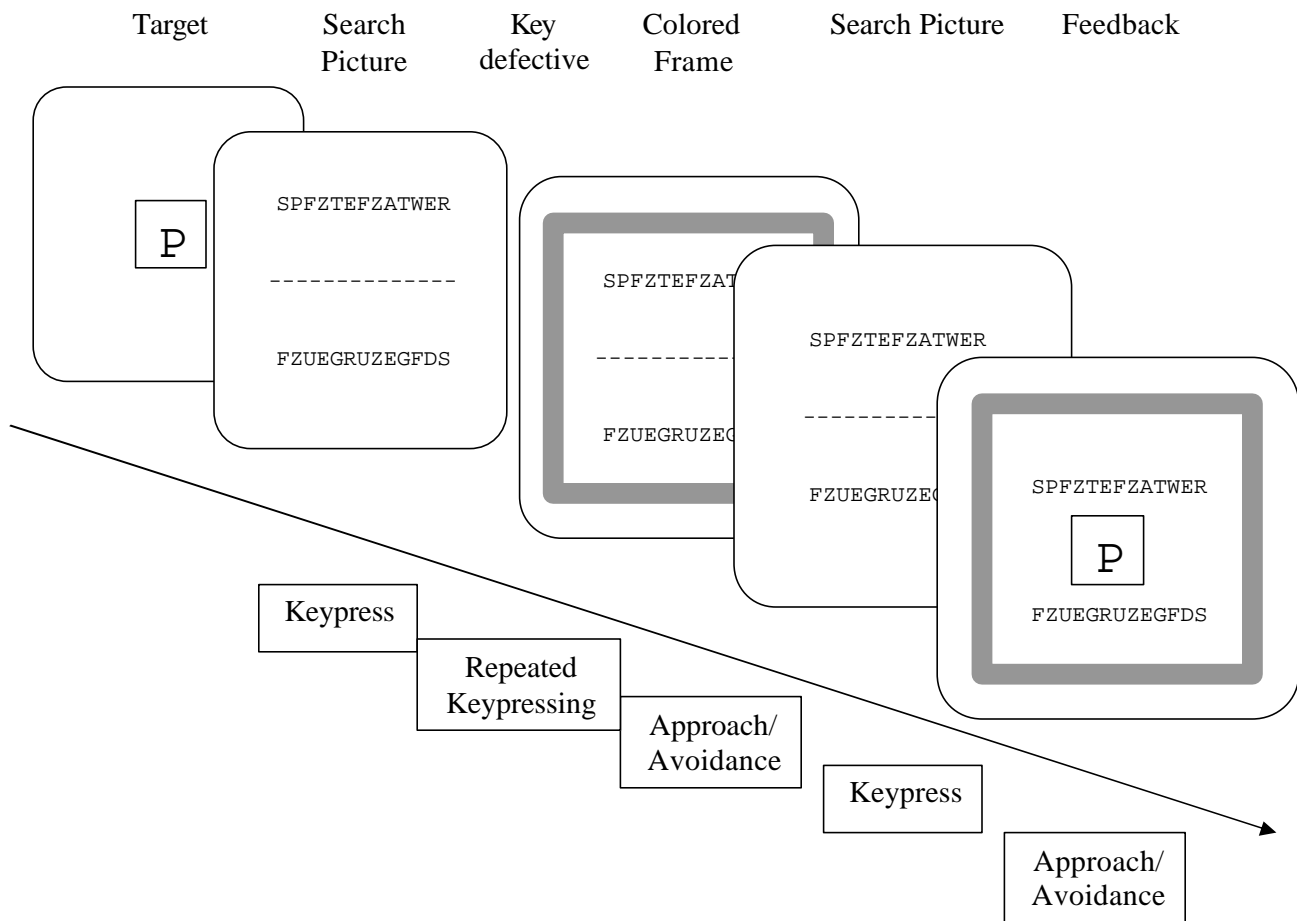


Figure 9: Sequence of a frustration trial, in which frustration can be overcome.

### Results

To test the hypotheses, first the effectiveness of the controllability manipulation was examined by analyzing appraisals of controllability and goal expectancy. Then, approach-avoidance tendencies and goal striving were analyzed separately. Afterwards, frustration approach-avoidance indices and goal striving were compared by a single analysis. At last, emotions and attributions were analyzed.

#### *Appraisals of Controllability and Goal Expectancy*

To test whether the manipulation of controllability was successful, appraisals of controllability and goal expectancy were analyzed with *t* tests for independent samples<sup>33</sup>. As expected, both controllability and goal expectancy ratings were affected by the controllability manipulation. In particular, feeling of controllability was higher in the high controllability group ( $M = 5.73$ ,  $SD = 1.84$ ) as compared to the low controllability group ( $M = 4.62$ ,  $SD = 2.23$ ),  $t(85) = 2.55$ ,  $p = .007$ . Appraisals of behavior-outcome contingency were assessed with two questions. The first question asked “How much could you influence with

<sup>33</sup> As the hypotheses were directed one-tailed *t* tests were performed.



your behavior that the defective keys functioned properly?”. The second question asked “When you attempted to make the keys working again, how often did they then function properly?”. Surprisingly, these questions did not show high internal consistency ( $\alpha = .48$ ). Thus, they were analyzed separately. Both ratings showed the expected pattern<sup>34</sup>. The first rating of behavior-outcome contingency was higher in the high controllability group ( $M = 2.71, SD = 2.02$ ) as compared to the low controllability group ( $M = 1.93, SD = 1.37$ ),  $t(78) = 2.13, p = .018$ . The second rating of behavior-outcome contingency revealed a similar difference ( $M_{\text{high control}} = 4.36, SD_{\text{high control}} = 1.96$ ;  $M_{\text{low control}} = 2.95, SD_{\text{low control}} = 1.56$ ),  $t(83) = 3.71, p < .001$ . Furthermore, appraisals of goal expectancy were as predicted. In particular, feelings of goal reachability were higher in the high controllability group ( $M = 5.60, SD = 2.10$ ) as compared to the low controllability group ( $M = 3.81, SD = 2.18$ ),  $t(85) = 3.90, p < .001$ . Similarly, performance estimates<sup>35</sup> were higher in the high controllability group ( $M = 67.02, SD = 16.83$ ) as compared to the low controllability group ( $M = 56.43, SD = 13.75$ ),  $t(83) = 3.18, p < .001$ .

#### *Approach-Avoidance Index*

From the solvable test trials of the motivational Simon task only approach-avoidance responses to successfully solved letter searching trials (96.3% of solvable trials) were analyzed. From the frustration trials, only approach-avoidance responses executed while overcoming frustration were analyzed. Incorrect joystick responses (3.9%) and responses with latencies lower than 300 ms and higher than 4000 ms (0.8%) were excluded. In addition, latencies above and below three standard deviations of the individual mean value were excluded (1.7%). Approach-avoidance indices for success and frustration were calculated by subtracting the latencies of approach responses from the latencies of avoidance responses.

*Motivational Valence and Controllability.* Approach-avoidance indices were submitted to an ANOVA for repeated measures with motivational valence as within factor and controllability as between factor<sup>36</sup>. As expected, the approach-avoidance index was only influenced by motivational valence,  $F(1,85) = 7.52, p = .007$  (see Figure 10). The approach-avoidance index was more positive for success ( $M = 39.09, SD = 64.69$ ) than for frustration ( $M = 5.70, SD = 116.95$ ). Neither the main effect of controllability, nor the interaction of controllability and motivational valence were significant (all  $F_s < 1$ ).

<sup>34</sup> Because of unequal variances revealed by the Levene-Test, statistics were adjusted.

<sup>35</sup> Two participants did not answer the question.

<sup>36</sup> In a preliminary analysis, the response assignment was entered as a between-participants factor. Unexpectedly, the response assignment interacted with controllability. Yet, as we are interested in the effect of motivational valence and its interaction with controllability, and response assignment did not interact with these effects, this factor was dropped for further analyses. See Appendix F for means and the ANOVA table.

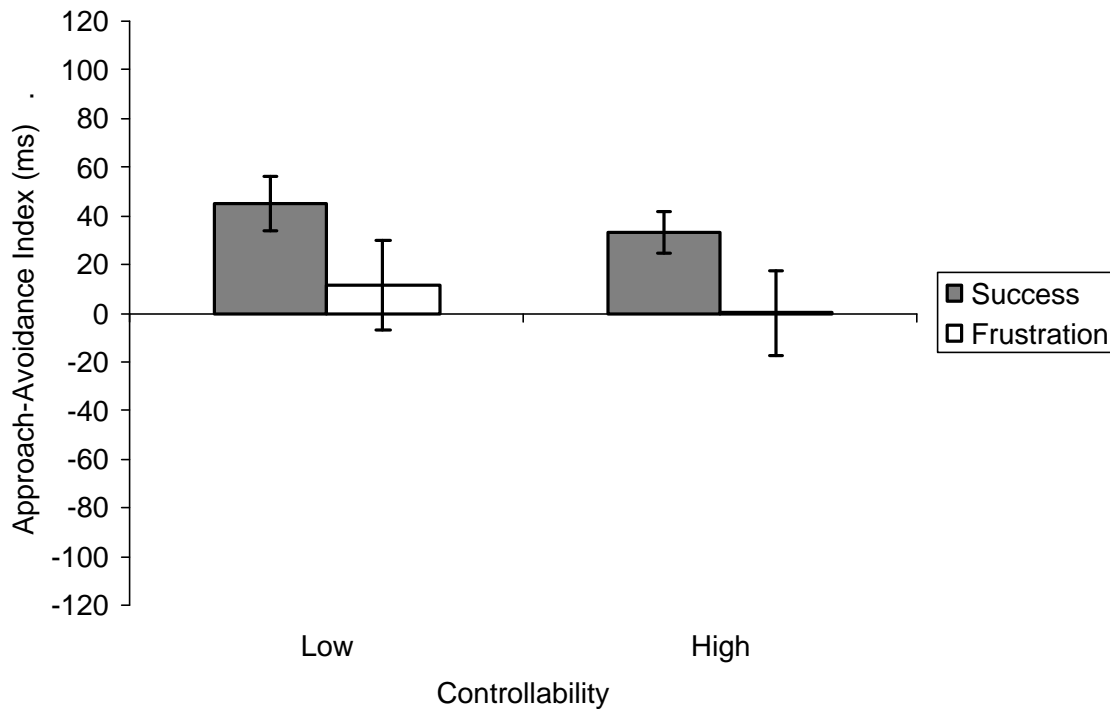


Figure 10: Mean approach-avoidance index as a function of motivational valence and controllability. Higher values indicate stronger approach tendencies. Error bars represent standard errors.

*Personality Factors.* Several personality factors were explored with respect to their relation to approach-avoidance tendencies of frustration. In particular, BAS sensitivity, control beliefs (Rotter's and Krampen's scale), and self-efficacy were examined by performing multiple regression analyses with one personality scale, the between factor controllability and the respective interaction term as predictors (Aiken & West, 1991; Cohen et al., 2003). As expected, none of the BAS scales were related to approach-avoidance indices of frustration (all  $F_s < 2.5$ ). Furthermore, neither control beliefs, nor self-efficacy were related to frustration approach-avoidance indices (all  $F_s < 1.3$ ).

Action-state orientation was examined by two separate ANOVAs for repeated measures with a personality factor (action orientation failure related [AOF] or action orientation decision related [AOD])<sup>37</sup> and controllability as between factors and motivational valence as within factor. The analyses yielded contradicting results. In particular, with respect to the failure related scale, among state oriented participants success facilitated approach and frustration facilitated avoidance, whereas among action-oriented participants both events facilitated approach. This result was reflected in a significant interaction of AOF and motivational valence,  $F(1,77) = 4.89$ ,  $p = .030$ . Simple comparisons indicate that motivational valence affected approach-avoidance tendencies only among state oriented but not among action oriented participants. In particular, among state oriented participants,

<sup>37</sup> Following the recommendations from the authors (Kuhl & Beckmann, 1994) two dichotomous variables were calculated.

success resulted in a positive approach-avoidance index ( $M = 48.14$ ,  $SD = 69.88$ ), whereas frustration resulted in a negative approach-avoidance index ( $M = -9.01$ ,  $SD = 122.22$ ),  $t(77) = 3.48$ ,  $p = .001$ . Conversely, among action-oriented participants, approach-avoidance indices were not different for success ( $M = 30.29$ ,  $SD = 61.58$ ) as compared to frustration ( $M = 28.83$ ,  $SD = 112.30$ ),  $t < 1$ . The ANOVA revealed also a main effect of motivational valence,  $F(1,77) = 5.88$ ,  $p = .018$ , indicating that overall success resulted in a more positive approach-avoidance index than frustration. No other effect was significant (all  $F$ s  $< 1$ ).

Surprisingly, the second ANOVA with the decision related scale revealed the opposite results: Among action oriented participants, success facilitated approach and frustration facilitated avoidance, whereas among state oriented participants both events facilitated approach. This result was reflected in a marginally significant interaction of motivational valence and AOD,  $F(1,77) = 3.06$ ,  $p = .084$ . Simple comparisons indicate that among state oriented participants approach-avoidance indices of success ( $M = 42.04$ ,  $SD = 71.80$ ) did not differ from approach-avoidance indices of frustration ( $M = 27.76$ ,  $SD = 94.83$ ),  $t < 1$ . However, among action oriented participants, success resulted in a more positive approach-avoidance index ( $M = 37.54$ ,  $SD = 58.96$ ) than frustration ( $M = -22.44$ ,  $SD = 143.25$ ),  $t(77) = 2.99$ ,  $p = .004$ . The ANOVA revealed also a main effect of motivational valence,  $F(1,77) = 8.12$ ,  $p = .006$ , indicating that overall success resulted in a more positive approach-avoidance index than frustration. No other effect was significant (all  $F$ s  $< 2.5$ ).

### *Goal Striving*

*Controllability.* To test whether goal striving was higher in the high controllability group, mean reaction latencies of keypressing during frustration were analyzed by a  $t$  test with the between factor controllability. Contrary to predictions, the analysis of mean latencies revealed no differences between groups. Participants in the low controllability group pressed the keys equally fast ( $M = 719.79$ ,  $SD = 217.93$ ) as participants in the high controllability group ( $M = 760.47$ ,  $SD = 210.98$ ),  $t < 1$ .

*Personality Factors.* The relationships of control beliefs, self efficacy, and BAS sensitivity to goal striving were analyzed by performing multiple regression analyses. Like the regression analyses on frustration approach-avoidance indices, one personality trait, the between factor controllability, and the interaction term were entered as predictors. Surprisingly, the BAS scales were not related to keypressing (all  $F$ s  $< 2.8$ ). Regression analyses with control beliefs as predictors, however, did partly confirm predictions. In particular, analyzing Krampen's control beliefs, revealed a significant interaction of control belief and controllability,  $\beta = -.63$ ,  $F(1,77) = 7.70$ ,  $p = .007$ . Simple slope tests indicated that in the high controllability group locus of control predicted keypressing,  $\beta = -.41$ ,  $t(77) = 2.30$ ,  $p = .024$ . The higher locus of control, the faster was keypressing to overcome frustration. In the low controllability group, however, keypressing was not related to locus of control,  $\beta = .22$ ,  $t(77) = 1.57$ ,  $p = .121$ . The main effect of controllability was not significant ( $F < 1.5$ ). The analysis of Rotter's locus of control scale revealed the same pattern of results, namely an interaction of locus of control and controllability,  $\beta = -.50$ ,  $F(1,77) = 4.82$ ,  $p = .031$ . Simple slope tests indicated that in the high controllability group locus of control predicted keypressing,  $\beta = -.33$ ,  $t(77) = 1.94$ ,  $p = .056$ . The higher locus of control, the faster was keypressing to overcome frustration. In the low controllability group, however, keypressing was not related to locus of control,  $\beta = .17$ ,  $t(77) = 1.12$ ,  $p = .266$ . The main effect of controllability was not significant ( $F < 1.3$ ). Self-efficacy was related to keypressing in the same way. In particular, the regression analysis revealed a significant interaction of self-efficacy and controllability,  $\beta = -.49$ ,  $F(1,76) = 4.86$ ,  $p = .031$ . Simple

slope tests indicated that in the high controllability group self-efficacy predicted keypressing,  $\beta = -.38$ ,  $t(76) = 2.49$ ,  $p = .015$ . The higher self-efficacy, the faster was keypressing to overcome frustration. In the low controllability group, however, keypressing was not related to self-efficacy,  $\beta = .11$ ,  $t < 1$ . The main effect of controllability was not significant ( $F < 1.2$ ).

The influence of action orientation on goal striving was tested by two ANOVAs with the respective action orientation scale (AOF or AOD) and controllability as between factors. These analyses revealed no significant effects (all  $F$ s  $< 1.7$ ).

To sum up, control beliefs and self-efficacy were related to goal striving in the high controllability condition. In particular, the higher control beliefs or self-efficacy the faster was keypressing to overcome frustration. BAS sensitivity and action-state orientation were not related to goal striving.

#### *Comparison of Frustration Approach-Avoidance Tendencies and Goal Striving*

The above analyses suggest that solely goal striving but not frustration approach-avoidance tendencies were a function of controllability and control beliefs. To further bolster this conclusion, the effects of controllability and control beliefs on goal striving and frustration approach-avoidance tendencies were tested within one single analysis. Following the suggestions from Judd and colleagues for testing moderation in within-subjects designs (Judd et al., 2001), the dependent variables were z-standardized, and a difference score was calculated by subtracting frustration approach-avoidance indices from latencies of goal striving. This score was subjected to a regression analyses with control beliefs (Rotter's scale<sup>38</sup>), the controllability factor, and the interaction term as predictors. As expected, the interaction of controllability and control beliefs predicted the difference score,  $\beta = -.75$ ,  $F(1,77) = 5.17$ ,  $p = .026$ . The main effect of controllability was not significant ( $F$ s  $< 1.2$ ). This result shows that the interaction of controllability and control beliefs affected goal striving and frustration approach-avoidance tendencies in a different way.

