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Association as Psychological Distance

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Abstract

One mechanism underlying the acquisition of interpersonal attitudes is the formation of an association between a valenced unconditioned stimulus (US) and an affectively neutral conditioned stimulus (CS). However, a stimulus (e.g., a person) is not always and necessarily perceived to be unambiguously positive or negative. An individual can be negative regarding abstract (trait) information but at the same time display a positive (concrete) behavior. The present research deals with the question of whether the valence of abstract or concrete information about a US is encoded and subsequently transferred to an associated CS. The central assumptions are that the valence of the concrete information is more important for the evaluation of the US, whereas the abstract information is more important for the evaluation of the CS. The rationale behind these assumptions is that the US is a psychologically proximal stimulus because it elicits a more direct affective reaction. The CS, however, is psychologically more distal because it is merely associated with the US and is therefore only experienced indirectly. It is postulated that the associative relation between US and CS constitutes a dimension of psychological distance. In four studies, the valence of abstract and concrete information about a number of USs was manipulated. Within an evaluative learning paradigm, these stimuli were associated with affectively neutral CSs. As predicted, ambivalent USs were evaluated according to the valence of the concrete information. The evaluation of CSs, however, was influenced more strongly by the valence of the abstract information. Moreover, in a subsequent lexical decision task, participants were faster to categorize abstract (vs. concrete) stimuli when the stimuli were preceded by a CS prime as compared to a US prime. The results provide first evidence that perceived psychological distance influences the evaluations of US and CS in an associative evaluative learning paradigm.

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1 Introduction

Imagine the following situation: You are sitting in a restaurant and while waiting for your order you observe the people around you. There is a couple sitting a few tables away from you with the man directly facing you and the woman sitting across the table, her back towards you. The man hasn't noticed you but you recognize Tom, a new colleague, who works in another department of your company. You wrote him an email last week because you needed some information about a current project his department is working on. He replied promptly and was very helpful in providing you with the information you needed, which left you with the impression that Tom is a friendly and generous person. As you sit watching him, you observe that Tom doesn't seem to be in his best mood today. He looks grumpy and barks at the waitress for having to wait for his food for too long. Apparently, your new colleague seems to possess quite positive traits (e.g., helpfulness) but he is currently in a bad mood and displays negative behavior. What would you predict regarding your attitude toward Tom? Would you like him because you know he is helpful? Or would you rather dislike him for his current behavior in the restaurant? In other words, is the current state or general trait information more important when forming an attitude toward Tom? Moreover, what about Tom's companion? She doesn't look familiar and you can't really observe her behavior because her back is facing you. The only thing you do know about her is that she is in the restaurant to have dinner with Tom. What would be your response if you were asked about the likeability of Tom's date?

For decades, the formation of interpersonal attitudes has been a subject of psychological research (e.g., Allport, 1935; Martin & Levey, 1978). One of the most popular models of the acquisition of likes and dislikes is evaluative conditioning (e.g., De Houwer, Thomas, & Baeyens, 2001; Walther & Langer, 2008) which is based on associative learning mechanisms. In evaluative conditioning, a subjectively positive or negative stimulus (e.g., a person) is associated with a subjectively neutral stimulus (e.g., another person), which subsequently results in a transfer of valence, such that the neutral person is evaluated according to the valence of the person with which it is associated. Coming back to the example above, Tom is the subjectively positive or negative stimulus, whereas the woman is the associated subjectively neutral stimulus. This specific example reveals that sometimes it is not immediately clear whether a stimulus is positive or negative. Specifically, Tom could be perceived as likeable due to his general helpfulness but at the same time, he could also be perceived as unlikeable due to the grumpy behavior he displayed in the restaurant. On the one hand, an individual's behavior is based on global aspects such as personality traits which are (more or less) independent of a specific situation. If someone is helpful, this helpfulness is usually not restricted to one single situation but rather shows across different contexts and situations. On the other hand, human behavior also depends on specific situational characteristics or mental states, such as current mood. Even a very helpful person will not help in each and every situation. For instance, when a helpful person like Tom is in a bad mood, he may behave quite negatively.

What are the consequences of different kinds of information about a person for the attitude toward that person? Which kind of information is more diagnostic when forming an attitude toward Tom, the general trait information or the concrete behavioral information? And is the attitude toward the woman who is associated with Tom also influenced by the global trait and specific behavioral information provided about Tom? At first sight, the last question already seems to be solved once Tom is evaluated either according to the trait information (i.e., positively) or according to the behavioral information (i.e., negatively). By the principles of associative learning, the valence of Tom should transfer to the woman. If Tom is evaluated positively because of the positive trait he possessed, the woman should also be evaluated positively. If Tom is evaluated negatively because of the negative behavior he displayed, the woman should also be evaluated negatively. However, I assume that the valence of the information that is decisive in forming an attitude toward Tom is not necessarily the valence that transfers to the associated woman. Rather, the global trait and specific behavioral information provided about Tom might also play a role when evaluating the woman. The questions that are the focus of the present work can be summarized as follows: Which kind of information, or in other words which kind of valence, (1) is encoded when evaluating Tom and (2) transfers when evaluating an associated person?

The main assumption of the present work is that these questions can be answered by drawing on the concept of perceived psychological distance. Specifically, it is postulated that the crucial variable in determining whether ambivalent stimuli (and stimuli associated with them) are evaluated according to global trait or concrete behavioral information is the perceived psychological distance toward these stimuli. Before outlining the concept of psychological distance, the theoretical assumptions and specific research questions in more detail, a short overview of the present work will be given.

The theoretical part of the present work is divided into three sections. In the first section, Chapter 2 outlines the concept of temporal distance. Chapter 3 describes in detail Construal Level Theory (CLT; Trope & Liberman, 2003), one of the most influential theories on psychological distance. Within Chapter 3, psychological distance is defined and the premises of the theory as well as the different construal levels are described. Subsequently, the bidirectional influence of psychological distance and construal level is discussed. Chapter 3 concludes with a description of possible interrelations among distance dimensions and with critical remarks about how to explain the relation of distance and construal. Chapter 4 deals with associative learning and constitutes the second part of the theoretical reasoning. In this chapter, the well-known phenomena of classical conditioning and evaluative conditioning are outlined. Important factors that determine the effectiveness of classical and evaluative conditioning, the role of associations, and theoretical models are discussed. Moreover, similarities and differences between classical and evaluative conditioning are explained. In the final part of the theory section, the role of distance in associative learning is addressed. First, Chapter 5 outlines why associative distance can be considered as one special form of psychological distance and discusses the role of distance for different conditioning phenomena. In Chapter 6, the research questions and specific hypotheses of the present work are outlined in detail. Chapter 7 describes the four experiments of the present work. For each experiment, a short overview and the specific hypotheses are presented before the procedural details are described. This is followed by the results and a discussion of each experiment. A general discussion of the results, of implications of the present work as well as of theoretical explanations and perspectives is provided in the general discussion section in Chapter 8.

2 The concept of temporal distance in psychology

Research on temporal distance dates back to Lewin (1942) and has since then received considerable attention in various disciplines. Most researchers were particularly interested in examining how human behavior and cognition changes depending on the temporal distance to a certain event. Within psychology, the major schools of thought, psychoanalysis (e.g., Freud, 1959), behaviorism (e.g., Ainslie, 1975; Rachlin, Brown, & Cross, 2000), and cognitive psychology (e.g., Mischel, 1974) have investigated temporal distance issues. However, psychology is only one of many research areas interested in temporal distance. Behavioral economics (e.g., O'Donoghue & Rabin, 2000; Thaler, 1981) and political science (e.g., Elster, 1977; Schelling, 1984; Streich & Levy, 2007) have also studied temporal distance phenomena using a wide range of methods. The question of how the value of an outcome changes as a function of temporal distance is the one common theme that runs through all of this research (Trope & Liberman, 2003). However, the specific foci of the disciplines differ substantially. Whereas political science recognizes that discounting of future events exists, they give little attention to the question of how people discount the future events and how they make tradeoffs between the present and the future (Streich & Levy, 2007). By contrast, economists and psychologists have devoted considerable attention to exactly these questions.

2.1 Time discounting

Time discounting refers to the observation that the value of outcomes is discounted or diminished as temporal distance from the outcome increases. There is indeed a considerable amount of research that demonstrates that people often place higher value on a near future reward than on a distant future reward, even when the distant future reward is larger (e.g., Ainslie & Haslam, 1992; Elster & Loewenstein, 1992; Read & Loewenstein, 2000). Thus, when people have the choice between two different amounts of money, they choose the smaller but temporally more proximal option instead of the larger but temporally more distant option.

2.1.1 Discounted Utility Model

The Discounted Utility Model (DU model) by Samuelson (1937) tried to express time discounting with a mathematical formula and did explicitly not include any psychological influence factors. The DU model has six basic assumptions and is now an often uncritically applied standard in economics. The most important of the six assumptions of the DU model is that discounting is constant over time. In other words, people have a single discount factor that they apply to each period of time. For example, if an object is worth 10% less to you a year from now than it is today, it will be 10% less the following year, another 10% less the following year and so on. Moreover, any preference relation between separately occurring outcomes remains invariant if the outcomes are delayed by an equal length of time. For instance, if you prefer one apple today to two apples tomorrow, you will prefer one apple in a year from now to two apples in a year and a day from now (Streich & Levy, 2007). This assumption reflects an exponential discounting function.

The DU model has led to a heated debate among economists and social psychologists regarding the accuracy of the model and its key assumption of a constant-rate discount factor. The experimental research that has been inspired by the DU model has revealed many problems with the assumptions of the model. For example, discount factors vary greatly with the type of good and the length of delay of the payoff, and also with age (see Frederick, Loewenstein, & O'Donoghue, 2003, for a review).

2.1.2 Anomalies in time discounting

There are six anomalies that directly violate some of the assumptions of the DU model. Three of them will be briefly described here because they clarify that the DU model does not accurately describe the choices of people over time. The anomaly best documented is that time discounting follows a hyperbolic function. Evidence suggests that discount rates tend to decline as one moves further into the future. As temporal distance of an outcome increases, the decline in the value of the outcome is initially steep and then becomes more moderate (e.g., Read & Loewenstein, 2000). Put differently, the discount function flattens out more than the exponential DU model would predict. O'Donoghue and Rabin (2003) point out that this is "the most robust conclusion" (p.218) from the literature on intertemporal choice. One study (Frederick, 2003) examined the amount of money that would leave respondents indifferent to receiving $100 in the present and a comparable amount in one month, one year, and ten years. The median responses were $150 for one year, $500 for five years, and $1.000 for ten years, representing discount rates of 50% for one year, 38% for five years, and 26% for ten years. Furthermore, individual's preference between two outcomes may not be consistent when both are delayed by an equal length of time. This is another consequence of a declining discount rate. In one study, participants had to choose between $100 today and $115 next week. Most participants chose the $100 option. However, when participants were asked whether they preferred $100 in 52 weeks and $115 in 53 weeks, most people chose the $115 (Herrnstein, 1990). This preference reversal is inconsistent with the assumptions of the DU model.

Another anomaly in time discounting is the sign effect. This effect describes the tendency that people discount future gains more than they do future losses. In relative terms, people give more weight to future losses than to future gains. Loewenstein and Prelec (1992) showed that people were indifferent between receiving $10 now and $21 in a year and indifferent between losing $10 now and $15 in a year. For gains, the discount rate was 110%, whereas for losses, the discount rate was 50%. The greater weight given to future losses than to future gains is consistent with the phenomenon of loss aversion in Prospect Theory (Kahneman & Tversky, 1979), which describes the idea that losses bring more pain than gains bring pleasure, and that losses are overweighted relative to comparable gains.

The absolute magnitude effect shows that individual discount rates are lower for larger payoffs than they are for small payoffs. As the value of rewards increases, the discount rate of individuals generally decreases (e.g., Loewenstein, 1987). This means that people assign greater weight to large future payoffs than to smaller future payoffs (Streich & Levy, 2007).

In one study by Thaler (1981), participants were indifferent between \$15 now and \$60 in a year, between \$250 now and \$350 in a year, and between \$3000 now and \$4000 in a year. In this example, the discount rates are 300%, 40%, and 33%. This violates the DU model's assumption that the discount rate should be independent of the value of the outcome.

The accumulation of experimental research in intertemporal choice has made it clear that the DU model does not accurately describe how most people actually behave in making choices over time. As outlined above, there is evidence that the rate of time discounting varies considerably (e.g., Chapman, 1996; Rachlin & Rainieri, 1992) and that time discounting even reverses such that the value of outcomes undergoes augmentation rather than discounting as temporal distance increases (e.g., Elster & Loewenstein, 1992; Lovallo & Kahneman, 2000). The anomalies in the exponential discounting function have led researchers to search for alternate explanations for the variations in time discounting rates. The next paragraphs describe several hypotheses that have been proposed in order to account for these variations.

2.1.3 Alternative discounting hypotheses

Affect-dependent time discounting: The affect-dependent time discounting hypothesis proposes that the effect of temporal distance depends on whether outcomes have affect-based 'hot' value, or cognition-based 'cold' value (Loewenstein, 1996; Metcalfe & Mischel, 1999; Mischel, Shoda, & Rodriguez, 1989). Affective outcomes are supposed to undergo steeper time discounting than do cognitive outcomes. Thus, increasing temporal distance to an outcome increases the weight of cognitive outcomes and decreases the weight of affective outcomes. For example, the tastiness of a meal reflects affective value, whereas its nutritious value is a more cognitive concern. According to this hypothesis, the tastiness of a meal should undergo steeper time discounting with increasing distance than the nutritious value. Consequently, with greater distance, the value of the meal depends more on its nutritious value than on its tastiness (Trope & Liberman, 2003).

Valence-dependent time discounting: The valence of an outcome has also been proposed to influence the effect of temporal distance. This hypothesis is based on conflict theories (Lewin, 1951; Miller, 1944). Specifically, the finding that avoidance gradients are steeper than approach gradients led to the formulation of the valence-dependent time discounting hypothesis. This hypothesis states that the value of all outcomes is discounted over temporal distance but that the discounting rate is greater for negative outcomes than for positive outcomes (e.g., Epstein, 1977; Shelley, 1994). Temporal distance should increase the value of options that are associated with both positive and negative outcomes (Trope &

Liberman, 2003). For instance, travelling to a conference in a foreign country includes positive and negative aspects. The positive aspects of the conference trip include that you will be able to present your research and will meet colleagues. The negative aspects of attending the conference involve the long flight and the time spent out of town while work is piling up on your desk. According to the valence-dependent time discounting hypothesis, the inconvenience of the long-distance flight should undergo steeper time discounting than the enjoyment of the conference. Therefore, the value of going to a conference should be greater in the distant future than in the near future.

Savoring-dreading hypothesis: The savoring-dreading hypothesis builds on the assumption that people sometimes also take expectations into account. Anticipating the consumption of a positive event is pleasant (savoring), whereas anticipating the consumption of a negative event is unpleasant (dreading). Savoring is supposed to add positive value to a positive event in the future, and dreading is supposed to add negative value to a negative event in the future (Elster & Loewenstein, 1992; Loewenstein, 1987; Lovallo & Kahneman, 2000). The savoring-dreading hypothesis (Loewenstein, 1987) postulates that the value of an event is always discounted over time. However, if the event is positive, the positive value of anticipation is added to the value of the event itself. The fact that the event itself is discounted but positive value (of anticipation) is added could make it appear as if the value of the event is actually augmented over time (Trope & Liberman, 2003).

These alternative hypotheses have inspired a large amount of research. One conclusion that can be drawn from this research is that temporal changes in value are a complex set of phenomena that standard models of behavioral decision theory were not able to capture. Trope and Liberman (2003) set out to reconcile conflicting findings and to explain temporal changes in value by examining temporal changes in the mental representation of future events. Construal Level Theory (CLT; Trope and Liberman, 2003) provides a theoretical explanation as well as empirical evidence for the effects of temporal (and also psychological) distance on judgments, preferences, choices, and many other psychological phenomena.

3 Construal Level Theory (CLT)

The development of Construal Level Theory (CLT; Trope & Liberman, 2003) was inspired by standard models of behavioral decision theory. The focus of CLT in its early stages was on temporal changes in the mental representation of future events. CLT argued that temporal changes in judgments, reasoning, planning, and prediction may be mediated by the same representational mechanism that mediates temporal changes in value. By now, CLT does not only focus on temporal changes but has generalized its assumptions to other dimensions of psychological distance.

3.1 Definition of psychological distance

The concept of distance within Construal Level Theory (CLT; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2003) was first confined to temporal distance. An event that takes place right now has zero temporal distance, whereas an event that takes place any time in the future (or took place any time in the past) is temporally distant. The degree of temporal distance depends on the time lag that lies between the immediate moment and the to-be-experienced event. An event that takes place a year from now is considered to be in the temporally distant future, whereas an event taking place tomorrow is considered to be in the temporally near future. Note that the understanding of temporally near and distant future is a relative one in the sense that something that is perceived as being temporally near in one case can be experienced as temporally distant in another. For example, when imagining an event that takes place next month, this event is perceived as temporally near when comparing it to an event that takes place in ten years. However, the very same event is perceived to be temporally distant compared to an event that takes place tomorrow.

The postulations of CLT also apply to other dimensions of distance. Psychologically distant things (objects, events) are those that are not present in the direct experience of reality (Liberman et al., 2007). Anything that is not present in the immediate surrounding at a specific moment is distant. It can be thought of, it can be constructed or reconstructed but it cannot be experienced directly. Thus, the directness of experience determines whether an object or event is psychologically near or distant.

Things that are not present in the immediate reality can be distant on different dimensions. They can belong to the past or to the future, to spatially remote locations, to experiences of other people, or to hypothetical alternatives of what could have been or could have happened but never did. These descriptions define the dimensions of psychological distance as postulated by CLT: temporal distance, spatial distance, social distance, and hypotheticality. Each of these dimensions provides examples that are more proximal versus more distant. My last birthday, for example, is temporally near, whereas my 10th birthday is temporally distant. My neighbour's house is spatially near whereas Australia is spatially distant. An experience of my spouse is psychologically near compared to the experience of a person I barely know. And finally, an event can be more or less hypothetical, e.g., having superpowers is certainly more hypothetical than the idea of having married another person. What all these distance dimensions have in common is that they are anchored on a single starting point, the so-called zero distance point, which is my own direct experience of the here and now (Liberman et al., 2007). Anything else - other times, other places, experiences of other people, and hypothetical alternatives - has to be mentally construed.

One important part of the definition of distance in CLT is that it is not about objective distance in the sense of meters, seconds, or other measurements but rather deals with subjectively experienced distance. The same objective distance may look differently due to certain factors that make the objective distance either look large or small. For instance, dividing something into more stages enhances perceived distance.

3.2 Basic postulations of CLT

The definition of psychological distance suggests that moving beyond direct experience involves construal. CLT proposes a basic relationship between psychological distance and construal. More specifically, CLT distinguishes different levels of construal and proposes that more distal things, objects, or events are construed on a higher level. In other words, psychological distance changes people's responses to distant events by altering their mental representation of those events. This means that individuals use more abstract mental models to represent information about psychologically distant events than they do to represent information about psychologically near events (Trope & Liberman, 2003).

CLT suggests that construal level changes as we move away from direct experience because we have less information about distant things. The low level information we have about distant events or objects is usually unreliable or even unavailable. Details about concrete and secondary aspects of future events, for example the context in which they occur, become available only as one gets closer to the event. And indeed, we do know less about the distant than about the near future, we know less about more remote places, we know acquaintances less well than close friends, and we know less about how the world could be with alternatives to reality that are less probable and more difficult to imagine. Thus, lack of knowledge requires that remote things are represented on a higher construal level as compared to proximal things (Liberman et al., 2007). According to CLT, the fact that we know less about distal as compared to proximal things is the reason why an association has formed between psychological distance and construal level. This association is assumed to be over-generalized such that more abstract construals are used for more distal entities even in situations when the same amount of knowledge exists for the near and the distant entity. Thus, the association between distance and construal level was formed because of differential knowledge but this does not mean that distal things are construed on a high level only in those cases in which we indeed know less about the distal thing. Rather, this heuristic is also applied to situations in which it is neither appropriate nor necessary.

3.3 Construal levels

CLT proposes that individuals use more abstract mental models to represent information about psychologically distant entities as compared to psychologically near entities. Abstract mental models are called high level construals and are relatively simple, decontextualized representations that extract the perceived essence from the available information (Trope & Liberman, 2003). High level construals consist of general, superordinate, and essential features of events. Changing one of these features leads to a major change in the meaning of the event. Information about psychologically near entities, on the other hand, is represented by using concrete mental models, so-called low level construals. Low level construals are relatively complex and unstructured representations that include subordinate, contextual, and incidental features of events. They are richer and more detailed but less structured and parsimonious than high level construals. Changes in the features of low level construals produce only minor changes in the meaning of the event. One major difference of high and low level construals is that the former are more abstract, whereas the latter are more concrete.

3.3.1 Abstract and concrete construals

Abstractness is generally defined as the quality of being considered apart from a specific instance or object, whereas concreteness is defined as the quality of being concrete (not abstract). It is widely supposed that every object falls into one of two categories. Some objects are concrete, the rest is abstract. There is no standard account of how the distinction is to be explained but there is a great deal of agreement about how to classify objects in concrete and abstract categories. For example, it is universally acknowledged that numbers and objects of mathematics are abstract, whereas rocks and trees are concrete. Even though there are quite a few studies in psychology and psycholinguistics that examine the effects of abstract and concrete words (Kroll & Merves, 1986; Schwanenflugel, Harnishfeger, & Stowe, 1988; Walker & Hulme, 1999), information (Borgida & Nisbett, 1977; Pettus & Diener, 1977; Wippich, 1979), and goals (Emmons, 1992; Freitas, Salovey, & Liberman, 2001; Peterman, 1997) on different psychological phenomena, none of these studies provides a definition of abstractness versus concreteness. At a more general level, abstract objects are defined as existing only in the mind and being separated from embodiment. For instance, "truth" and "justice" are considered to be abstract terms. Concrete objects, on the other hand, are defined as capable of being perceived by the senses and are thus not abstract or imaginary.

Apart from objects, actions can also be concrete or abstract. Vallacher and Wegner (1985, 1987) differentiated concrete action identities describing how one performs an action from abstract action identities describing why one performs an action. Reading a book, for example, can be construed as acquiring knowledge (i.e., why one reads) or as turning pages (i.e., how one reads). The description "turning pages" is concrete because it is a single, directly observable action that does not require any interpretation in order to be described as such. However, "gaining knowledge" is abstract because it cannot be perceived by the senses. We can perceive the act of reading by observing the reader but the process of gaining knowledge requires some cognitive interpretation of the observation, namely that reading a book leads to (or should lead to) a gain of knowledge.

Another defining property of concrete representations is that they can be abstractly represented in multiple ways (Liberman et al., 2007). For example, "a dog" could be classified either as a pet or as a mammal (Rosch & Lloyd, 1978). Which of the possible abstract representations is selected depends on the context and on the goal. Moving from a concrete to an abstract representation involves deciding on one of the possible abstract representations. Another feature of abstract as compared to concrete representations is that irrelevant or inconsistent details are omitted from the abstract representation. For example, the fact that one used its hand while "waving a hand" is omitted when choosing the abstract interpretation of "being friendly" (Semin & Fiedler, 1988). This is one reason why abstract representations are simpler, less ambiguous, more schematic, and more prototypical than concrete representations (Fiske & Taylor, 1991; Smith, 1998). Moreover, there are different levels of abstractness that can be seen as a gradual reduction in incidental details and in complexity of representations. However, this does not mean that abstract representations are simply more impoverished than concrete representations. They often contain additional information about the value of a stimulus and its relation to other stimuli (Liberman et al., 2007). For instance, construing a dog as a mammal entails characteristics that are not directly observable in the dog stimulus (e.g., ways of reproduction). Thus, abstract representations contain less specific, idiosyncratic information about one unique instance but they contain more general information.