#### *Emotions*

The ratings on the emotion items anger, sadness, fear and happiness administered before and after the achievement task were submitted to a 2 (time) X 4 (emotion) X 2 (controllability) ANOVA for repeated measures. As expected only subjective anger increased during the task, whereas the other emotions decreased or did not change. This result was reflected in a significant interaction of time and emotion,  $F(3,255) = 18.92$ ,  $p < .001$ . However, this interaction was further qualified by a significant three-way interaction of time, emotion and controllability,  $F(3,255) = 3.81$ ,  $p = .011$ , indicating that emotion change was different in the controllability conditions. Simple comparisons revealed that anger increased strongly in the low controllability group ( $M_{pre} = 1.64$ ,  $SD_{pre} = 1.08$ ,  $M_{post} = 3.02$ ,  $SD_{post} = 1.63$ ),  $t(85) = 5.03$ ,  $p < .001$ , but only slightly in the high controllability group, ( $M_{pre} = 1.84$ ,  $SD_{pre} = 1.26$ ,  $M_{post} = 2.31$ ,  $SD_{post} = 1.38$ ),  $t(85) = 1.76$ ,  $p = .082$ . Sadness did not change in both groups (low controllability:  $M_{pre} = 1.88$ ,  $SD_{pre} = 1.11$ ,  $M_{post} = 1.98$ ,  $SD_{post} = 1.12$ ,  $t < 1$ ; high controllability:  $M_{pre} = 2.49$ ,  $SD_{pre} = 1.47$ ,  $M_{post} = 2.20$ ,  $SD_{post} = 1.29$ ,  $t(85) = 1.61$ ,  $p = .111$ ). Fear decreased in the low controllability group ( $M_{pre} = 1.93$ ,  $SD_{pre} = 1.14$ ,  $M_{post} = 1.50$ ,  $SD_{post} = 0.94$ ),  $t(85) = 2.74$ ,  $p = .008$ , but did not change in the high controllability group, ( $M_{pre} = 1.69$ ,  $SD_{pre} = 1.04$ ,  $M_{post} = 1.49$ ,  $SD_{post} = 0.84$ ),  $t(85) = 1.32$ ,  $p = .190$ . Happiness decreased in the low controllability group

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<sup>38</sup> Analyses with the other scales of control beliefs yielded the same pattern of results.

( $M_{pre} = 4.45$ ,  $SD_{pre} = 1.44$ ,  $M_{post} = 3.95$ ,  $SD_{post} = 1.15$ ),  $t(85) = 2.47$ ,  $p = .015$ , but did not change in the high controllability group, ( $M_{pre} = 4.31$ ,  $SD_{pre} = 1.16$ ,  $M_{post} = 4.02$ ,  $SD_{post} = 1.25$ ),  $t(85) = 1.48$ ,  $p = .143$ . In addition, the ANOVA revealed a significant main effect of emotion,  $F(3,255) = 118.69$ ,  $p < .001$ , indicating that happiness was overall higher than the negative emotions. No other effect was significant (all  $F$ s  $< 2.1$ ).

To summarize, as expected anger increased in both groups, though the increase was more pronounced in the low controllability group. The other emotions decreased or did not change. Differences for controllability groups were found for fear and happiness: Fear and happiness decreased only in the low controllability group.

### *Attributions*

To explore attributions, an ANOVA for repeated measures with the within factor attribution locus and the between factor controllability was conducted. This analysis revealed a main effect of attribution locus,  $F(2,170) = 114.44$ ,  $p < .001$ , which was further qualified by an interaction of locus and controllability,  $F(2,170) = 7.20$ ,  $p = .001$ . Simple comparisons revealed that attribution to circumstances was higher in the low controllability group ( $M = 6.71$ ,  $SD = 1.81$ ) as compared to the high controllability group ( $M = 5.38$ ,  $SD = 2.52$ ),  $t(85) = 2.83$ ,  $p = .006$ . In contrast, attribution to the self was lower in the low controllability group ( $M = 3.05$ ,  $SD = 1.55$ ) than in the high controllability group ( $M = 3.93$ ,  $SD = 2.19$ ),  $t(85) = 2.17$ ,  $p = .033$ . Attribution to another person was not affected by controllability (low controllability:  $M = 1.21$ ,  $SD = 0.65$ ; high controllability:  $M = 1.60$ ,  $SD = 1.53$ ),  $t(85) = 1.51$ ,  $p = .134$ . Nevertheless, in both groups task failure was attributed more to the circumstances than to the self or to another person. In particular, in the low controllability group task failure was attributed more to circumstances than to the self,  $t(41) = 7.98$ ,  $p < .001$ , or to another person,  $t(41) = 20.13$ ,  $p < .001$ . Similarly, in the high controllability group task failure was attributed more to the circumstances than to the self,  $t(44) = 2.36$ ,  $p = .023$ , or to another person,  $t(44) = 8.72$ ,  $p < .001$ . In the ANOVA, the main effect of controllability was not significant,  $F < 1$ .

### *Discussion*

The results confirm most of the hypotheses. Replicating the results from the previous study, approach-avoidance tendencies were affected by motivational valence, but not by controllability (Hypothesis 6.1). Although motivational valence affected motivational orientation as expected (i.e., success caused a more positive approach-avoidance index than frustration), inspection of the means reveals that the frustration approach-avoidance index is not negative, as it was the case in the previous experiments. Because the zero point cannot be taken as a reference point (see baseline measures in Experiment 1), the absolute value of the frustration approach-avoidance index cannot be interpreted. Thus, it is not clear whether frustration actually elicited an avoidance orientation or only a neutral orientation. Nevertheless, consistent with hypotheses, the frustration approach-avoidance index was lower than the success approach-avoidance index. Moreover, alternative models (e.g., Carver, 2004) would have predicted stronger approach tendencies for frustration than for success, because an increase of approach motivation helps to overcome obstacles. Importantly, the present finding disproves this assumption.

Concerning goal striving, it was predicted that keypressing is faster in the high controllability group (Hypothesis 6.2). This hypothesis could not be confirmed. In particular, the manipulation of controllability did not influence goal striving as a main effect. However,

further inspection of personality factors revealed an interaction of controllability and dispositional control beliefs. In particular, control beliefs were related to goal striving in the high but not in the low controllability group. When the situation provided high controllability, then the higher control beliefs were, the stronger was goal striving (i.e., faster keypressing). The interaction of manipulated controllability and dispositional control beliefs suggests that situational as well as personal factors must be high with respect to controllability in order that motivational intensity is aroused. This finding is inconsistent with the results of Experiment 5, in which manipulation of controllability influenced goal striving as a main effect. How can this pattern be explained? According to the assumptions advanced in this thesis, two mechanisms influence motivational intensity. First, an intending mechanism keeps behavioral schemata activated as long as the goal has not been reached yet. Second, appraisals of controllability enter into decisions of continuing or quitting goal pursuit. It is probable that interindividual differences manifest in the first mechanism. That is because people who believe that things are under their control typically behave accordingly by exerting goal directed behavior even under difficult circumstances. This may be reflected in a stronger intending mechanism of keeping behavioral schemata activated. However, this may only apply for situations in which control is possible. Thus, situational circumstances determine appraisals of control, whereas interindividual differences determine activation of behavioral schemata given that control appraisals are high. If this reasoning is correct, then decisions of continuing goal pursuit should be a function of situational circumstances (i.e., control possible), and be mediated by control appraisals (see results from Experiment 5). In contrast, facilitation of goal-relevant behavioral schemata should be a function of interindividual differences, and be moderated by situational circumstances (see results from Experiment 6).

Like in Experiment 5, BAS sensitivity was neither related to goal striving nor to approach-avoidance tendencies in frustration trials. Whereas the lack of a relation to approach-avoidance tendencies is in line with Hypothesis 6.3, the lack of a relation to goal striving is inconsistent with Hypothesis 6.3. Thus, the findings from Experiment 5 and 6 suggest that BAS sensitivity is not at all related to reactions to frustration. Because this is inconsistent with previous findings (Carver, 2004), further research needs to explore whether BAS sensitivity is related to all varieties of frustration or only to special cases.

Action orientation turned out to be related to approach-avoidance tendencies in a contradicting way. According to the failure related scale, state oriented participants responded with avoidance to frustration, whereas action oriented participants responded with approach to frustration. This is consistent with research on intuitive affect regulation (Koole & Jostmann, 2004), which was basis for Hypothesis 6.4. However, the decision related scale affected approach-avoidance tendencies in the opposite way. According to this scale, action oriented participants responded with congruent behavior tendencies to success and frustration, whereas state oriented participants responded overall with approach. This contradicts research on intuitive affect regulation (Koole & Jostmann, 2004). This finding is rather puzzling. Further research has to explore, whether it is substantial. Surprisingly and inconsistent with Hypothesis 6.4, goal striving was not affected by action orientation, contradicting previous findings on performance in helplessness paradigms (Kuhl, 1981). This can probably be explained by the findings that performance deficits due to interference from state oriented cognitions appear only when failure is attributed internally (Mikulincer & Nizan, 1988). As frustration implies external attribution, state oriented participants may not have suffered from interfering cognitions.

Finally, replicating the results from previous experiments of this thesis, it was demonstrated that frustration increases anger but not fear or sadness (Hypothesis 6.5).

Furthermore, frustration was attributed more externally than internally (Hypothesis 6.6). In particular, replicating the results from Experiment 5, frustration was attributed more to the circumstances than to the self or to another person.

## GENERAL DISCUSSION

### Significance of the Findings

The present thesis studied how frustration influences motivational orientation and motivational intensity. A two-system model (Strack & Deutsch, 2004) was applied to describe the processes underlying the effect of frustration on both, motivational orientation and motivational intensity. According to the RIM, an impulsive system of information processing can be oriented towards approach or avoidance depending on immediate perceptual input. In particular, automatic evaluations determine which motivational orientation will be elicited. Because frustration is assumed to be negative, I predicted that frustration elicits an avoidance orientation. This hypothesis is opposed to the assumption of another model of approach-avoidance motivation (Carver, 2004) that argues that controllable obstacles that occur during pursuing approach goals strengthen approach motivation. The basic idea of this alternative model is that motivational intensity increases as approach motivation increases. Thus, enhanced approach motivation functions to maintain goal striving in the face of obstacles. In contrast to this, the present thesis proposes that motivational orientation as a reaction to obstacles is independent of motivational intensity. Whereas motivational orientation is affected only by the valence of immediate perceptual input, motivational intensity depends on the status of goal progress and appraisals of controllability and goal expectancy. In particular, a basic motivational mechanism called intending secures that goal-relevant schemata are kept activated as long as the goal has not been reached yet. Furthermore, in a reflective system of information processing, decisions about goal pursuit are construed based on appraisals of controllability and goal expectancy. Depending on the decision (i.e., engaging in further effort, changing the means, or disengaging from goal pursuit), respective behavioral schemata are activated. Thus, motivational intensity is reflected in behavioral decisions as well as in activation of goal-relevant behavioral schemata. In summary, frustration was predicted to elicit an avoidance orientation irrespective of control appraisals. Motivational intensity, however, was expected to be influenced by control appraisals.

### *Frustration and Motivational Orientation*

#### *Frustration elicits an Avoidance Orientation*

Motivational orientation was investigated in all six experiments of this thesis. In general, the results of all experiments strongly support the hypothesis that frustration elicits an avoidance orientation as compared to success or neutral stimuli. Importantly, this pattern of results appeared independent of additional manipulations and different experimental operationalizations. First, elicitation of an avoidance orientation was evident immediately after frustration, as well as, at a delayed measurement point of time (Experiment 1). This finding indicates that frustration elicits a rather strong avoidance orientation that does not decline quickly. Second, the frustration-avoidance link was confirmed for feedback containing both, motivational and intrinsic valence (Experiments 1 and 2) as well as for feedback containing only motivational valence (Experiments 3 to 6). Thus, extending previous results on behavioral effects of motivational valence (Moos & De Houwer, 2001), the present finding further supports the assumption that motivational valence is evaluated



fast and then immediately results in the activation of compatible behavior tendencies. Third, the frustration-avoidance link was confirmed for superordinate approach as well as avoidance goals (Experiments 1 and 2). This finding is important, because alternative approach-avoidance models (Carver, 2004; Förster et al., 2001) would have predicted that superordinate goals moderate the effects of frustration on motivational orientation. In particular, Carver's model (2004) would have predicted that controllable obstacles increase the prevalent motivation, be it approach or avoidance. The present findings, however, bolster the assumption that motivational orientations are solely a function of the valence of immediate perceptual input, and that they are not moderated by superordinate goals that are represented in memory.

Fourth, different operationalizations of frustration and different measurement points yielded basically the same results. In particular, frustration was operationalized in five experiments through defective keys, and in one experiment (Experiment 4) through visual stimuli that impaired goal achievement (i.e., white square covering the search picture). Furthermore, motivational orientation was measured in four experiments after completion of a trial and in two experiments during completion of a trial (Experiments 4 and 6). In all experiments, frustration elicited a more negative approach-avoidance index than success. The pervasiveness of this finding is strong support for the assumptions advanced in the present thesis. However, one observation limits the conclusions. Whereas in most of the experiments frustration clearly elicited an avoidance orientation (Experiments 1-3, 5), in Experiments 4 and 6 the approach-avoidance index was close to zero. As these experiments did not include neutral stimuli as a reference point, no conclusions can be drawn with respect to the question whether actually an avoidance orientation was elicited. Nevertheless, the finding that frustration elicited a more negative approach-avoidance index than success is consistent with the thesis that after as well as during frustration the motivational orientation is more strongly directed towards avoidance as compared to the motivational orientation elicited by success. This result clearly disproves alternative models (Carver, 2004) that propose a functional role of approach motivation by stating that an increased approach motivation helps to overcome frustration and to reach the goal. This model would have predicted that frustration leads to a stronger approach motivation as compared to success, because after success an increase in approach motivation would not be functional any more. In sum, the present finding that frustration results in a more negative approach-avoidance index than success across different operationalizations of frustration and different measurement points strongly bolsters the assumption that motivational orientation is a function of valence and does not reflect goal striving.

#### *Avoidance Behavior towards Obstacles improves Goal Achievement*

If an avoidance orientation is compatible with frustration, then executing avoidance behavior towards obstacles should lead to performance benefits in a subsequent task as compared to executing approach behavior towards obstacles. This assumption is based on a core feature of compatibility: Executing incompatible responses requires cognitive resources and therefore leads to performance deficits in a secondary task (Förster & Stepper, 2000; Förster & Strack, 1996). The results from Experiment 4 show that this is also true for the situation of frustration. In particular, performance in a letter-searching task was better when participants executed avoidance behavior towards obstacles that appeared during letter searching than when they executed approach behavior. The opposite was true when helpful stimuli instead of obstacles appeared during letter searching (i.e., hints for letter searching).

Thus, responding with approach to frustration impairs goal achievement, whereas responding with avoidance to frustration improves goal achievement. This finding strongly bolsters the assumption that an avoidance orientation is compatible with the perception of frustration.

*Motivational Orientation is solely a Function of Valence*

To further test the assumption that motivational orientation is solely a function of valence, the influence of variables that change motivational intensity as well as the influence of variables that change valence was investigated. Variables that change motivational intensity (e.g., controllability) were expected to not affect motivational orientation. Conversely, variables that change valence should indeed affect motivational orientation (e.g., affect regulation).

To test these hypotheses, controllability was manipulated and interindividual differences in general control beliefs (Krampen, 1991; Rotter, 1966; Schwarzer, 1994), approach motivation (Carver & White, 1994), and action-state orientation (Kuhl & Beckmann, 1994) were measured. Concerning control beliefs, alternative approach-avoidance models (Carver, 2004) would have suggested that under high controllability frustration leads to an increase of approach motivation. However, consistent with the assumptions advanced in this thesis, the manipulation of controllability did not influence the avoidance orientation that was elicited by frustration. In particular, two different manipulations of controllability (i.e., compensation through additional trials in Experiment 5 and repeated keypressing in Experiment 6) did not change motivational orientations. Furthermore, dispositional control beliefs were unrelated to motivational orientation (Experiment 6). Importantly, measures of motivational intensity were indeed influenced by manipulation of controllability and dispositional control beliefs, as will be summarized in the next section.

Dispositional approach motivation (i.e., BAS sensitivity, Carver & White, 1994) was assumed to reflect motivational intensity in the pursuit of an approach goal, therefore it should be unrelated to motivational orientation. This was confirmed in Experiments 5 and 6. However, since dispositional approach motivation did also not influence measures of motivational intensity, as was expected, this null effect is difficult to interpret. Probably, the reward announced in both experiments (i.e., lottery of cinema tickets) was not attractive enough, and the task was too strenuous in order for participants' approach motivation to have been stimulated. If this explanation is true and can be supported by further research, then the generality of the relation of BAS sensitivity to motivation must be questioned.

Finally, action-state orientation (Kuhl & Beckmann, 1994) was measured in Experiment 6. Because action oriented people have been shown to automatically regulate negative affect (Koole & Jostmann, 2004), they were expected to exhibit less avoidance orientation after frustration. Surprisingly, this hypothesis was confirmed for the first subscale of action-state orientation (i.e., failure related action orientation), but disproved for the second subscale (i.e., decision related action orientation). In particular, with respect to self regulation after failure, people who were action oriented did not show an avoidance orientation after frustration as compared to people who were state oriented. This result is in line with previous research showing that action oriented people automatically regulate their negative affect (Koole & Jostmann, 2004). However, the decision related subscale yielded the opposite results. In particular, with respect to the capacity of translating decisions into actions, state oriented people did not show an avoidance orientation after frustration as compared to action oriented people. Thus, among people who have problems in translating their decisions into

actions, frustration did not elicit an avoidance orientation. This finding is rather puzzling and further research is needed to see whether it can be replicated.

To summarize, the general pattern of results strongly supports the hypothesis that motivational orientations are solely a function of immediate valence. In line with this hypothesis, variables that influence motivational intensity (i.e., manipulation of controllability and dispositional control beliefs) did not alter the motivational orientation elicited by frustration. Conversely, variables that change the negative valence of frustration (i.e., ability to automatically regulate affect after failure), did alter the motivational orientation elicited by frustration.

### *Frustration and Motivational Intensity*

To compare motivational orientation with motivational intensity, two measures of motivational intensity, namely decisions to engage in more effort and facilitation of goal-related behavior, were assessed. According to the reasoning advanced in the present thesis, the first measure mirrors reflective processes of appraising controllability and goal expectancy, while the second measure captures the activation level of goal-relevant behavioral schemata.

In Experiment 5, manipulation of controllability influenced decisions to exert more effort. In particular, participants in the high controllability group took more additional trials, which helped them to reach the goal despite frustration, as compared to participants in the low controllability group. Moreover, this effect was mediated by appraisals of controllability and goal expectancy. Thus, based on these appraisals participants decided to spend more effort on the task by completing additional trials. This pattern of results strongly confirms the assumptions advanced in the current thesis that people construe decisions about goal pursuit based on appraisals of controllability and goal expectancy. To my knowledge, this is the first study that demonstrated by means of a mediation analysis how frustration influences goal striving.

In Experiment 6, activation of goal-relevant behavioral schemata was measured by facilitation of that behavior (i.e., keypressing latencies). It turned out that the activation of behavioral schemata was influenced by an interaction of the manipulation of controllability and dispositional control beliefs (Krampen, 1991; Rotter, 1966; Schwarzer, 1994). In particular, in the high controllability condition, interindividual differences in control beliefs predicted speed of keypressing to overcome the obstacle. In the low controllability condition, control beliefs were unrelated to keypressing. This finding is not fully in line with hypothesis. The activation of goal-relevant schemata was expected to be regulated by an intending mechanism that is influenced by reflective decisions of goal pursuit. Thus, when the goal is appraised as achievable (i.e., high controllability condition), activation of behavioral schemata should be maintained despite frustration, resulting in the facilitation of that behavior. However, the data reveals that interindividual differences in control beliefs determine the facilitation of goal-relevant behavior depending on situational controllability. More specifically, given that frustration is controllable, the stronger people generally believe that things are under their control, the stronger the activation of behavioral schemata is maintained in the face of obstacles. These interindividual differences may be due to the fact that people with high control beliefs typically exert more goal-directed behavior in every day life, which may strengthen their intending mechanism. As the intending mechanism is assumed to be influenced by reflective decisions of goal pursuit, interindividual differences

only become apparent when the goal is not abandoned but maintained (i.e., high controllability condition).

In sum, appraisals of control and goal expectancy determined decisions about exerting more effort in the face of obstacles as predicted. When frustration was controllable and therefore the goal was maintained, interindividual differences in control beliefs determined how strong goal-relevant behavioral schemata were kept activated.

### *What is special about Frustration?*

One may argue that it is not surprising that obstacles elicit an avoidance orientation, because there are already studies showing that negative intrinsic as well as motivational valence elicits an avoidance orientation (e.g., Chen & Bargh, 1999; Moors & De Houwer, 2001). In fact, the main proposition of this thesis is totally in line with these findings. However, the present thesis goes beyond these findings by investigating frustration, which is characterized by a goal hierarchy of a superordinate approach goal and subordinate avoidance goal. Up to now, it has not been examined yet how a positive representation at an abstract level (i.e., approach goal) and a negative representation at a concrete level (i.e., obstacle) jointly affect motivational orientation. That the answer to this question is not trivial is underlined by theories proposing that anger and frustration are associated with approach motivation under conditions of high controllability (e.g., Carver, 2004; Harmon-Jones, 2003). Thus, according to these authors, not only valence but valence combined with appraisals (e.g., controllability) determines motivational orientation. In contrast, the present thesis proposes that motivational orientations are exclusively a function of valence, and that they are virtually blind for additional information like attributions or appraisals.

Thus, the present thesis aims to show that frustration elicits an avoidance orientation, and that concomitantly attributions, appraisals and emotions that are typical for frustration are present. The results of the experiments strongly confirm these assumptions. As expected, frustration elicited an avoidance orientation and was concomitantly attributed to an external cause, was appraised as controllable (Experiments 5 and 6), and provoked an increase of anger but not of fear or sadness.

### Implications for Research on Frustration and Approach-Avoidance Motivation

The present findings have several implications for both, research on frustration and research on approach-avoidance motivation. These will be outlined below.

#### *Frustration*

Frustration influences emotions (i.e., anger), behavior (i.e., aggression) and motivation (i.e., goal striving). In what follows, it will be elaborated what the present findings imply for research on anger and aggression. Then, implications for research on goal striving will be outlined.

### *Anger and Aggression*

The implications for research on anger and aggression are twofold. On the one hand, the present research is relevant for the discussion, whether (and if yes which) appraisals are necessary for anger to occur (Berkowitz & Harmon-Jones, 2004; Roseman, 2004; Smith & Kirby, 2004). On the other hand, the present research is relevant for the discussion whether anger is associated with approach or avoidance motivation (Carver, 2004; Harmon-Jones, 2003; Harmon-Jones & Allen, 1998). The implications for these lines of research will be elaborated below.

*The Role of Appraisals.* Scientists have been discussing the necessary preconditions for anger and aggression for a long time. While Berkowitz argues that negative affect is sufficient to evoke anger and aggressive tendencies (Berkowitz, 1990, 1993, 2000; Berkowitz & Harmon-Jones, 2004), appraisal theorists posit that specific appraisals are necessary preconditions for anger to occur (e.g., Roseman, 2004; Smith & Kirby, 2004). Moreover, appraisal theorists discuss, which specific appraisals contribute anger. Whereas Roseman (2001, 2004) claims that undesirability and control potential are necessary appraisals, Smith and Kirby (2004) propose that other blame (composed of other accountability, motivational relevance and motivational incongruence) is necessary and sufficient to elicit anger. In contrast, studies conducted by Kuppens et al. (2003) revealed that none of the typical appraisals are necessary or sufficient for anger to occur. Instead different appraisals can co-occur with anger. Taken together, research is very inconclusive about the relation of appraisals and anger.

The results of the present experiments challenge appraisal theorists' propositions regarding the necessity of specific appraisals for anger generation. In particular, participants in the present studies attributed frustration to the circumstances and not to another person. This finding questions Smith and Kirby's (2004) proposition that other blame is necessary in order for anger to be evoked. Furthermore, manipulation of control potential influenced the intensity of anger, at least in Experiment 6. In particular, *less* anger was evoked when participants' control potential was high than when their control potential was low. Apparently, control reduced the aversive quality of frustration. This finding contradicts Roseman's (2001, 2004) proposition that high control potential is necessary for anger generation. Because evidence for appraisal theories mainly comes from studies in which participants had to remember emotional episodes and report associated appraisals<sup>39</sup>, this research may have revealed people's subjective theories of emotions and appraisals rather than their actual appraisals elicited by an emotional event. Given that the concept of anger is very fuzzy and that very different varieties of anger exist (Russell & Fehr, 1994), it is not surprising that studies concerned with subjective theories of anger and related appraisals yielded different results.

Contrary to appraisal theories, Berkowitz (1990, 2000) proposes that negative affect is sufficient to evoke anger and affective aggression. Specifically, every stimulation that evokes negative affect (e.g., physical pain, stress, provocation, or frustration) automatically activates anger related feelings, thoughts and motor schemata that are linked in an associative network, without mediation of appraisal processes (Berkowitz, 1990, 2000). Assuming that avoidance behavior is part of that network (Gray, 1987; Krieglmeier & Deutsch, 2007; Strack & Deutsch, 2004), the present findings are fully in line with

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<sup>39</sup> For exceptions see Neumann (2000), Lerner and Keltner (2001), and Roseman and Evdokas (2004).

Berkowitz' assumptions. Moreover, to my knowledge the present studies are the first studies that demonstrate automatic behavior activation in the context of frustration independent of appraisals. Because previous studies in the framework of Berkowitz' model measured primarily overt behavior (for summaries see Berkowitz, 1989, 1990; Berkowitz & Harmon-Jones, 2004), they did not allow for conclusions with respect to automatic behavior activation. Yet, since the present studies used a Simon paradigm to measure behavior activation (cf. De Houwer et al., 2001; Moors & De Houwer, 2006), the present results allow for the conclusion that frustration activates avoidance behavior quickly and independent of the intention to evaluate the frustrating situation. Since general avoidance behavior, but not aggression or withdrawal was measured, it is of course still an open question whether frustration automatically activates aggression tendencies. Yet, since aggression and withdrawal can be conceived of as two means of avoidance (Strack & Deutsch, 2004), the present results may provide preliminary evidence for the assumption of an automatic link between frustration and aggression. Further research is needed to investigate more thoroughly, which specific behavior tendencies are activated by frustration and other aversive conditions, and how the process of behavior activation can be described in the terms of the different features of automaticity (i.e., fast, efficient, unintentional/uncontrollable, unaware; see Moors & De Houwer, 2006).

*Anger and Approach-Avoidance Motivation.* The second implication of the present research concerns the relationship of anger and aggression to approach-avoidance motivation. Previously, anger and aggression have often been associated with approach motivation (e.g., Harmon-Jones, 2003; Harmon-Jones & Sigelman, 2001). The main argument for this relationship is the observation that anger contains the impulse to move against the source of the emotion, and that aggressive behavior implies approaching the target (e.g., Frijda, Kuipers, & ter Schure, 1989; Plutchik, 1980; Roseman, Wiest, & Swartz, 1994). However, to my knowledge no study exists demonstrating increased approach motivation during anger or aggressive behavior. Moreover, from a theoretical perspective it can also be argued that not the concrete movement determines the motivational orientation, but the valence of the stimuli or the goal of the person. Then, anger and aggression would go along with an avoidance orientation, because the eliciting stimuli are negative and the person's goal is to cause the stimuli to move away, which is clearly an avoidance goal (cf. Strack & Deutsch, 2004; Weinshenker & Siegel, 2002). In accordance with this reasoning, Krieglmeier and Deutsch (2007) demonstrated that anger-eliciting stimuli facilitate avoidance behavior. Similarly, the results of the present studies clearly show that an avoidance orientation caused by frustration goes along with anger. Thus, empirical evidence more strongly supports a relationship between anger and avoidance than between anger and approach.

However, it is very plausible that there is no simple relation between emotion and motivational orientation, but that motivational orientations depend on the type of information that is being processed by a person. As a motivational orientation can be induced by the perception of valence, the perception of distance change, and the execution of approach-avoidance behavior (for reviews see Neumann et al., 2003; Strack & Deutsch, 2004), the focus of attention while being angry or behaving aggressively may determine the motivational orientation. More specifically, when the focus of attention is directed at the valence of the source of the emotion then an avoidance orientation will be elicited. However, when the focus of attention is directed at changes in distance to the target, then probably an approach orientation will be elicited. Further research is needed to test these assumptions and

to investigate the relationship between emotion, focus of attention, and motivational orientation more thoroughly.

### *Goal striving*

Research on the influence of frustration on goal striving highlights arousal and control beliefs as important variables (Amsel, 1992; Amsel & Rousell, 1952; Wortman & Brehm, 1975). Both variables are assumed to mediate the effect of frustration on goal striving. In particular, on the one hand frustration is assumed to enhance arousal, which increases the vigor of dominant responses, resulting in stronger goal striving. On the other hand, control beliefs are assumed to determine whether people enhance or reduce goal striving after frustration. However, as outlined in the theoretical part, empirical evidence is rather scarce and theoretical integration of the possible mechanisms is still lacking.

The theoretical framework advanced in this thesis offers an integration of possible processes causing changes in motivational intensity after frustration. From the perspective of a dual-system model, two qualitatively distinct processes are assumed to affect goal striving. In particular, appraisals of controllability and goal expectancy enter in decisions about continuing or quitting goal pursuit. In addition, a rather automatic mechanism called intending keeps goal-relevant behavioral schemata activated as long as the goal has not been reached yet, and as long as the goal is still relevant. On the one hand, arousal increases the activation of behavior schemata, resulting in higher persistence. On the other hand, high levels of arousal diminish reflective processing, resulting in poorer assessment of controllability, goal expectancy and availability of alternative means to reach the goal.

The experimental work of the present thesis aimed at testing only parts of these assumptions. In particular, reflective behavior (i.e., decisions) as well as impulsive behavior (i.e., speed of keypressing) were measured as indicators of motivational intensity after frustration. The impact of frustration on decisions to engage further effort was mediated by control appraisals. This finding extends previous research on exposure to uncontrollability and control appraisals. Whereas early studies in this line of research indicated that control beliefs are responsible for performance changes after exposure to uncontrollability (Pittman & Pittman, 1979; Roth & Kubal, 1975), later studies revealed that cognitive interference due to state-oriented cognitions produced a decrease in performance after high exposure to uncontrollable outcomes (Kuhl, 1981; Mikulincer, 1989; Mikulincer & Nizan, 1988; Ric & Scharnitzky, 2003). However, as this explanation was only studied in situations where task failure was attributed internally, it is unclear whether it also applies to frustration, which is characterized by external attributions (cf. Tennen & Eller, 1977). Thus, up to now unequivocal evidence showing the mediating role of control beliefs on the impact of frustration on goal striving was still missing. The present experiment clearly demonstrates that under conditions of external failure attribution, control beliefs are responsible for changes in reflective indicators of goal striving.

In contrast to reflective goal striving, impulsive behavior (i.e., keypressing latencies) was shown in the present experiment to be a product of situation (i.e., manipulation of controllability) and personality (i.e., control beliefs). In other areas of research, activation of goal-relevant information was examined as a function of goal-attainment. For instance, goal-related information was demonstrated to attract attention (Rothermund, 2003a) and to be higher accessible after goal-nonattainment as compared to goal-attainment (Förster et al., 2005; for an overview see Johnson, Chang, & Lord, 2006). The present experiment did not directly compare frustration with success trials. Instead, the impact of frustration

controllability was tested, leaving it unclear whether goal-attainment decreases the activation of behavior schemata. Further research is needed to examine the interplay of goal-attainment and control appraisals on the activation of behavior schemata.

Furthermore, the role of arousal has to be examined in future research. Several questions remain to be investigated. First, it is interesting whether arousal strengthens solely goal-relevant behavioral schemata or also goal-irrelevant dominant (well-learned) responses. Whereas the latter would be predicted by drive theory (Hull, 1966), the first would be clearly more functional with respect to goal pursuit. Second, it would be worthwhile to examine whether arousal indeed impairs reflective processes that typically take place in frustration situations (e.g., control appraisals, generation of alternative means) as it is predicted by the RIM. For instance, in research on the control of stereotype expression a detrimental effect of arousal on cognitive control has been demonstrated (Lambert et al., 2003). Third, the impact of arousal on perceptions of goal value and consequently approach motivation would be a fascinating area of further investigations. Research on the impact of task difficulty on goal attractiveness indicates that more difficult goals are evaluated as more attractive because the arousal that arises due to energy mobilization is attributed to the goal (Brehm, Wright, Solomon, Silka, & Greenberg, 1983; Wright, 1982; Wright & Brehm, 1989). A similar idea is proposed in a model presented recently by Higgins (2006). Up to now, only explicit measures of goal valence were used in this line of research. It would be interesting to also assess measures of approach-avoidance motivation towards the goal. What would be predicted according to the reasoning advanced in this thesis? If arousal strengthens valence and motivational orientations, then avoidance motivation towards the obstacles as well as approach motivation towards the goal should increase with arousal. Thus, the greater the obstacle the more avoidance motivation should be elicited. When the person directs the focus of her attention away from the obstacle and towards the goal, the residual arousal should strengthen approach motivation to the goal. The role of attention focus in elicitation of approach-avoidance motivation will be elaborated more thoroughly in the next section.

### *Models of Approach-Avoidance Motivation*

As outlined in the theoretical part, theories of approach-avoidance motivation can be distinguished on the basis of the determinants that activate one type of motivation. While some theories focus on the valence of immediate perceptual input (Gray & McNaughton, 2000; Lang, 1995; Neumann et al., 2003; Strack & Deutsch, 2004), other theories concentrate on rather superordinate goals of approach or avoidance (Carver, 2006; Carver & Scheier, 1990, 1998; Higgins, 1997, 1998). This difference implies assumptions about the stability of approach-avoidance motivation. In particular, according to the first types of theories, motivational orientations can change rapidly depending on the perceptual input. In contrast, according to the latter type of theories, the activation of a motivational system prevails during the entire period of goal pursuit.

To my knowledge, up to now no research has been conducted yet to test the different theories of approach-avoidance motivation against each other<sup>40</sup>. The present research on frustration provides an ideal means to test contradicting predictions. As it has been outlined in the theoretical part, the situation of frustration is characterized by a superordinate

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<sup>40</sup> The authors of the RIM (Strack & Deutsch, 2004) propose an integration of contradicting results from human research on regulatory focus theory and animal research on operant conditioning. However, to my knowledge, the ideas have not been tested yet empirically.



approach goal (i.e., reaching the gratification) and a subordinate avoidance goal (i.e., removing the obstacle). Whereas in most situations the superordinate goal is only represented in memory, the obstacle is immediately perceivable. This given situation provides an ideal means to test whether the superordinate goal or the perceptual input dominates in activating a motivational orientation. The present research demonstrates that a motivational orientation is exclusively determined by the immediate perceptual input. Thus, the present findings strongly support the types of theories that propose that motivational orientations are activated by the valence of immediately perceived stimuli (Gray & McNaughton, 2000; Lang, 1995; Neumann et al., 2003; Strack & Deutsch, 2004). How can the research on the theories that propose superordinate goals as activators of motivational systems (Carver, 2006; Higgins, 1997) be reconciled with the present findings? In what follows, two different questions will be answered. The first question is more general: How can the research on these theories be integrated in the RIM (Strack & Deutsch, 2004) that provided the theoretical framework for the present thesis? The second question is more specific: How can research on regulatory focus theory be explained, which demonstrated that only focus-compatible feedback increases motivation (Förster et al., 2001)?

Concerning the first question, Strack and Deutsch (2004) propose the following. When goals are set by reflective operations (e.g., I don't want to lose that race), the respective constructs are activated in the impulsive system (*lose* and *race*), thereby eliciting a congruent motivational orientation. In the example, the motivational orientation would be avoidance because of the negative valence of *lose*. If the impulsive system does not receive another valenced input, the avoidance orientation would persist. However, if the person perceives something positive (for instance that the other competitors are behind him) the motivational orientation changes to approach. That is, because immediate input determines the motivational orientation of the impulsive system. Yet, rehearsing the avoidance goal (I don't want to lose that race) would again elicit an avoidance orientation. Thus, a prolonged motivational orientation as it is proposed in the theories of Higgins (1997) and Carver (2006) can result from continuously thinking of the goal. Applied to the situation of frustration, it follows that while pursuing an approach goal, obstacles elicit an avoidance orientation *unless* the person intensively thinks of his approach goal. Certainly, further research has to proof whether these assumptions are right.