3.3.2 Desirability and feasibility

Desirability is considered to be a high level feature as it describes the value of an outcome. Feasibility, on the other hand, is a low level feature because it pertains to the perceived ease or difficulty of attaining that specific outcome. For example, the value of getting a job promotion reflects a desirability concern, whereas the amount of time and effort invested to get the promotion reflects a feasibility concern. Desirability concerns deal with superordinate "why" aspects of an action, and feasibility concerns reflect the "how" aspects of an action (Carver & Scheier, 1990; Vallacher & Wegner, 1987). According to Vallacher and Wegner (1987), "why" aspects of an action are more abstract than "how" aspects. Indeed, Liberman and Trope (1998) found that participants described distant future activities in terms of their goals but used low level construals when describing near future activities. For instance, in the distant future, the activity "reading a science fiction book" was described as "broadening my horizon", whereas in the near future the same activity was described as "flipping pages".

Given these results, CLT further predicts that desirability considerations are more relevant in influencing decisions for the distant future, whereas feasibility considerations are more relevant for decisions in the near future. Desirability and feasibility considerations have been primarily investigated in the area of future choice and planning. Liberman and Trope (1998) tested the predictions in a number of studies. In one of the studies, university students had to choose one course assignment out of a list of several assignments. The assignments differed with regard to their desirability and feasibility aspects. An assignment was either easy or difficult (feasibility concern) or on an interesting or uninteresting topic (desirability concern). Students had to choose one near future assignment that was to be given one week later, and one distant future assignment that was to be given nine weeks later. As predicted by CLT, time delay increased the effect of interest level of the assignment (desirability) but decreased the effect of difficulty of the assignment (feasibility). In the near future, students preferred easy but uninteresting tasks, whereas in the distant future, they preferred interesting but difficult assignments. In other words, with decreasing distance students were willing to sacrifice interest for the sake of ease. This difference cannot be explained with the amount of time students were given for the preparation of the assignment as this was kept constant across conditions. Thus, feasibility information was more influential in decisions regarding near future options, whereas desirability information was more influential in decisions regarding distant future options. Importantly, at the time of the irreversible decision, feasibility and desirability information was equally available for both the near and distant future options. Thus, the results cannot be explained by differential availability of desirability and feasibility information or by the possibility to postpone the use of one of these kinds of information to a later point in time (Trope & Liberman, 2003).

3.3.3 Value and probability

The distinction between desirability and feasibility may be extended to games of chance (gambles). A gamble is characterized by the probability of winning and the value or payoff associated with the winning. In terms of CLT, payoff is a superordinate consideration that reflects the desirability of the gamble. Probability of winning is a subordinate (feasibility) consideration because the probability of winning is determined by the specific outcome-generating process (e.g., coin flips, urn draws).

Subjective expected utility models predict that value and probability in a gamble combine multiplicatively with each of the two aspects being equally important in determining the attractiveness of the gamble. However, studies by Sagristano, Trope, and Liberman (2002) demonstrated that probability of winning is indeed subordinate to the payoff. This means that people are interested in the payoff of a gamble regardless of the probability of winning. However, people are only interested in the probability when the payoff is high. Given this asymmetric relationship, CLT predicts that people assign more weight to value (desirability) and less weight to probability (feasibility) when deciding for the more distant as compared to the near future. A series of studies by Sagristano et al. (2002) confirmed this hypothesis. When a gamble was to be played in the near future, people based their preferences for the gambles more on the probability of winning. However, when a gamble was to be played in the distant future, the payoff associated with winning was more important for people's preferences. In other words, less risky gambles with a high probability of winning a small amount of money were more attractive in the near future, whereas more risky gambles with a low probability of winning a large prize were more attractive in the distant future. Interestingly, participants' reason for choosing a gamble revealed the same temporal pattern. For near future gambles, participants more frequently offered reasons associated with probability of winning, whereas reasons associated with payoffs were more frequently offered for distant future gambles. This suggests that distance changed gambling preferences by increasing the perceived importance of the value of the gamble and decreasing the perceived importance of the probability of winning this payoff. The findings of the studies by Sagristano et al. (2002) are particularly interesting because they extend CLT to random, uncontrollable outcomes.

3.3.4 Pros and Cons

Decisions about future actions are based on arguments that are in favor of (pro) and against an action (con). CLT argues that there is a subordination of cons to pros, similar to the subordination of feasibility to desirability and of probability to value. The subjective importance of cons depends on the presence of pros. However, the subjective importance of pros is relatively independent of the existence of cons. Imagine you are suffering from a disease and your physician offers you a new medical treatment. If you know that the treatment has some health benefits (pros), you would probably inquire about possible side effects (cons). However, if you learn that the treatment has no benefits, there is no need to inquire about possible side effects. If an action has no advantage it will not be undertaken. On the other hand, if you are informed about the side effects of the treatment first, you would inquire about the benefits, regardless of potential side effects. If there are no side effects, information about the benefits helps you to decide whether the treatment is worth taking. However, even if there are side effects, you would still want to know about the benefits in order to decide whether the benefits outweigh the side effects (Eyal, Liberman, Trope, & Walther, 2004). Thus, the importance of side effects depends on whether the treatment is known to have benefits, but the importance of benefits is independent of whether the treatment is known to have side effects (Liberman et al., 2007). This subordination hypothesis has been tested and supported by Eyal et al. (2004) who investigated in a series of studies whether temporal distance from a future action differentially influenced the salience of pro and con considerations. In these studies (Eyal et al., 2004), participants were asked to generate arguments in favor and against near or distant future actions. As predicted, participants generated more pro arguments and fewer con arguments when the action was to take place in the more distant future. This result was found for a variety of different actions, including new exam procedures, social policies, and a variety of personal and interpersonal behaviors (e.g., approaching a fellow student and offering to write an assignment together).

The above described differences between high and low level construals (desirability-feasibility, value-probability, pros-cons) have the commonality that the low level construal is subordinate to the high level construal. As outlined above, this leads to a differential weighing of the respective information in decision making such that the high level information is considered regardless of the low level information, whereas the consideration of low level information depends on the high level information.

3.3.5 Traits and states

There is a vast amount of social-cognitive research showing that the inferences of individuals about themselves and others vary in their level of abstraction. Personality traits are considered to be more abstract, whereas specific behaviors, mental states, motives, beliefs, and intentions are considered to be more concrete (Cantor & Mischel, 1979; Dweck & Leggett, 1988; Hampson, John, Goldberg, 1986; Mischel & Shoda, 1995, 1998; Trope, 1986, 1989). In terms of CLT, global personality traits constitute high level construals of behavior, whereas mental states or specific behaviors constitute low level construals of behavior. This is in line with Semin and Fiedler's (1988) Linguistic Categorization Model (LCM) which states that verbal descriptions of behavior vary on a dimension of abstractness. Trait adjectives constitute the highest level of abstractness (e.g., "A is aggressive"). At lower levels of abstraction are state verbs ("A is angry with B"), interpretative action verbs ("A hurt B"), and descriptive action verbs ("A pushed B"). Thus, high level construals represent behavior episodes in general terms rather than in more concrete and contextualized terms. The distinction between concrete and more abstract construals of behavior has been of central importance to person perception and attribution theory (Gilbert & Malone, 1995; Heider, 1958; Jones, 1979; Jones & Davis, 1965). These theories state that concrete identifications of behavior serve as a basis for inferences of more abstract dispositional qualities. Concrete behavior takes place in a specific situation or context, whereas personality traits refer to global, decontextualized dispositions that are invariant across different situations.

Nussbaum, Trope, and Liberman (2003) demonstrated that behavioral representations differ when predicting behavior in near versus distant future situations. That is, perceivers should use more abstract, higher level construals for predicting behavior in distant future than in near future situations. Traits are less contextualized than mental states, which implies that information about concrete aspects of the situational context should receive less weight in predicting distant future behavior than in predicting near future behavior. In a distant future situation, people are expected to express their character, whereas in a near future situation, they are expected to respond more flexibly to the specific contingencies of the situational context. Therefore, people should perceive greater cross-situational consistency in other persons' behavior in the distant future than in the near future. Moreover, the correspondence bias which is defined as the tendency to attribute situationally constrained behavior to the corresponding personal disposition should be more likely when the target person is perceived to be more distal.

In one of their studies (Nussbaum et al., 2003, Study 1), the Jones and Harris (1967) attitude attribution paradigm was used. Student participants from the University of Tel Aviv read an essay arguing in favor of Israel's withdrawal from Lebanon. They were told that the essay was either written by a student who had been instructed to express his/her own opinion (unconstrained condition) or who had been instructed to argue in favor of withdrawal (constrained condition). Participants were then asked to estimate the likelihood that the author of the essay would express pro-withdrawal opinion in a variety of near or distant future situations. Results revealed that the estimated likelihood of pro-withdrawal attitudes in a near future situation was moderated by the situational constraint, which means that participants took into account whether people were free to express their opinion in the essay or whether they were instructed to express a pro-withdrawal attitude. However, in the distant future condition, the judged likelihood of pro-withdrawal attitudes was high, regardless of situational constraints. Thus, near future predictions showed situational discounting, whereas distant future predictions did not. In other words, the correspondence bias was more pronounced when the displayed behavior is used to predict the distant as compared to the near future. It is somewhat ironic that perceivers treat a target's behavior that is constrained by the present situation as more predictive of what the target will do in a distant future situation than in a near future situation.

Another study (Nussbaum et al., 2003, Study 2) tested whether people indeed expect others to behave more consistently across different situations in the distant future than in the near future. Participants were asked to imagine a target person in four different situations (e.g., a birthday party, waiting in line) in either the near or the distant future. They were instructed to predict the extent to which their acquaintances would display 15 traits representative of the Big Five personality dimensions (e.g., extraversion, agreeableness). The variance of the predicted behaviors across the four situations was computed for each of the 15 traits. The lower the cross-situational variance is, the higher is the predicted cross-situational consistency related to a given trait dimension. For example, the amount of cross-situational variance in extraversion indicated the extent to which the target was predicted to show varying degrees of extraverted behavior in the four situations. Results confirmed the hypotheses. Participants expected others to behave more consistently across distant future situations than across near future situations. This was manifested in lower cross-situational variance and higher cross-situational correlations for distant future predictions than for near future predictions.

Taken together, the studies by Nussbaum et al. (2003) demonstrated that psychological distance increases the tendency to think about others in terms of global factors such as dispositions rather than in terms of more concrete, context-specific factors. Most important for the present research is the finding that traits are more abstract and contextualized constructs than are mental states. As CLT predicts and as the studies by Nussbaum et al. (2003) confirmed, perceivers are more likely to rely on traits and less likely to rely on the concrete mental states when predicting distant future behavior. These studies showed that the categorization of traits as abstract constructs and the categorization of mental states as more concrete concepts can be extended to the principles of CLT such that traits can be considered to be high level construals, whereas mental states are considered to be low level construals. This is of importance to the present research because in all of the experiments the high level construals were traits and the low level construals were mental states.

3.4 The effect of psychological distance on construal level

The construal level hypothesis states that distancing produces more abstract, higher-level construals. The next paragraphs discuss studies that demonstrate the effect of the different dimensions of psychological distance on construal level.

3.4.1 Temporal distance

Liberman, Sagristano, and Trope (2002) investigated whether more distant future events would be construed in more abstract, higher-level terms. In their first study, they examined whether temporal distance increases the abstractness of object categories. One way to conceptualize the abstractness of categories is by their breadth or level of inclusiveness. Abstract categories (e.g., nutrition) are broader and more inclusive than concrete, subordinate categories (e.g., vegetables). CLT predicts that individuals use fewer and broader categories to classify objects that pertain to distant future situations than to near future situations. To test this prediction, Liberman et al. (2002, Study 1) asked participants to imagine an event (e.g., a camping trip, a friend visiting them in New York) taking place either the upcoming weekend or on a weekend a few months later. Participants were then asked to classify a given set of 38 objects related to each scenario into as many mutually exclusive categories as they deemed appropriate. To assess whether temporal distance affected the breadth of categories, the authors counted the number of groups into which participants classified the objects from each scenario. Results revealed that the same set of objects was classified into fewer and broader categories when they were part of a distant future than a near future situation. This finding is consistent with the assumption that distant future events are represented in terms of high level, abstract categories, whereas near future events are represented in terms of low level, specific categories.

Liberman et al. (2002) could also demonstrate that positive and negative experiences in the more distant future are expected to be more prototypical (Study 2), that more distant future coping experiences are less variable (Study 3), and that more distant future preferences are organized around simpler structures (Study 4). These studies provide evidence for the construal level hypothesis by demonstrating that temporal distance systematically changes the way actions and events are represented, with more distant future actions and events being represented in a more schematic and abstract way.

3.4.2 Spatial distance

According to CLT, spatial distance is a dimension of psychological distance that has similar effects on the representation of social objects and events. Fujita, Henderson, Eng, Trope, and Liberman (2006) investigated in two experiments whether increased spatial distance activates high level construals. In Study 1, participants were asked to imagine engaging in behaviors at a spatially distant or spatially near location. For each behavior, participants indicated their preference between two alternate descriptions (Vallacher & Wegner, 1987, 1989), a low-level identification (emphasizing the how aspect of an action) and a high-level identification (emphasizing the why aspect of an action). As predicted, participants who imagined the event at a spatially distant location had stronger preferences for high level identifications. Importantly, the effect of spatial distance on construal level could not be explained by differences in familiarity, evaluation, or difficulty of imagining the scenario. In Study 2, Fujita et al. (2006) examined how perceivers construe a social interaction they believed to take place in either a spatially near or distant location. Participants watched a video ostensibly filmed at a spatially near (New York) or distant (Florence) location and then described what they saw in writing. These descriptions were content-analysed using coding schemes developed for the LCM (Semin & Fiedler, 1989). As predicted, the descriptions of the taped interaction were more abstract when the interaction was said to take place in Florence than in New York City. Again, alternate explanations based on familiarity with the location and on perceived similarity to the actors were ruled out. These results support the idea that spatial distance of social events leads to higher level construal of the information at hand.

Moreover, Henderson, Fujita, Trope, and Liberman (2006) demonstrated that spatial distance also has an effect on social judgment. Their results showed that increasing the spatial distance of an event increased the impact of high level information (i.e., central tendencies, general trends, dispositional characteristics) and decreased the impact of low level information (i.e., incidental details, irregular outcomes, situation-specific task characteristics) on social judgment and decision-making.

3.4.3 Social distance

The dimension of social distance is most important for the present research because the kind of psychological distance that is at the core of the research presented here can probably be most suitably described as being a special form of social distance (see also Chapter 5 and General Discussion). There are several distinctions that can all be considered as instances of social distance, for example, self and other, similar and dissimilar others, in-group and out-group members, as well as status differences (e.g., powerful vs. powerless). Some of the research documenting higher level construals for more distant social targets is reviewed.

Self versus others: Probably the most well-known example for a different construal of self and other is the actor-observer difference in attribution (Jones & Nisbett, 1972), which describes the effect that people see their own behavior as being influenced by the specific context in which this behavior takes place. However, the behavior of others is attributed to stable, dispositional characteristics of the actor. Semin and Fiedler (1989) investigated whether this actor-observer difference was reflected in different levels of abstraction. Participants in their study described either their own or another person's behavior in a number of situations. Semin and Fiedler (1989) coded their responses for abstractness and their results revealed that observers' descriptions of behavior had a higher proportion of abstract verbs than did actors' descriptions. In terms of CLT, these findings demonstrate that a higher construal level is applied for distal social targets (another person) than for proximal social targets (the self).

Interestingly, changing perspective from a first-person to a third-person perspective when recalling memories can also lead to an enhanced level of abstraction such that behaviors recalled from a third-person perspective contain more dispositional (vs. situational) terms than behaviors recalled from a first-person perspective (Frank & Gilovich, 1989; Nigro & Neisser, 1983). Furthermore, Libby and Eibach (2002) showed that imagining performing an activity from a third-person perspective produced less vivid and rich reports of the activity than imagining the same activity in the first-person perspective. Thus, a third-person perspective seems to impose more distance than a first-person perspective and induce a higher level of construal. This effect is particularly interesting because it rules out an alternative explanation of the self-other differences in construal, namely that differential knowledge about the self versus another person could be responsible for the effects.

Similarity versus dissimilarity: Interpersonal similarity is another form of social distance. Liviatan, Trope, and Liberman (2008) hypothesized that greater levels of similarity increase the relative weight of subordinate and secondary features of information when judging others' actions. In four studies, participants judged either a similar or a dissimilar target on the basis of the same information about the target's actions and situation. The results of the first experiment revealed that participants used less "why" identifications (i.e., high level construals) to categorize a similar target's behavior than a dissimilar target's behavior. The other three experiments demonstrated that participants assigned greater weight to subordinate and secondary features in judging similar relative to dissimilar others' actions. These findings provide evidence for the construal level hypothesis by demonstrating that perceivers place increasingly more weight on low level features relative to high level features in judgments of similar compared to judgments of dissimilar others' actions.

In-group versus out-group: In-groups are generally perceived as socially closer than out-groups (e.g., Brewer & Weber, 1994; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). From a construal level perspective, it follows that people should form higher level construals of out-groups than in-groups. Indeed, research has shown that more abstract representations are constructed for out-groups. For example, out-groups are described in more abstract terms (e.g., Fiedler, Semin, Finkenauer, & Berkel, 1995) and are perceived as more homogeneous and less distinctive on various dimensions than in-groups (Jones, Wood, & Quattrone, 1981; Linville & Jones, 1980, Park & Judd, 1990). In terms of CLT, the out-group is construed more abstractly than the in-group because we typically have less direct experience with out-groups and thus perceive them as more distant.

Social Power: Social power affects a broad range of social-cognitive and self-regulatory phenomena (Fiske, 1993; Keltner, Gruenfeld, & Anderson, 2003). Smith and Trope (2006) proposed that more powerful individuals feel more independent of others, and therefore, more distinct and separate from them (e.g., Lee & Tiedens, 2001; Snyder & Fromkin, 1980). Assuming that power entails more social distance, CLT predicts that more powerful individuals are inclined to form high level construals of relevant situations. Powerful individuals might focus on the most central aspects of the situation and disregard secondary, more peripheral aspects. For example, Overbeck and Park (2001) demonstrated that participants who had more power in a dyadic interaction were better at distinguishing between primary and secondary information. Moreover, powerful people also use more abstract language (Guinote, 2001). Smith and Trope (2006) investigated the effect of power priming on participants' ability to abstract visual stimuli in perceptual tasks. In six experiments involving both conceptual and perceptual tasks, they could demonstrate that priming high power leads to more abstract information processing (i.e., focusing on central aspects, perceiving structure to extract the gist and categorizing stimuli at a higher level) than did priming low power. One explanation for why high power individuals focus on high level aspects could be that the distal perspective activated by the possession of social power promotes going beyond the information given, detecting the underlying structure, and abstracting from it the central features.

3.4.4 Probability

Probability (sometimes also called hypotheticality) represents another dimension of psychological distance. Accordingly, outcomes or events that are unlikely seem more remote or distant and are construed on a higher level. Outcomes that are highly likely, on the other hand, are construed on a lower level. Todorov, Goren, and Trope (2007) conducted two experiments in which participants were asked to make decisions about four different outcomes that were presented as either likely or unlikely. Each outcome could be characterized on two attributes: its desirability (central attribute) and its feasibility (secondary attribute). As predicted, the findings revealed that secondary features were overweighted in decisions when probability was high but not when probability was low. When probability was low, participants preferred the more desirable but less feasible outcome. However, this was only found in separate but not in joint evaluations. The interesting thing about these findings is that the probability of an outcome apparently changes the weighting of outcome features in decisions, which results in predictable preference reversals at different levels of probability. These findings are consistent with the proposal of CLT that low probability outcomes are viewed from a mentally distant perspective.

In addition, the influence of probability on level of construal was demonstrated in the context of memory retrieval. In a study by Stern and Rotello (2000), participants performed some actions and imagined others (e.g., eating crackers and tying a ribbon around a pencil). The memory characteristics of these actions were examined both immediately and one week later. Results revealed that performed events were clearer and richer in sensory and contextual details than imagined events. In terms of CLT, memories of actions that were not hypothetical (i.e., zero distance on the dimension of hypotheticality/probability) were construed on a lower level than actions that were purely hypothetical.

3.5 The effect of level of construal on psychological distance

The research discussed above illustrates that psychological distance affects level of construal. It is equally plausible, however, that the relationship is vice versa with construal level affecting psychological distance. According to CLT, the association between distance and construal level is a bidirectional one: High level construals may also induce a perception of greater psychological distance.

3.5.1 Temporal distance

Liberman, Trope, McCrea, and Sherman (2007) examined the effect of construal level on the perceived temporal distance of activity enactment. Their prediction was that construing activities in high level terms would foster perception of the more distal future as appropriate for their enactment. For example, in Study 1, participants first indicated either why (high level construal) or how (low level construal) a person would perform an activity. Subsequently, participants estimated at how much time in the future they expected the person to perform the activity. Results revealed more distant enactment times after a high level (why) construal than after a low level (how) construal. This effect was demonstrated across different operationalizations of level of construal, different types of activities, and for both the self and another person as targets.

Even though CLT mostly deals with future temporal distance, there is evidence that construal level also exerts effects on past temporal distance. For example, Semin and Smith (1999) studied the effect of linguistic abstractness on event age. They provided participants with either abstract or concrete retrieval cues and examined how distant the recalled events were. For example, participants recalled an occasion on which they helped somebody (i.e., concrete retrieval cue) or an occasion on which they displayed a trait of helpfulness (i.e., abstract retrieval cue). Abstract retrieval led to the recall of memories that were more than eight months older than memories recalled after given a concrete retrieval cue (Semin & Smith, 1999). Thus, abstractness affected past temporal distance.

3.5.2 Social distance

The effect of level of construal on social distance has also received empirical support. Specifically, Stephan (2005) examined the effect of level of construal on politeness and familiarity, which were conceptualized as indicators of social distance. It was predicted that a higher level of construal would lead to higher perceived politeness and lower perceived familiarity. In one study, participants had to give either a high level dispositional or a low level situational explanation of another person's behavior and subsequently rate the perceived familiarity of the target. As predicted, familiarity was higher when participants generated low level as compared to high level attributions. Thus, an increase in level of construal leads to an increase in perceived social distance.

3.5.3 Probability

If a hypothetical event is construed on a low level it is perceived more likely to become real compared to a hypothetical event construed on a high level (Koehler, 1991; Nisbett, 1993). Empirical evidence for the effect of construal level on probability comes from Sherman, Cialdini, Schwartzman, and Reynolds (1985). In this study, student participants were presented with information about a disease that supposedly was becoming prevalent on campus. Participants were either told concrete symptoms of the disease (e.g., head ache, muscle ache) or more abstract symptoms (e.g., disorientation, malfunctioning nervous system). All participants were asked to imagine actually contracting the disease. Participants that were provided with the concrete symptoms estimated that the likelihood of actually contracting the disease as greater than participants who were provided with abstract symptoms. Thus, construing an event on a lower level makes it seem more likely. One possible explanation could be that concrete, low level details create a feeling of greater reality, veridicality, and likelihood.