The second question concerns an explanation for the finding that people in an approach or avoidance motivation are only motivated by compatible feedback (i.e., approach oriented people by success, avoidance oriented people by failure) (Förster et al., 2001). At first glance this may be incompatible with the finding that motivational intensity is maintained or even increased when obstacles are encountered, because obstacles can be conceived of as incompatible feedback. The solution for this inconsistency probably lies in the specific emotions that are typically elicited by success and failure depending on approach-avoidance motivation, and the respective differences in arousal. In particular, in approach motivation, success causes cheerfulness-related emotions, and failure causes dejection-related emotions. Conversely, in avoidance motivation, success causes quiescence-related emotions, and failure causes agitation-related emotions (e.g., Higgins et al., 1997). Obviously, emotions with high arousal are caused by approach-success and avoidance-failure, whereas emotions with low arousal are caused by approach-failure and avoidance success (cf. circumplex model of affect, Russell, 1980). As arousal is linked very tightly with motivational intensity (Brehm & Self, 1989), it is plausible that the type of feedback that caused high-arousal emotions also caused an increase of motivation due to arousal. One may still raise the question, why the studies in the framework of regulatory focus theory found that failure feedback in approach motivation (which can be conceived of as frustration) led to dejection-

related emotions, whereas studies in the realm of frustration research found that obstacles in approach motivation led to anger. The solution for this obvious inconsistency is probably the locus of attribution and related control appraisals (cf. Carver, 2004; Tennen & Eller, 1977; Wortman & Brehm, 1975). If a set back is attributed to lack of ability then the person does not have control over the cause, which causes depression and decreased motivation. However, if a set back is attributed to an external unstable cause, then control may still be possible, which causes anger and increased motivation. Probably, failure feedback in the studies on regulatory focus theory was provided in a way that suggested an internal attribution through lack of ability, whereas obstacles in frustration studies were operationalized in a way that implied external attributions.

In summary, the present findings strongly bolster the assumption that motivational orientations are determined by immediate perceptual input, which is in line with several theories of approach-avoidance motivation (Gray, 1987; Lang, 1995; Strack & Deutsch, 2004). Further research has to investigate how the reflective activation of representations on a more abstract level of the goal hierarchy (e.g., intensively thinking of the superordinate goal) influence motivational orientations in frustrating situations.

### Implications for Research on Emotion and Motivation

Besides the above described implications, the present research has also more general implications for current theories of emotion and motivation. These will be delineated in the following sections.

#### *Emotion*

Recently, two fundamental new ways of describing how emotions are generated have been presented in emotion research. One approach applies dual-process models to emotion generation (Smith & Neumann, 2005). The other approach distinguishes between the generation of core affect and the application of emotional knowledge (Barrett, 2006; Russell, 2003; Russell & Barrett, 1999). In what follows, the basic ideas of these theories will be outlined, and the implications of the present research for these theories will be delineated.

Based on dual-process models of social psychology (Chaiken & Trope, 1999; Smith & DeCoster, 2000; Strack & Deutsch, 2004) Smith and Neumann (2005) distinguish between associative and rule-based processing. An emotional stimulus (e.g., a spider) activates its associated emotional responses (i.e., physiological changes, behavior tendencies, and thoughts) fast and uncontrollably via a pattern completion mechanism. The stimulus does not even have to be processed consciously to activate the emotion network (e.g., Bradley, Codispoti, Cuthbert, & Lang, 2001). In addition to these associative processes, rule-based processes can influence the generation of an emotion. Rule-based processes are, for instance, anticipation of future events, attribution, or thinking about other persons' thoughts. In contrast to associative processes, rule-based processes are flexible, but slow and require cognitive resources. Emotions can be generated by either associative processes (e.g., fear of spiders) or rule-based processes (e.g., fear of a future exam) or by both acting in parallel (e.g., feeling proud when being praised). Importantly, both processes can work in an antagonistic way. Then, the faster associative processes determine the emotional outcome. For instance, a chocolate mousse in the form of dog feces has been shown to elicit disgust

despite the knowledge that chocolate mousse is delicious (Rozin, Millman, & Nemeroff, 1986).

The second type of emotion model also distinguishes two types of processes (Barrett, 2006; Russell, 2003). Yet, the processes are described very differently. For sake of brevity, the newest model presented by Barrett (2006) will be outlined here. According to the conceptual act model (Barrett, 2006), a person experiences an emotion when she categorizes her core affect guided by embodied knowledge about emotion. Thus, two processes create emotional experience. First, the person evaluates the situation, which results in a change of core affect. Core affect can vary along the dimensions of valence and arousal. Furthermore, basic behavior tendencies of approach and avoidance are part of core affect. Second, the person categorizes her core affect with conceptual knowledge about emotions, resulting in the experience of a discrete emotion. How is emotion knowledge represented? There is not a single concept for one emotion, but different sets of representations that are specific for the situation in which the representation has developed (e.g., anger in the highway or on the football field). Furthermore, the sets are represented modally that is in the form of the sensorimotor states that were activated when the representation has developed (Barsalou, Simmons, Barbey, & Wilson, 2003). Importantly, both processes, change of core affect and categorization of core affect with conceptual knowledge, proceed in parallel and “in the blink of an eye” (Barrett, 2006, p. 35).

Taken together, dual-process models of emotion (Smith & Neumann, 2005) as well as the conceptual act model of emotion (Barrett, 2006) propose two qualitatively different processes that play a role in emotion generation. However, whereas dual-process models distinguish associative from rule-based processes that differ in terms of automaticity (i.e., fast, controllable, efficient, unconscious), the conceptual act model distinguishes evaluation from categorization processes that both proceed rather automatically, but result in different outputs (i.e., simple core affect vs. discrete emotions).

How does the present thesis relate to these models? The main finding of the present experiments is that approach-avoidance tendencies are only sensitive to valence but not to appraisals of controllability and goal expectancy. Assuming that controllable frustration is less negative than uncontrollable frustration (cf. positive effects of illusion of control, Taylor & Brown, 1988), this finding is contrary to the predictions of the conceptual act model. That is because if controllable frustration is less negative, it should elicit less negative core affect, resulting in less avoidance behavior. The current finding can only be explained by dual-process models of emotion. Only if one assumes that appraisals of controllability and goal expectancy are slower (because they are rule-based) than the evaluation of immediate valence (i.e., success vs. frustration), one can explain that fast approach-avoidance responses are not influenced by such appraisals. In sum, the present findings support a dual-process view of emotions (Smith & Neumann, 2005) rather than the conceptual act model of emotion (Barrett, 2006).

### *Motivation*

The present thesis aimed at a theoretical integration of different findings of how frustration affects motivation. For this purpose, a dual-system model of social behavior (Strack & Deutsch, 2004) was applied to describe the processes underlying the effects of frustration on motivational orientation and motivational intensity. This theoretical framework may not only help to understand frustration, but also motivation in general.

Motivation can be described along two dimensions, intensity and direction. Probably one of the first accounting for this was Lewin (1936) by claiming that needs determine the valence of an object and therefore the direction of behavior (i.e., approach vs. avoidance), whereas the distance to an object determines the force of behavior (i.e., intensity). Many theories of motivation comprise concepts that reflect one of these or both dimensions (Atkinson, 1957; Brehm & Self, 1989; Carver & Scheier, 1990; Higgins, 1997, 2006; Hull, 1966; Tolman, 1955; Wortman & Brehm, 1975). What the present thesis can add to these theories is the idea that qualitatively distinct processes can lead to changes in motivational orientation and motivational intensity. Current models of motivation usually describe functional relationships between motivational concepts. For instance, Brehm and Self (1989) propose that arousal, motivational intensity, and attractiveness of the goal increase with the difficulty of the task. Higgins (2006) suggests that attraction towards something and repulsion away from something is determined by hedonic quality as well as the strength of engagement to the goal. Engagement strength varies as a function of different variables, for instance opposition to interfering forces or regulatory fit. Carver and Scheier (1990) advance a control process theory, according to which behavior is monitored by feedback loops (cf. Miller, Galanter, & Pribram, 1960). Discrepancies between the actual state and the reference value that can be an approach or avoidance goal, lead to changes in behavior and emotions. Taken together, these models describe direction and intensity of motivation as a function of variables like difficulty, motivational fit, or discrepancy.

The present thesis extends this view by applying a dual-system model to motivational phenomena. In particular, I suggested that distinct processes, namely fast activation of behavior and resource-dependent reasoning, contribute to changes of motivation. From this assumption it follows that measures that tap rather automatic processes yield different results than measures that tap rather reflective processes, as demonstrated in the present thesis. Moreover, it follows that under different processing conditions (e.g., cognitive load, arousal) different changes of motivation arise. Further research is needed to test these predictions. Findings from other areas like self-regulation (Baumeister, Schmeichel, & Vohs, 2007) or prediction of behavior by implicit and explicit attitudes (Poehlman, Uhlmann, Greenwald, & Banaji, 2007), which support a dual-process view, may inspire research on impulsive and reflective processes of motivation.

### Summary and Conclusion

In the introduction of this thesis, an example was presented to illustrate a situation of frustration: A young man is trying to start the engine of his car to get to a date with a woman he fancies. But the engine doesn't start, it only howls. The man tries again, frowns, sweats, and hits the steering wheel. At the same time he imagines the waiting woman and wishes to get to her on time.

The example demonstrates that frustration has various consequences that range from behavioral impulses to goal-directed behavior, from physiological changes to cognitive imaginations. These many different reactions most likely stem from only a few underlying mechanisms. To describe these underlying mechanisms, the present thesis applied a dual-system model. Based on this model, I predicted that frustration elicits an avoidance orientation because of its negativity. This happens very quickly and is therefore not moderated by further appraisals of the situation. In turn, an avoidance orientation is coupled with negative affect and behavioral impulses of avoidance (i.e., aggression and withdrawal). Parallel to these rather hot processes, another mechanism called intending secures that goal-

relevant behavioral schemata are kept activated as long as the goal has not yet been reached. This leads to repeated behavior execution. At the same time, the situation is appraised on several dimensions. Does engaging more effort help to attain the goal? Which different means are available? Is it hopeless and should one better give up? These processes take some time and finally result in a decision. Depending on the decision, activation of behavioral schemata is maintained or different schemata are activated.

In conclusion, frustration was proposed to elicit an avoidance orientation in an impulsive system of information processing irrespective of appraisals. Yet, motivational intensity after frustration was predicted to depend on decisions that are construed in a reflective system based on appraisals of controllability and goal expectancy. Dependent on the decisions made, matching behavioral schemata are activated. To test these assumptions, behavior tendencies of approach and avoidance, performance, decisions to engage more effort, and facilitation of goal-relevant behavior were measured after frustration. Controllability of frustration was manipulated and interindividual differences in control beliefs, approach motivation and action orientation were assessed. Overall, the results of all six experiments provide strong support for the proposed assumptions. In particular, frustration elicited an avoidance orientation irrespective of the manipulation of controllability and interindividual differences in control beliefs. The only variable that influenced motivational orientation after frustration was action orientation – a personality trait that reflects automatic affect regulation abilities and is therefore responsible for changing the negativity of frustration. Furthermore, performance in a goal pursuit task was improved when participants responded with compatible behavior (i.e., avoidance) to frustration as compared to incompatible behavior (i.e., approach). Regarding motivational intensity, decisions to engage more effort to overcome frustration were determined by appraisals of controllability and goal expectancy. Furthermore, facilitation of goal-relevant behavior was a function of situational controllability and dispositional control beliefs. When frustration could be overcome, goal-relevant behavior was facilitated more strongly with increasing control beliefs.

In sum, the present findings demonstrate that motivational orientation towards frustration and motivational intensity are independent processes. These findings clearly disprove other models of approach-avoidance motivation that suggest that increased approach motivation towards obstacles is a means to overcome obstacles and to strengthen goal pursuit. Whereas empirical evidence supporting this assumption had been lacking until now, the present studies strongly bolster the assumptions advanced in this thesis. In particular, motivational orientation has been found to be solely a function of immediate valence. Motivational intensity, however, has been found to be affected by appraisals of controllability.

## REFERENCES

- Adelman, H. M. & Maatsch, J. L. (1956). Learning and extinction based upon frustration, food reward and exploration tendency. *Journal of Experimental Psychology*, *52*, 311-315.
- Aiken, L. S. & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage Publications.
- Amsel, A. (1992). *Frustration theory: An analysis of dispositional learning and memory*. Cambridge, England: Cambridge University Press.
- Amsel, A. (1994). Précis of frustration theory: An analysis of dispositional learning and memory. *Psychonomic Bulletin and Review*, *1*, 280-296.
- Amsel, A. & Rousell, J. (1952). Motivational properties of frustration: I. Effect on a running response of the addition of frustration to the motivational complex. *Journal of Experimental Psychology*, *43*, 363-368.
- Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*, 359-372.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.
- Bargh, J. A., Chaiken, S., Govender, R., & Pratto, F. (1992). The generality of the attitude activation effect. *Journal of Personality and Social Psychology*, *62*, 893-912.
- Bargh, J. A., Chaiken, S., Raymond, P., & Hymes, C. (1996). The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. *Journal of Experimental Social Psychology*, *32*, 104-128.
- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Barrett, L. F. (2006). Solving the emotion paradox: Categorization and the experience of emotion. *Personality and Social Psychology Review*, *10*, 20-46.
- Barsalou, L. W., Simmons, W. K., Barbey, A. K., & Wilson, C. D. (2003). Grounding conceptual knowledge in modality-specific systems. *Trends in Cognitive Sciences*, *7*, 84-91.
- Baumeister, R. F., Schmeichel, B. J., & Vohs, K. D. (2007). Self-regulation and the executive function: The self as controlling agent. In A.W.Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles*. New York: Guilford Press.
- Baumeister, R. F. & Vohs, K. D. (2004). *Handbook of self-regulation: Research, theory, and applications*. New York: Guilford Press.
- Berkowitz, L. (1989). Frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin*, *106*, 59-73.
- Berkowitz, L. (1990). On the formulation and regulation of anger and aggression. *American Psychologist*, *45*, 494-503.
- Berkowitz, L. (1993). More thoughts about the social cognitive and neoassociationistic approaches: Similarities and differences. In R.S.Wyer & T. K. Srull (Eds.), *Perspectives on anger and emotion* (pp. 179-197). Hillsdale, NJ: Erlbaum.
- Berkowitz, L. (2000). *Causes and consequences of feelings*. Cambridge, England: Cambridge University Press.
- Berkowitz, L. & Harmon-Jones, E. (2004). Toward an understanding of the determinants of anger. *Emotion*, *4*, 107-130.

- Berntson, G. G., Bechara, A., Damasio, H., Tranel, D., & Cacioppo, J. T. (2007). Amygdala contribution to selective dimensions of emotion. *Social Cognitive and Affective Neuroscience*, 2, 123-129.
- Bradley, M. M., Codispoti, M., Cuthbert, B. N., & Lang, P. J. (2001). Emotion and motivation I: Defensive and appetitive reactions in picture processing. *Emotion*, 1, 276-298.
- Brehm, J. W. (1966). *A theory of psychological reactance*. New York: Academic Press.
- Brehm, J. W. & Self, E. A. (1989). The intensity of motivation. *Annual Review of Psychology*, 40, 109-131.
- Brehm, J. W., Wright, R. A., Solomon, S., Silka, L., & Greenberg, J. (1983). Perceived difficulty, energization, and the magnitude of goal valence. *Journal of Experimental Social Psychology*, 19, 21-48.
- Brissett, M. & Nowicki, S. (1973). Internal versus external control of reinforcement and reaction to frustration. *Journal of Personality and Social Psychology*, 25, 35-44.
- Burnstein, E. & Worchel, P. (1962). Arbitrariness of frustration and its consequences for aggression in a social situation. *Journal of Personality*, 30, 528-540.
- Cacioppo, J. T., Priester, J. R., & Bernston, G. G. (1993). Rudimentary determinants of attitudes II: Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology*, 65, 5-17.
- Carver, C. S. (2001). Affect and the functional bases of behavior: On the dimensional structure of affective experience. *Personality and Social Psychology Review*, 5, 345-356.
- Carver, C. S. (2004). Negative affects deriving from the behavioral approach system. *Emotion*, 4, 3-22.
- Carver, C. S. (2006). Approach, avoidance, and the self-regulation of affect and action. *Motivation and Emotion*, 30, 105-110.
- Carver, C. S. & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control process view. *Psychological Review*, 97, 19-35.
- Carver, C. S. & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.
- Carver, C. S. & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, 67, 319-333.
- Castelli, L., Zogmaister, C., Smith, E. R., & Arcuri, L. (2004). On the automatic evaluation of social exemplars. *Journal of Personality and Social Psychology*, 86, 373-387.
- Chaiken, S. & Trope, Y. (1999). *Dual-process theories in social psychology*. New York: Guilford Press.
- Chen, M. & Bargh, J. A. (1999). Consequences of automatic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. *Personality and Social Psychology Bulletin*, 25, 215-224.
- Cohen, A. R. (1955). Social norms, arbitrariness of frustration and status of the agent of frustration in the frustration-aggression-hypothesis. *Journal of Abnormal and Social Psychology*, 51, 222-226.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Crick, N. R. & Dodge, K. A. (1996). Social information processing mechanisms in reactive and proactive aggression. *Child Development*, 67, 993-1002.

- Crowe, E. & Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes*, *69*, 117-132.
- Davidson, R. J. (1995). Cerebral asymmetry, emotion, and affective style. In R.J. Davidson & K. Hugdahl (Eds.), *Brain asymmetry* (pp. 361-387). Cambridge, MA: Massachusetts Institute of Technology.
- Davidson, R. J., Ekman, P., Saron, C. D., Senulis, J. A., & Friesen, W. V. (1990). Approach-withdrawal and cerebral asymmetry: Emotional expression and brain physiology I. *Journal of Personality and Social Psychology*, *58*, 330-341.
- De Houwer, J., Crombez, G., Baeyens, F., & Hermans, D. (2001). On the generality of the affective Simon effect. *Cognition & Emotion*, *15*, 189-206.
- De Houwer, J., Hermans, D., & Spruyt, A. (2001). Affective priming of pronunciation responses: Effects of target degradation. *Journal of Experimental Social Psychology*, *37*, 85-91.
- De Houwer, J. & Randell, T. (2002). Attention to primes modulates affective priming of pronunciation responses. *Experimental Psychology*, *49*, 163-170.
- Deutsch, R., Gawronski, B., & Strack, F. (2006). At the boundaries of automaticity: Negation as reflective operation. *Journal of Personality and Social Psychology*, *91*, 385-405.
- Dickinson, A. & Dearing, M. F. (1979). Appetitive-aversive interactions and inhibitory processes. In A. Dickinson & R. A. Boakes (Eds.), *Mechanisms of learning and motivation* (pp. 203-231). Hillsdale NY: Erlbaum.
- Dill, J. C. & Anderson, C. A. (1995). Effects of frustration justification on hostile aggression. *Aggressive Behavior*, *21*, 359-369.
- Ditkoff, G. & Ley, R. (1974). Effects of positive and negative force-contingent reinforcement on the frustration effect in humans. *Journal of Experimental Psychology*, *102*, 818-823.
- Dollard, J., Miller, N. E., Doob, L. W., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.
- Duckworth, K. L., Bargh, J. A., Garcia, M., & Chaiken, S. (2002). The automatic evaluation of novel stimuli. *Psychological Science*, *13*, 513-519.
- Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition & Emotion*, *15*, 115-141.
- Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, *69*, 1013-1027.
- Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, *50*, 229-238.
- Fishbach, A. & Shah, J. Y. (2006). Self-control in action: Implicit dispositions toward goals and away from temptations. *Journal of Personality and Social Psychology*, *90*, 820-832.
- Förster, J., Grant, H., Idson, L. C., & Higgins, E. T. (2001). Success/failure feedback, expectancies, and approach/avoidance motivation: How regulatory focus moderates classic relations. *Journal of Experimental Social Psychology*, *37*, 253-260.
- Förster, J., Higgins, E. T., & Bianco, A. T. (2003). Speed/accuracy decisions in task performance: Built-in trade-off or separate strategic concerns? *Organizational Behavior and Human Decision Processes*, *90*, 148-164.



- 
- Förster, J., Higgins, E. T., & Idson, L. C. (1998). Approach and avoidance strength during goal attainment: Regulatory focus and the "goal looms larger" effect. *Journal of Personality and Social Psychology, 75*, 1115-1131.
- Förster, J., Liberman, N., & Higgins, E. T. (2005). Accessibility from active and fulfilled goals. *Journal of Experimental Social Psychology, 41*, 220-239.
- Förster, J. & Stepper, S. (2000). Compatibility between approach/avoidance stimulation and valenced information determines residual attention during the process of encoding. *European Journal of Social Psychology, 30*, 853-871.
- Förster, J. & Strack, F. (1996). Influence of overt head movements on memory for valenced words: A case of conceptual-motor compatibility. *Journal of Personality and Social Psychology, 71*, 421-430.
- Frijda, N. H., Kuipers, P., & ter Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology, 57*, 212-228.
- Gawronski, B., Deutsch, R., & Strack, F. (2005). Approach/avoidance-related motor actions and the processing of affective stimuli: Incongruency effects in automatic attention allocation. *Social Cognition, 23*, 182-203.
- Gray, J. A. (1987). *The psychology of fear and stress*. Cambridge, England: Cambridge University Press.
- Gray, J. A. (1994). Three fundamental emotion systems. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 243-247). New York: Oxford University Press.
- Gray, J. A. & McNaughton, N. (2000). *The neuropsychology of anxiety. An inquiry into the functions of the septo-hippocampal system*. New York: Oxford University Press.
- Harmon-Jones, E. (2003). Anger and the behavioral approach system. *Personality and Individual Differences, 35*, 995-1005.
- Harmon-Jones, E. (2004a). Contributions from research on anger and cognitive dissonance to understanding the motivational functions of asymmetrical frontal brain activity. *Biological Psychology, 67*, 51-76.
- Harmon-Jones, E. (2004b). On the relationship of frontal brain activity and anger: Examining the role of attitude toward anger. *Cognition & Emotion, 18*, 337-361.
- Harmon-Jones, E. & Allen, J. J. B. (1998). Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence. *Journal of Personality and Social Psychology, 74*, 1310-1316.
- Harmon-Jones, E., Lueck, L., Fearn, M., & Harmon-Jones, C. (2006). The effect of personal relevance and approach-related action expectation on relative left frontal cortical activity. *Psychological Science, 17*, 434-440.
- Harmon-Jones, E. & Sigelman, J. (2001). State anger and prefrontal brain activity: Evidence that insult-related relative left-prefrontal activation is associated with experienced anger and aggression. *Journal of Personality and Social Psychology, 80*, 797-803.
- Harmon-Jones, E., Sigelman, J. D., Bohlig, A., & Harmon-Jones, C. (2003). Anger, coping, and frontal cortical activity: The effect of coping potential on anger-induced left frontal activity. *Cognition & Emotion, 17*, 1-24.
- Henke, P. G. & Maxwell, D. (1973). Lesions in amygdala and frustration effect. *Physiology & Behavior, 10*, 647-650.
- Hepworth, J. T. & West, S. G. (1988). Lynchings and the economy: A time-series reanalysis of Hovland and Sears. *Journal of Personality and Social Psychology, 55*, 239-247.
- Hermans, D., De Houwer, J., & Eelen, P. (1994). The affective priming effect: Automatic activation of evaluative information in memory. *Cognition & Emotion, 8*, 515-533.

- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280-1300.
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M.P.Zanna (Ed.), *Advances in experimental social psychology* (pp. 1-46). San Diego, CA: Academic Press.
- Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological Review*, *113*, 439-460.
- Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology*, *72*, 515-525.
- Hubbard, J. A., Smithmyer, C. M., Ramsden, S. R., Parker, E. H., Flanagan, K. D., Dearing, K. F. et al. (2002). Observational, physiological, and self-report measures of children's anger: Relations to reactive vs. proactive aggression. *Child Development*, *73*, 1101-1118.
- Hull, C. L. (1934). The concept of habit-family hierarchy and maze learning: Part I [Electronic version]. *Psychological Review*, *41*, 33-52.
- Hull, C. L. (1966). *Principles of behavior. An introduction to behavior theory*. New York: Appleton-Century-Crofts.
- Johnson, R. E., Chang, C. H., & Lord, R. G. (2006). Moving from cognition to behavior: What the research says. *Psychological Bulletin*, *132*, 381-415.
- Judd, C. M., Kenny, D. A., & McClelland, G. H. (2001). Estimating and testing mediation and moderation in within-subject designs. *Journal of Personality and Social Psychology*, *6*, 115-134.
- Klauer, K. C. & Musch, J. (1999). Eine Normierung unterschiedlicher Aspekte der evaluativen Berwertung von 92 Substantiven [A standardization of various aspects of the evaluation of 92 nouns]. *Zeitschrift für Sozialpsychologie*, *30*, 1-11.
- Koole, S. L. & Jostmann, N. B. (2004). Getting a grip on your feelings: Effects of action orientation and external demands on intuitive affect regulation. *Journal of Personality and Social Psychology*, *87*, 974-990.
- Krampen, G. (1991). *Fragenbogen zu Kompetenz- und Kontrollüberzeugungen (FKK)*. Göttingen, Germany: Hogrefe.
- Krieglmeyer, R. & Deutsch, R. (2007). Anger stimuli elicit an avoidance orientation. Unpublished manuscript.
- Krieglmeyer, R., Strack, F., & Wittstadt, D. (2007). What is an apology for? Impulsive and reflective processes of aggressive behavior. Unpublished manuscript.
- Kuhl, J. (1981). Motivational and functional helplessness: The moderating effect of state versus action orientation. *Journal of Personality and Social Psychology*, *40*, 155-170.
- Kuhl, J. & Beckmann, J. (1994). *Volition and personality: Action versus state orientation*. Göttingen, Germany: Hogrefe & Huber Publishers.
- Kulik, J. A. & Brown, R. (1979). Frustration, attribution of blame, and aggression. *Journal of Experimental Social Psychology*, *15*, 183-194.
- Kuppens, P., Van Mechelen, I., Smits, D. J. M., & De Boeck, P. (2003). The appraisal basis of anger: Specificity, necessity, and sufficiency of components. *Emotion*, *3*, 254-269.
- Lambert, A. J., Payne, B. K., Jacoby, L. L., Shaffer, L. M., Chasteen, A. L., & Khan, S. R. (2003). Stereotypes as dominant responses: On the "social facilitation" of prejudice in anticipated public contexts. *Journal of Personality and Social Psychology*, *84*, 277-295.
- Lang, P. J. (1995). The emotion probe: Studies of motivation and attention. *American Psychologist*, *50*, 372-385.

- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1990). Emotion, attention, and the startle reflex. *Psychological Review*, *97*, 377-395.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lerner, J. S. & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, *81*, 146-159.
- Lewin, K. (1936). *Principles of topological psychology*. New York: McGraw-Hill.
- Lewis, M., Sullivan, M. W., Ramsay, D. S., & Alessandri, S. M. (1992). Individual differences in anger and sad expressions during extinction: Antecedents and consequences. *Infant Behavior and Development*, *15*, 443-452.
- Libb, J. W. & Serum, C. (1974). Reactions to frustrative nonreward as a function of perceived locus of control of reinforcement. *Journal of Experimental Psychology*, *102*, 494-497.
- Markman, A. B. & Brendl, C. M. (2005). Constraining theories of embodied cognition. *Psychological Science*, *16*, 6-10.
- Marsh, A. A., Ambady, N., & Kleck, R. E. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviors. *Emotion*, *5*, 119-124.
- Metcalf, J. & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, *106*, 3-19.
- Mikulincer, M. (1989). Cognitive interference and learned helplessness: The effect of off-task cognitions on performance following unsolvable problems. *Journal of Personality and Social Psychology*, *57*, 129-135.
- Mikulincer, M. & Nizan, B. (1988). Causal attribution, cognitive interference, and the generalization of learned helplessness. *Journal of Personality and Social Psychology*, *55*, 470-478.
- Miller, G. A., Galanter, E., & Pribram, K. H. (1960). *Plans and the structure of behavior*. New York: Henry Holt and Co.
- Miller, N. E. (1944). Experimental studies of conflict. In J.M.Hunt (Ed.), *Personality and the behavior disorders* (pp. 431-465). Oxford, England: Ronald Press.
- Mischel, W. & Masters, J. C. (1966). Effects of probability of reward attainment on responses to frustration. *Journal of Personality and Social Psychology*, *3*, 390-396.
- Moors, A. & De Houwer, J. (2001). Automatic appraisal of motivational valence: Motivational affective priming and Simon effects. *Cognition & Emotion*, *15*, 749-766.
- Moors, A. & De Houwer, J. (2005). Unintentional processing of motivational valence. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology*, *58*, 1043-1063.
- Moors, A. & De Houwer, J. (2006). Automaticity: A theoretical and conceptual analysis. *Psychological Bulletin*, *132*, 297-326.
- Moors, A., De Houwer, J., & Eelen, P. (2004). Automatic stimulus-goal comparisons: Support from motivational affective priming studies. *Cognition & Emotion*, *18*, 29-54.
- Moskowitz, G. B. (2002). Preconscious effects of temporary goals on attention. *Journal of Experimental Social Psychology*, *38*, 397-404.
- Murphy, S. T. & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology*, *64*, 723-739.
- Neumann, R. (2000). The causal influences of attributions on emotions: A procedural priming approach. *Psychological Science*, *11*, 179-182.

- Neumann, R., Förster, J., & Strack, F. (2003). Motor compatibility: The bidirectional link between behavior and evaluation. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation* (pp. 371-391). London: Lawrence Erlbaum Associates.
- Neumann, R., Hulsbeck, K., & Seibt, B. (2004). Attitudes towards people with AIDS and avoidance behavior: Automatic and reflective bases of behavior. *Journal of Experimental Social Psychology, 40*, 543-550.
- Niedenthal, P. M., Barsalou, L. W., Winkielman, P., Krauth-Gruber, S., & Ric, F. (2005). Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review, 9*, 184-211.
- Otis, J. & Ley, R. (1993). The effects of frustration induced by discontinuation of reinforcement on force of response and magnitude of the skin conductance response. *Bulletin of the Psychonomic Society, 31*, 97-100.
- Papini, M. R. & Dudley, R. T. (1997). Consequences of surprising reward omissions. *Review of General Psychology, 1*, 175-197.
- Pastore, N. (1952). The role of arbitrariness in the frustration-aggression hypothesis. *Journal of Abnormal and Social Psychology, 47*, 728-731.
- Pavlov, I. P. (1927). *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex [Electronic version]*. Oxford, England: Oxford University Press.
- Piontkowski, U. & Ruppelt, M. (1981). Eine Normierung von Rotters I-E-Skala [A standardization of Rotter's I-E scale]. *Diagnostica, 27*, 313-323.
- Pittman, N. L. & Pittman, T. S. (1979). Effects of amount of helplessness training and internal-external locus of control on mood and performance. *Journal of Personality and Social Psychology, 37*, 39-47.
- Plutchik, R. (1980). *Emotions: A psychoevolutionary synthesis*. New York: Harper & Row.
- Poehlman, T. A., Uhlmann, E. L., Greenwald, A. G., & Banaji, M. (2007). Understanding and using the implicit association test: III. Meta-analysis of predictive validity. Unpublished manuscript.
- Puca, R. M., Rinkenauer, G., & Breidenstein, C. (2006). Individual differences in approach and avoidance movements: How the avoidance motive influences response force. *Journal of Personality, 74*, 979-1014.
- Reeve, J. (2005). *Understanding motivation and emotion*. Hoboken, NJ: Wiley.
- Ric, F. & Scharnitzky, P. (2003). Effects of control deprivation on effort expenditure and accuracy performance. *European Journal of Social Psychology, 33*, 103-118.
- Rinck, M. & Becker, E. S. (2007). Approach and avoidance in fear of spiders. *Journal of Behavior Therapy and Experimental Psychiatry, 38*, 105-120.
- Riskind, J. H. (1984). They stoop to conquer: Guiding and self-regulatory functions of physical posture after success and failure. *Journal of Personality and Social Psychology, 47*, 479-493.
- Roelofs, K., Elzinga, B. M., & Rotteveel, M. (2005). The effects of stress-induced cortisol responses on approach-avoidance behavior. *Psychoneuroendocrinology, 30*, 665-677.
- Roseman, I. J. (2001). A model of appraisal in the emotion system: Integrating theory, research, and applications. In K.R.Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 68-91). New York: Oxford University Press.
- Roseman, I. J. (2004). Appraisals, rather than unpleasantness or muscle movements, are the primary determinants of specific emotions. *Emotion, 4*, 145-150.
- Roseman, I. J., Antoniou, A. A., & Jose, P. E. (1996). Appraisal determinants of emotions: Constructing a more accurate and comprehensive theory. *Cognition & Emotion, 10*, 241-277.

- Roseman, I. J. & Evdokas, A. (2004). Appraisal cause experienced emotions: Experimental evidence. *Cognition & Emotion, 18*, 1-28.
- Roseman, I. J., Wiest, C., & Swartz, T. S. (1994). Phenomenology, behaviors, and goals differentiate discrete emotions. *Journal of Personality and Social Psychology, 67*, 206-221.
- Roth, S. & Kubal, L. (1975). Effects of noncontingent reinforcement on tasks of differing importance: Facilitation and learned helplessness. *Journal of Personality and Social Psychology, 32*, 680-691.
- Rothermund, K. (2003a). Automatic vigilance for task-related information: Perseverance after failure and inhibition after success. *Memory & Cognition, 31*, 343-352.
- Rothermund, K. (2003b). Motivation and attention: Incongruent effects of feedback on the processing of valence. *Emotion, 3*, 223-238.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80*, 1-28.
- Rotteveel, M. & Phaf, R. H. (2004). Automatic affective evaluation does not automatically predispose for arm flexion and extension. *Emotion, 4*, 156-172.
- Rozin, P., Millman, L., & Nemeroff, C. (1986). Operation of the laws of sympathetic magic in disgust and other domains. *Journal of Personality and Social Psychology, 50*, 703-712.
- Rule, B. G., Dyck, R., & Nesdale, A. R. (1978). Arbitrariness of frustration: Inhibition or instigation effects on aggression. *European Journal of Social Psychology, 8*, 237-244.
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161-1178.
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*, 145-172.
- Russell, J. A. & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called *emotion*: Dissecting the elephant. *Journal of Personality and Social Psychology, 76*, 805-819.
- Russell, J. A. & Fehr, B. (1994). Fuzzy concepts in a fuzzy hierarchy: Varieties of anger. *Journal of Personality and Social Psychology, 67*, 186-205.
- Schnabel, K., Banse, R., & Asendorpf, J. (2006). Employing automatic approach and avoidance tendencies for the assessment of implicit personality self-concept: The implicit association procedure (IAP). *Experimental Psychology, 53*, 69-76.
- Schwarzer, R. (1994). Optimistische Kompetenzerwartung: Zur Erfassung einer personellen Bewältigungsressource [Generalized self-efficacy: Assessment of a personal coping resource. *Diagnostica, 40*, 105-123.
- Seibt, B., Neumann, R., Nussinson, R., & Strack, F. Movement direction or change in distance? Self and object related approach-avoidance movements. *Journal of Experimental Social Psychology*, (in press).
- Seligman, M. E. P. (1975). *Helplessness*. San Francisco: Freeman.
- Shah, J., Higgins, E. T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. *Journal of Personality and Social Psychology, 74*, 285-293.
- Skinner, E. A. (1996). A guide to constructs of control. *Personality Processes and Individual Differences, 71*, 549-570.
- Smith, C. A. & Kirby, L. D. (2004). Appraisal as a pervasive determinant of anger. *Emotion, 4*, 133-138.

- Smith, E. R. (1998). Mental representation and memory. In D.T.Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology, Vol. 1* (pp. 391-445). New York: Oxford University Press.
- Smith, E. R. & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review, 4*, 108-131.
- Smith, E. R. & Neumann, R. (2005). Emotion processes considered from the perspective of dual-process models. In L.F.Barett, P. M. Niedenthal, & P. Winkielman (Eds.), *Emotion and consciousness*. (pp. 287-311). New York: The Guilford Press.
- Solarz, A. K. (1960). Latency of instrumental responses as a function of compatibility with the meaning of eliciting verbal signs. *Journal of Experimental Psychology, 59*, 239-245.
- Spector, P. E. (1978). Organizational frustration: A model and review of the literature. *Personnel Psychology, 31*, 815-829.
- Spruyt, A., De Houwer, J., Hermans, D., & Eelen, P. (2007). Affective priming of nonaffective semantic categorization responses. *Experimental Psychology, 54*, 44-53.
- Strack, F. & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*, 220-247.
- Strobel, A., Beauducel, A., Debener, S., & Brocke, B. (2001). Eine deutschsprachige Version des BIS/BAS-Fragebogens von Carver und White [A german version of Carver and White's BIS/BAS scales]. *Zeitschrift für Differentielle und Diagnostische Psychologie, 22*, 216-227.
- Sutton, S. K. & Davidson, R. J. (1997). Prefrontal brain asymmetry: A biological substrate of the behavioral approach and inhibition systems. *Psychological Science, 8*, 204-210.
- Taylor, S. E. & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin, 103*, 193-210.
- Tennen, H. & Eller, S. J. (1977). Attributional components of learned helplessness and facilitation. *Journal of Personality and Social Psychology, 35*, 265-271.
- Tolman, E. C. (1955). Principles of performance. *Psychological Review, 62*, 315-326.
- Wacker, J., Heldmann, M., & Stemmler, G. (2002). Separating emotion and motivational direction in fear and anger: Effects on frontal asymmetry. *Journal of Psychophysiology, 16*, 251.
- Weil, M. & Katkin, E. S. (1969). Galvanic skin reactions associated with nonrepresentation of an accustomed valued object in humans. *Psychonomic Science, 16*, 171-172.
- Weinshenker, N. J. & Siegel, A. (2002). Bimodal classification of aggression: Affective defense and predatory attack. *Aggression and Violent Behavior, 7*, 237-250.
- Werth, L. & Förster, J. (2007). Regulatorischer Fokus: Ein Überblick [Regulatory focus: An overview]. *Zeitschrift für Sozialpsychologie, 38*, 33-42.
- Wortman, C. B. & Brehm, J. W. (1975). Responses to uncontrollable outcomes: An integration of reactance theory and the learned helplessness model. In L.Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 277-336). New York: Academic Press.
- Wright, R. A. (1982). Perceived motivational arousal as a mediator of the magnitude of goal valence. *Motivation and Emotion, 6*, 161-180.
- Wright, R. A. & Brehm, J. W. (1989). Energization and goal attractiveness. In L.A.Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 169-210). Hillsdale, NJ: Erlbaum.