Although there is no study yet that examines the influence of construal level on spatial distance, it seems safe to conclude that the different dimensions similarly affect and are affected by level of construal. People think more abstractly about distant than about near objects, and more abstract construals lead them to think of more distant objects (Liberman & Trope, 2008).

3.6 Implicit associations between psychological distance and level of construal

Previous CLT research has always tested the association between attributes of targets (e.g., the distance or the level of construal) and the way that people process these targets. A recent series of studies (Bar-Anan, Liberman, & Trope, 2006) directly examined the association between psychological distance and level of construal at the purely conceptual level. The question was whether words that imply greater social distance (e.g., strangers vs. friends) are automatically associated with words that imply higher level of construal (e.g., abstract vs. concrete). The association between concepts of distance and construal level was assessed using the Implicit Association Test (IAT, Greenwald, McGhee, & Schwartz, 1998; Greenwald et al., 2002). Participants in these studies (Bar-Anan et al., 2006) were presented with stimuli from four categories: stimuli denoting a high level of construal (e.g., category names such as "animals"), stimuli denoting a low level of construal (e.g., exemplar names such as "poodle"), stimuli pertaining to low psychological distance (e.g., the word "soon" for temporal distance), and stimuli pertaining to high psychological distance (e.g., the word "later"). Two experiments for each dimension of psychological distance were conducted. Participants' task was to map stimuli from each of the four categories on two responses by pressing either a left key or a right key on the keyboard. The pairings of distance and level of construal were either congruent or incongruent with the assumptions of CLT. On CLT-congruent trials, high level stimuli were paired with distant stimuli and low level stimuli were paired with proximal stimuli. On CLT-incongruent trials, high level stimuli were paired with proximal stimuli and low level stimuli were paired with distant stimuli. CLT predicts that reaction times would be faster on congruent than incongruent trials. The results of eight experiments provide converging evidence for the hypothesis that people associate psychological proximity with low level construal and psychological distance with high level construal (congruent pairings) more than psychological proximity with high level construal and psychological distance with low level construal (incongruent pairings). These findings suggest that people indeed implicitly associate psychological distance with high level construal and psychological proximity with low level construal (Bar-Anan et al., 2006).

These results have some important implications. First, the alternative hypothesis that the association of distance and construal level could be explained by specific characteristics on which distal and proximal objects may differ (such as differential knowledge) was ruled out because the association between concepts of distance and level of construal seems to be independent of any specific context or target of construal. Second, similar effects were demonstrated across all the four dimensions of psychological distance, suggesting that they all share a common meaning as instances of psychological distance and are related to level of construal in a similar way (Bar-Anan et al., 2006). Third, it seems that the association between psychological distance and construal level can be activated automatically without conscious deliberation. Summing up, apparently, there is an association between psychological distance and high level construals and psychological proximity and low level construals on the level of concepts, which means that the association does not only exist as an effect of distance or construal level on the way that people process targets. Although the research by Bar-Anan et al. (2006) supports the idea that the four dimensions of psychological distance are different manifestations of one underlying concept of psychological distance, it doesn't address the question of whether and how these four dimensions are interrelated.

3.7 Interrelations among psychological distance dimensions

According to CLT, psychological distance is reflected in different dimensions. Thus, it seems quite plausible to assume that these dimensions are also mentally associated. For instance, people use spatial metaphors to represent time in everyday language and reasoning (Casasanto & Boroditsky, 2008). The common feature of the distance dimensions relates to the fact that they represent distances from one's direct experience. Thus, remote locations should bring to mind the distant rather than near future, other people rather than oneself, and unlikely rather than likely events.

Bar-Anan, Liberman, Trope, and Algom (2007) provided initial support for these interrelations. In their studies, they used a picture-word version of the Stroop task (Stroop, 1935). In a typical Stroop task, participants are faster in naming the ink color of semantically compatible words (e.g., the word "green" or the word "grass" printed in green ink) than in naming the ink color of semantically incompatible words (e.g., the word "green" or the word "grass" printed in blue ink). In the Stroop task, people are required to focus on one aspect (color) and ignore the other aspect (semantic meaning). The idea is that the irrelevant dimension (i.e., the semantic meaning of the words) interferes with and facilitates participants' response as a function of the congruence between the relevant stimulus and the irrelevant stimulus. Bar-Anan et al. (2007) demonstrated a similar effect with distance-congruent versus distant-incongruent stimuli. In a modified picture-word version of the Stroop task, participants had to discriminate between cues of one psychological distance dimension while ignoring cues of another psychological distance dimension. The pictures used in the study were landscape photographs containing an arrow that was pointing to an either proximal or distal point on the landscape. The words used in the study were written on the arrow and carried various meanings of psychological distance: temporal (e.g., tomorrow, in a year), social (e.g., friend, enemy), and hypotheticality (e.g., sure, maybe). Participants had to respond by pressing one of two keys as quickly and as accurately as possible. In one version, they had to indicate whether the arrow pointed to a proximal or distal location (spatial discrimination), whereas in another version, they had to identify the word printed on the arrow (semantic discrimination). The distance-congruent trials were the ones in which the spatially distant arrow contained a word that denoted large temporal distance, large social distance, or low probability and the spatially proximal arrow contained words that denoted temporal proximity, social proximity, or high probability. The distance-incongruent stimuli were the ones in which the spatially distant arrow contained words denoting proximity and spatially proximal arrows contained words denoting distance. As predicted, in both types of tasks and across all four dimensions of distance, participants responded faster to distance-congruent stimuli than to distance-incongruent stimuli. These results suggest that temporal distance, spatial distance, social distance, and hypotheticality have a common meaning – psychological distance – and that people assess this meaning spontaneously, even when it is not directly related to their current task.

3.8 Critical appraisal and explanations for the relation of distance and construal

Psychological distance is at the core of CLT, subsuming any type of distance from temporal to social to physical distance. The assumption of an association between psychological distance and construal level is elegant, simple, and is supported by a growing amount of research under the conceptual umbrella of CLT. According to CLT, the association between distance and construal has evolved from the relationship between psychological distance and people’s knowledge about high and low level features of objects (Liberman et al., 2007; Trope & Liberman, 2003). This association is assumed to be over-generalized, leading people to use high level construals when thinking of distant targets and low level construals when thinking of proximal targets, regardless of the amount of available knowledge about the target. The level of construal might be adjusted to the psychological distance of the target, even when the available information about the target does not favor one construal level over another.

Although this explanation appears plausible and can explain many of the construal effects described above, CLT nonetheless has been criticized for being a pattern-driven and not a process-driven theory (e.g., Semin, 2007). According to these critics, CLT simply proposes an associative relationship between construal level and distance but does not specify *why* this is the case. The theory does not offer any explanation for the process underlying the formation of this association. Because most empirical evidence for CLT rests on a specific outcome pattern, it seems quite difficult to understand or explain what exactly drives the different construals. It would therefore be valuable to consider alternative explanations for the relation of distance and construal. One of these alternative explanations was proposed by Fiedler (2007) who argued that distance effects cannot be explained by an over-generalized association but rather by an unequal amount of information about proximal and distal stimuli. Although CLT experiments do provide participants with the same amount of information, the size of the effective information sample about distal and proximal objects may still differ markedly. Fiedler (2007) argued that this is the case because people generate their own inferences, form their own associations, and memorize different past experiences. At a short psychological distance, people should enrich their decision options with more self-generated inferences, self-references, past experiences, imagined scenarios, and world knowledge than at a long psychological distance. Thus, the effective amount of knowledge consists of both, experimenter-provided *and* self-generated information, and is richer with decreasing distance (Fiedler, 2007). Following this logic, Fiedler (2007) concluded that distance effects are not automatic, over-learned and detached from informational differences between proximal and distal objects. This reasoning, however, cannot explain the effects found by Bar-Anan et al. (2006, 2007) about automatic associations of distance and construal level and about the interrelations of the distance dimensions.

If there is indeed an over-generalized association between distance and construal level as assumed by CLT, the question of *how* this association developed in the first place is of equal theoretical and empirical relevance. One possible explanation for this can be found when looking at construal level and distance from a developmental point of view. In other words, it might be helpful (1) to consider how an understanding of the different dimensions of distance and their relation to each other actually developed in human beings; and (2) to investigate the development of construal levels (i.e., mental representations). Once it is clear how the distance dimensions and construal levels develop, it might be easier to explain the origin of the association between these two concepts.

Due to the fact that CLT is still a young theory, it is only recently that CLT researchers have started to investigate the interrelations of different dimensions (Bar-Anan et al., 2007; Liberman et al., 2007). CLT argues that all four dimensions of psychological distance share the same underlying meaning, namely that they are all distances from direct experience and as a consequence have similar effects on construal. However, the question of how the different distance dimensions relate to each other is still unanswered. It might be useful to interpret the different distance dimensions from an ontogenetic developmental point of view in order to learn more about the interrelations of the dimensions. Regarding the different distance dimensions, there is reason to doubt the assumption that all distance dimensions are equal. It seems quite possible that the dimensions itself are asymmetrically related, which means that one dimension might be more abstract than another one and even evolved out of the other one. Evidence for this view originates in research on metaphorical structuring (Boroditsky, 2000; Lakoff & Johnson, 1980). A metaphorical view of concepts and representations claims that abstract concepts have evolved out of more concrete concepts. Time can be understood as an abstract concept because time cannot be experienced by the senses. Space, on the other hand, is a more concrete concept. More abstract concepts such as time were initially understood as metaphors of very concrete and experiential concepts such as space. Based on this reasoning, one could argue that not psychological distance in general (as postulated by CLT) but spatial distance is at the core of all distance dimensions because it seems to be the first of all the distance dimensions to develop. For instance, Casasanto and Boroditsky (2008) have shown that people use spatial metaphors to represent time in everyday language and reasoning. Lakoff and Johnson (1980) emphasized that the first complex conceptual mental structures to develop are those that come out of our direct experience as infants and children. For example, direct experience of physical location and orientation in space (up/down, forward/backward) is one such basic structure. Other conceptual structures are then built onto the direct structures in a metaphorical way (e.g., 'I'm feeling *down* today'). Thus, the concept of time is built onto the conceptual structure of space because time as a concept develops later in children than do spatial relations. Bargh (2006, p. 154) argued in line with this reasoning: "What is psychological distance, after all but a metaphor that derives its meaning from the more basic and directly experienced concept of physical distance?"

More evidence for the view that the concept of time developed out of the concept of space comes from Piaget (1980). Piaget (1975) argued that a special kind of social distance, namely the experience of a child that its self and its surroundings are divided entities, is the very first experience of distance. However, he could also show that structural aspects of space are earlier understood by children than time (Piaget, 1980; Piaget & Inhelder, 1975). For instance, children's ability to reason about the temporal structure of an event can be seriously distorted by the spatial structure of the event (Piaget, 1980). This can be taken as additional evidence for a developmental mechanism of the concepts of space and time. It seems a little more difficult to locate the social distance dimension on a developmental pathway because there are many different instances of social distance. As mentioned above, the difference between self and the surrounding world is recognized very early in life. However, for the other types of social distance a different picture emerges. Whether the distinction between in-group and out-group, for example, develops before or after an understanding of time is hard to say. I suspect that understanding of most forms of social distances (such as hierarchical distance, power, and politeness) occurs after the development of a basic understanding of temporal relations. For the dimension of probability, it seems obvious that probability constitutes an abstract dimension of distance, which is probably the last one of the four distance dimensions to develop (Piaget, 1975). However, if and how the dimensions of social distance and probability build onto the concepts of space and time is subject to speculation at the moment.

Even if the distance dimensions did indeed all develop out of spatial distance, this is not discrediting the postulations of CLT because it does not necessarily mean that the different dimensions are unable to elicit the same effects on construal level once all the dimensions have evolved. Rather, it may provide additional explanations that go beyond the scope and assumptions of CLT. However, Wallot (2008) was able to provide first evidence that spatial and temporal distances are unequal not only with regard to structural properties (see Boroditsky, 2000; Casasanto & Boroditsky, 2008) but also with regard to level of construal. However, given the current empirical literature, it is too early to draw definite conclusions regarding the interrelations of the distance dimensions.

The second aspect that needs to be addressed when investigating the origin of an over-generalized association concerns the levels of construal. It might be possible that construal levels developed in a way very similar to the development of the distance dimensions. In other words, high level construals may have evolved ontogenetically out of low level construals. This reasoning actually bases on the same assumptions as outlined in the preceding paragraph. That is, infants and young children first only experience their environment directly with their senses (e.g., they see, hear, smell, touch). Thus, children's initial mental representations are very concrete. For example, a very young child represents the event of 'playing with a ball' probably concretely such as 'throwing a ball in the air and catching it'. In the course of development, children start to learn to abstract from their concrete experiences. Older children are usually able to represent the same action more abstractly, for instance in terms of 'doing sports'. This does not mean that older children or adults only represent objects and events abstractly. Rather, it means that an event *can* be represented abstractly because the cognitive abilities have developed by then, whereas this is not yet the case in very young children. Thus, abstract concepts may evolve out of concrete concepts.

It seems quite trivial to say that children learn abstractness on the basis of concreteness but this reasoning has interesting implications both for CLT and for our understanding of the mechanism underlying CLT. Specifically, if the concepts of distance and construal level both develop in childhood and if both developments rely on the same underlying mechanisms (i.e., the abstract dimension of time develops out of the concrete concept of space, and the abstract representation of an object develops out of a concrete experience), this can possibly explain the origin of the association between distance and construal level as being formed in early childhood. If this assumption is correct, it could be fruitful for CLT because an explanation of the over-generalized association between distance and construal level might be backed up by developmental research. On the other hand, evidence for this assumption might also question the validity of CLT. Specifically, it would be difficult to maintain the postulation of CLT that distance and construal level are different concepts. One could even propose that psychological distance and construal level may be one and the same thing. This argument has already been brought forward by Fiedler (2007) and Wallot (2008) and is particularly obvious in the case of probability. On the one hand, high probability (or low hypotheticality) indicates proximity. On the other hand, probability is sometimes introduced as an aspect of construal level (feasibility; Liberman & Trope, 1998). Feasibility concerns may actually reduce the probability of attaining a desired outcome (Fiedler, 2007). For example, the desired goal of a holiday trip is less likely to be attained when the holiday trip begins soon. Moreover, Sagristano et al. (2002) demonstrated that low probability (i.e., the possibility of not winning) is more likely realized for proximal than for distant decisions. Thus, high level and low level construals might be interpreted as end points of a dimension of distance itself, which means that a high level construal *is* psychologically distant, whereas a low level construal *is* psychologically near. Liberman, Trope, and Wakslak (2007) correctly recognized "if level of construal is defined as a distance dimension, the contention that distal things are construed more abstractly becomes tautological" (p.114). However, they argued that level of construal is a type of mental representation that is invoked by distance rather than a distance dimension itself. According to CLT, a high level construal *induces* a perception of greater distance but is not more distant per se, whereas a low level construal *induces* a perception of proximity but is not more proximal per se. Further empirical research has to find out which of the two points of view can be corroborated.

Considering that there is an impressive amount of research dealing with CLT effects in diverse areas such as choice, preferences, judgments and decision making, it is surprising that the influence of psychological distance on learning, and specifically on associative learning, has never been investigated. The present work fills this research gap. Specifically, the aim is to gather further evidence for distance effects within CLT but extend previous research by introducing another dimension of distance. The present research includes studies that utilize an associative learning paradigm, a paradigm that is novel in the context of CLT. The prediction is that association is a dimension of psychological distance and as such also influence a product of associative learning, namely our attitudes. Before explaining how distance might relate to and has an influence on associative learning, the next chapter first outlines the theoretical bases of associative learning.

4 Associative Learning

For many decades, it has been a goal of experimental psychologists to discover how animals and humans learn about relationships between stimuli and events in the world around them (Le Pelley, 2004). The reason for this interest is that the ability to learn about correlative or predictive relationships enables organisms to adapt and survive in a changing environment. Associative learning can be defined as the process by which an organism represents the relations between the events it experiences (Harris, 2006). The scientific study of associative learning began over a century ago with the pioneering studies of Thorndike (1898, 1911) and Pavlov (1927), and it continues today as an active area of research and theory (for a review see Wasserman & Miller, 1997). Even though the principles of associative learning have been studied primarily in nonhuman animals, the study of associative learning in human beings is growing in interest and importance (Shanks, 1994; Wills, 2005).

The cardinal example of associative learning is Pavlovian classical conditioning in which a neutral stimulus signals the delivery of a biologically significant event. Another (newer) line of research within associative learning is evaluative conditioning which investigates the acquisition of likes and dislikes. Although the focus of the present work lies on evaluative conditioning, it is crucial to first discuss classical (or Pavlovian) conditioning because evaluative conditioning arose out of classical conditioning and is sometimes still regarded as an instance of classical conditioning (e.g., Eagly & Chaiken, 1993). Before discussing whether this view is justified, the phenomenon of classical conditioning is outlined in more detail.

4.1 Classical Conditioning (CC)

Classical Conditioning (CC) is one of the most studied phenomena in psychology (Rescorla, 1988). CC is a form of associative learning that was first demonstrated by Ivan Pavlov (1927). The typical procedure in CC involves presentations of a neutral stimulus along with a stimulus of some significance. The neutral stimulus is referred to as conditioned stimulus (CS) and can be any event that does not result in an overt behavioral response from the organism under investigation. The presentation of the significant stimulus, on the other hand, necessarily evokes an innate, often reflexive, response. This stimulus is called unconditioned stimulus (US), whereas the response is called unconditioned response (UR). CS and US are then repeatedly paired. Eventually, the two stimuli become associated and the organism begins to produce a behavioral response to the CS called conditioned response (CR).

The original and most famous example of CC represents the salivary conditioning of Pavlov’s dogs: During his research on the physiology of digestion in dogs, Pavlov (1927) noticed that the dogs began to salivate in the presence of the lab technician who normally fed them. Following this observation, Pavlov predicted that a natural reflex such as salivation could be affected by learning. If a particular stimulus in the dog’s surroundings was present when the dog was presented with food, this stimulus would become *associated* with food and cause salivation on its own. Pavlov trained dogs to associate a tone with a food reward by using bells to call the dogs to their food. Initially, the dogs showed no or weak responses to the tone but after a few repetitions, the dogs started to salivate in response to the tone. The neutral stimulus (i.e., the tone) became a CS as a result of consistent paring with the US (i.e., food).

Since Pavlov’s seminal research (1927), CC was demonstrated in a plethora of studies. Therefore, it can be regarded as a long established fact that organisms tend to learn associations during CC, and that such associations mediate the CR. However, the picture of what is actually learned during conditioning is often too simplistic (Field, 2006a). For instance, the traditional view which was based on the reflex tradition in physiology sees conditioning as a kind of low level mechanical process in which the control over a response is passed from one stimulus to another. This view, even though proven wrong, is still quite popular in recent textbooks (e.g., Atkinson, Atkinson, Smith, & Hilgard, 1987). As we know now, conditioning does not represent an extremely restricted form of learning in which a single stimulus becomes associated with a single outcome. Rather, conditioning is a much more complex process in which past learning and contextual variables are accounted for (e.g., Field, 2006a; Rescorla, 1988). During conditioning, associations between representations of multiple events are formed, thus providing an organism with a detailed representation of its environment. Rescorla (1988) stated that the modern view "sees conditioning as the learning that results from exposure to relations among events in the environment." (p.152).

4.1.1 Important factors determining the effectiveness of CC

Whereas the more traditional descriptions of CC cite the pairing or contiguity of two events as responsible for producing conditioning effects, the view of conditioning as learning of relations sees contiguity as neither necessary nor sufficient (Rescorla, 1988). For example, Rescorla (1968) conducted a study with two conditions that had identical pairings of a CS (tone) with a US (shock). However, in one condition the US was also presented in between conditioning trials. Thus, the contiguity between CS and US was identical in the two conditions but they differed in terms of the information the CS provided about the US. In the condition in which the CS perfectly predicted the US, a significant conditioning effect was observed. In the other condition in which the likelihood of the US was not dependent on the presence of the CS, no conditioning effect was found. This experiment (Rescorla, 1968) demonstrated that simple contiguity of CS and US fails to capture the relation required to produce an association. Rather, conditioned responding is sensitive to the base rate of the US. Thus, when the CS provides no information about the occurrence of the US, no conditioning takes place. The key to obtaining conditioning effects is the predictive power of the CS, not the contiguity between CS and US (Field, 2006a). The phenomenon of conditioned inhibition (e.g., LoLordo & Fairless, 1985; Rescorla, 1969) even demonstrates that contiguity is actually unnecessary. In experiments on conditioned inhibition, one group experiences the CS only when the US is not present. If predictions about what is learned in such a situation are based on contiguity, then the organism should learn nothing. However, something is learned, namely that there is a negative relation between CS and US (LoLordo & Fairless, 1985; Pavlov, 1927; Rescorla, 1969).

Another important conditioning phenomenon is the Kamin (1968, 1969) blocking effect. In a typical blocking paradigm, there are two groups of participants. In the first phase of the experiment, one group is presented with conditioning trials in which a CS1 (e.g., a light) predicts a US, whereas the other group does not receive these trials. In the second phase, both groups experience a compound stimulus CS1 plus CS2 (e.g., a light and a tone) predicting the same US as in the first phase. Thus, one group has the history of a light alone signaling the US, whereas the other group lacks that history. The interesting result is that the tone becomes well-conditioned in the group that was not exposed to CS1-US contingencies. However, the pre-exposed group shows reduced conditioned responding to CS2 (the tone). This finding can be explained by the fact that the CS1 already reliably predicted the US and this blocks learning about the CS2 in the second phase. Thus, blocking can be described as the effect where the pairing of one stimulus with a US stops the US from being associated with other subsequently presented stimuli. The blocking effect is an example that organisms enter conditioning episodes with information about prior experience and prior relationships between CSs and USs. Other phenomena that support this assumption but will not be covered in detail here are latent inhibition (Lubow, 1973), learned irrelevance (Mackintosh, 1973), or super-learning (Aitken, Larkin, & Dickinson, 2000; Rescorla, 1971).

4.1.2 Associations: What is learned?

One of the persistent questions in studies of CC asks what organisms learn. When a CS like a tone is paired with a US like food until animals start salivating to the tone, do the animals learn to associate the CS with salivation or do they learn to associate the CS with food? The first possibility is in line with Pavlov's (1927) original notion of associative learning and assumes that conditioning involves the formation of stimulus-response (S-R) associations. The S-R explanation of learning assumes a connection between the CS and the US at the response level. According to this account, the CS acquires its own response that mimics the conditioned response elicited by the US. The second possibility suggests that conditioning involves stimulus-stimulus (S-S) associations which means that there is a mental connection between the cognitive representations of the CS and the US. The answer to whether CC is based on S-S or S-R associations is far from simple.

There are a number of different ways to investigate this question experimentally. Rizley and Rescorla (1972) used sensory preconditioning and second-order conditioning procedures in order to investigate what is actually learned. In sensory-preconditioning, a CS2 (e.g., a tone) is paired with a CS1 (e.g., a light). No conditioned responses develop because neither the light nor the tone produces an unconditioned response. In a next step, the CS1 (light) is paired with a US until the CS1 is producing a CR. When the CS2 (tone) is then presented in a final test, it also produces a CR. Thus, sensory preconditioning experiments suggest an S-S association because one CS becomes associated with a second CS even though no UR is present. The procedure used in second-order conditioning is slightly modified. First, a CS1 (e.g., a light) is paired with a US (e.g., food) just as in a regular conditioning paradigm. Post-conditionally, the CS1 is paired with a CS2 (e.g., a tone). The common finding is that the tone also produces a CR even though it has never been paired directly with a US. The light, a first-order CS, comes to serve as a US for the tone, a second-order CS. In terms of conditioning, the second-order conditioning procedure examines a forward spread, whereas sensory pre-conditioning investigates a backward spread.