- Yerkes, R. M. & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit formation. *Journal of Comparative and Neurological Psychology*, 18, 459-482.
- Zajonc, R. B. (1965). Social facilitation. *Science*, 149, 269-274.

## APPENDIX

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## Experiment 1

### *Instructions*

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie interessieren wir uns für Ihre Leistungsfähigkeit in einem Konzentrationstest. Unter Anderem interessieren wir uns dafür, ob absolute Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuches Ohrstöpsel zu tragen. Der Konzentrations-Leistungstest wurde in den USA entwickelt und wird nun an deutschen Studierenden validiert. In diesem Test sollen Sie wiederholt zwei unterschiedliche Aufgaben nacheinander durchführen. Die erste Aufgabe besteht darin, in einem Suchbild einen bestimmten Buchstaben zu finden. Bei der zweiten Aufgabe sollen Sie mit dem Joystick auf farbige Rahmen reagieren. Die zweite Aufgabe können Sie zunächst isoliert üben. Sie sehen im Folgenden wiederholt einen gelben oder blauen Rahmen. Wenn der Rahmen blau [gelb]<sup>41</sup> ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Falls Sie keine Fragen mehr haben, können Sie nun den Übungsdurchgang mit der Leertaste starten.

#### *Motivational Simon Task: Practice II*

Nun wird die Joystickaufgabe mit der Suchaufgabe kombiniert. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Suchbild. Sie haben die Aufgabe zu entscheiden, ob sich der Buchstabe in der oberen oder unteren Hälfte des Bildes befindet. Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie die Joystick-Taste, auf welcher der Zeigefinger liegt. Versuchen Sie den Buchstaben so schnell wie möglich zu finden! Sie bekommen jeweils rückgemeldet, ob Ihre Reaktion richtig und schnell genug war. Zusätzlich zur Rückmeldung erscheint wieder ein gelber oder blauer Rahmen. Hier haben Sie dieselbe Aufgabe wie in der Übungsaufgabe. Bei einem blauen [gelben] Rahmen ziehen Sie das Bild so schnell wie möglich zu sich heran. Bei einem gelben [blauen] Rahmen drücken Sie das Bild so schnell wie möglich von sich weg. Dann kommt die nächste Suchaufgabe. Zusammengefasst:

1. Suchbild:
  - Buchstabe oben → Daumen-Taste drücken
  - Buchstabe unten → Zeigefinger-Taste drücken
2. Rahmen:
  - blau [gelb] – Bild heranziehen
  - gelb [blau] – Bild wegdrücken

Sie können auch diese Aufgabe zunächst üben. Nehmen Sie nun bitte den Joystick in die Hand und starten Sie den Übungsdurchgang mit der Leertaste.

#### *Motivational Simon Task: Test*

Nun kommt die eigentliche Testphase. Die Testphase dauert 15 Minuten. Versuchen Sie, in dieser Zeit 80 Treffer (= richtige Lösungen in der Suchaufgabe) zu schaffen. Das war die

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<sup>41</sup> Response assignment was varied between participants.

durchschnittliche Leistung amerikanischer Studierender. Also: Versuchen Sie, jeweils schnell den Buchstaben zu finden und dann schnell und korrekt auf die Rahmenfarbe zu reagieren. Um ein optimales Testergebnis zu erzielen, ist es sehr wichtig, dass Sie sich währenddessen nicht ablenken lassen. Nach jeweils 5 Minuten wird die Testphase unterbrochen. In diesen Pausen bitten wir Sie, erneut die Joystickaufgabe isoliert durchzuführen. Nehmen Sie nun bitte den Joystick in die Hand und starten Sie die Aufgabe mit der Leertaste.

*Motivational Simon Task: Baseline Measurement*

Kurze Unterbrechung. Wir bitten Sie, nun die Joystickaufgabe isoliert durchzuführen: Am Bildschirm erscheinen wieder der gelbe oder blaue Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Sie können die Aufgabe mit der Leertaste starten.

*Debriefing*

Liebe/r Teilnehmer/in, die Versuche sind nun beendet. Das Ziel der ersten Studie bestand unter anderem darin, Motivation und Leistung unter erschwerten Bedingungen zu untersuchen. Daher hat in einigen Fällen die Joystick-Taste nicht richtig funktioniert. Wir möchten Sie hiermit um Verständnis dafür bitten, dass wir Sie diesen unangenehmen Bedingungen ausgesetzt haben. Leider wäre es anders nicht möglich gewesen, diese Fragestellung zu untersuchen. Für diese Versuchsreihe ist es außerordentlich wichtig, dass unsere Versuchspersonen vorher nicht wissen, dass die kaputte Joysticktaste ein Teil des Versuches ist. Daher bitten wir Sie, Ihren Freunden und Bekannten, die auch an unseren Versuchen teilnehmen, nichts davon zu erzählen. Damit leisten Sie einen sehr wichtigen Beitrag zum Gelingen der wissenschaftlichen Forschung. Vielen Dank für Ihre Kooperation!

*Questions*

*Emotional State*

Bitte beantworten Sie nun Fragen zu Ihrer momentanen Stimmung.

Wie fühlen Sie sich im Moment?

-4	-3	-2	-1	0	1	2	3	4
sehr								sehr
schlecht								gut

Bitte geben Sie an, wie sehr Sie jetzt im Moment die folgenden Gefühle empfinden<sup>42</sup>.

1	2	3	4	5	6	7
gar nicht	sehr	schwach	etwas	ziemlich	stark	sehr
	schwach					stark

Gefühle des Ärgers (z.B. ärgerlich, gereizt)

Gefühl der Freude (z.B. freudig, fröhlich)

Gefühl der Traurigkeit (z.B. traurig, betrübt)

Gefühl der Ängstlichkeit (z.B. ängstlich, angsterfüllt)

Gefühl des seelischen Wohlbefindens (z.B. angenehm, zufrieden)

<sup>42</sup> Emotions were presented in randomized order.

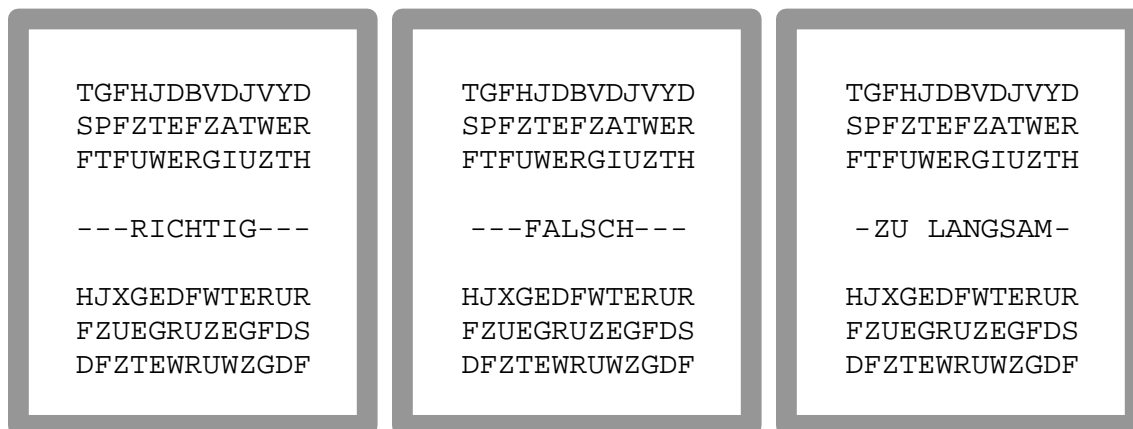
Gefühl der gehobenen Stimmung (z.B. gutgelaunt, heiter)  
 Gefühl der Aggressivität (z.B. aggressiv, angriffslustig)  
 Gefühl der Feindseligkeit (z.B. feindselig, misstrauisch)  
 Gefühl der Niedergeschlagenheit (z.B. gedückt, deprimiert)  
 Gefühl der Furcht (z.B. furchtsam, schreckhaft)  
 Gefühl der Enttäuschung (z.B. enttäuscht, unzufrieden)  
 Gefühl der inneren Erregtheit (z.B. aufgeregt, erregt)  
 Gefühl der körperlichen Erregtheit (z.B. Herzklopfen, Muskelanspannung)

### *Stimuli*

#### *Letters used as Target Stimuli*

A, B, C, D, E, F, G, H, I, J, L, O, P, S, T

#### *Feedback Pictures*<sup>43</sup>



<sup>43</sup> The frame was either yellow or blue.

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*Additional Analyses*

Table A 1

*Mean Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Neutral vs. Frustration), SOA (0 vs. 1000 ms) and Response Assignment (BAP, YAV vs. YAP, BAV)*

SOA	Motivational Valence		
	Success	Neutral	Frustration
Response Assignment: BAP, YAV			
0 ms			
M	64.77	11.47	-72.66
SD	73.98	17.98	118.39
1000 ms			
M	-.72	31.95	-100.29
SD	44.79	52.53	157.50
Response Assignment: YAP, BAV			
0 ms			
M	116.03	41.83	5.37
SD	55.10	26.14	182.27
1000 ms			
M	39.51	12.36	17.77
SD	39.30	49.10	49.20

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

Table A 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Neutral vs. Frustration), SOA (0 vs. 1000 msec) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
SOA	1	2.78
Response Assignment (RA)	1	8.95 **
SOA X RA	1	.04
Error (SOA X RA)	30	(7019.90)
Within Participants		
Motivational Valence (MV)	2	9.09 ***
MV X SOA	2	1.45
MV X RA	2	2.22
MV X SOA X RA	2	.52
Error (MV)	60	(8250.97)

*Note.* Values enclosed in parentheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

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## Experiment 2

### *Instructions*

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie untersuchen wir Leistungs- und Lernfähigkeit in einem Konzentrationstest. Unter Anderem interessieren wir uns dafür, ob absolute Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuches Ohrenstöpsel zu tragen. Da die Leistungsfähigkeit von der momentanen Stimmung beeinflusst wird, bitten wir Sie, zunächst einige Fragen zu Ihrer Stimmung zu beantworten.

Nun kommt der Konzentrationstest. In diesem Test sollen Sie wiederholt zwei unterschiedliche Aufgaben nacheinander durchführen. Die erste Aufgabe besteht darin, in einem Suchbild einen bestimmten Buchstaben zu finden. Bei der zweiten Aufgabe sollen Sie mit dem Joystick auf farbige Rahmen reagieren. Die zweite Aufgabe können Sie zunächst isoliert üben. Sie sehen im Folgenden wiederholt einen gelben oder blauen Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des Rahmens erscheinen zufällig irgendwelche Wörter. Die Wörter sind völlig irrelevant. Versuchen Sie, sich nicht von ihnen ablenken zu lassen. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Falls Sie keine Fragen mehr haben, können Sie nun den Übungsdurchgang mit der Leertaste starten.

#### *Motivational Simon Task: Practice II*

Nun wird die Joystickaufgabe mit der Suchaufgabe kombiniert. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Suchbild. Sie haben die Aufgabe zu entscheiden, ob sich der Buchstabe in der oberen oder unteren Hälfte des Bildes befindet. Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie die Joystick-Taste, auf der der Zeigefinger liegt. Versuchen Sie den Buchstaben so schnell wie möglich zu finden! Sie bekommen jeweils rückgemeldet, ob Ihre Reaktion richtig und schnell genug war. Gleichzeitig mit der Rückmeldung erscheint wieder ein gelber oder blauer Rahmen. Hier haben Sie dieselbe Aufgabe wie in der Übungsaufgabe. Bei einem blauen [gelben] Rahmen ziehen Sie das Bild so schnell wie möglich zu sich heran. Bei einem gelben [blauen] Rahmen drücken Sie das Bild so schnell wie möglich von sich weg. Dann kommt die nächste Suchaufgabe. Zusammengefasst:

1. Suchbild:
  - Buchstabe oben → Daumen-Taste drücken
  - Buchstabe unten → Zeigefinger-Taste drücken
2. Rahmen:
  - blau [gelb] – Bild heranziehen
  - gelb [blau] – Bild wegdrücken

Sie können auch diese Aufgabe zunächst üben. Nehmen Sie nun bitte den Joystick in die Hand und starten Sie den Übungsdurchgang mit der Leertaste.

*Motivational Simon Task: Test*

Nun kommt die eigentliche Testphase. Die Testphase dauert 12 Minuten. Versuchen Sie, in dieser Zeit 80 Treffer (= richtige Reaktionen in der Suchaufgabe) zu schaffen und jeweils korrekt auf die Rahmenfarbe zu reagieren. Wenn Sie die 80 Treffer in den 12 Minuten schaffen, ist der Test hiermit für Sie beendet. Wir interessieren uns unter anderem für Übungseffekte: Wenn Sie die 80 Treffer nicht schaffen sollten, möchten wir Sie bitten, den Test ein zweites Mal zu machen. Also: Versuchen Sie, jeweils schnell den Buchstaben zu finden, um die 80 Treffer zu schaffen, und dann schnell und korrekt auf die Rahmenfarbe zu reagieren. Um ein optimales Testergebnis zu erzielen, ist es sehr wichtig, dass Sie sich währenddessen nicht ablenken lassen. Nach jeweils 4 Minuten wird die Testphase unterbrochen. In diesen Pausen bitten wir Sie, erneut die Joystickaufgabe isoliert durchzuführen. Nehmen Sie nun bitte den Joystick in die Hand und starten Sie die Aufgabe mit der Leertaste.

*Motivational Simon Task: Baseline Measurement*

Kurze Unterbrechung. Wir bitten Sie, nun die Joystickaufgabe isoliert durchzuführen: Am Bildschirm erscheinen wieder der gelbe oder blaue Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des Rahmens erscheinen zufällig irgendwelche Wörter. Die Wörter sind völlig irrelevant. Versuchen Sie, sich nicht von ihnen ablenken zu lassen. Sie können die Aufgabe mit der Leertaste starten.

*Debriefing*

Liebe/r Teilnehmer/in, Sie brauchen den Test nicht wiederholen, der Versuch ist nun beendet. Das Ziel dieser Studie bestand unter anderem darin, Motivation und Leistung unter erschwerten Bedingungen zu untersuchen. Daher hat in einigen Fällen die Joystick-Taste nicht richtig funktioniert. Wir möchten Sie hiermit um Verständnis dafür bitten, dass wir Sie diesen unangenehmen Bedingungen ausgesetzt haben. Leider wäre es anders nicht möglich gewesen, diese Fragestellung zu untersuchen. Für diese Versuchsreihe ist es außerordentlich wichtig, dass unsere Versuchspersonen vorher nicht wissen, dass die kaputte Joysticktaste ein Teil des Versuches ist. Daher bitten wir Sie, Ihren Freunden und Bekannten, die auch an unseren Versuchen teilnehmen, nichts davon zu erzählen. Damit leisten Sie einen sehr wichtigen Beitrag zum Gelingen der wissenschaftlichen Forschung. Vielen Dank für Ihre Kooperation!

*Questions**Emotional State*

Bitte geben Sie an, wie sehr Sie jetzt im Moment die folgenden Gefühle empfinden<sup>44</sup>.

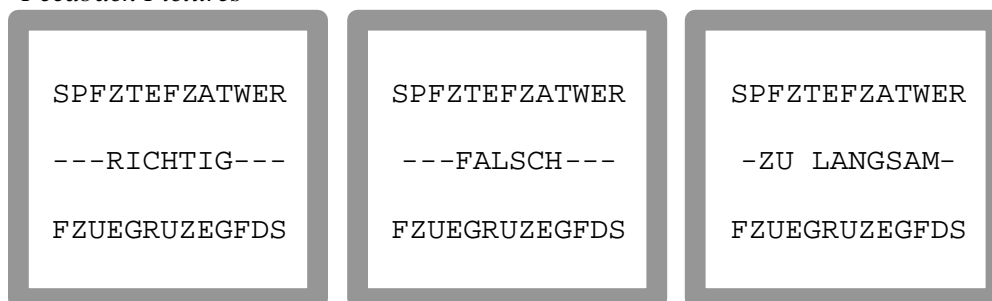
1	2	3	4	5	6	7
gar nicht	sehr schwach	schwach	etwas	ziemlich	stark	sehr stark

<sup>44</sup> Emotions were presented in randomized order.

Gefühle des Ärgers (z.B. ärgerlich, gereizt)  
 Gefühl der Freude (z.B. freudig, fröhlich)  
 Gefühl der Ängstlichkeit (z.B. ängstlich, angsterfüllt)  
 Gefühl der Traurigkeit (z.B. traurig, betrübt)  
 Gefühl des seelischen Wohlbefindens (z.B. angenehm, zufrieden)  
 Gefühl der gehobenen Stimmung (z.B. gutgelaunt, heiter)  
 Gefühl der Aggressivität (z.B. aggressiv, angriffslustig)  
 Gefühl der Feindseligkeit (z.B. feindselig, misstrauisch)  
 Gefühl der Niedergeschlagenheit (z.B. gedrückt, deprimiert)  
 Gefühl der Furcht (z.B. furchtsam, schreckhaft)  
 Gefühl der Enttäuschung (z.B. enttäuscht, unzufrieden)  
 Gefühl der Müdigkeit (z.B. müde, schläfrig)  
 Gefühl der Aktivität (z.B. aktiv, tatkräftig)

### *Stimuli*

#### *Feedback Pictures*<sup>45</sup>



#### *Stimuli used in the Baseline Approach-Avoidance Task*

##### *Positive*

LIEBE, FREUND, URLAUB, SOMMER, PARTY, BLUME, GESCHENK, GENUSS, BABY, KUCHEN

##### *Negative*

KRANKHEIT, WURM, VIRUS, KAKERLAKEN, RATTE, KRIEG, BOMBE, HASS, HÖLLE, KREBS

<sup>45</sup> The frame was either yellow or blue.