In their experiments, Rizley and Rescorla (1972) investigated what happens when one presents the first-order CS without the US after second-order conditioning took place. This procedure called extinction is usually known to eliminate the CR. Specifically, the question was what would happen with responding to the second-order CS once the first-order CS is extinguished? If second-order conditioning involves associating the CS with the CR, the animal should continue responding (S-R learning). If, however, it involves associating the second-order CS with the first-order CS, the animal should stop responding, since the first-order CS is no longer associated with the US. The result was that animals continued to respond to the second-order CS after the first-order CS-US association has been removed (Rizley & Rescorla, 1972). The retention of conditioning to a second-order CS, despite the extinction of conditioning to a first-order CS upon which it was based, suggests that associations between the stimuli (S-S learning) do not provide the basis for second-order conditioning. However, in the case of sensory preconditioning, extinction of the first-order CS did completely eliminate responding to the second-order CS (Rizley & Rescorla, 1972). Thus, Rizley and Rescorla (1972) could show that extinction of the first-order CS has different effects in sensory preconditioning than it does in second-order conditioning, suggesting that the question of what is learned may have more than one answer.

In conclusion, the evidence suggests that S-S as well as S-R associations are formed in CC. Sensory preconditioning provides evidence for S-S associations because no S-R association can form. In second-order conditioning, the S-S association of CS1 and CS2 is relatively weak, allowing the S-R association to become dominant. This combination of competing associations and expectancies is further evidence that conditioning is a complex and sophisticated learning mechanism.

4.1.3 Theoretical models

As mentioned above, current theory sees conditioning very differently from the reflex account of the past which stated that conditioning is the simple pairing of two events. Instead, conditioning is seen as the learning of relations among events. Theories are needed that can explain how these relations are coded by the organism. The theories by Rescorla and Wagner (1972), Mackintosh (1975), and Pearce and Hall (1980) provide useful accounts. These models emphasize the importance of a discrepancy between the actual state of the world and the organism's representation of that state (Rescorla, 1988). They see learning as a process by which the two are brought into line. In other words, associative learning theories strive to capture the processes underlying and driving the change in strength of associations between representations of stimuli that develop as a result of experience of the predictive relationships between those stimuli (Le Pelley, 2004). In this paragraph, an overview of some of the most popular models of CC is given which does not claim to be exhaustive. I start with the Rescorla-Wagner (1972) model because it has been the dominant theory of associative learning in the last quarter of the twentieth century.

Rescorla - Wagner model (1972): The idea of the Rescorla - Wagner (1972) model is that learning is wholly governed by changes in the effectiveness of the US, with a surprising outcome supporting more learning than a predicted outcome. The contribution of the CS to learning is seen as fixed which makes the Rescorla-Wagner model a "US-processing"-model. According to the model, associations are formed between cues (CSs) and surprising outcomes (USs). The strength of the conditioned response that is evoked by a CS will depend on the strength of the associations between the representations of the CS and the US. The model is formalized in the following equation:

$$\Delta V_A = \alpha_A \beta \, (\lambda - \sum V)$$

According to this learning rule, the change in associative strength of a given CS (ΔV_A) is a function of the intensity or salience of the cue itself (α_A), known as associability, and the intensity of the US (β). The part in parenthesis is called error term and reflects the difference between the maximum associative strength that the US can support (λ; the maximum amount of conditioning possible with a given US) and the sum of the associative strengths of *all* cues presented on the trial ($\sum V$). In other words, the error governing associative change for any cue on a trial is based on the combined associative strength of all cues present on that trial. This summed error term is in contrast to earlier formal models of associative learning (Bush & Mosteller, 1951; Estes, 1950; Kendler, 1971) that employed separate and independent error terms for each presented stimulus. However, the assumption of cue independence in earlier models has been challenged by studies demonstrating that cues presented in compound interact and compete for associative strength. This is most powerfully demonstrated in the phenomenon of blocking (Kamin, 1969). The Rescorla-Wagner model with its assumption of a summed error term is able to explain such blocking and related cue competition effects. For example, a first cue A acquires associative strength up to a maximum value that depends on the intensity of the US. In a second phase of the experiment, the amount of associative strength gained by a second cue B depends on the discrepancy between the amount of conditioning supported by the US (λ) and the summed associative strength of A and B ($\sum V$). The presentation of A up to its maximum associative strength means that the summed associative strength of A and B will equal the amount of conditioning supported by the US. As a consequence, the discrepancy between A and B is zero which implies that the associative strength acquired by B is also zero. Put in more psychological terms, the Rescorla-Wagner model postulates that learning (i.e., the change in associative strength) depends on the extent to which the presence of the US is expected (De Houwer & Beckers, 2002). If participants learn on the A-only trials that A predicts the US, they are not surprised by the presence of the US on the A plus B trials. As a result, they learn little about the relation between B and the US.

Summing up, the model states that the change in associative strength (i.e., the amount of learning) will depend on three things (Field, 2006a): First, it depends on the intensity of the US: stronger USs produce stronger conditioned responding. Second, it depends on the salience of the CS which itself can be influenced by a number of other factors. And third, it depends on the extent to which the CS is presented with other cues that already have some associative connection to the US (cue competition effects).

Mackintosh's (1975) model: In the Rescorla-Wagner model, the associability of a cue (i.e., the amount of processing power secured by a given CS) is simply a fixed parameter depending on its intensity or salience. The Mackintosh (1975) model, on the other hand, is a "CS-processing" model which sees associability as a variable that is able to change as a result of experience with a cue and with that cue's predictive abilities. Mackintosh (1975) suggested that the attention devoted to a given cue is a function of its importance in predicting an outcome. Put more simply, organisms devote attention to relevant stimuli at the expense of not giving attention to irrelevant stimuli. The model can be formalized as follows:

$$\Delta V_A = \alpha_A \, \beta \, (\lambda - \sum V_A)$$

In the model, V_A refers to the existing associative strength of the cue. In contrast to the Rescorla-Wagner model, the associability of a cue (α_A) does not stay constant but updates as a function of the degree to which that cue predicts the outcome relative to other cues that are presented on the same trial. Specifically, cue A maintains a high α to the extent that it is a better predictor of the outcome of the current trial than are all other cues present. Conversely, α will decrease if the outcome is predicted by other events in the environment at least as well as by A. Thus, if the associative strength of the CS approaches its maximum (or is closer to the maximum for that CS than for any other cue) the salience of that CS increases which makes the CS a better predictor. On the other hand, if the associative strength of the other cues is as close or closer to the possible maximum than the associative strength of the CS, the salience of the CS will decrease. This results in the CS being a weaker predictor for the outcome. Attentional models such as the Mackintosh (1975) model explain blocking effects in terms of associability rather than error. The first CS which is known to predict the US reliably attracts most or all of the attentional resources when it is presented together with a second CS. Thus, the second CS receives little or no attention which implies that no learning takes place (Kruschke & Blair, 2000; Mackintosh, 1975). However, the Mackintosh (1975) model cannot explain phenomena such as latent inhibition which led Pearce and Hall (1980) to the development of an alternative model.

Pearce-Hall (1980) model: Like Mackintosh's (1975) model, the Pearce-Hall model is an attentional model that is based on CS-processing. However, Pearce and Hall (1980) have a view on associability processes that is diametrically opposite to that taken by Mackintosh (1975). Specifically, Pearce and Hall (1980) believed that attention is not placed on CSs that already reliably predict a US. Rather, attention should be given to stimuli about which the predictive significance is unclear. It is reasoned that limited attentional resources should not be "wasted" on stimuli that are already known to be reliable predictors of a certain outcome. Instead, it would seem to make more sense to devote attention to stimuli whose predictive status is currently unclear in an attempt to learn more rapidly about the true significance of those stimuli. These proposals capture the intuition that an organism needs to attend to and fully process an event of which the consequences are uncertain, but may deal differently with an event with known consequences. Thus, in contrast to Mackintosh (1975), Pearce and Hall (1980) propose that the associability of a CS is declining when a CS accurately predicts its consequences, whereas the associability of a CS is increasing when the CS is followed by unpredictable consequences. Thus, the associability of a CS changes on each trial depending on whether the US was predicted on the previous trial.

In the Pearce-Hall (1980) model, there are different equations depending on whether the trial is excitatory or inhibitory. The following equation describes an excitatory trial.

$$\Delta V_A^n = \beta_E \alpha_A^{n-1} \lambda^n$$

The equation describes that the change in associative strength is determined by a function of a learning parameter related to US intensity (β_E), the associative strength of the CS on the previous trial (α_A^{n-1}) and the maximum possible conditioning (λ^n). The equation demonstrates that the Pearce-Hall model goes one step further than Mackintosh (1975) in its view of the role of associability processes in learning. For excitatory learning, the model places the entire burden of modulation of associative change on processing of the CS. There is no error term in the calculation of associative change.

In inhibitory trials, the change in associative strength is determined by a function of a learning rate parameter related to US intensity (β_I), the associative strength of the CS on the previous trial (α_A^{n-1}), the discrepancy between the maximum possible conditioning (λ^n), and the extent to which a US is predicted by all stimuli presented on that trial ($\sum V_{NET}^{n-1}$).

$$\Delta V_A^n = \beta_I \alpha_A^{n-1} (\lambda^n - \sum V_{NET}^{n-1})$$

The Pearce-Hall (1980) model can also explain blocking effects. During the first phase, cue A is established as a good predictor of the outcome, and its associability will decline accordingly. In the second phase, the AB compound is followed by the US. The presence of A will ensure that the US is already well predicted on these trials. Thus, the outcome following AB trials is not surprising. As a result, little attention will be devoted to the elements of this compound and little will be learnt about B compared to a control group without pre-training. In the control group, the occurrence of the US on AB compound trials is more surprising.

Interestingly, attention to (or processing of) the CS can be measured in terms of an orienting response (OR) which is not to be mistaken for a CR. Thus, support for the Pearce-Hall model comes from the finding that subjects orient towards novel stimuli and maintain their orientation, given that the stimulus is a poor predictor of the US (Pearce & Kaye, 1985). Similar and further evidence supporting the Pearce-Hall view of associability is provided by the observation that, under certain conditions, learning about a stimulus is more rapid when that stimulus is an inaccurate predictor of the events that follow it than when it is an accurate predictor (Kaye & Pearce, 1984; Swan & Pearce, 1988; Wilson, Boumphrey, & Pearce, 1992).

Hybrid models: The formal models introduced so far have focused on two potential factors underlying associative change, namely processing of the CS (in terms of changes in associability) and processing of the US (in terms of changes in error). However, all of these models have some problems. For example, the Rescorla-Wagner model assumes that the individual associative strength is unimportant and that only the combined associative strength matters. Even though Mackintosh's model does not have this problem because it views cue competition in terms of associability rather than error, it is unable to explain conditioned inhibition. The Mackintosh and Pearce-Hall models both focus on CS processing but take opposing views of the way in which processing of a stimulus changes as a result of experience of predictive relationships involving that stimulus. Given the existence of evidence supporting each of these conflicting views, it becomes clear that none of these approaches alone is sufficient to account for the range of empirically observed effects. The hybrid model by Le Pelley (2004) combines features of all the previously mentioned approaches in an attempt to capture the strengths of each. The details of the hybrid model are beyond the scope of this work but in general, the model can be broken down into the following features: attentional associability (as in Mackintosh's model), salience associability (as in the Pearce-Hall model), summed error term (as in the Rescorla-Wagner model), and separable error term. By integrating two different approaches to changes in CS processing as a result of experience, and by further combining these associability-based processes with mechanisms allowing for modulation of learning in terms of changes in the processing of the US, the model is able to reconcile a number of seemingly opposing effects. The hybrid model can, for example, explain conditioning phenomena such as learned irrelevance, blocking, latent inhibition, and conditioned inhibition, and thus provides a more satisfactory account of associative learning than the previous single-process theories (Le Pelley, 2004).

These theoretical models provide possible explanations for the processes underlying CC. More specifically, they try to formalize when and under what conditions the pairing of a CS with a US results in a CR, thus indicating a successful conditioning procedure. In CC, the CR usually manifests itself in some kind of behavioral or physiological response (e.g., avoidance behavior, salivation, heart rate, etc.). However, there are also other CRs that some researchers claim to be the result of CC. Specifically, CC is also generally considered to be one of the approaches to influence liking and preferences. Textbooks, for example, often refer to CC as a mechanism that leads to attitude formation (e.g., Eagly & Chaiken, 1993). And even though the Pavlovian CC paradigm is often cited as the prototypical example of how attitudes are acquired, it is not really suitable for explaining the origin of attitudes (Walther, Nagengast, & Trasselli, 2005). In CC, the organism learns an if-then relationship between the CS and the US such that it acquires an expectancy that the US (e.g., food) will follow when the CS (e.g., tone) occurs. Conversely, attitudinal processes do not refer to the prediction of events (Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992). Rather, attitude objects acquire affective or cognitive meaning because they are associated with pleasant or unpleasant experiences. In learning psychology, the term “evaluative conditioning” (EC) is used to refer to the conditioning of attitudes. Thus, EC can be considered to be another instance of associative learning. The next chapter discusses the phenomenon of EC, its theoretical bases and empirical findings as well as the similarities and differences of CC and EC.

4.2 Evaluative Conditioning (EC)

The question of how preferences are acquired has a longstanding history in psychology. The reason for this interest in the process of preference (or attitude) acquisition is the idea that preferences are an important determinant of behavior (e.g., Allport, 1935; Martin & Levey, 1978). That preferences indeed influence behavior can be seen in many different areas of life. To name only two examples, people tend to seek the company of persons they like and avoid being in the company of persons they dislike; they buy products that they like more often than those that they do not like. Thus, in order to understand, predict, and influence behavior, it is essential to understand how preferences are formed (De Houwer, 2007). Although some preferences are genetically determined, most stem from learning that took place during the lifetime of the individual (e.g., Rozin, 1982). Evaluative conditioning (EC) is generally considered to be one such type of learning that is able to explain the acquisition of attitudes. EC describes changes in liking that are due to the pairing of stimuli. Importantly, EC is not to be seen as a certain procedure or as a theoretical process but rather as an effect (De Houwer, 2007). There are several advantages of defining EC as an effect. For instance, it clarifies that more than one procedure can be used to obtain EC effects. Moreover, defining EC as an effect implies that EC can be due to multiple processes.

In a prototypical EC study, a subjectively neutral stimulus (CS) is repeatedly paired with a subjectively liked or disliked stimulus (US). The mere pairing results in a transfer of valence such that the formerly neutral stimulus acquires the affective qualities of the stimulus with which it was paired (e.g., Baeyens, Eelen, Crombez, & Van den Bergh, 1992; Walther, 2002). A stimulus that initially evokes a neutral affective response comes to evoke a positive or negative affective response because the stimulus has been paired with a different stimulus of strong affective value. In other words, after conditioning, a formerly neutral stimulus is judged more positively (or negatively) due to the simple co-occurrence with the positively (negatively) evaluated US. EC is another example of associative learning because the EC effect is usually explained by the formation of an association between the cognitive representation of the CS and the US (see also paragraph 4.2.3; De Houwer et al., 2001; Walther, 2002).

EC is a well-known paradigm in learning psychology and one of the few experimental models that is able to explain how preferences (or aversions) can be acquired (Rozin, Wrzesniewski, & Byrnes, 1998), namely by a simple spatio-temporal co-occurrence of positively (or negatively) evaluated events with a neutral event or stimulus. The interest in explaining preferences as conditioned responses dates back to the 1930s when Razran conducted several studies (all reported only as abstracts) in which various stimulus materials (e.g., music, literary quotations, political slogans) were first rated and subsequently presented during a free luncheon (the so-called luncheon technique). Evaluations of these stimuli became more positive because of the association between the stimulus and the pleasant experience of the luncheon. However, when stimuli were paired with noxious odor, likeability ratings of these stimuli decreased (Razran, 1938a, 1938b, 1940a, 1940b). Thus, the pairing of a CS (political slogan) with either a positive (free lunch) or negative (unpleasant odor) US changed the liking of the CS (Razran, 1954). Staats and Staats (1957) investigated the conditioning of attitudes by developing a verbal conditioning paradigm. They presented participants with either national names (e.g., Dutch, Swedish) or male names as CSs. These CSs were then paired with positively or negatively valenced words (Staats & Staats, 1958). The results provide early evidence for EC. The words paired with either positively or negatively valenced words acquired the affective value of the words with which they were paired, which means that participants responded differently to stimuli paired with positive words as compared to stimuli paired with negative words.

Martin and Levey first used the term "evaluative conditioning" in 1978. However, it was already in 1975 that they introduced what has become known as the "picture-picture" paradigm. In their study, participants were asked to sort picture postcards into the categories ‘liked’, ‘disliked’ and ‘neutral’. Then they had to choose the two most liked and two most disliked pictures that subsequently were paired with pictures from the neutral category resulting in two neutral-liked and two neutral-disliked pairs. One neutral-neutral pair served as a control pair. The shifts in the liking of the CSs of the neutral-liked and neutral-disliked pairs were later compared to this control pair. In the test phase, participants had to judge the pictures again. Levey and Martin (1975) found that participant’s evaluation of the formerly neutral stimulus shifted in a negative direction when paired with a negative US and in a positive direction when paired with a positive US.

Since these early demonstrations of EC, the phenomenon has been examined in a large number of studies (see De Houwer et al., 2001) by a variety of researchers from backgrounds as diverse as learning psychology (e.g., Martin & Levey, 1978), social psychology (e.g., Olson & Fazio, 2001; Walther & Langer, 2008; Zajonc, 1980), consumer science (e.g., Stuart, Shimp, & Engle, 1987), emotion research (e.g., Sherer, 1993), and clinical psychology (e.g., Hermans, 1998). The generality of EC becomes obvious when taking a look at the different kinds of stimuli and procedures used in EC research.

4.2.1 Stimuli and procedures

Modern EC research is based on the work of Martin and Levey (1975) who introduced the so-called 'picture-picture' EC paradigm. Studies within the visual domain have been of primary interest to a variety of other researchers (Baeyens, Eelen, van den Bergh, & Crombez, 1989a, 1989b, 1990, 1992a, 1992b, Baeyens, Hermans, & Eelen, 1993; De Houwer, Baeyens, Vansteenwegen, & Eelen, 2000; Hammerl & Grabitz, 1993, 1996; Walther, 2002).

The typical procedure consists of three consequential phases. During the first phase, the baseline, participants are presented with a number of pictures. These stimuli can be pictures of seemingly unspectacular objects such as fountains and outdoor sculptures (Hammerl & Grabitz, 1996). Pictures of human faces have also proven to be successful in establishing EC effects (e.g., Walther, 2002). Participants have to evaluate the pictures with regard to how much they like them. The evaluated pictures are categorized (by the experimenter or by a computer program) as disliked, neutral, and liked. The pictures that the participants like most and those they like least of all serve as USs. The pictures that the participants judge to be neutral are selected as CSs. A CS is then assigned to a US, creating CS-US pairs that are either neutral-liked pairs or neutral-disliked pairs. There are also neutral-neutral pairs (two CSs) that serve as control pairs. A control pair is needed to have a comparison standard to which obtained conditioning effects for the neutral-liked and neutral-disliked pairs can be compared to.

Alternatively to this baseline phase during which participants have to rate all stimuli according to their likeability, some studies have applied a slightly different procedure (Gawronski, Walther, & Blank, 2005; Langer, Walther, Gawronski, & Blank, in press; Walther, Gawronski, Blank, & Langer, 2009). During the so-called attitude formation phase, participants are presented with slightly positive or negative stimuli along with positive or negative behavioral information pertaining to these stimuli. Thus, the USs are not selected by the participant but are created by preselecting slightly positive and negative stimuli and presenting them with positive and negative information. This procedure is also quite successful in establishing EC effects (Langer et al., in press; Walther et al., 2009) and has the advantage of preventing strong inter-individual differences in the evaluation of the USs. Thus, on a technical level, this attitude formation procedure might be regarded as an instance of second-order conditioning, in which a CS first acquires the qualities of a US before it is paired with another CS in a learning paradigm (Walther, 2002). However, the fact that these studies did not use initially neutral USs but rather USs that already possessed some valence before being paired with positive or negative statements, distinguishes this procedure from the standard second-order learning paradigm (Walther et al., 2009).

In the second phase of the experiment, the conditioning phase, the picture pairs are repeatedly presented to participants. Typically, the CS appears for a short time (e.g., 1000 ms), there's a trace interval of a few seconds, and then the US appears (e.g., again for 1000 ms). The exact timings and the number of times each CS-US pair is presented varies across studies. In the third phase, the test phase, participants have to re-rate all pictures that were presented in the conditioning phase. There are a number of different measurement techniques which can roughly be divided into explicit and implicit attitude measures. The most common explicit measure are probably rating scales (e.g., Baeyens, Crombez, Van den Bergh, & Eelen, 1988; Baeyens et al., 1989a, 1989b, 1990; Field & Davey, 1999; Hammerl & Grabitz, 2000; Walther, 2002) but also ranking scales (e.g., Field, 2006b; Johnsrude, Owen, Zhao, & White, 1999; Levey & Martin, 1975). Implicit attitude measures have also been successful in demonstrating EC effects (e.g., Field, 2006b; Hermans, Vansteenwegen, Crombez, Baeyens, & Eelen, 2002; Olson & Fazio, 2001; Walther et al., 2009). The affective priming paradigm (Fazio, Jackson, Dunton, & Williams, 1995) is the most commonly used implicit attitude measure employed in EC. In a standard affective priming task, a positive or negative target stimulus is preceded by a positive or negative prime stimulus. Participants are told to ignore the prime stimulus and to categorize the target stimulus as quickly as possible on the basis of its valence. Results typically show that the reaction time toward the target stimulus is mediated by the valence of the prime stimulus. When prime and target have the same valence, response times are significantly shorter than when both stimuli have different valences. This effect is based on the automatic processing of the valence of the prime (see Fazio, 2001, for a review).

The hypotheses of the standard EC experiment are that the evaluation of a formerly neutral stimulus (CS) shifts toward a more positive direction when paired with a liked stimulus during acquisition. When paired with a disliked stimulus the evaluation of the CS is hypothesized to shift toward a more negative direction. Many researchers have obtained significant EC effects using the described paradigm (Baeyens et al., 1989, 1990, 1992, 1993; De Houwer et al., 2000; Hammerl & Grabitz, 1993, 1996; Walther, 2002). This suggests that EC within the visual domain is stable and reliable although there have been a number of failures to replicate the standard effects (e.g., Rozin et al., 1998).

EC effects are not restricted to the picture-picture paradigm but have been found in other domains as well. For instance, in the gustatory domain, EC worked successfully in several studies (Baeyens, Crombez, Hendrickx, & Eelen, 1995; Zellner, Rozin, Aron, & Kulish, 1983). However, it has to be mentioned that the effects tend to be less reliable when positive USs are used but seem to be very reliable with negative USs (Baeyens et al., 1990, 1995). The only evidence for EC effects in the haptic domain comes from three studies by Hammerl and Grabitz (2000). Regarding odor preferences, there is only inconsistent evidence that these can be conditioned (Stevenson, Boakes, & Prescott, 1998; Stevenson, Boakes, & Wilson, 2000; Stevenson, Prescott, & Boakes, 1995). In the cross-modal domain, successful EC could be demonstrated using combinations of CS and US that were visual-auditory (e.g. geometric shapes and music, Bierley, McSweeney & Vannieuwkerk, 1985) or visual-olfactory (e.g. photographs of faces and odors, Todrank, Byrnes, Wrzesniewski, & Rozin, 1995). However, there have also been several studies that failed to produce cross-modal EC effects (Baeyens et al., 1990; Baeyens, Vansteenwegen, De Houwer, & Eelen, 1996) leaving open the question of possible boundary conditions within the cross-modal domain.

To summarize, it can be said that EC effects can be demonstrated with a large variety of different kinds of stimuli. The visual domain is the one that receives the most attention in psychological research and also the one where EC effects are obtained most reliably. Even though EC seems to be a robust and reliable phenomenon the failure of some studies (Van Reekum, van den Bergh, & Frijda, 1999; Baeyens et al., 1990; Field & Davey, 1999; Rozin et al., 1998) to obtain EC effects shows that there are limitations to the phenomenon that are hard to explain. In the next paragraph, factors that influence the effectiveness of EC as well as possible boundary conditions for EC are discussed.

4.2.2 Important factors determining the effectiveness of EC

Although an abundant amount of research has devoted attention to EC, it is still not completely clear what boundary conditions need to be fulfilled in order to obtain EC effects. This is partly due to the fact that there are no reports of studies in which possible boundary conditions were systematically investigated (De Houwer, Baeyens, & Field, 2005). However, several researchers that have failed to obtain EC have speculated about the procedural parameters necessary in order to find EC. According to De Houwer (2009b), two types of variables that modulate EC should be distinguished. The first type is variables that relate to the manner in which the stimuli are paired, whereas the second type relates to the conditions under which stimuli are paired.

A first important variable with regard to the manner in which stimuli are paired is the order of CS and US. In conditioning, there is a distinction of forward conditioning and backward conditioning. In a forward conditioning procedure, the CS is consistently followed by the US, whereas in a backward conditioning procedure, the presentation order of CS and US is reversed. Thus, a backward conditioning procedure resembles the circumstances found in many consumer and marketing contexts, where advertisers frequently present the US before displaying the product they intend to sell (the CS; Stuart et al., 1987). Forward conditioning procedures are most frequently used in EC research because EC effects are usually larger with forward than with backward conditioning (Hammerl & Grabitz, 1993; Stuart et al., 1987). However, there are also significant changes in liking of the CS when a backward procedure is applied (Martin & Levey, 1978; Stuart et al., 1987).

Another relevant variable is the number of times US and CS are paired. Although studies have shown stronger EC effects with increasing number of pairings (e.g., Baeyens et al., 1992a), the same studies also revealed that going beyond a certain number of pairings (i.e., 20 pairings) does no longer lead to the strengthening of the effect and might even produce a weaker EC effect. Thus, overexposing participants to the CS-US pairings can have adverse effects. One should note, however, that there are also studies that have successfully demonstrated EC with only a single CS-US pairing (Stuart et al., 1987).

A third factor concerns the statistical contingency between CS and US (De Houwer, 2009b). Whereas in CC the degree of statistical contingency is crucial (Rescorla, 1968), it appears to have less of an impact in EC (De Houwer et al., 2001). For instance, Baeyens et al. (1993) manipulated the degree of CS-US contingency in the standard picture-picture paradigm. In one condition, the CS and the US were presented 10 times in close temporal contiguity without any additional CS-only or US-only presentations. In the second condition, there were 10 CS-US presentations and an additional 10 CS-only presentations. In the third condition, there were 10 CS-US presentations, 10 CS-only, and 10 US-only presentations. Baeyens et al. (1993) found that the different levels of CS-US contingency did not result in significantly different levels of conditioning, which suggests that EC is resistant to extinction. Once the valence of a CS has been changed by pairing it with a US, this learned valence cannot be erased by simply presenting the CS on its own (e.g., Baeyens et al., 1988; De Houwer et al., 2000). Another implication of this result is that changes in the liking of a stimulus can be long lasting (De Houwer, 2009b). These results as well as similar findings suggest that CS-US spatiotemporal contiguity is more important than statistical contingency.

The second type of variable important in determining the effectiveness of EC refers to the conditions under which the pairings are presented. In this context, the most hotly debated issue that has received considerable attention is the question of whether EC depends on the awareness of the CS-US contingencies (De Houwer, 2009b). Some studies suggest that changes in the liking of a CS occur without people being aware of the fact that the CS has been repeatedly paired with another stimulus (e.g., Baeyens, Eelen, van den Bergh, 1990; Fulcher & Hammerl, 2001). Thus, persons form attitudes toward objects, other individuals, or events without knowing the source of valence that led to this attitude. Moreover, EC has also been observed when CSs and USs were presented too briefly to be consciously detected by participants (e.g., De Houwer, Hendrickx, & Baeyens, 1997; Dijksterhuis, 2004; Krosnick, Betz, Jussim, & Lynn, 1992). Evidence for nonconscious EC also comes from Olson and Fazio (2001) who demonstrated that attitudes toward various Pokemon figures formed without an explicit focus on these figures. However, the evidence regarding EC without contingency awareness is rather mixed. There are several studies documenting EC effects only when participants were aware of the contingencies (Allen & Janiszewski, 1989; Fulcher & Cooks, 1997; Ghuman & Bar, 2006; Pleyers, Corneille, Luminet, & Yzerbyt, 2007; Shimp, Stuart, & Engle, 1991).

One problem that might be responsible for these contradictory findings is the fact that EC studies often differ with respect to the learning parameters that are involved (Walther & Langer, 2009). For example, the range of USs used in EC studies ranges from mild USs (e.g., liked or disliked faces) to highly arousing appetitive or aversive pictures (e.g., IAPS pictures, Lang, Bradley, & Cuthbert, 2005). It seems quite plausible that the type of US influences whether participants become aware of the CS-US contingency during the experiment. Another factor refers to the question of measurement of contingency awareness. Although widely debated, no agreement has been reached yet regarding this issue (Baeyens et al., 1993; Dawson & Reardon, 1973; Field, 2000, 2001; Field & Moore, 2005; Hammerl, 2000; Lovibond & Shanks, 2002, Plyers et al., 2007). As Walther and Nagengast (2006) demonstrated, the way contingency awareness is measured strongly determines whether a person is categorized as aware or unaware. Besides, there are different ways of computing contingency awareness (e.g., person-wise or item-wise), which also leads to different results regarding influences of contingency awareness on EC effects. Before agreement is reached on what constitute the learning parameters of a standard EC paradigm and on how to measure and compute contingency awareness, the question of whether contingency awareness is a necessary condition for EC to occur cannot be answered conclusively. Future research should concentrate on defining the conditions under which EC occurs without awareness as compared to the conditions under which EC only occurs with contingency awareness.

This overview of some procedural and functional parameters is by no means exhaustive but rather highlights some of the most important characteristics important in EC research. However, in order to completely and systematically determine the factors that modulate EC, it is necessary to investigate possible boundary conditions of EC in a more systematic manner.

4.2.3 Associations: What is learned?

Another issue of debate is which processes are underlying EC. Even though EC has been investigated for decades, its underlying mechanisms are still not sufficiently well understood (De Houwer et al., 2001; Walther et al., 2009; Walther & Langer, 2008). Similarly to CC, the question is whether EC is an example for stimulus-response (S-R) or stimulus-stimulus (S-S) learning. S-S learning implies that a CS acquires evaluative meaning by means of its association to the US (Rescorla, 1974). The presentation of the CS activates the associative link to the US which in turn makes the evaluative meaning of the US accessible. S-R learning, on the other hand, implies that the CS changes intrinsically during the conditioning procedure (Walther et al., 2009). The question of whether S-S or S-R learning underlies conditioning has also been investigated in CC research and a more detailed explanation of the differences of S-R and S-S learning has been given in the respective paragraph (4.1.2).

In conditioning research, one popular way of testing which of these two assumptions is correct has been the US-revaluation paradigm (Rescorla, 1974). US-revaluation means that post-conditional changes in the valence of USs lead to corresponding changes in the valence of the CSs that had previously been paired with these USs (Baeyens et al., 1992b; Walther et al., 2009). For instance, Walther et al. (2009) post-conditionally presented positive USs with negative statements and negative USs with positive statements. Subsequently, participants had to rate the likeability of the CSs and USs. The revaluation procedure not only led to a reversal in the valence of the US but also changed the liking of the CS in the direction of the revaluated US. Importantly, this effect occurred even though the CSs have neither been paired with the revaluating information nor with the revaluated USs. Thus, changing the attitude toward a given stimulus (US) leads to corresponding changes in attitudes toward stimuli (CS) that were merely associated with the US. These results provide a straightforward answer to the question of whether S-R or S-S learning underlies EC. S-R learning implies that responses to the CS should be unaffected by US revaluation because the CS acquires its own valence during the pairing with the US. Consequently, the evaluation of the CS should not change if the original evaluation of the US is changed. S-S learning, on the other hand, implies that responses to the CS should reflect the new valence of the US. The data of revaluation studies (Baeyens et al., 1992b; Walther et al., 2009) provide strong evidence for S-S rather than S-R learning in EC. However, the results of the US-revaluation studies cannot completely rule out S-R learning. Walther et al. (2009) critically remarked that it might be possible that S-R learning occurred in the US-revaluation phase and thus counteracted prior S-R learning that occurred during the attitude formation phase. Moreover, the S-S learning account does not make any assumption about how the associations between stimuli cause the organism to make a response. In other words, evaluative learning cannot only be the result of S-S learning because this implies that each US would acquire its valence by means of an association to another US which in turn would have acquired its valence through an association to still another US, and so on (Walther et al., 2009).

4.2.4 Differences and similarities of EC and CC

CC and EC do appear to be quite similar on a procedural level. Both, in EC and CC, a pairing procedure of a neutral CS with a US leads to a change in value assigned to the CS. Taking this similarity into account, it seems as if EC is just a different form of CC. This is compatible with the view that was long held by learning theorists as well, namely that CC is the prototypical example of how attitudes are acquired. However, when taking a closer look at the processing level it becomes clear that these two forms of learning differ in several aspects. Although modern learning theories regard EC as a distinct form of learning, it is not clear whether the assumption of two different processes underlying EC and CC is justified (Walther & Langer, 2009). The following section explains the functional characteristics of EC in comparison to CC.

Learning without awareness of the stimulus contingencies: The awareness of the CS-US contingency is of critical importance in CC (Brewer, 1974; Dawson & Schell, 1987; Lovibond & Shanks, 2002; Shanks & St. John, 1994). The presentation of the CS is contingently followed by the US. Conditioning only occurs when subjects are aware that the CS (e.g., tone) signals the occurrence of the US (e.g., shock). The organism acquires an expectancy that a shock will follow when it hears the tone. The participant cannot expect the shock after a tone if he is not aware that there is a statistical correlation between the two stimuli and that the tone predicts the shock. The conscious awareness of the contingencies between CS and US seems to be a necessary precondition for CC to occur. However, there is also empirical evidence that CC can occur without awareness under certain conditions (Öhman, Esteves, & Soares, 1995; Öhman & Soares, 1998; Schell, Dawson, & Marinkovic, 1991). The role of contingency awareness in EC has already been discussed in paragraph 4.2.2 which is why the issue is not discussed in detail here. Summing up the respective paragraph, it can be concluded that the evidence regarding the possibility of EC effects without contingency awareness is rather mixed and probably depends on several learning parameters such as the nature of the stimuli and the number of CS-US pairings as well as on the specific way of measurement. Although a large amount of research has demonstrated EC without contingency awareness, the actual role of contingency awareness in EC is not very well understood yet. Consequently, it is currently not possible to conclude whether the issue of contingency awareness is something that suggests that EC is a different form of learning than CC or not.

Statistical stimulus contingency: Traditional CC studies show that a statistical contingency between CS and US is of crucial importance for the learning procedure (e.g., Rescorla, 1968). Whether a CS functions as a predictor for US occurrence depends on the objective degree of statistical correlation between CS and US occurrence. The organism only acquires the predictive qualities of the CS if it is contingently paired with the US. This is a basic criterion for organisms that enable them to distinguish between stimuli with and without predictive qualities. Moreover, this is also one reason why signal learning has rarely been applied to social psychology because strict CS-US contingency rarely occurs in the real world (Walther et al., 2005). EC, on the other hand, is not dependent on the statistical CS-US contingency, which increases the range of situations in which evaluative learning can be applied. Baeyens et al. (1993) manipulated the degree of CS-US contingency and found no significantly different levels of conditioning. Thus, the predictability of a US doesn’t seem to be part of the EC learning process (Walther & Langer, 2009). This assumption is further supported by the lack of blocking effects in EC.

Resistance to extinction: In CC, single CS-presentations (CS without US) in the post-acquisition phase lead to a gradual elimination of the previously acquired conditioned response (e.g., Hamm & Vaitl, 1996; Hughdahl & Öhmann, 1977). This phenomenon is referred to as extinction. EC, however, is highly resistant to extinction, which means that after successful evaluative learning, single CS presentations do not alter the previously acquired valence (Baeyens et al., 1988, 1989a, 1995; De Houwer et al., 2000). Thus, EC is stable over time which means that the once acquired affective attitude is not changed when the attitudinal object is presented without the US after conditioning. Several studies demonstrated that the acquired valence of the CS remained unchanged even when the CS was presented several times without US reinforcement (Walther, 2002). Even when the number of extinction trials was twice as large as the number of acquisition trials EC was resistant to extinction (De Houwer et al., 2001), which is a clear difference to CC.

Sensory preconditioning: Both paradigms, EC (e.g., Walther, 2002) and CC (e.g., Kimmel, 1977), are sensitive to sensory preconditioning. Sensory preconditioning refers to the phenomenon that affective value of the CS can be transferred to stimuli that have never been directly paired with the US but are pre-associated with the CS (Barnet, Graham, & Miller, 1991; Hammerl & Grabitz, 1996; Walther, 2002). This means that the liked or disliked US not only affects the evaluation of the CS but also influences the evaluation of other stimuli pre-associated with the CS. Thus, affective-evaluative learning can occur without directly experiencing a valued event (Hammerl & Grabitz, 1996). In other words, attitudes are not always based on a direct appetitive or aversive experience but can also be based on prior experiences with similar attitudinal objects, or on mere pre-associations (Walther et al., 2005).

Counterconditioning: The sensitivity of EC to counterconditioning procedures is another feature that parallels findings form CC research (Lovibond & Dickinson, 1982). As already mentioned, EC is resistant to extinction and the attitude toward a CS cannot be altered by simple exposure to the CS. However, if the CS is post-experimentally paired with a US of opposite than the acquired valence the positive or negative evaluation of the CS can be eliminated or even changed into an evaluation of opposite valence. Counterconditioning implies that affective attitudes can be changed through a post-conditional affective experience of opposite valence. A stimulus that is evaluated negatively can become neutral or even positive in the context of a positively evaluated stimulus (e.g., Baeyens et al., 1989a).

US-Revaluation: As already mentioned in paragraph 4.2.3, the US-revaluation effect provides convincing evidence for S-S learning in EC. US-revaluation has also reliably been found in CC (Delamater & Lolordo, 1991; Rescorla, 1974), which is additional evidence for the assumption that S-S learning also plays an important role in CC. In US-revaluation, a CS-US pair is presented first and the US is post-conditionally revalued in the absence of the CS. When the CS is subsequently tested alone, the common finding is that the evaluation of the CS reflects the new valence of the US (Baeyens et al., 1992b; Walther et al., 2009). The US-revaluation effects can hardly be explained in any other way than by an associative account and support the view that CC and EC are based on associative learning mechanisms.

Latent inhibition: Latent inhibition (or CS pre-exposure) refers to a phenomenon in CC and describes the finding that exposure to the CS prior to conditioning slows down the development of a CR (Lubow, 1973; Lubow & Moore, 1959). The effects of CS pre-exposure have also been investigated in EC. For instance, Stuart et al. (1987) explored latent inhibition in an advertising context and found that CS pre-exposure retarded conditioning relative to a control condition with no CS pre-exposure. A study of De Houwer et al. (2000) applying a picture-picture paradigm demonstrated EC effects only in the no pre-exposure group. However, only few studies have investigated latent inhibition in EC, which is why more research is needed before definite conclusions can be drawn.

As we have seen, there seem to be functional differences between CC and EC. Unlike CC, EC appears to be driven by simple contiguity instead of statistical contingency, not necessarily dependent on contingency awareness, and resistant to extinction. On the other hand, effects that are typical for CC have also been obtained in EC (such as counterconditioning, sensory preconditioning, latent inhibition, and US-revaluation). Taken together, there is mixed evidence regarding the question of whether the EC learning mechanism is different from signal learning (Walther & Langer, 2009). One problem with the existing evidence is that EC studies differ from typical CC studies in a number of ways (De Houwer et al., 2001). For instance, signal learning traditionally uses biologically significant and mostly aversive USs (e.g., shocks) and assesses the responses mainly with physiological measures (e.g., skin conductance responses). In EC, however, the USs are typically not biologically significant and are only mildly aversive or appetitive (for exceptions see Vansteenwegen, Crombez, Baeyens, & Eelen, 1998; Zanna, Kiesler, & Pilkonis, 1970). Moreover, the measures are mostly not physiological but verbal evaluative ratings or the affective priming task. Conducting research that combines different kinds of USs and different kinds of measures (e.g., Hermans et al., 2002) might be one way of finding out whether the differences between EC and CC are due to procedural discrepancies or reflect genuine differences in the learning mechanisms underlying EC and CC (De Houwer et al., 2001).

4.2.5 Theoretical models

Although it is not completely clear which process underlies EC and whether this process differs from the one underlying CC, there are a few models that have been developed in order to understand and explain EC effects.

Holistic Account (Martin & Levey, 1978): The holistic account has been proposed by Martin and Levey (1978) who could be described as the parents of modern EC research. In their point of view, EC is a core element of CC and is not a separate type of learning (Martin & Levey, 1994). They assumed that EC is based on a primitive mechanism that operates in all animals. All organisms evaluate their surroundings in terms of what is beneficial and what is harmful (Martin & Levey, 1987). Martin and Levey (1978) assumed that each and every stimulus elicits a reaction of the organism in terms of good/bad, dangerous/safe. They labeled this characteristic internal reaction "subjective evaluative response". The subjective evaluative response is on a level between autonomic arousal and actual approach-avoidance behavior, which means that it is more than pure physiological arousal but it is not actual behavior yet (Martin & Levey, 1978). Simple organisms only have a limited repertoire of evaluative responses that first of all ensure the survival of their species and second their own individual survival. A more complex organism like a human being is able to acquire new evaluations of stimuli as a consequence of its experience of the contingencies in an environment (Martin & Levey, 1978). Through the mechanism of conditioning, especially of EC, the individual acquires new likes and dislikes which help to adapt more accurately to the actual environment. Martin and Levey (1978) stated that no overt response can be conditioned without eliciting an evaluative reaction first. Therefore, CC also involves EC because no behavior response is shown as long as no evaluation is elicited – the evaluative response is a necessary component of the conditioning process. The evaluative response is immediate in all conditioning procedures and it requires only a minimal degree of processing before a stimulus is evaluated (Martin & Levey, 1987).

According to Martin and Levey, this primitive and fundamental transfer of valence is the result of the formation of a holistic, non-associative representation. A holistic representation is formed through the contiguous presentation of a CS and a US and it contains the stimulus properties of the CS and the US as well as the evaluative nature of the US. In the holistic representation, the CS, the US, and the evaluative response are fused or integrated (Martin & Levey, 1994). This means that one cue, in this case the CS, can activate the whole image of which it is a component and cannot be perceived without the US (Martin & Levey, 1994). After conditioning, the CS activates the same evaluative response as the US.

Several findings and characteristics of EC support the holistic account. For instance, the finding that EC is resistant to extinction is compatible with a holistic account. Once a holistic representation is formed, the presentation of the CS will automatically activate the valence of the US, which means that the US itself does not have to be presented to evoke its valence. Therefore, single CS presentations as during extinction should not have an impact on the acquired valence of the CS because the valence of the US doesn't change. The automatic formation of a holistic representation is also compatible with the finding that contingency awareness seems to be no necessary prerequisite for EC to occur. The holistic model states that the stimulus characteristics of CS and US are stored in a stimulus complex which fails to discriminate between the stimuli as separate CSs and USs (Martin & Levey, 1987). If participants only have a mental representation of a stimulus complex and not of two separate stimuli there is no "contingency" of which they could be aware of.

Even though the holistic account is compatible with some characteristics of EC it cannot explain sensory preconditioning results. As Hammerl and Grabitz (1996) and Walther (2002) have shown, the liking of a CS1 can be changed even though it was never directly paired with a US but only with a CS2 that was itself paired with the US. If no association between CS and US exists and if they are really part of a holistic presentation there is no explanation how the CS2 can be affected by the evaluation of the US.

Conceptual-Categorization Account (Field & Davey, 1999): Field and Davey (1997, 1999) proposed an account similar to the holistic account, the so-called conceptual or categorization model. They explained EC effects in terms of a categorization mechanism and assumed that there are no associations built in an EC paradigm.

According to Davey (1994), it is unlikely that people possess rigid categories of 'liked' and 'disliked' that can be defined by "necessary and sufficient condition". He pointed out that every stimulus has features that are liked or disliked by the participants and the likeability of a stimulus is defined by the overlap of features. If a stimulus has, for instance, ten likable features it will be put into the 'liked' category. None of these features alone would be enough to like the stimulus but the combination of ten features makes the stimulus likable. A neutrally valenced CS contains both features that are liked and features that are disliked. By pairing these neutral CSs with a US those features of the CS that are conceptually congruent with the US are highlighted. These conceptually congruent features are not salient prior to conditioning. After conditioning, the participant categorizes the CS on the basis of the salient features. The categories in which the stimuli are put into are defined by degrees of overlap between features, which means that the participants judge the stimuli as liked, disliked or neutral on the basis of the overlap of features. According to Davey (1994), the pairing process makes the features that the CS shares with the US more salient and the CS is put into the same category (liked vs. disliked) as the US, just because of the salient features. Participants' evaluation of the CS changes because they have identified features of the CS that correspond to their concept of liked and disliked. As a result of this pairing procedure participants subsequently re-categorize the CSs.

Some of the characteristics of EC are compatible with the conceptual model. According to Field and Davey (1997), the resistance to extinction can be easily explained. The pairing procedure does not result in an associative link of CS and US but only elicits a re-categorization process (Field & Davey, 1997). If no associative link is established it is logical that CS-only presentations do not alter the evaluation of the CS. After the pairing procedure, the CS is put into a new category that is defined by an overlap of features with the US. CS-only presentations do not change the characteristics of the newly formed category and as a result the evaluation of the CS does not change. A second characteristic that fits within the conceptual account is that participants do not need to be aware of the CS-US contingencies. The explanation is similar: No associative link between CS and US is made and so it is reasonable that participants have a poor recall of the contingencies. Based on these explanations, Field and Davey (1997) called the EC characteristics "non-associative artifacts". They concluded that EC effects are not caused by the pairing process but rather through a bias in the stimulus selection process that occurs before conditioning. The CSs in early EC studies were often perceptually similar to the USs. Field and Davey (1997) suggested that this is exactly why EC effects have been obtained in studies that used the typical EC paradigm. While this is true and clearly subject to criticism in the early studies of Baeyens et al. (1990, 1992b), there have been numerous studies (e.g., De Houwer et al., 2000) that have advanced and redefined the EC paradigm. These studies invalidate this criticism by randomly pairing CS and US and still obtaining EC effects (e.g., Hammerl, Bloch & Silverthorne, 1997).