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*Additional Analyses*

Table B 1

*Mean Approach-Avoidance Index as a Function of Type of Valence (Motivational vs. Intrinsic), Valence (Positive vs. Negative) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Type of Valence	Valence	
	Positive	Negative
Response Assignment: BAP, YAV		
Motivational		
M	35.80	-86.05
SD	40.78	193.64
Intrinsic		
M	12.27	-41.86
SD	41.55	51.45
Response Assignment: YAP, BAV		
Motivational		
M	63.13	-64.74
SD	74.83	119.70
Intrinsic		
M	19.40	32.12
SD	57.31	48.25

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

Table B 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Type of Valence (Motivational vs. Intrinsic), Valence (Positive vs. Negative) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
Response Assignment (RA)	1	1.79
Error (RA)	21	(12887.79)
Within Participants		
Type of Valence (TV)	1	.92
TV X RA	1	.18
Error (TV)	21	(8122.46)
Valence (V)	1	18.61 ***
V X RA	1	.81
Error (V)	21	(6237.04)
TV X V	1	11.55 **
TV X V X RA	1	1.41
Error (TV X V)	21	(5146.35)

*Note.* Values enclosed in parantheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\*p<.05. \*\*p<.01. \*\*\*p<.001

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## Experiment 3

### *Instructions*

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie untersuchen wir Ihre Leistungsfähigkeit in einem Konzentrationstest. Unter Anderem interessieren wir uns dafür, ob absolute Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuches Ohrstöpsel zu tragen. Da bei dieser Aufgabe die momentane Stimmung eine Rolle spielt, bitten wir Sie dazu zunächst einige Fragen zu beantworten.

Vielen Dank! Nun folgt der Konzentrationstest. In diesem Test sollen Sie wiederholt zwei unterschiedliche Aufgaben nacheinander durchführen. Die erste Aufgabe besteht darin, in einem Suchbild einen bestimmten Buchstaben zu finden. Bei der zweiten Aufgabe sollen Sie mit dem Joystick auf farbige Rahmen reagieren. Die zweite Aufgabe können Sie zunächst isoliert üben. Sie sehen im Folgenden wiederholt einen gelben oder blauen Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des farbigen Rahmens erscheinen Buchstaben oder ein leerer Rahmen. Diese sind für diese Aufgabe völlig irrelevant. Sie können sie ignorieren. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Falls Sie keine Fragen mehr haben, können Sie nun den Übungsdurchgang mit der Leertaste starten.

#### *Motivational Simon Task: Practice II*

Nun wird die Joystickaufgabe mit der Suchaufgabe kombiniert. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Suchbild. Sie haben die Aufgabe zu entscheiden, ob sich der Buchstabe in der oberen oder unteren Hälfte des Bildes befindet. Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie die Joystick-Taste, auf welcher der Zeigefinger liegt. Versuchen Sie den Buchstaben so schnell wie möglich zu finden! Wenn Sie **richtig** und **schnell** genug waren, **erscheint der gesuchte Buchstabe in der Mitte**. Wenn Sie **falsch** reagiert haben oder **zu langsam** waren, **erscheint kein Buchstabe**. Zusätzlich zum Feedback erscheint wieder ein gelber oder blauer Rahmen. Hier haben Sie dieselbe Aufgabe wie in der Übungsaufgabe. Bei einem blauen [gelben] Rahmen ziehen Sie das Bild so schnell wie möglich zu sich heran. Bei einem gelben [blauen] Rahmen drücken Sie das Bild so schnell wie möglich von sich weg. Dann kommt die nächste Suchaufgabe. Zusammengefasst:

1. Suchbild:

Buchstabe oben → Daumen-Taste drücken

Buchstabe unten → Zeigefinger-Taste drücken

Wenn Sie richtig und schnell genug reagiert haben, erscheint der gesuchte Buchstabe und der farbige Rahmen. Wenn sie falsch oder zu langsam reagiert haben, erscheint nur der Rahmen und kein Buchstabe.

2. Rahmen

blau [gelb] – Bild heranziehen

gelb [blau] – Bild wegdrücken

Sie können auch diese Aufgabe zunächst üben.

*Motivational Simon Task: Test*

Nun kommt die eigentliche Testphase. Die Testphase dauert insgesamt 12 Minuten. Als kleinen Anreiz erhalten Sie zwei Kinogutscheine, wenn Sie in den 12 Minuten 70 Buchstaben „sammeln“. In früheren Untersuchungen betrug die durchschnittliche Leistung Studierender 87 Buchstaben. *Zur Erinnerung:* Sie haben einen Buchstaben gesammelt, wenn er in der Mitte des farbigen Rahmens erscheint. Wenn nichts erscheint, war der Durchgang verloren. Um ein optimales Testergebnis zu erzielen, ist es sehr wichtig, dass Sie sich währenddessen nicht ablenken lassen und nicht unterbrechen. Nach jeweils 4 Minuten können Sie eine kurze Pause machen. Hier wird die Zeitmessung natürlich angehalten. Also: Versuchen Sie, jeweils schnell den Buchstaben zu finden, die richtige Taste zu drücken und dann schnell und korrekt auf die Rahmenfarbe zu reagieren. Wenn Sie Fragen haben, dann wenden Sie sich bitte jetzt an die Versuchsleitung. Ansonsten nehmen Sie nun bitte den Joystick in die Hand und starten die Aufgabe mit der Leertaste.

*Motivational Simon Task: Baseline Measurement*

Nun bitten wir Sie noch einmal, mit dem Joystick auf farbige Rahmen zu reagieren: Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des farbigen Rahmens erscheinen Buchstaben oder ein leerer Rahmen. Diese sind für diese Aufgabe völlig irrelevant. Sie können sie ignorieren. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Starten Sie den Durchgang nun bitte mit der Leertaste.

*Debriefing*

Liebe Versuchsteilnehmer, wie Sie sicherlich bemerkt haben, haben die Joysticktasten nicht richtig funktioniert. Da in dieser Studie Motivation unter frustrierenden Bedingungen untersucht wurde, wurde die kaputte Joysticktaste absichtlich eingebaut. Wir bitten Sie um Entschuldigung, dass wir Sie darüber nicht informiert haben und dass wir Sie diesen unangenehmen Bedingungen ausgesetzt haben. Es wäre anders nicht möglich gewesen, die Fragestellung zu untersuchen. Vielen Dank für Ihr Verständnis!

*Questions**Emotional State*

Bitte beantworten Sie nun Fragen zu Ihrer momentanen Stimmung.

Wie fühlen Sie sich im Moment?

-4	-3	-2	-1	0	1	2	3	4
sehr								sehr
schlecht								gut

Bitte geben Sie an, wie sehr Sie jetzt im Moment die folgenden Gefühle empfinden<sup>46</sup>.

1	2	3	4	5	6	7
gar nicht	sehr	schwach	etwas	ziemlich	stark	sehr
	schwach					stark

<sup>46</sup> Emotions were presented in randomized order.

Gefühle des Ärgers (z.B. ärgerlich, gereizt)  
 Gefühl der Freude (z.B. freudig, fröhlich)  
 Gefühl der Ängstlichkeit (z.B. ängstlich, angsterfüllt)  
 Gefühl der Traurigkeit (z.B. traurig, betrübt)  
 Gefühl des seelischen Wohlbefindens (z.B. angenehm, zufrieden)  
 Gefühl der gehobenen Stimmung (z.B. gutgelaunt, heiter)  
 Gefühl der Aggressivität (z.B. aggressiv, angriffslustig)  
 Gefühl der Feindseligkeit (z.B. feindselig, misstrauisch)  
 Gefühl der inneren Erregtheit (z.B. aufgeregt, erregt)

#### *Attribution*

Bitte erinnern Sie sich an die Durchgänge, in denen Sie keinen Buchstaben gesammelt haben. Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in Ihnen selbst (z.B. mangelnde Konzentration, Unfähigkeit, ...)?

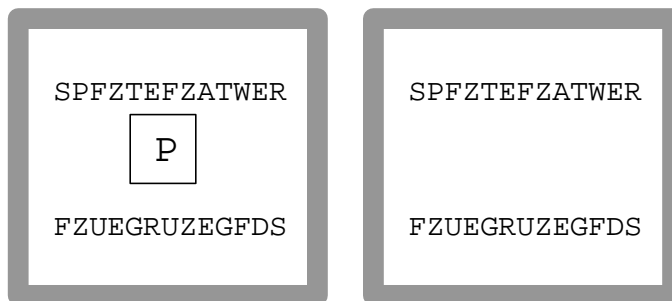
1	2	3	4	5	6	7	8	9
überhaupt nicht in mir selbst								völlig in mir selbst

Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, außerhalb Ihrer Person (z.B. störende Umgebung, schlechtes Material, ...)?

1	2	3	4	5	6	7	8	9
überhaupt nicht außerhalb meiner Person								völlig außerhalb meiner Person

#### *Stimuli*

#### *Feedback Pictures*<sup>47</sup>



<sup>47</sup> The frame was either yellow or blue.

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*Additional Analyses*

Table C 1

*Mean Approach-Avoidance Index as a Function of Task (Motivational vs. Non-motivational), Letter Appearance (Yes vs. No) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Task	Letter Appearance	
	Yes / Success	No / Frustration
Response Assignment: BAP, YAV		
Motivational		
M	14.75	-47.38
SD	58.35	99.75
Non-motivational		
M	-4.50	.10
SD	45.72	24.80
Response Assignment: YAP, BAV		
Motivational		
M	82.34	13.73
SD	105.58	91.31
Non-motivational		
M	45.72	23.45
SD	35.47	50.18

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

Table C 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Task (Motivational vs. Non-motivational), Letter Appearance (Yes vs. No) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
Response Assignment (RA)	1	6.26 *
Error (RA)	21	(9376.52)
Within Participants		
Task (T)	1	.001
T X RA	1	.93
Error (T)	21	(4674.26)
Letter Appearance (LA)	1	15.28 **
LA X RA	1	.77
Error (LA)	21	(2068.44)
T X LA	1	4.99 *
T X LA X RA	1	.16
Error (T X LA)	21	(3676.26)

*Note.* Values enclosed in parantheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

---

## Experiment 4

### *Instructions*

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie untersuchen wir Ihre Leistungsfähigkeit in einem Konzentrationstest. Dieser Konzentrationstest erfasst sowohl Ausdauer als auch schnelles, flexibles Reagieren. Unter Anderem interessieren wir uns dafür, ob Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuchs Ohrenstöpsel zu tragen.

In dem Konzentrationstest besteht Ihre Grundaufgabe darin, wiederholt einen bestimmten Buchstaben zu suchen. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Buchstabenfeld: Befindet sich der gesuchte Buchstabe oben oder unten? Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie die Joystick-Taste, auf welcher der Zeigefinger liegt. Dann kommt der nächste Durchgang. Sie können diese Grundaufgabe kurz üben: Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Legen Sie Zeigefinger und Daumen auf die jeweiligen Tasten – das hilft Ihnen schnell zu sein.

#### *Motivational Simon Task: Practice II*

Zusätzlich zur Suchaufgabe müssen Sie manchmal auf ein Quadrat mit einem farbigen Rahmen so schnell wie möglich reagieren. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Sie können diese Reaktion nun üben. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren!

#### *Motivational Simon Task: Practice III*

Nun kommt der eigentliche Konzentrationstest. Ihre Grundaufgabe besteht darin, die jeweiligen Buchstaben zu suchen. Manchmal – aber nicht immer - erscheint während der Buchstabensuche das Quadrat mit dem farbigen Rahmen. Nun ist es wichtig, dass Sie schnell und richtig auf den Rahmen reagieren. Denn nur dann erscheint wieder das Buchstabenfeld und der gesuchte Buchstabe leuchtet im Suchfeld auf<sup>48</sup> / Sie können weiter suchen<sup>49</sup>. Für die Buchstabensuche haben Sie nur eine begrenzte Zeit. Versuchen Sie also, den jeweiligen Buchstaben so schnell wie möglich zu finden. Sie können das nun kurz üben. Versuchen Sie, so **schnell wie möglich** den Buchstaben zu finden. Wenn der Rahmen erscheint, reagieren Sie **schnell** mit der **richtigen** Bewegung, damit sie dann weiter suchen können. Lassen Sie Ihre Finger immer auf den Tasten liegen – das hilft Ihnen schnell zu sein.

#### *Motivational Simon Task: Test Block I*

Nun kommt der eigentliche Konzentrationstest. Der Test dauert insgesamt 8 Minuten und wird nach 4 Minuten kurz unterbrochen. Versuchen Sie, in den 8 Minuten so viele Buchstaben wie möglich zu finden und so schnell und korrekt wie möglich auf die farbigen Rahmen zu reagieren. Bei vorhergehenden Untersuchungen hat sich gezeigt, dass Studierende im Durchschnitt in 8 Minuten 58 Buchstaben finden. Als kleinen Anreiz

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<sup>48</sup> Instruction in condition *Positive motivational valence first*.

<sup>49</sup> Instruction in condition *Negative motivational valence first*.



erhalten Sie einen Kinogutschein, wenn Sie diese Durchschnittsleistung übertreffen. Falls Sie noch Fragen haben, wenden Sie sich bitte jetzt an die Versuchsleitung.

*Motivational Simon Task: Test Block II*

Die ersten 4 Minuten sind geschafft! Im zweiten Teil wird der Konzentrationstest etwas abgewandelt: Wenn nun das Quadrat erscheint und Sie richtig darauf reagieren, erscheint nur noch das Suchfeld, ohne dass der gesuchte Buchstabe aufleuchtet<sup>50</sup> / leuchtet anschließend der gesuchte Buchstabe im Suchfeld auf<sup>51</sup>.

*Additional Analyses*

Table D 1

*Mean Approach-Avoidance Index as a Function of Motivational Valence (Positive vs. Negative), Order of Blocks (Positive motivational valence first vs. Negative motivational valence first) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Order of Blocks	Motivational Valence	
	Positive	Negative
Response Assignment: BAP, YAV		
Positive motivational valence first		
M	-18.73	-34.78
SD	110.30	55.60
Negative motivational valence first		
M	16.14	-39.89
SD	61.02	81.29
Response Assignment: YAP, BAV		
Positive motivational valence first		
M	114.43	-6.98
SD	99.46	63.72
Negative motivational valence first		
M	97.76	59.27
SD	138.28	73.19

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

<sup>50</sup> Instruction in condition *Positive motivational valence first*.

<sup>51</sup> Instruction in condition *Negative motivational valence first*.

Table D 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Motivational Valence (Positive vs. Negative), Order of Blocks (Positive motivational valence first vs. Negative motivational valence first) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
Order (O)	1	.39
Response Assignment (RA)	1	7.28 *
O X RA	1	.02
Error (O X RA)	18	(10946.47)
Within Participants		
Motivational Valence (MV)	1	6.69 *
MV X O	1	.23
MV X RA	1	.96
MV X O X RA	1	1.88
Error (MV)	18	(5487.90)

*Note.* Values enclosed in parantheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\*p<.05. \*\*p<.01. \*\*\*p<.001

Table D 3

*Mean Reaction Latencies of Correct Responses in the Letter Search Task as a Function of Motivational Valence (Positive vs. Negative), Response (Approach vs. Avoidance), and Order of Blocks (Positive motivational valence first vs. Negative motivational valence first)*

Response	Motivational Valence	
	Positive	Negative
	Positive motivational valence first	
Approach		
M	698.80	1219.38
SD	98.88	212.73
Avoidance		
M	745.09	1105.72
SD	80.12	279.12
	Negative motivational valence first	
Approach	673.12	1318.67
M	105.90	287.71
SD		
Avoidance	702.07	1111.33
M	87.07	169.20
SD		

Table D 4

*Analysis of Variance: Reaction Latencies of Correct Responses in the Letter Search Task as a Function of Motivational Valence (Positive vs. Negative), Response (Approach vs. Avoidance), and Order of Blocks (Positive motivational valence first vs. Negative motivational valence first)*

Source	df	F
Between Participants		
Order (O)	1	.03
Error	20	(63576.86)
Within Participants		
Motivational Valence (MV)	1	108.05 ***
MV X O	1	.87
Response (R)	1	6.79 *
R X O	1	1.39
MV X R	1	19.15 ***
MV X R X O	1	.71
Error (MV X R)	20	(11272.20)

*Note.* Values enclosed in parantheses represent mean square errors.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

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## Experiment 5

### *Instructions*

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie untersuchen wir Ihre Leistungsfähigkeit in einem Konzentrationstest. Unter Anderem interessieren wir uns dafür, ob absolute Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuches Ohrstöpsel zu tragen. Da bei dieser Aufgabe die momentane Stimmung eine Rolle spielt, bitten wir Sie dazu zunächst einige Fragen zu beantworten.

Vielen Dank! Nun folgt der Konzentrationstest. In diesem Test sollen Sie wiederholt zwei unterschiedliche Aufgaben nacheinander durchführen. Die erste Aufgabe besteht darin, in einem Suchbild einen bestimmten Buchstaben zu finden. Bei der zweiten Aufgabe sollen Sie mit dem Joystick auf farbige Rahmen reagieren. Die zweite Aufgabe können Sie zunächst isoliert üben. Sie sehen im Folgenden wiederholt einen gelben oder blauen Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des farbigen Rahmens erscheinen Buchstaben oder ein leerer Rahmen. Diese sind für diese Aufgabe völlig irrelevant. Sie können sie ignorieren. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Falls Sie keine Fragen mehr haben, können Sie nun den Übungsdurchgang mit der Leertaste starten.

#### *Motivational Simon Task: Practice II*

Nun wird die Joystickaufgabe mit der Suchaufgabe kombiniert. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Suchbild. Sie haben die Aufgabe zu entscheiden, ob sich der Buchstabe in der oberen oder unteren Hälfte des Bildes befindet. Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die obere rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie mit dem Daumen die untere rot markierte Joystick-Taste. Versuchen Sie den Buchstaben so schnell wie möglich zu finden! Wenn Sie **richtig** und **schnell** genug waren, **erscheint der gesuchte Buchstabe in der Mitte**. Wenn Sie **falsch** reagiert haben oder **zu langsam** waren, **erscheint kein Buchstabe**. Zusätzlich zum Feedback erscheint wieder ein gelber oder blauer Rahmen. Hier haben Sie dieselbe Aufgabe wie in der Übungsaufgabe. Bei einem blauen [gelben] Rahmen ziehen Sie das Bild so schnell wie möglich zu sich heran. Bei einem gelben [blauen] Rahmen drücken Sie das Bild so schnell wie möglich von sich weg. Dann kommt die nächste Suchaufgabe. Zusammengefasst:

1. Suchbild:

Buchstabe oben → obere Taste mit dem Daumen drücken

Buchstabe unten → untere Taste mit dem Daumen drücken

Wenn sie richtig und schnell genug reagiert haben, erscheint der gesuchte Buchstabe und der farbige Rahmen. Wenn sie falsch oder zu langsam reagiert haben, erscheint nur der Rahmen und kein Buchstabe.

2. Rahmen:

blau [gelb] – Bild heranziehen

gelb [blau] – Bild wegdrücken

Sie können auch diese Aufgabe zunächst üben.

*Motivational Simon Task: Test*

Nun kommt die Testphase. In der Testphase bearbeiten Sie 90 Durchgänge. Als kleinen Anreiz nehmen Sie an der Verlosung von 20 Kinogutscheinen (unter 72 Teilnehmern) teil, wenn Sie 75 Durchgänge korrekt lösen, also 75 Buchstaben „sammeln“. In früheren Tests betrug die durchschnittliche Leistung Studierender 83 Buchstaben. Für die Verlosung des Kinogutscheins ziehen Sie jetzt bitte eine Nummer aus der Box auf dem Tisch. Bewahren Sie die Nummer gut auf. Wir werden Sie per email informieren, welche Nummern gewonnen haben.

Tragen Sie bitte hier Ihre Losnummer und Ihre email-Adresse ein, damit wir Sie über den Ausgang der Verlosung informieren können.

In der Testphase gibt es auch noch eine „Jokertaste“: Wenn Sie bei der Buchstabensuche einmal erfolglos waren, dann können Sie sich mit der Jokertaste einen zusätzlichen Durchgang verschaffen. Dadurch bekommen Sie eine zweite Chance. Nach einem erfolglosen Durchgang (aber nur wenn Sie korrekt auf die Rahmenfarbe reagiert haben)

Zusatzdurchgang?
------------------

nein = 1x drücken
-------------------

ja = 2x drücken
-----------------

erscheint meistens (aber nicht immer) am Bildschirm

Wenn Sie die Taste, auf welcher Ihr Zeigefinger liegt (Jokertaste), 1x drücken, dann geht es normal weiter. Wenn Sie die Taste 2x schnell drücken, dann bekommen Sie einen Zusatzdurchgang. Um ein optimales Testergebnis zu erzielen, ist es sehr wichtig, dass Sie sich währenddessen nicht ablenken lassen und nicht unterbrechen. An festgesetzten Zeitpunkten können Sie jeweils eine kurze Pause machen. Also: Versuchen Sie, jeweils schnell den Buchstaben zu finden, die richtige Taste zu drücken und dann schnell und korrekt auf die Rahmenfarbe zu reagieren. *Zur Erinnerung*: Sie haben einen Buchstaben gesammelt, wenn er in der Mitte des farbigen Rahmens erscheint. Wenn nur der leere Rahmen erscheint, war der Durchgang verloren. Sie können sich aber durch die Jokertaste einen zusätzlichen Durchgang verschaffen. Wenn Sie Fragen haben, dann wenden Sie sich bitte jetzt an die Versuchsleitung. Ansonsten nehmen Sie nun bitte den Joystick in die Hand und starten die Aufgabe mit der Leertaste.

*Debriefing*

Liebe Versuchsteilnehmer, wie Sie sicherlich bemerkt haben, haben die Joysticktasten nicht richtig funktioniert. Da in dieser Studie Motivation unter frustrierenden Bedingungen untersucht wurde, wurde die kaputte Joysticktaste absichtlich eingebaut. Wir bitten Sie um Entschuldigung, dass wir Sie darüber nicht informiert haben und dass wir Sie diesen unangenehmen Bedingungen ausgesetzt haben. Es wäre anders nicht möglich gewesen, die Fragestellung zu untersuchen. Vielen Dank für Ihr Verständnis!

P.S. Die Verlosung der Kinogutscheine findet statt!

---

*Questions*

*Emotional State*

Bitte beantworten Sie nun Fragen zu Ihrer momentanen Stimmung.

Wie fühlen Sie sich im Moment?

-4	-3	-2	-1	0	1	2	3	4
sehr schlecht								sehr gut

Bitte geben Sie an, wie sehr Sie jetzt im Moment die folgenden Gefühle empfinden<sup>52</sup>.

1	2	3	4	5	6	7
gar nicht	sehr schwach	schwach	Etwas	ziemlich	stark	sehr stark

Gefühle des Ärgers (z.B. ärgerlich, gereizt)

Gefühl der Freude (z.B. freudig, fröhlich)

Gefühl der Ängstlichkeit (z.B. ängstlich, angsterfüllt)

Gefühl der Traurigkeit (z.B. traurig, betrübt)

Gefühl des seelischen Wohlbefindens (z.B. angenehm, zufrieden)

Gefühl der gehobenen Stimmung (z.B. gutgelaunt, heiter)

Gefühl der Aggressivität (z.B. aggressiv, angriffslustig)

Gefühl der Feindseligkeit (z.B. feindselig, misstrauisch)

Gefühl der inneren Erregtheit (z.B. aufgeregt, erregt)

*Appraisals*

Was schätzen Sie, wie viele Buchstaben Sie gesammelt haben?

Bitte erinnern Sie sich an die Durchgänge, in denen Sie keinen Buchstaben gesammelt haben. Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in Ihnen selbst (z.B. mangelnde Konzentration, Unfähigkeit, ...)?

1	2	3	4	5	6	7	8	9
überhaupt nicht in mir selbst								völlig in mir selbst

Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in den äußeren Umständen (z.B. störende Umgebung, schlechtes Material, ...)?

1	2	3	4	5	6	7	8	9
überhaupt nicht in den äußeren Umständen								völlig in den äußeren Umständen

---

<sup>52</sup> Emotions were presented in randomized order.

Und wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in einer anderen Person?

1	2	3	4	5	6	7	8	9
überhaupt nicht in einer anderen Person								völlig in einer anderen Person

Bei der Buchstabensuche hat die Taste manchmal nicht richtig funktioniert. Wie sehr konnten Sie beeinflussen, dass Sie trotz der kaputten Taste genug Buchstaben für den Kinogutschein sammeln können?

1	2	3	4	5	6	7	8	9
überhaupt nicht								sehr stark

#### *Additional Analyses*

Table E 1

*Mean Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Frustration), Controllability (Low vs. High) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Controllability	Motivational Valence	
	Success	Frustration
	Response Assignment: BAP, YAV	
Low		
M	41.27	-3.80
SD	72.55	120.23
High		
M	-13.07	-36.05
SD	80.45	122.77
	Response Assignment: YAP, BAV	
Low		
M	32.55	-43.85
SD	66.48	87.29
High		
M	-6.60	-36.07
SD	43.91	177.89

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

Table E 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Frustration), Controllability (Low vs. High) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
Controllability (C)	1	1.66
Response Assignment (RA)	1	.21
C X RA	1	.36
Error (C X RA)	55	(15295.77)
Within Participants		
Motivational Valence (MV)	1	7.63 **
MV X C	1	1.20
MV X RA	1	.36
MV X C X RA	1	.16
Error (MV X C X RA)	55	(7242.26)

*Note.* Values enclosed in parantheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\*p<.05. \*\*p<.01. \*\*\*p<.001



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## Experiment 6

### *Instructions*

#### *Verbal Instructions*

Es ist schon mal passiert, dass die Tasten des Joysticks nicht richtig funktioniert haben. Bei dir müsste aber alles klappen. Falls nicht, dann drück' die Tasten einfach öfter schnell hintereinander, dann geht es meistens. Versuch' den Test auf jeden Fall so gut wie möglich zu bearbeiten. Und mach den Test auf jeden Fall zu Ende, da wir nicht unterbrechen können. Denn dann werden die Daten nicht gespeichert. Sag mir erst nach dem Versuch, ob alles geklappt hat.

#### *Motivational Simon Task: Practice I*

Liebe Versuchsteilnehmer, in dieser Studie untersuchen wir Ihre Leistungsfähigkeit in einem Konzentrationstest. Unter Anderem interessieren wir uns dafür, ob absolute Ruhe die Leistung verbessert. Daher bitten wir Sie, während des Versuches Ohrstöpsel zu tragen. Da bei dieser Aufgabe die momentane Stimmung eine Rolle spielt, bitten wir Sie dazu zunächst einige Fragen zu beantworten.

Vielen Dank! Nun folgt der Konzentrationstest. In diesem Test sollen Sie wiederholt zwei unterschiedliche Aufgaben nacheinander durchführen. Die erste Aufgabe besteht darin, in einem Suchbild einen bestimmten Buchstaben zu finden. Bei der zweiten Aufgabe sollen Sie mit dem Joystick auf farbige Rahmen reagieren. Die zweite Aufgabe können Sie zunächst isoliert üben. Sie sehen im Folgenden wiederholt einen gelben oder blauen Rahmen. Wenn der Rahmen blau [gelb] ist, dann ziehen Sie den Rahmen mit dem Joystick zu sich heran. Wenn der Rahmen gelb [blau] ist, dann drücken Sie den Rahmen mit dem Joystick von sich weg. Innerhalb des farbigen Rahmens erscheinen Buchstaben oder ein leerer Rahmen. Diese sind für diese Aufgabe völlig irrelevant. Sie können sie ignorieren. Umfassen Sie den Joystick mit der rechten Hand (Linkshänder mit der linken Hand) und halten Sie den Sockel mit der anderen Hand fest. Versuchen Sie, so **schnell und korrekt** wie möglich zu reagieren! Falls Sie keine Fragen mehr haben, können Sie nun den Übungsdurchgang mit der Leertaste starten.

#### *Motivational Simon Task: Practice II*

Nun wird die Joystickaufgabe mit der Suchaufgabe kombiniert. Als erstes sehen Sie jeweils den Buchstaben, den Sie suchen sollen. Dann erscheint das Suchbild. Sie haben die Aufgabe zu entscheiden, ob sich der Buchstabe in der oberen oder unteren Hälfte des Bildes befindet. Wenn der Buchstabe oben ist, dann drücken Sie mit dem Daumen die obere rot markierte Joystick-Taste. Wenn der Buchstabe unten ist, dann drücken Sie mit dem Daumen die untere rot markierte Joystick-Taste. Versuchen Sie den Buchstaben so schnell wie möglich zu finden! Wenn Sie **richtig** und **schnell** genug waren, **erscheint der gesuchte Buchstabe in der Mitte**. Wenn Sie **falsch** reagiert haben oder **zu langsam** waren, **erscheint kein Buchstabe**. Nach und manchmal auch während der Suchdurchgänge erscheint wieder ein gelber oder blauer Rahmen. Hier haben Sie dieselbe Aufgabe wie in der Übungsaufgabe: Bei einem blauen [gelben] Rahmen ziehen Sie das Bild so schnell wie möglich zu sich heran. Bei einem gelben [blauen] Rahmen drücken Sie das Bild so schnell wie möglich von sich weg. Der farbige Rahmen erscheint immer nach dem Suchdurchgang gleichzeitig mit dem Feedback und manchmal zusätzlich während des Suchens. Wichtig ist, dass Sie immer schnell und richtig auf den Rahmen reagieren. Denn sonst wird dieser Suchdurchgang nicht gewertet.

Zusammengefasst:

1. Suchbild:  
Buchstabe oben → obere Taste mit dem Daumen drücken  
Buchstabe unten → untere Taste mit dem Daumen drücken
2. Rahmen (gleichzeitig mit dem Feedback und evtl. während der Suche):  
blau [gelb] – Bild heranziehen  
gelb [blau] – Bild wegdrücken
3. Feedback zur Suchaufgabe:  
Gesuchter Buchstabe erscheint = Punkt  
Leerer Rahmen erscheint = kein Punkt

Sie können auch diese Aufgabe zunächst üben.

### *Motivational Simon Task: Test*

Nun kommt die Testphase. In der Testphase bearbeiten Sie 90 Buchstaben-Suchdurchgänge. Als kleinen Anreiz nehmen Sie an der Verlosung von 20 Kinogutscheinen (unter 72 Teilnehmern) teil, wenn Sie 75 Durchgänge korrekt lösen, also 75 Buchstaben „sammeln“. In früheren Tests betrug die durchschnittliche Leistung Studierender 83 Buchstaben. Für die Verlosung des Kinogutscheins ziehen Sie jetzt bitte eine Nummer aus der Box auf dem Tisch. Bewahren Sie die Nummer gut auf. Wir werden Sie per email informieren, welche Nummern gewonnen haben.

Tragen Sie bitte hier Ihre Losnummer und Ihre email-Adresse ein, damit wir Sie über den Ausgang der Verlosung informieren können.

Um ein optimales Testergebnis zu erzielen, ist es sehr wichtig, dass Sie sich währenddessen nicht ablenken lassen und nicht unterbrechen. An festgesetzten Zeitpunkten können Sie jeweils eine kurze Pause machen. Also: Versuchen Sie, jeweils schnell den Buchstaben zu finden und die richtige Taste zu drücken. Versuchen Sie außerdem, schnell und korrekt auf die Rahmenfarbe zu reagieren. *Zur Erinnerung:* Sie haben einen Buchstaben gesammelt, wenn er in der Mitte des farbigen Rahmens erscheint. Wenn nur der leere Rahmen erscheint, war der Durchgang verloren. Wenn Sie Fragen haben, dann wenden Sie sich bitte jetzt an die Versuchsleitung. Ansonsten nehmen Sie nun bitte den Joystick in die Hand und starten die Aufgabe mit der Leertaste.

### *Debriefing*

Liebe Versuchsteilnehmer, wie Sie sicherlich bemerkt haben, haben die Joysticktasten nicht richtig funktioniert. Da in dieser Studie Motivation unter frustrierenden Bedingungen untersucht wurde, wurde die kaputte Joysticktaste absichtlich eingebaut. Wir bitten Sie um Entschuldigung, dass wir Sie darüber nicht informiert haben und dass wir Sie diesen unangenehmen Bedingungen ausgesetzt haben. Es wäre anders nicht möglich gewesen, die Fragestellung zu untersuchen. Vielen Dank für Ihr Verständnis!

P.S. Die Verlosung der Kinogutscheine findet statt!

### *Questions*

#### *Emotional State*

Bitte beantworten Sie nun Fragen zu Ihrer momentanen Stimmung.

Wie fühlen Sie sich im Moment?

-4	-3	-2	-1	0	1	2	3	4
sehr								sehr
schlecht								gut

Bitte geben Sie an, wie sehr Sie jetzt im Moment die folgenden Gefühle empfinden<sup>53</sup>.

1	2	3	4	5	6	7
gar nicht	sehr schwach	schwach	etwas	ziemlich	stark	sehr stark

Gefühle des Ärgers (z.B. ärgerlich, gereizt)

Gefühl der Freude (z.B. freudig, fröhlich)

Gefühl der Ängstlichkeit (z.B. ängstlich, angsterfüllt)

Gefühl der Traurigkeit (z.B. traurig, betrübt)

Gefühl des seelischen Wohlbefindens (z.B. angenehm, zu frieden)

Gefühl der gehobenen Stimmung (z.B. gutgelaunt, heiter)

Gefühl der Aggressivität (z.B. aggressiv, angriffslustig)

Gefühl der Feindseligkeit (z.B. feindselig, misstrauisch)

Gefühl der inneren Erregtheit (z.B. aufgeregt, erregt)

#### *Appraisals*

Wie sehr hatten Sie während der Aufgabenbearbeitung das Gefühl, dass Sie das Ziel (75 Buchstaben/Kinogutschein) erreichen können?

1	2	3	4	5	6	7	8	9
überhaupt nicht								sehr stark

Wie sehr hatten Sie während der Aufgabenbearbeitung das Gefühl, die Situation im Griff zu haben.

1	2	3	4	5	6	7	8	9
überhaupt nicht								sehr stark

Was schätzen Sie, wie viele Buchstaben Sie gesammelt haben?

Bitte erinnern Sie sich an die Durchgänge, in denen Sie keinen Buchstaben gesammelt haben. Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in Ihnen selbst (z.B. mangelnde Konzentration, Unfähigkeit, ...)?

1	2	3	4	5	6	7	8	9
überhaupt nicht in mir selbst								völlig in mir selbst

Wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in den äußeren Umständen (z.B. störende Umgebung, schlechtes Material, ...)?

1	2	3	4	5	6	7	8	9
überhaupt nicht in den äußeren Umständen								völlig in den äußeren Umständen

<sup>53</sup> Emotions were presented in randomized order.

Und wie sehr liegen die Ursachen dafür, dass Sie keinen Buchstaben gesammelt haben, in einer anderen Person?

1	2	3	4	5	6	7	8	9
überhaupt nicht in einer anderen Person								völlig in einer anderen Person

Bei der Buchstabensuche hat die Taste manchmal nicht richtig funktioniert. Wie sehr konnten Sie durch Ihr Verhalten beeinflussen, dass die kaputte Taste wieder geht?

1	2	3	4	5	6	7	8	9
überhaupt nicht								sehr stark

Wenn Sie etwas gegen die kaputte Taste unternommen haben, wie häufig hat die kaputte Taste dann wieder funktioniert?

1	2	3	4	5	6	7	8	9
nie								immer

#### *Additional Analyses*

Table F 1

*Mean Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Frustration), Controllability (Low vs. High) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Controllability	Motivational Valence	
	Success	Frustration
Response Assignment: BAP, YAV		
Low		
M	26.88	-15.95
SD	53.90	111.30
High		
M	39.50	35.57
SD	60.37	91.49
Response Assignment: YAP, BAV		
Low		
M	63.43	39.19
SD	82.35	121.02
High		
M	27.08	-36.81
SD	56.58	130.51

*Note.* BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

Table F 2

*Analysis of Variance: Approach-Avoidance Index as a Function of Motivational Valence (Success vs. Frustration), Controllability (Low vs. High) and Response Assignment (BAP, YAV vs. YAP, BAV)*

Source	df	F
Between Participants		
Controllability (C)	1	.58
Response Assignment (RA)	1	.01
C X RA	1	7.82 **
Error (C X RA)	83	(10817.58)
Within Participants		
Motivational Valence (MV)	1	7.80 **
MV X C	1	.01
MV X RA	1	.73
MV X C X RA	1	2.64
Error (MV X C X RA)	83	(6334.67)

*Note.* Values enclosed in parantheses represent mean square errors. BAP = blue approach, YAV = yellow avoidance, YAP = yellow approach, BAV = blue avoidance

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$