There are several points in this non-associative account of EC that can be and have been criticized. First, the model provides no explanation for cross-modal conditioning effects that have been demonstrated in the literature (Baeyens, De Houwer, Vansteenwegen & Eelen, 1998). As long as CS and US are stimuli from the same modality - for instance, both are pictures of human faces - it is at least plausible that they share some features and that these salient features lead to a re-categorization of the CS. However, if one stimulus is a face and the other one is a painting (Baeyens et al., 1989b) or the CS is an odor and the US a massage (Baeyens, Wrzesniewski, De Houwer, & Eelen, 1996) it is hard to imagine what features the two stimuli might share that could become salient (Baeyens et al., 1998). Second, the model can’t explain the selective post-acquisition US-revaluation effects that have been demonstrated (Baeyens et al., 1992b) although Davey (1994) argued otherwise. He assumed that the pairing of liked US faces with unliked personality characteristics during revaluation would change the criteria for the ‘liked’ concept. The changed criteria would subsequently be applied to the CS faces. However, Baeyens and colleagues (1998) criticized that the selective nature of the US-revaluation cannot be explained by the conceptual account. When N1-L1 (neutral-liked pair) and N2-L2 pairings are followed by a revaluation of L1 but not of L2, N1 loses its positive valence but not N2. If Davey (1994) is right and the criteria for the category ‘liked’ change because of the US revaluation, the valence of N2 should be equally affected which is not the case (Baeyens et al., 1992b).

Referential Account (Baeyens et al., 1992a): Baeyens and a group of collaborators proposed the referential account which resembles the holistic account of Martin and Levey in so far as both models lead to similar predictions. However, Baeyens et al. (1992a) postulated that EC and CC are two different forms of learning.

CC can be described as signal or expectancy learning. In a typical CC paradigm, the individual learns that the CS becomes a signal for the occurrence of the US, e.g. a tone predicts the onset of shock. Therefore, when presented with the CS the individual expects that the US is actually going to happen. CC can thus be defined as associatively induced changes in appetitive or defensive preparatory responses. The expectancy system reacts to the presence of reliable predictors of significant events and activates responses that prepare the organism for the significant event. The activation of these responses requires information processing which is why CC effects only occur when the individuals are aware of the CS-US relation. This is also compatible with the findings that CC is sensitive to extinction and contingency manipulations. If contingency is manipulated, so that the CS is not a reliable predictor of the US, then the expectancy system will not activate a response, which means that no learning occurs.

Conversely, EC is regarded as a form of referential learning. In an EC paradigm, the presentation of the CS does not lead to the expectation that the US is going to occur but rather makes the individual (consciously or unconsciously) think of the US, e.g. smelling a good cake makes me feel good because it reminds me of my grandmother and her baking but I’m not expecting to see my grandmother now just because of the smell of the cake. EC can be defined as associatively induced changes in the valence of the CS. According to Baeyens et al. (1995), the referential system will automatically determine the valence of the stimulus by comparing and averaging the valence of the other stimuli with which the target stimulus occurred in the past. The presented stimulus will then be evaluated as liked or disliked.

One could object that EC and CC are not two distinct forms of learning because they are both based on associative processes. However, Baeyens et al. (1992a) argue that the associative structure underlying the two forms of learning is qualitatively different. In EC, the CS acquires referential value because it co-occurs with a valenced US. The individual learns about this co-occurrence between a neutral stimulus and an affectively valued event. In signal learning, the CS becomes a reliable predictor of the US and the individual detects the predictive qualities of the CS. The distinction that has to be made resembles the S-S versus S-R distinction made in the learning literature (see paragraphs 4.1.2 and 4.2.3). The referential account claims that EC represents S-S type of learning because the evaluative changes of the CS are based on an associative link between CS and US representation (Baeyens et al., 1992a). The most important thing that differentiates the referential model from the holistic and the conceptual account is the emphasis on associative processes. Baeyens and his collaborators (e.g. 1988, 1989, 1990) conducted a few studies supporting the assumption that EC reflects S-S learning. For instance, based on the results of a US-revaluation study, Baeyens et al. (1992b) concluded that the acquired valence of the CS is based on an associative link between CS and US representations and that the CS activates the altered US-representation during the evaluation phase. If the CS had acquired intrinsic value during the conditioning (as S-R type of learning would suggest) a revaluation of the US should not influence the evaluation of the CS. Thus, the US revaluation effects indeed provide strong support not only for S-S learning but also for the referential account.

There are more findings and characteristics of EC that are compatible with the referential system. For instance, EC is not sensitive to extinction and contingency manipulations. The referential system is only sensitive to co-occurrences of the CS and the US but doesn’t depend on a statistical contingency of CS and US and is not influenced by situations or presentations where the stimuli do not co-occur. This can be illustrated by the already mentioned example: You learned to associate the smell of a fresh cake with your loving and caring grandma who used to be an excellent baker. The smell of cake evokes a positive feeling. This happens even though there are many times when you saw your grandmother not baking a cake (US-only presentation) and it happens just as often that you smell a freshly baked cake without your grandmother being near (CS-only presentation). The CS-only and US-only presentations do not influence the positive evaluation of the (smell of the) cake. Besides, if EC is not about detecting reliable predictors for the US, there is also no reason why statistical CS-US contingency should be a prerequisite for EC (Baeyens et al., 1993). Finally, the most important findings that cannot be explained by any other model are sensory preconditioning results (Hammerl & Grabitz, 1996; Walther, 2002). The only logical explanation for sensory preconditioning effects is that the contiguous presentation of two stimuli leads to an association. The CS paired with the US is also associated to another neutral stimulus and this allows the valence to "spread" to this neutral stimulus (Walther, 2002).

Now after having specified the characteristics of the expectancy system and the referential system, the question remains which processes are operating within each system. The exact processes are not explained in more detail, which leaves room for different ways of specification. One way of specification would be that the learning rules underlying the referential and the expectancy system are different and also have different influences on behavior. On the one hand, the referential system could be based on the simple learning rule that every co-occurrence of two stimuli leads to an increase in association strength. However, the strength of the association is not diminished by single CS-presentations but remains the same. On the other hand, the associations formed in CC could underlie a different learning rule that strengthens the CS-US association only to the extent to which the CS is a reliable predictor of the US (Rescorla & Wagner, 1972). It could furthermore be possible that some behaviors are based on associations that are generated by the expectancy system, whereas other behaviors depend on associations generated by the referential system. According to De Houwer et al. (2001), both systems depend on the same learning rule but differ in the way in which the associations are transformed into behavior. The assumption here is that CC is based on a simple learning rule but that the translation of the acquired associations into behavior is quite complex. This is supported by findings of Bouton (1993, 1998) and Rescorla (1996) who demonstrated that an extinction procedure resulted in decreased CC effects but did not affect the strength of the association that was underlying the conditioned response. Thus, it is only the extent to which associations influence actual behavior but not the association itself that is influenced by extinction. This suggests that both systems are based on the same associative knowledge base but take different information into account when it comes to the actual behavioral responses. Baeyens, Eelen and Crombez (1995) argue in the same direction. For them, the two systems are hierarchical. The referential system can clearly exist without any expectancy but any expectancy must have some referential relation as well. Therefore, the referential system is seen as less sophisticated because it only deals with the co-occurrences of CSs and affectively valenced USs and not with the relationship itself.

Taken together, these three models of EC are able to explain some of the functional characteristics of EC with the referential model being able to explain most of them. However, all of the models also have some shortcomings. First of all, they don’t clearly specify the processes underlying EC which makes it difficult to derive hypotheses or to test the models against each other (De Houwer et al., 2001). Moreover, none of the models is able to specify the boundary conditions of EC. Recently, Walther and Langer (2009) provided a fruitful theoretical approach that tries to integrate signal learning and EC. Based on the unimodel of Kruglanksi and Thompson (1999), Walther and Langer (2009) proposed that several orthogonal parameters are represented in conditioning such as parameters of cognitive resources (e.g., cognitive load), task demand parameters (e.g., number of trials), motivation parameters (e.g., surprisingness of the US), and relevance (e.g., valence and intensity of the US). Thus, different outcomes of EC (or CC) studies can possibly be explained by a difference in parameters and do not necessarily imply different underlying learning processes. Although there is some evidence from animal research that a single rule-based process underlies all types of conditioning (Beckers, Miller, De Houwer, & Urishihara, 2006), there is a clear need for further empirical research as well as theoretical advancements in order to fully understand whether EC is distinct from CC or whether these two types of conditioning are based on the same learning process.

5 The role of distance in associative learning

The present work has outlined the theoretical background of two distinct research areas that have both received considerable attention in social psychology, namely the concept of distance, or more specifically Construal Level Theory, and associative learning, or more specifically, evaluative conditioning. Although the idea of (psychological) distance has influenced many different research areas of psychology, including developmental psychology (e.g., Bartsch, 1988; Hund & Plumert, 2007; Siegler & Richards, 1979; Steward & Steward, 1974), social psychology (e.g., Broemer, Grabowski, Gebauer, Ermel, & Diehl, 2008; Liberman et al., 2007; Liviatan et al., 2008; Pronin, Olivola, & Kennedy, 2008; Reitsma-van Rooijen, Semin, & van Leeuwen, 2007), clinical psychology (e.g., Angermeyer & Matschinger, 1995; Christensen & Shenk, 1991; Gerber, 1973; Horch & Hodgins, 2008), and cognitive psychology (e.g., Carlson & Covey, 2005, Gärling & Loukopoulos, 2007; Moyer & Bayer, 1976; Richardson & Waller, 2005), the influence of distance on the process of preference acquisition has never been investigated. This is even more surprising considering the fact that both associative learning and research on psychological distance have a longstanding history within psychological science. The present research combines these two lines of research and investigates why and how psychological distance influences associative learning.

There are many possibilities how distance could influence the learning of associations. For instance, changing the context in which associative learning takes place could influence the formation of an association as well as the implications of that association formation (i.e., the specific attitudes). Specifically, participants could be instructed to imagine that they are going to meet certain individuals (i.e., stimuli that serve as USs and CSs) either tomorrow (near setting) or in a year from now (distant setting). It could be hypothesized that the perceived distance of the imagined context in which the learning situation is placed in differentially influences how participants perceive the US and the CS, and thus influences how US and CS are evaluated.

Furthermore, distance cannot only be manipulated by changing the contexts or settings in which the experimental situation takes place but distance can also be experienced on a smaller and maybe more subtle level. Drawing on Liberman and colleagues' (2007) definition of psychological distance, the present research proposes that distance exists *within* the paradigm of associative learning. It is assumed that the association itself constitutes a dimension of psychological distance. This kind of distance is referred to as *associative* distance.

5.1 Associative distance as a special form of psychological distance

The associative learning paradigm consists of a US and a CS which are repeatedly paired. The present work claims that the associative relation between US and CS constitutes a form of psychological distance. The hypothesis is that the US is more proximal than the CS because it can be experienced more directly. The CS, on the other hand, is supposed to be more distant than the US because it can be experienced only indirectly. This is due to the circumstance that the CS acquires its meaning by means of an association with the US. The next paragraphs take a closer look at the characteristics of US and CS in order to explain and specify these assumptions.

5.1.1 The US and distance

In classical conditioning (CC), the US is defined as a stimulus that unconditionally, naturally, and automatically triggers a response. This definition makes clear that the US is an excellent example of a psychologically near and directly experienced stimulus. In evaluative conditioning (EC), the US is defined as a stimulus that elicits a positive or negative affective reaction. This implies that the US carries affective meaning which is experienced when encountering the US. The affective experience of a US is more direct and less distant than the experience of a CS because it is not mediated by an association. More generally, anything that elicits an affective reaction (i.e., the US) is experienced directly, whereas anything that is mediated by an association (i.e., the CS) is experienced more indirectly.

This reasoning is in line with Zajonc (1980) who argued that cognitive inferences are not necessary for affect to be experienced. According to Zajonc (1980, 1984a, 1984b), affective reactions to stimuli are often the very first reactions of the organism, and for lower-order organisms they are the dominant reactions. Thus, affective reactions can occur without extensive perceptual and cognitive encoding. This is due to the understanding of affect and cognition as separate and partially independent systems. They can and commonly do function together but a cognitive process is no pre-condition for affect to be elicited (Zajonc, 1980). Affect is considered to be the first link in the evolution of complex adaptive functions that eventually differentiated animals from plants (Langer, 1967). Unlike language and cognition, affective responsiveness is universal among animal species. For instance, a rabbit confronted by a snake has no time to consider whether the snake is going to attack or when and why it will attack. If the rabbit is to escape, the action must be undertaken long before the completion of even a simple cognitive process (Zajonc, 1980). The affective reaction toward the snake is more rapid and basic than cognitive evaluations. In other words, immediate affective responses provide organisms with a fast but crude assessment of the behavioral options they face, which makes it possible to take rapid action. According to Zajonc (1980), humans, too, have these instantaneous and automatic reactions to stimuli. We need not be aware of this affective reaction nor do we have to be able to verbalize it but it is always there. Additionally, Zajonc (1980) showed that memory for affective reactions can be dissociated from memory for details of a situation with the former being better than the latter. For example, we often remember whether we liked or disliked a particular person, book, or movie without being able to remember any details other than our affective reaction (Bargh, 1984). Thus, affect as the primary and basic reaction of the organism is experienced directly (Zajonc, 1980, 1984a, 1984b).

Besides the work of Zajonc, there is considerable empirical evidence from other areas of research supporting the notion that the pathway from a stimulus to an affective reaction can be direct, i.e., not mediated by any cognitive evaluation except for the most basic perceptual processing. For instance, evidence for the affect-as-information hypothesis (Clore, Schwarz, & Conway, 1994; Schwarz & Clore, 1983) in social cognition supports the direct effect of feelings on judgments and decisions over indirect (cognitively mediated) effect interpretations which assume that affect selectively primes semantic concepts (Bower, 1981, 1982). When it comes to the area of decision making under uncertainty, the risk-as-feeling hypothesis (Loewenstein, Weber, Hsee, & Welch, 2001) highlights the role of affect experienced at the moment of decision making. The authors showed that affective reactions to risky situations often diverge from cognitive assessments of those risks. When such divergence occurs, affective reactions often drive behavior. Loewenstein et al. (2001) argue in line with Zajonc (1980) that affective reactions to a perceived risk can arise with minimal cognitive processing and thus before the risk can be cognitively assessed.

Even more evidence for the notion of affective primacy comes from neuroanatomical research. It has been the common view for a long time that the sensory apparatus registers stimuli and sends signals to the thalamus, which in turn relays them to the sensory areas of the neocortex for integration and analysis of meaning. This view requires that all affective reactions are mediated by neocortical activity which would be in line with the cognitive appraisal theory (Lazarus, 1982). However, LeDoux and his colleagues (summarized in LeDoux, 1996) have found a direct pathway between the sensory thalamus (which performs crude signal processing) and the amygdala (which plays a critical role in the processing of affective stimuli) that is just one synapse long. These neural projections are not mediated by cortical processing. The direct access from the thalamus to the amygdala allows the amygdala to respond up to 40 ms faster than the hippocampus which is separated from the thalamus by several synapses (LeDoux, 1996). Therefore, the neuroanatomical architecture allows us to like or dislike something even without knowing what it is. For example, a sudden noise can cause fear before the source of the noise is determined. In research with humans, Servan-Schreiber and Perlstein (1998) have shown that intravenous injections of procaine, which produce powerful emotional responses, also produce amygdala activation. People who received such injections report panic sensations and other powerful feelings that were disturbing precisely because they had no obvious cognitive antecedents. Armony, Servan-Schreiber, Cohen, and LeDoux (1995, 1997) argued that these rapid emotional reactions serve as a mechanism to interrupt and redirect cognitive processing toward potentially high-priority concerns, such as imminent danger.

5.1.2 The CS and distance

The CS does not elicit any direct affective reaction because in evaluative learning the CS is defined as a stimulus that is initially neutral with regard to its affect-eliciting qualities. After becoming associated with the US, the CS evokes a reaction. Thus, the CS is a cognitive representation of the US mediated by the CS-US association. A cognitive operation in the sense of recognizing the US-CS relation is necessary for the CS to become associated with the US. If the organism doesn't learn this association, the CS remains meaningless. However, the mediation of the reaction toward the CS by the US-CS association does not imply that the CS is not or cannot be affectively experienced. Rather, it means that the CS is only affectively experienced *after* and *because* it is associated with the US. Therefore, it can even be regarded as a necessity that the US is more proximal than the CS because the US *causes* a certain affective reaction in the associated CS. A cause always precedes an effect and an effect would not be there without a cause. Something that serves as a cause has to be more proximal than the effect that it causes. In the case of US and CS, the US is the cause and the attitude toward the CS is the effect. There would be no valenced attitude toward the CS without the US. Thus, the CS has to be psychologically more distant than the US because the (affective) meaning of the CS depends on the US, or more specifically on the association with the US.

The idea that the CS is experienced more indirectly because the experience is caused by an association to the US is further supported when taking a look at what kind of organisms show reactions toward such associated stimuli. Specifically, it is assumed that not every organism possesses the cognitive functions necessary for learning a US-CS relation that goes beyond the level of reflexes. At first sight, this assumption seems to be in contrast with a large amount of research in CC, which has demonstrated conditioning effects in vertebrate and invertebrate animals (e.g., Carew & Sahley, 1986; Rescorla & Wagner, 1972; Squire & Kandel, 1999). However, conditioning studies in invertebrates mostly investigated the conditioning of simple reflexes (e.g., eye withdrawal reflex; Abramson, Armstrong, Feinman, & Feinman, 1988). Although invertebrates are able to acquire conditioned responses as a result of pairing a US with a CS, they cannot be classically conditioned in cases in which the conditioning effect depends on the existence of certain brain structures that invertebrate animals do not possess. For instance, the cerebellum is part of the brain of vertebrates and has been identified as the essential (necessary and sufficient) structure for the acquisition and performance of the basic classically conditioned eyeblink response observed in vertebrates (e.g., Christian & Thompson, 2003; Steinmetz, 1996, 2000). The cerebellum is important for the integration of sensory perception, coordination and motor control. Moreover, modern research has shown that it also plays a broader role in a number of key cognitive functions, including attention and the processing of language, music, and other sensory temporal stimuli (Rapp, 2001). Consequently, the fact that not every organism is able to learn complex contingencies that go beyond the level of reflexes can be attributed to the not-existing or limited cognitive functions of lower organisms. The learning of more complex contingencies and their meanings requires certain cognitive capacities, capacities that humans acquire during their course of life.

For example, almost every child has at one point during childhood made the physical experience of the meaning of "hot" by touching the stove or something equally hot. The first and immediate reaction of a child who burned its fingers is that it starts crying because of the pain experienced. This is undoubtedly a very direct and quite affective experience. In fact, it is natural for any organism to show some kind of physical reaction when experiencing such extreme heat. In the terminology of learning theory, the heat of the stove is the US. The child directly experiences affect when encountering the US. The stove is the CS. The CS is affectively meaningless before the aversive experience of the burn has been made (given that no positive or negative experience of similar strength has been made with the stove before). The child learns an association between heat (i.e., pain) and the stove and this learning usually translates into behavior (i.e., avoidance of the stove). That is, the CS acquires an affective meaning through this experience but only - and that's the critical point - if the child learned the contingency between pain and stove. Learning this contingency requires a cognitive operation in the sense of recognizing and encoding the US-CS association. Thus, the US-CS association mediates the affective reaction toward the CS.

One critical point that should be mentioned is that in most conditioning studies a forward conditioning procedure is used, which implies that the CS is presented before the US. Thus, one could argue that the CS is the more proximal stimulus because participants experience the CS first. This reasoning would imply that a neutral stimulus that possesses no evaluative meaning (i.e., CS) can be perceived to be more proximal than a valenced stimulus (i.e., US). However, when considering the importance of affect and evaluative meaning outlined above, it seems unlikely that presentation order should be more important than affective meaning in determining perceived psychological distance (see also General Discussion).

Summing up, the present research builds on the hypothesis that a special form of psychological distance in terms of direct and indirect experience underlies the CS-US relation in associative learning. The US is assumed to be a stimulus that is psychologically near because it can be experienced directly (i.e., affectively). The CS, on the other hand, is a psychologically more distal stimulus because it is experienced indirectly and only elicits a reaction because of its association with the US.

5.2 Conditioning phenomena and the role of distance

Although the assumptions that the US is experienced more directly and construed on a lower level, whereas the CS is experienced more indirectly and construed on a more abstract level might seem quite trivial at first, this idea has never been put to a direct test. However, when considering certain conditioning phenomena from the angle of associative distance, one can readily find empirical support for the assumptions that the US is experienced directly, whereas the CS is experienced indirectly by means of an association to the US. The next chapter outlines phenomena of associative learning and explains how these phenomena possibly relate to the idea of psychological distance within associative learning paradigms.

5.2.1 US-Revaluation

US-revaluation effects have been shown in CC (Rescorla, 1974) as well as in EC (Baeyens et al., 1992b; Walther et al., 2009). For instance, Rescorla (1974) conditioned a CR using a weak shock as a US in rats. Following conditioning, these rats were exposed to a stronger shock than that used during conditioning. The CS was not present during these exposures. Subsequent presentations of the CS led to greater intensity in the conditioned responses than after conditioning. The exposure to greater intensity shocks had led to US-revaluation, such that the US was re-valued by the organism as more aversive than it has been during conditioning. In EC, US-revaluation refers to the findings that post-conditional changes in the valence of a US lead to corresponding changes in the valence of pre-associated CSs. These experiments (e.g., Baeyens et al., 1992b; Walther et al., 2009) demonstrated that conditioned responses are mediated by CS-US associations because revaluing the US changes the reactions toward the CS. Therefore, conditioned responses can be altered by experiences outside of the original learning trials. Thus, the phenomenon of US-revaluation supports the notion that the reaction toward the CS is due to the CS-US association which makes the CS a psychologically more distant stimulus than the US.

5.2.2 Second-order conditioning

Second-order conditioning (Rescorla, 1980) refers to the phenomenon that a predictor (CS) that elicits a reliable conditioned response through its association with another stimulus can itself act as an outcome for other potential predictors. For instance, in a typical procedure in CC, (1) a CS1 (e.g., a tone) is paired with a US (e.g., shock) until it reliably evokes a response (anxiety); (2) a second predictor CS2 (e.g., a light) is paired with CS1; CS2 (light) is presented alone and is found to elicit the conditioned response (anxiety) without having ever been directly paired with a US (shock; see also 4.1.2). Second-order conditioning is by definition an indirect form of learning because there is only an indirect contact between CS2 and US. Interestingly, there is some evidence (Rizley & Rescorla, 1972) that second-order conditioning is not based on an association between CS1 and CS2 because extinction of the conditioned response toward CS1 does not lead to an extinction of the conditioned response toward CS2 (Mackintosh, 1983, Nairne & Rescorla, 1981). Davey and McKenna (1983) found that devaluing the US eliminates conditioned responses to CS2. These findings suggest that the CS2 forms a direct association to the US. This implies that the CS1 evokes a representation of the US that becomes associated with CS2.

Second-order conditioning has also been successfully applied in EC. Walther (2002) paired an affectively valenced US with a neutral CS and subsequently paired the CS with another neutral stimulus (CS2). Results indicated that the CS2 acquired the affective qualities of the US without ever being in direct contact with the US. Moreover, the second-order conditioning effects were just as strong as the conventional EC effects. These results provide more evidence that associative learning is characterized by an indirect or mediated contact with a positively or negatively valued object or event. Concretely, the reaction toward the CS2 is due to its association with the US, thus showing that the CS is psychologically more distant than the US.

5.2.3 Sensory preconditioning

Sensory preconditioning is very similar to second-order conditioning and has also been successfully applied in classical human and animal conditioning (see also 4.1.2; Barnet et al., 1991; Holland & Rescorla, 1975; Rashotte, Griffin, & Sisk, 1977) as well as in EC (see also 4.2.4; Walther, 2002). In sensory preconditioning, the CS2 is paired with the CS1 and only after this pairing of two neutral stimuli is the CS1 paired with the US. Sensory pre-conditioning also requires no direct contact between the CS2 and the US. In EC, the CS2 acquires the affective qualities of the US without ever being in direct contact with the US which is usually explained with an association formation of CS1 and CS2. When the CS1 is subsequently paired with the US it acquires the affective qualities of the US and also influences pre-associated stimuli (CS2). Thus, conditioning effects can also be shown on stimuli that were never directly presented with the US. The finding that these stimuli nevertheless are able to elicit an affective response consistent with that toward the US provides further evidence that the CS acquires affective meaning only because of an association with the US and is therefore experienced only indirectly.

5.2.4 Observational learning

In observational learning, a person experiences a stimulus and observes someone else's reaction to it. Olsson and Phelps (2004) suggested that the representation of another individual's emotional expression can function as a US and the stimulus that elicits this reaction can function as a CS. For instance, someone else's distress can itself be anxiety evoking. From this point of view, observational learning is procedurally the same as so-called direct conditioning.

Observational learning paradigms have often investigated the acquisition of fear responses. To illustrate, in an early study of observational fear learning (Hygge & Öhman, 1978), participants were exposed to a confederate's fear reactions to either fear-relevant stimuli (e.g., snakes) or fear-irrelevant stimuli (e.g., flowers). The results showed that participants acquired a fear response to the stimuli paired with a fear expression in the confederate. This response was stronger for fear-relevant stimuli. A related set of findings was reported by Mineka and Cook (1993) who studied vicarious fear learning in monkeys. In their studies, laboratory-reared rhesus monkeys observed the fear-response of wild-reared monkeys toward a snake. Observer monkeys showed high levels of distress when they watched models reacting fearfully to snake stimuli. These results are consistent with the hypothesis that the mechanism involved in observational learning may not be substantially different from those involved in conditioning. This supports the idea that other's affective (in this case fear) responses can act as a US. Furthermore, it might be plausible that observational learning represents a form of second-order conditioning. A fear response can actually be a CS which has acquired a fear-evoking quality through some prior co-occurrence with a traumatic event (US). The observational learning episode itself, therefore, is the co-occurrence of a new CS2 with the CS1 of the observed fear response of the model. Thus, a CS2 acquires a second-order fear response through co-occurrence with a model's fear response (CS1) which has previously been associated with a traumatic event.

Unfortunately, there is no available evidence to disambiguate the processes underlying observational learning (Mineka & Cook, 1993). However, observational learning is a form of conditioning at the procedural level and the associative structure of such a vicarious learning episode can be conceptualized in the same way as a direct conditioning episode and seems to be driven by CS-US associations. Moreover, in a study by Olsson and Phelps (2004), fear learning acquired through CC and fear learning acquired without direct experience via observation led to comparable learning responses. Evidence that observational learning is a form of associative learning could also be found in studies with humans (e.g., Askew, Zioga,

& Field, 2004; Baeyens et al., 1996; Gerull & Rapee, 2002). Taken together, observational learning can be explained by an indirect, associatively mediated contact to an affect-eliciting US. Therefore, observational learning supports the assumption that a CS is experienced only indirectly because it acquires affective meaning by means of its association to a US.

5.2.5 Counterconditioning

Just as the term implies, counterconditioning means conditioning an animal or human being to display a response that is *counter* to (i.e., mutually exclusive of) a response to a particular stimulus. In a typical counterconditioning procedure, a CS that already elicits a certain response (e.g., fear) is repeatedly paired with a US of opposite valence (e.g., food). The effectiveness of counterconditioning procedures has been shown in CC (Lovibond & Dickinson, 1982) as well as in EC (Baeyens et al., 1989a). The phenomenon of counterconditioning shows that the CS is not experienced directly because the affective value of the CS can be changed into its opposite by associating the CS with another US. Thus, the CS represents the valence or reaction that is inherent in the specific US with which it is paired. A US, on the other hand, is experienced directly because the affective reaction it elicits cannot be changed into its opposite (except by means of US-revaluation). For example, a shock is always a negative event and cannot be "changed" into a positive one by pairing it with positive stimuli. The phenomenon of counterconditioning also makes clear that there is an asymmetrical relation between CS and US: The reaction toward the CS is dependent on the US because it is based on the association to the US. However, the reaction toward the US is independent of the CS because the US elicits an affective reaction, regardless of whether it is paired with a CS or not.

6 Research Questions

As illustrated in the preceding chapter, a direct experience is psychologically more proximal, whereas an experience that is mediated by an association between two stimuli is more indirect and thus psychologically distant. The US is a stimulus that is experienced directly because it elicits an immediate affective reaction. The CS, on the other hand, is experienced only indirectly because the CS is a cognitive representation of the US mediated by the CS-US association. Even though the above mentioned conditioning phenomena do support the assumption of a differential experience of US and CS, the idea that the CS is indeed psychologically more distant than the US has never been put to a direct test.

The basic idea of the present work is that associative distance constitutes an additional distance dimension. As such, it elicits effects similar to those of the other distance dimensions postulated by CLT. Specifically, it is predicted that there is an association between distance and construal level such that more concrete construals are applied when thinking about the US, whereas more abstract construals are applied when thinking about the CS. In other words, there should be an association of US (as a psychologically proximal stimulus) with low level construal and of CS (as a psychologically distal stimulus) with high level construal. Several open research questions arise. First, what consequences do the psychologically proximity of the US and the psychological distance of the CS imply for the formation of interpersonal attitudes and for our understanding of associative learning in general? Second, is there indeed an association of US with low level construal and CS with high level construal and if so, how can the existence of that association be demonstrated experimentally? Investigating these questions has important theoretical and real-world implications because associative learning is one primary mechanism that is able to explain how our attitudes and preferences are formed. Therefore, an association of psychological distance and construal within an evaluative learning paradigm might also affect the result of associative learning (i.e., our attitudes). For instance, whether the attitude toward a stimulus is positive or negative might depend on perceived distance of the stimulus that is to be evaluated.

Given that the US is indeed psychologically more proximal than the CS, this should result in a more concrete representation of the US and a more abstract representation of the CS. One possibility to examine whether the US is represented more concretely could be to present concrete and abstract information about the US. Although participants should be able to encode both pieces of information (e.g., Miller, 1956), it is predicted that the information is processed differently such that the concrete features are more salient when evaluating the US and the abstract features are more salient when evaluating the CS. It is expected that the focus on concrete features in the US subsequently leads participants to evaluate the US according to the valence of these concrete features instead of according to the valence of the abstract features. Although the representation of the US consists of both concrete and abstract features the actual valence of the US is determined more by the concrete features. The CS, on the other hand, is associated with the representation of the whole US (i.e., the US with its concrete and abstract features). The abstract features should be more salient when evaluating the CS, which should lead participants to evaluate the CS according to the valence of the abstract features. The next paragraph describes the specific hypotheses and how they are derived from the associative learning paradigm used in the present studies.

6.1 Paradigm and hypotheses

For the present studies, an associative learning paradigm was developed in which the US stimuli were initially presented with positive and negative behavioral information. Some of the information about the stimuli was abstract and some of the information was concrete. As outlined above (3.3.5), trait information is generally considered to be abstract and independent of context, whereas state information is concrete and situation specific (Nussbaum et al., 2003). Therefore, traits represent high level construals and mental states represent low level construals. In the paradigm employed in the present work, participants were presented with positive and negative trait and state information about a number of USs. This resulted in four different kinds of USs: USs that were presented together with positive trait and positive state information, USs that were presented with negative trait and negative state information, USs that were presented with positive trait and negative state information, and USs that were presented with negative trait and positive state information. Thus, the representation of the US consists of abstract and concrete features that are either of the same valence or are ambivalent. Which feature is more relevant when evaluating the US manifests itself in the attitude that is formed towards the US. That is, the USs for which high and low level valence of the presented information is either unambiguously positive or unambiguously negative should be evaluated according to the valence of the presented information. For the so-called ambivalent USs, the valence of the high level information differs from the valence of the low level information. It is predicted that the valence of the US is determined by the valence of the concrete low level features. The reason for this is that the concrete features should be more salient than the abstract features when focusing on a proximal stimulus (i.e., the US). For instance, if positive trait and negative state information is presented about US1 and negative trait and positive state information is presented about US2, then US1 should be evaluated more negatively than US2 even though both USs are presented with one piece of positive and one piece of negative information. The relevant difference lies in the construal level of the presented features. Importantly, this differential focus on high versus low level information cannot be explained with a general tendency to prefer one kind of information over the other (in this case to prefer state information over trait information). Rather, which kind of information is focused on depends on the target of that information. If the US is the target stimulus concrete features (i.e., state information) should guide the evaluation of the US because the US is a stimulus that is psychologically more proximal. Thus, the first specific hypothesis that is tested in the present work is: A psychologically more proximal stimulus such as the US is evaluated according to the valence of its concrete features.

The second hypothesis refers to the more distal stimulus, the CS. After participants encode the information presented about the US, the US is repeatedly paired with the CS. The only information participants have about the CS is that it is associated with the US. Participants learn something about the CS by means of its association with the US. Intuitively, the most plausible assumption is that the valence of the US directly transfers to the CS. This is expected to happen for the unambiguous stimuli; CSs paired with unambiguously positive (negative) USs should be evaluated positively (negatively). For ambivalent stimuli, one might expect that the concrete low level valence that is focused on when evaluating the US simply transfers to the associated CS. This would also be consistent with theories on associative learning which assume that CS and US become similar as a function of conditioning (e.g., Baeyens et al., 1992a; Martin & Levey, 1978; Rescorla & Wagner, 1972). However, the present work makes a different prediction and proposes that US and CS become dissimilar to each other when the US is ambivalent. Concretely, the pairing of CS and US creates a mental link between CS and US in memory. As such, the activation of a CS associatively spreads to the US, whose representation consists of abstract and concrete features. As a consequence, both features should be activated when the CS is presented and subsequently evaluated. Conversely to the US, however, the evaluation of the CS should be influenced more strongly by the valence of the abstract high level feature because the CS is a stimulus that is perceived to be psychologically more distal than the US. The perceived distance should make the abstract features more salient. For instance, if the CS is paired with a US that possesses a positive high level feature and a negative low level feature, the CS should be evaluated more positively compared to a CS paired with a US that possesses a negative high level feature and a positive low level feature. This should be the case because the CS is psychologically more distal and should be associated more with high level construal than with low level construal. Thus, the second specific hypothesis is as follows: A psychologically more distal stimulus such as the CS is evaluated according to the valence of the abstract features pertaining to the stimulus with which the CS is associated (see Figure 1 for a graphical depiction of the hypotheses).

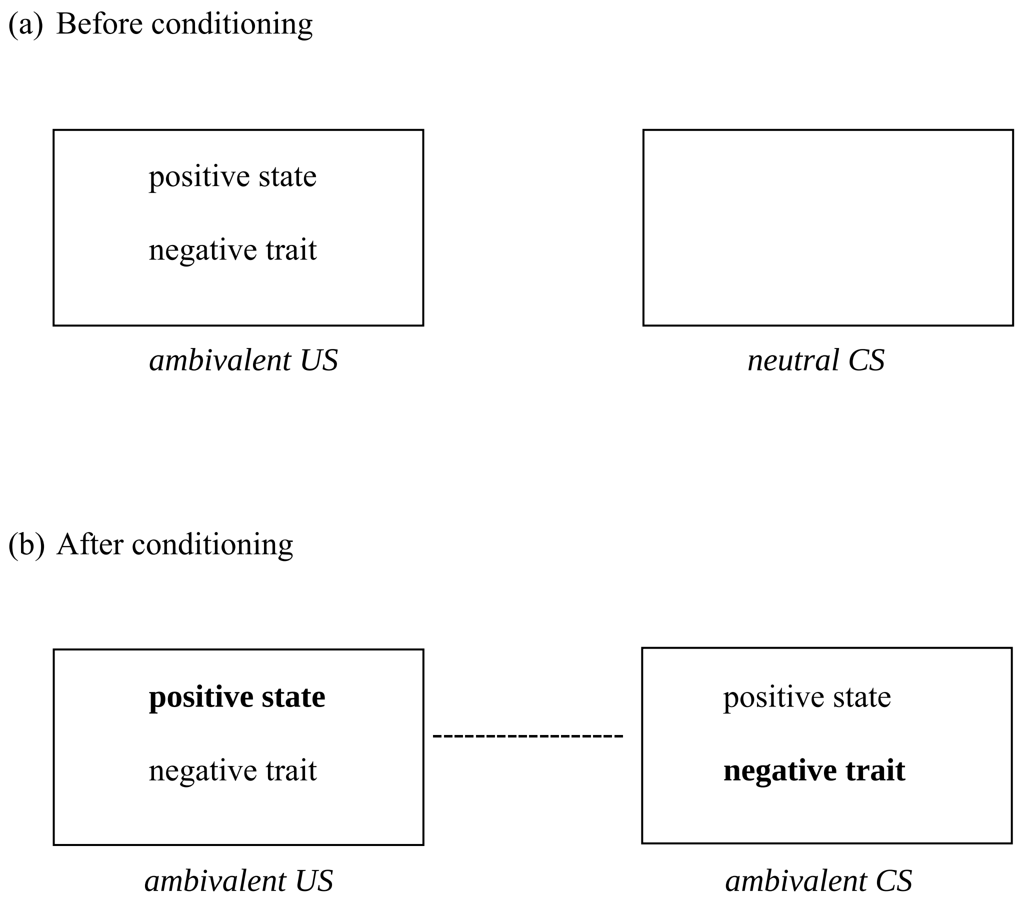


Figure 1: Illustration of the first two hypotheses of the present work. Figure 1a depicts the valence of the features provided about ambivalent US before conditioning. The neutral CS is not associated with the US. Figure 1b depicts the evaluations of US and CS after conditioning. The dashed line indicates an association between US and CS. The bold feature is the one that is focused on during evaluation. Note that the valence of high and low level features is only exemplary and could also be vice versa.

Obtaining evidence for the two hypotheses that the US is evaluated according to low level features, whereas the CS is evaluated according to high level features would also provide important implications for associative learning theories in general. Although the above mentioned learning theories of CC and EC (e.g., Baeyens et al., 1992a; Martin & Levey, 1978; Pearce & Hall, 1980; Rescorla & Wagner, 1972) differ in several respects from each other, they have one thing in common. All of them assume that the CS becomes more similar to the US as a result of conditioning. In CC, the CS evokes a conditioned response that mimics the unconditioned response. In EC, the CS acquires the same valence as the US, irrespective of where this valence comes from. The predictions of the present work, however, imply that the CS and the US can become dissimilar to each other as a result of conditioning. This is strikingly different and in sharp contrast to all other theories of associative learning.

Specifically, the present work proposes that the interpretation of valence depends on distance. The valence of the abstract and concrete features provided about the US is interpreted differently depending on whether the proximal US or the more distant CS is to be evaluated. Hence, it is not simply the valence of the US that transfers to the CS. Rather, the basis of the valence, i.e. the construal level of the valenced information, is taken into account. Most importantly, this can lead to an affective attitude toward the CS that is directly *opposite* to the evaluation of the associated US. Although the only source of valence for the CS is the associated US, the CS can be evaluated oppositely to the US after conditioning. In other words, the US causes the evaluation of the CS but the attitude toward the CS can nonetheless be different than (i.e., opposite to) the attitude toward the US. If these predictions can be corroborated by the present work, it would question some of the basic assumptions of well-established learning theories, namely that US and CS become similar as a result of their association. Specifically, it would provide evidence that the assumption of a similarity of US and CS as a consequence of their association might be limited to certain circumstances, namely those in which the US is unambiguously positive or negative. As soon as the US is ambivalent, US and CS might become dissimilar to each other. If the outlined reasoning is correct, the present work might be able to identify boundary conditions under which the assumptions of traditional learning theories are invalid.

Another research question refers to whether there is indeed an association between US and low level construal as well as between CS and high level construal. Although evaluations of USs and CSs that are in line with the above mentioned hypotheses would already provide strong evidence for the existence of an associative distance dimension they do not directly speak to the question of an association between US/CS and construal level. In other words, the evaluations do not provide direct evidence for an associative distance dimension that is comparable to other dimensions of psychological distance. If the US is indeed more proximal than the CS, the US should be associated with concrete low level construal more than with abstract high level construal. Conversely, if the CS is more distal than the US, the CS should be associated with high level construal more than with low level construal. The association of levels of construal and psychological distance in general has already been successfully demonstrated by Bar-Anan et al. (2006) using an IAT (see paragraph 3.6). Although a reaction-time based measure seems to be most suitable to experimentally demonstrate the association of distance and construal level, the IAT did not appear to be the optimal choice in the present research. This is mainly due to a methodological problem, namely to the fact that the two categories "US" and "CS" could not be labelled as such within an IAT because participants are of course not familiar with these labels and more importantly are not aware which of the presented stimuli is a US and which is a CS. Thus, in order to use an IAT, it would have been necessary to introduce a new category label and to have participants learn that all the USs belong to category "Y" and all the CSs belong to category "Z". By using such a procedure it would have been difficult to interpret the results because it would have been impossible to determine which of the obtained effects are due to the real association between distance and construal level and which effects are due to the artificial additional categories. It was decided to apply a picture-word version of a Lexical Decision Task (LDT) in order to find out more about the association between associative distance and construal level.

The LDT has received prominence in studies investigating the structure of semantic memory (Meyer & Schvaneveldt, 1971) but has also been successfully used in studies investigating lexical access in general. In a classical LDT, participants are presented, either visually or auditory, with a mixture of words and so-called non-words (nonsense strings that respect the phonotactic rules of a language). Their task is to indicate, usually by pressing a key, whether the presented stimulus is a word or not. LDTs are often combined with other experimental techniques, such as priming, in which the subject is 'primed' with a certain stimulus before the actual lexical decision task has to be performed. It has been shown that subjects are faster to respond to words when they are first shown a related prime: participants are faster to confirm "nurse" as a word when it is preceded by "doctor" than when it is preceded by "butter".

In the present research, USs and CSs were used as primes and abstract and concrete stimuli as well as non-words served as target stimuli. Based on the assumption that there is an association between distance and construal level, the third hypothesis of the present work is that the presentation of the more proximal US followed by a concrete word (i.e., low level construal) leads to faster categorization of the concrete word than the presentation of the CS followed by a concrete word. On the other hand, reaction times should be faster when the CS as compared to the US is the prime and an abstract word (i.e., high level construal) is the target. In other words, the association between US and concrete low level construal should facilitate reaction times toward a concrete word when this word is preceded by a US prime as compared to a CS prime. Conversely, the association between CS and abstract high level construal should facilitate reaction times toward an abstract word when this word is preceded by a CS prime as compared to a US prime.

Summing up, the present research aims to provide empirical support for the following three hypotheses: (1) The US is perceived to be psychologically closer than the CS and is thus evaluated according to the valence of concrete low level information. (2) The CS is perceived to be psychologically more distal than the US and is thus evaluated according to the valence of the abstract high level information presented about the US. (3) Comparable to other dimensions of psychological distance, there exists an association between associative distance and level of construal. This association should reveal itself in faster reaction times in a lexical decision task that uses USs and CSs as primes and abstract and concrete words as targets. Specifically, reaction times toward concrete words should be faster when the concrete word is preceded by a US as compared to a CS, whereas reaction times toward abstract words should be faster when the abstract word is preceded by a CS as compared to a US.

7 Experiments

Four experiments were conducted in order to test the three hypotheses. Experiments 1-3 investigated the first two hypotheses and Experiment 4 dealt with the third hypothesis. Subsequently, each of these experiments is described in detail.

7.1 Experiment 1

The main goal of Experiment 1 was to provide first evidence for the hypothesis that the US would be evaluated according to the valence of concrete low level information, whereas the CS would be evaluated according to the valence of abstract high level information presented about the US. For this purpose, an associative learning paradigm was employed. In the first phase of the study, participants received information about the USs that was either of positive or of negative valence and that pertained to either a high construal level or a low construal level. Participants' task was to encode the presented information and to form an impression about the USs. It was tested whether participants were successful in encoding the high and low level information. In the conditioning phase, the already familiar USs were repeatedly paired with yet unknown neutral CSs. The effect of this conditioning procedure was subsequently tested by assessing likeability ratings for USs and CSs.

The hypotheses were as follows: When the valence of high and low level information presented about the USs does not differ, the respective valence is encoded and transferred to the associated CS. Specifically, when the US is presented with positive high level and positive low level information, it should be evaluated positively and the positive valence should transfer to the associated CS. Conversely, when the US is presented with negative high level and negative low level information, it should be evaluated negatively and the negative valence should transfer to the CS. This effect can be described as the standard EC effect that has been obtained in numerous EC studies. However, the novel hypotheses of the present research refer to the cases in which high and low level information is of different valence. These ambivalent USs should be evaluated according to the valence of the concrete low level information. The evaluation of the associated CSs, however, should be influenced more strongly by the valence of the abstract high level information. For instance, a US with a positive high level feature and a negative low level feature should be evaluated more negatively compared to a US with a negative high level feature and a positive low level feature. Conversely, the CS associated with a positive high level - negative low level US should be evaluated more positively compared to a CS associated with a negative high level - positive low level US.

Additionally, temporal distance was included in the experiment as a between-factor. Temporal distance was manipulated by telling participants that the scenario that was to be imagined in the experiment would take place either in the near or in the distant future. This temporal distance manipulation was included to explore whether EC effects would be observed in a temporally distant context. Although EC studies so far have neither explicitly addressed nor manipulated temporal distance, it seems that the instructions and scenarios used in typical EC studies all refer to a temporally near setting or context in which participants are asked to imagine that they are going to "meet some people now" (i.e., in the very near future). Under these conditions, EC effects have been reliably obtained in numerous studies (for overviews see De Houwer et al., 2001, Walther & Langer, 2008). Another reason for implementing the temporal distance manipulation was to investigate whether the effects of associative distance would be enhanced or diminished by employing an additional dimension of distance. As outlined in paragraph 3.7, there is little research so far that addresses the interaction of different distance dimensions. It might be possible that associative and temporal distance interact in such a way that in the temporally near condition (as compared to the temporally distant condition) participants would pay more attention to the concrete information when evaluating the US and less attention to the abstract information when evaluating the CS. Alternatively, it appears plausible that temporal distance leads to a main effect such that concrete information is in the focus of attention in the temporally near condition and abstract information is in the focus of attention in the temporally distant condition, irrespective of whether US or CS is evaluated. In this case, temporal distance would override the effects of associative distance.

7.1.1 Participants and Design

A total of 41 participants (32 female, 9 male) took part in the study. They were recruited from a shopping mall close to the Psychology Department at the University of Heidelberg and received a chocolate bar for their participation. The experiment consisted of a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) × 2 (temporal distance: near future vs. distant future) design with the first two factors being manipulated within-subjects and the last factor being manipulated between-subjects.

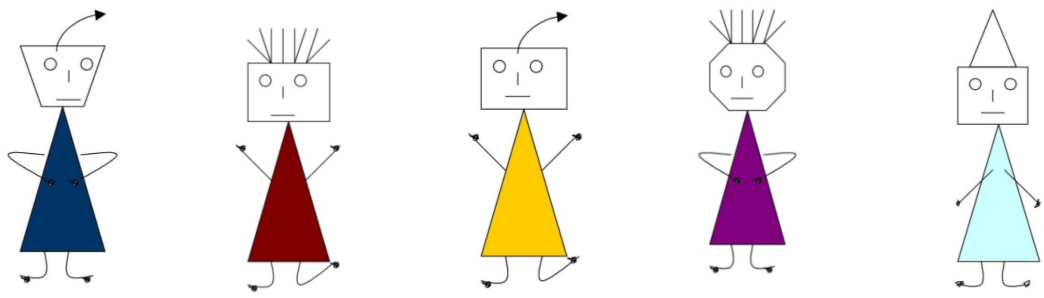
7.1.2 Materials

The stimuli used as USs and CSs were pictures of drawings of "alien creatures" that were created using Microsoft Word (see Figure 2 for examples). Artificial creatures were used because participants had no previous knowledge about these characters or their typical traits and mental states. Thus, it was possible to experimentally induce high and low level construal by presenting abstract and concrete information about these stimuli. In order to make the scenario more plausible for participants they were told that the experiment is similar to a computer game and that it was their task during the experiment to survive on an alien planet.

The information about the high level construal information (i.e., trait) of each stimulus was given by means of the specific look of the stimuli. Participants learned that two tribes were living on a foreign planet "Elpo", the "Trisons" and the "Pongals". The Trisons were known to be very warlike, whereas the Pongals were known to be very pacific. Participants could distinguish the Trisons from the Pongals by their specific headdress. Trisons had an antenna on their head, whereas Pongals had spiky hear. The individual Trisons and Pongals differed from each other by the shape of their head and the color of their clothing. Thus, participants learned about the valence of the high level information by encoding whether a specific creature belonged to a warlike or to a pacific tribe.

The information about the low level construal information (i.e., mood state) of each stimulus was also inherent in the specific look of the stimulus. Specifically, the different mood states (i.e., bad mood, good mood) could be recognized by the way the creatures were holding their arms. Thus, four different kinds of USs were presented: warlike/good mood, warlike/bad mood, pacific/good mood, and pacific/bad mood.

The CSs were also pictures of alien creatures but they were not presented until participants encoded the trait and state information about the USs. The CSs were introduced as being members of another tribe, the so-called "Metis". Metis could be recognized by a specific headdress looking like a triangle. Participants were told that Metis were neither warlike nor pacific, and they were neither in a particularly good nor in a particularly bad mood. Thus, the Metis served as CSs because they were neutral on the high as well as on the low level of construal.



A B C D E

Figure 2: Examples of the stimulus materials used in Experiment 1. Creature A is an unambiguously negative US (warlike Trison in a bad mood); B is an unambiguously positive US (pacific Pongal in a good mood); C is an ambivalent US (warlike Trison in a good mood); D is an ambivalent US (pacific Pongal in a bad mood); E is a neutral CS (Meti).

7.1.3 Procedure and Measures

Participants were greeted by an experimenter and were seated in front of a computer screen. They were told that the study would be similar to a computer game and that it would be their task to survive on an alien planet. The experiment consisted of three sequential phases which were guided entirely by a computer program: a classification phase, a conditioning phase, and a test phase.

Cover Story: Participants were asked to imagine that researchers found out that there is indeed life on an alien planet. They were told that they had just started a new job as a scientific researcher in a company investigating extraterrestrial life and that they were supposed to fly to a foreign planet named Elpo in order to construct a new research facility on this planet. The temporal distance manipulation was employed by telling half of the participants that they will fly to Elpo tomorrow (near future condition) and the other half that they will fly to Elpo in six months (distant future condition). Participants learned that the Trisons and Pongals were the two different tribes living on Elpo. They were informed about the traits and mood states of the creatures as well as how to recognize them. Participants were told that they will have to learn two things on the basis of the information they were about to receive in order to survive on Elpo: which tribe the creatures belong to and what mood they are in. The cover story stressed the importance to encode all of the information by telling participants that they will only survive on Elpo if they are able to recognize which tribe a creature belongs to *and* what mood the creature is in (see Appendix A for exact wording of the cover story).

Classification Phase: The purpose of the classification phase was to present participants with the USs and the high and low level information. Participants' task was to correctly encode the provided information. After participants finished reading the cover story, they were presented with pictures of different tribe members (USs). The pictures were presented on the left side of the computer screen and information about each picture was presented in terms of adjectives on the right side. Adjectives were used to describe the high level of construal because, according to the LCM (Semin & Fiedler, 1988), adjectives are the most abstract linguistic category. The adjectives were synonyms of "warlike" (e.g., aggressive, belligerent, fierce) and "pacific" (e.g., pleasant, gentle, amiable; see Appendix B for a list of all adjectives). Although tribe membership (and thus the trait) could be recognized by the mere look of the specific stimuli, the adjectives were additionally displayed in order to help participants to correctly classify the stimuli into the right category. Thus, to recognize the high level of construal, participants had to pay attention to the headdress of the stimuli and had to read the descriptions assigned to these creatures. To recognize the low level construal, they had to pay attention to the way each creature was holding its arms.

A matrix consisting of four cells was presented below each of the stimulus-adjective combinations. Each cell contained one possible combination of high and low level construal, i.e., a tribe - mood combination (e.g., Pongal in a good mood, Trison in a bad mood, etc.). After participants clicked on the cell they considered to be the correct one, the actual correct cell blinked in green color for 1500 ms, giving feedback to participants as to whether their answer was correct. Picture-adjective-matrix pairs were presented one-by-one, with each pair being displayed until participants clicked on one of the cells. If participants did not click on one of the cells within 10 seconds the picture-adjective pair disappeared and the next trial began. The inter-trial interval (ITI) was 1000 ms. The classification phase was terminated when participants classified one stimulus from each of the four categories correctly, which means that the duration of the classification phase differed for each participant. If participants did not reach the previously set learning criterion of one correct classification for each cell the classification phase was terminated after a maximum of 162 trials.

Evaluative Conditioning: The CSs were introduced by asking participants to imagine that there is another tribe on Elpo which the researchers don't have any knowledge about so far. Participants were informed about the name of the tribe (Metis) and how they could be recognized. Participants were then presented with pairs of already familiar tribe members from the initial classification phase (USs) and yet unfamiliar, neutral target tribe members (CSs). Three of the USs were unambiguously positive, three were unambiguously negative, three were positive on the high level and negative on the low level of construal and three were negative on the high level and positive on the low level of construal, thus resulting in a total number of 12 USs. The 12 CS-US pairs were presented six times in a trace conditioning procedure with each stimulus being displayed in the center of the computer screen for 1500 ms with an inter-stimulus interval (ISI) of 300 ms and an inter-trial interval (ITI) of 1500 ms. This results in a total of 72 presentations. Participants' task was to form impressions of the targets presented on the screen.

Test Phases: After the conditioning task, three test phases followed. The first two test phases served as manipulation checks. Specifically, these two test phases investigated whether participants correctly remembered which high and low level information was presented about each specific US. Furthermore, these test phases allowed to test whether level of construal might also transfer to the CSs such that, for instance, a CS paired with a warlike-good mood US is also perceived to be warlike and in a good mood.

In the first test phase, participants evaluated all tribe members on a graphic rating scale (labeled "warlike" on the left and "pacific" on the right) by positioning the cursor on any point of the scale and then pressing the left mouse key. To avoid response tendencies, the graphic scale consisted of no additional numbers or other numerical labels. The computer program recorded warlike judgments on the left side from –1 to –100, and pacific judgments on the right side from +1 to +100. The neutral midpoint of the scale (0) served as the starting position for each judgment. This test phase is subsequently referred to as trait test phase. The second test phase used the same rating scale and participants had to judge the mood of the displayed stimuli. Thus, the scale of this so-called mood test phase was labeled "bad mood" on the left side and "good mood" on the right side. In the third test phase, valence ratings of all stimuli were assessed by asking participants to evaluate all tribe members on a scale labeled "not likeable at all" on the left and "very likeable" on the right. This test phase constitutes the actual dependent variable and is subsequently referred to as valence test phase.

Finally, participants completed the post-experimental questionnaire (see Appendix C) that assessed demographical data as well as questions referring to the procedure of the study such as whether participants were aware of the hypothesis of the study.

7.1.4 Results

The between-subjects manipulation of temporal distance revealed no significant results in any of the following analyses, which is why it is refrained from reporting it in detail. However, possible explanations for these non-results are outlined in the discussion section. The data were collapsed over the two between-subjects conditions.

Trait and mood judgments: In a first step, it was necessary to test whether participants indeed encoded the high and low level information presented about the USs. In order to check the effectiveness of the trait (high level) and mood (low level) information, the ratings of the trait and mood test phases were analyzed. First, a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with US ratings of the trait test phase as dependent variable was conducted. All effect sizes for *F* values are reported as partial eta squared. As expected, this analysis revealed a highly significant main effect, $F(1,40) = 10.29$, $p < .01$, $\eta^2 = .21$, indicating that the warlike Trisons were indeed judged as more warlike than the Pongals, and the pacific Pongals were judged as more pacific than the Trisons (*Ms* = -22.88 vs. 22.39, respectively). In a next step, the same ANOVA was conducted using the trait ratings of the CSs as dependent variable. Remember that participants were told that all of the CSs belonged to a tribe that was neither particularly warlike nor particularly pacific. Because the definition of EC refers to the transfer of valence only (and not to the transfer of specific traits) it was not expected that the CS-US pairings would result in a warlike (pacific) judgment of CSs that were paired with warlike (pacific) USs. And indeed, the ANOVA revealed that the trait ratings of the CSs did not differ significantly from each other on the warlike-pacific dimension ($F < 1$), indicating that the traits associated with tribe membership of the USs did not transfer to the CSs.

Second, the same 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with the ratings of the mood of USs as dependent variable was conducted. A highly significant main effect emerged, $F(1,40) = 343.14$, $p < .001$, $\eta^2 = .89$, indicating that USs in a good mood were indeed classified as having a good mood, whereas USs in a bad mood were classified as having a bad mood (*Ms* = 87.28 vs. -78.35). The same ANOVA with mood ratings of the CSs as dependent variable did not reveal a significant effect, ($F < 1$), indicating that mood itself did not transfer from the USs to the associated CSs.

Thus, the CSs paired with USs in a good mood were not judged to be in a better mood compared to CSs that were paired with USs in a bad mood.

US-Attitudes: In order to investigate the effects of the positive and negative high and low level information on the valence judgments of the USs, the mean valence ratings of the USs were submitted to a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with repeated measurement on both factors. This revealed a significant main effect of valence of high level of construal, $F(1,40) = 8.28$, $p < .01$, $\eta^2 = .17$, indicating that attitudes toward pacific USs were more positive than attitudes toward warlike USs (*M*s = 15.33 vs. –7.31, respectively). The same ANOVA also revealed a highly significant main effect of valence of low level of construal, $F(1,40) = 47.83$, $p < .001$, $\eta^2 = .54$, indicating that attitudes toward USs in a good mood were significantly more positive than attitudes toward USs in a bad mood (*Ms* = 37.37 vs. -29.35, respectively). Although both main effects reached significance, the main effect for low level construal was stronger than the effect for the high level construal, indicating that the valence of the low level construal was more decisive in forming an attitude toward the US. This is particularly interesting because it is exactly in line with the hypothesis that the valence of the low level information is more strongly focused on than the valence of high level construal when evaluating the US. Figure 3 displays the mean valence ratings of the USs.

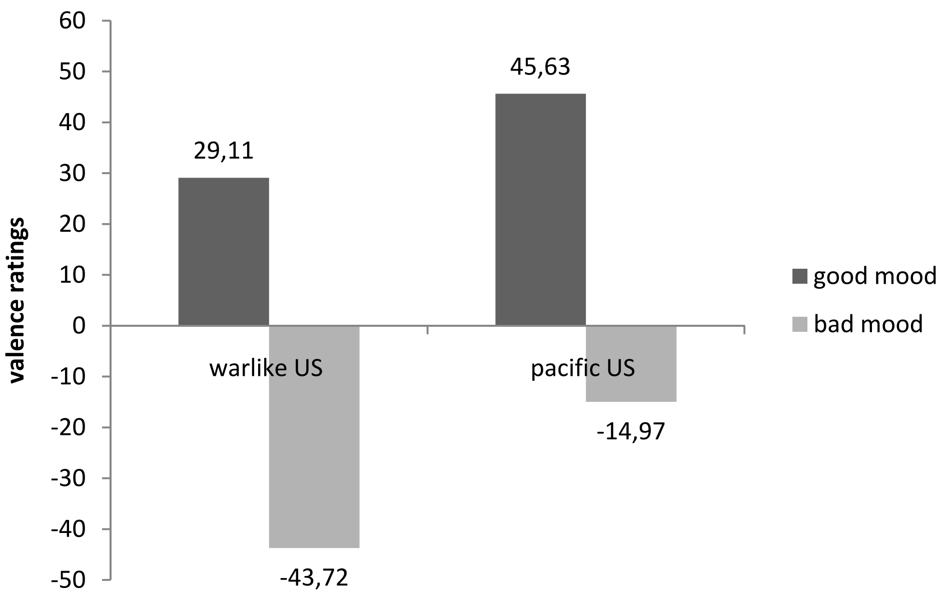


Figure 3. Mean valence ratings of the USs as a function of valence of high level construal (i.e., trait) and valence of low level construal (i.e., mood). Higher values indicate more positive evaluations; Experiment 1.

In a further step, the valence ratings for the unambiguous (i.e., same valence on high and low level construal) and the ambivalent (i.e., different valence on high and low level construal) USs were analyzed separately with mean comparisons for repeated measures. For the unambiguous USs, this revealed a highly significant difference as a function of the valence manipulation, $t(40) = -7.29$, $p < .001$, $d = 1.91$, indicating that attitudes toward unambiguously positive USs were strongly positive and attitudes toward unambiguously negative USs were strongly negative (*M*s = 45.6 vs. –43.7, respectively). Of greater interest, however, were the valence ratings of the ambivalent USs because they directly refer to the first hypothesis, namely that the ambivalent USs should be evaluated according to the valence of the concrete low level information. Consistent with the hypothesis, the mean comparison of the ambivalent USs revealed a highly significant difference as a function of the construal level manipulation, $t(40) = 3.49$, $p = .001$, $d = .91$, indicating that attitudes toward USs with a positive valence on the high level and a negative valence on the low level construal (i.e., pacific Pongal in a bad mood) were evaluated more negatively than USs with a negative valence on the high level and a positive valence on the low level (i.e., warlike Trison in a good mood) (*Ms* = -14.97 vs. 29.11, respectively). Importantly, this effect was obtained even though each US possessed one positive and one negative feature. Thus, the construal level of the specific positive or negative feature seems to be crucial in determining whether a psychologically close stimulus such as a US is evaluated positively or negatively.

CS-Attitudes: The valence ratings of the CSs shed light on the question of whether the valence of the unambiguous USs was successfully transferred to the CSs as would be expected in a standard EC study. Moreover, the valence ratings of the CSs give information about whether and how the ambivalent USs influence the evaluation of the CSs.

First, direct conditioning effects were analyzed by comparing valence scores for formerly neutral CSs that were paired with unambiguously positive and unambiguously negative USs as well as formerly neutral CSs that were paired with ambivalent USs. A 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with repeated measurement on both factors revealed a significant main effect of valence of high level construal, $F(1,40) = 12.89$, $p = .001$, $\eta^2 = .24$, indicating that the repeated pairing of neutral CSs with warlike USs evoked a negative attitude towards the CSs, whereas the repeated pairing of neutral CSs with pacific USs led to a more positive attitude towards the CSs (*M*s = -7.27 vs. 3.77, respectively). The same ANOVA also revealed a significant main effect of valence of low level construal, $F(1,40) = 4.14$, $p =.049$, $\eta^2 = .09$, indicating that the repeated pairing of neutral CSs with USs in a bad mood evoked a more negative attitude towards the CSs, whereas the repeated pairing of neutral CSs with USs in a good mood led to a more positive attitude towards the CSs (*M*s = -5.87 vs. 2.37, respectively). Conversely to the USs, the main effect for the high level construal was stronger than the main effect for the valence of the low level construal, indicating that the valence of the abstract trait is more relevant than the valence of the concrete mood when evaluating the CSs. This confirms the hypothesis that high level construals are more salient when evaluating CSs. The means are displayed in Figure 4.

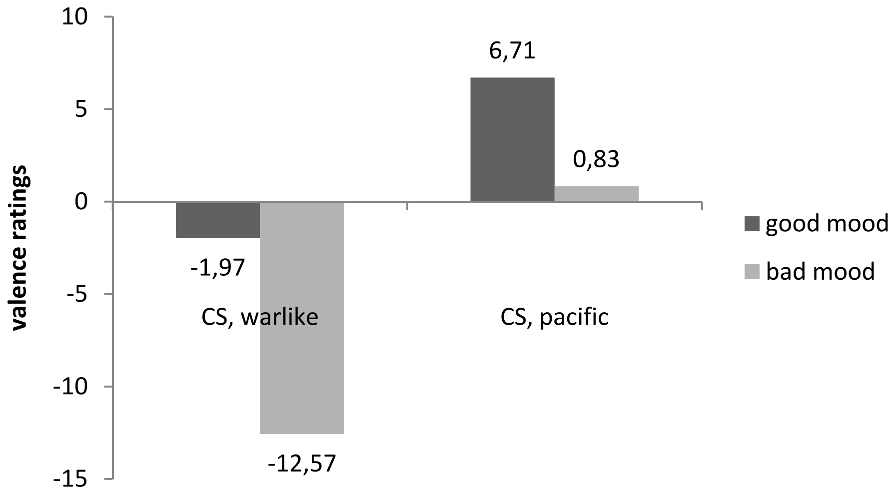


Figure 4. Mean valence ratings of the CSs as a function of valence of high level construal (i.e., trait) and valence of low level construal (i.e., mood) of the paired USs. Higher values indicate more positive evaluations; Experiment 1.

Second, the valence ratings of the unambiguous and ambivalent CSs were analyzed separately. Unambiguous CSs refer to those stimuli that were paired with a warlike US in a bad mood or with a pacific US in a good mood. Ambivalent CSs, on the other hand, refer to stimuli that were paired with a warlike US in a good mood or with a pacific US in a bad mood. A mean comparison for repeated measures for the unambiguous CSs revealed a significant conditioning effect, $t(40) = 3.83$, $p < .001$, $d = .63$, indicating that the CSs paired with positive USs were evaluated more positively, whereas the CSs paired with negative USs were evaluated more negatively (*Ms* = 6.71 vs. -12.57, respectively). However, when comparing only the ambivalent CSs, the conditioning effect disappeared, $t(40) = 0.55$, $p = .59$ (*Ms* = -1.97 vs. 0.83, respectively). In other words, the evaluation of the CSs paired with warlike USs in a good mood did not differ significantly from the evaluation of the CSs paired with pacific USs in a bad mood. According to the hypothesis that the evaluation of the CSs should be influenced more strongly by the valence of the abstract high level information, it was expected that the CSs paired with a warlike US in a good mood would be evaluated more negatively compared to CSs paired with a pacific US in a bad mood. This hypothesis was not supported by the data of the present experiment.

Interaction of US and CS valence: The observation that the main effect for the concrete low level construal is stronger when evaluating the USs, whereas the main effect for the abstract high level construal is stronger when evaluating the CSs is supported by a significant two-way interaction. Specifically, the valence ratings of the ambivalent USs were compared directly with those of the CSs that had been paired with ambivalent USs. A 2 (US: warlike/good mood vs. pacific/bad mood) × 2 (CS: warlike/good mood US vs. pacific/bad mood US) ANOVA was conducted with repeated measurement on both factors. This analysis revealed a significant main effect, $F(1,40) = 8.98$, $p = .005$, $\eta^2 = .18$, indicating that the warlike stimuli in a good mood were judged more positively than the pacific stimuli in a bad mood. More important for the present hypotheses, however, was the highly significant interaction effect, $F(1,40) = 12.01$, $p = .001$, $\eta^2 = .23$, indicating that for the USs, the pacific US in a bad mood was judged more negatively than the warlike US in a good mood (*Ms* = -14.97 vs. 29.11, respectively). For the CSs, this effect attenuated and even slightly reversed (*Ms* = -1.97 vs. 0.83, respectively) (see Figure 5).

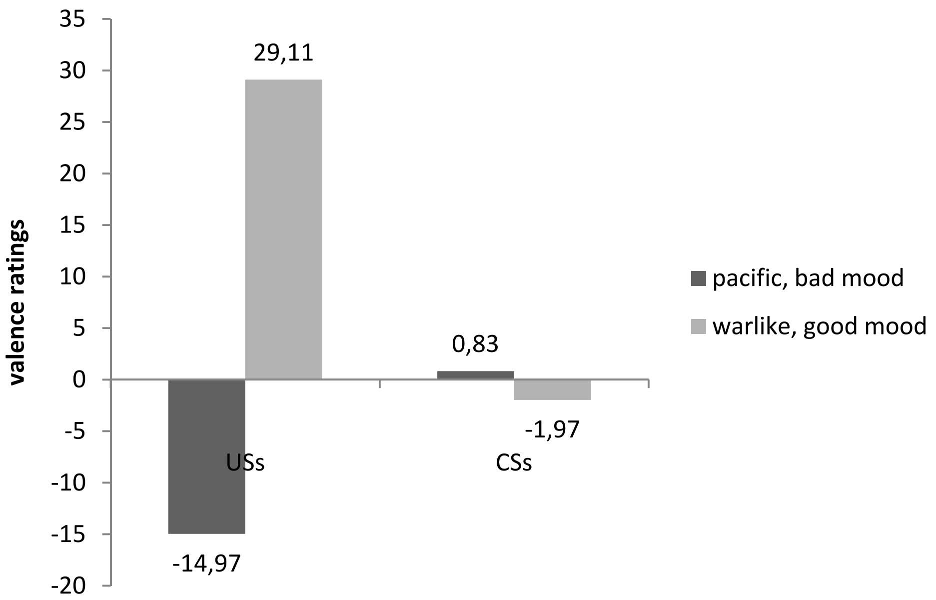


Figure 5. Mean valence ratings of the ambivalent USs and CSs. Higher values indicate more positive evaluations; Experiment 1.

In other words, the greater importance of concrete low level information when evaluating the USs disappeared when evaluating the associated CSs. Although the prediction was that the effect would not only disappear but even reverse such that the CS paired with a warlike stimulus in a good mood would be judged significantly more negative than the CS paired with a pacific stimulus in a bad mood, the observed interaction supports the above mentioned hypotheses. The valence of the low level of construal (i.e., valence of mood state) seems to be more important when evaluating the USs, whereas there was no differential importance of valence of low versus high level of construal when evaluating the associated CSs.

7.1.5 Discussion

The data of Experiment 1 provide first evidence for the hypothesis that the US in an evaluative learning paradigm is psychologically more proximal than the CS. The effect sizes for the main effects revealed that the valence of low level construals had a greater effect on the evaluation of the USs than the valence of high level construals. For the unambiguously positive or negative USs, it is secondary which information is more relevant because both kinds of information are either positive or negative, thus leading to an either positive or negative attitude toward the USs. However, attitudes toward ambivalent USs were also influenced more strongly by the valence of the concrete low level information (i.e., mood) than by the valence of the abstract high level information (i.e., trait). That is, USs that possessed a negative low level feature and a positive high level feature were evaluated more negatively as compared to USs that possessed a positive low level feature and a negative high level feature. This result can be explained in terms of associative distance and provides first evidence that association constitutes a dimension of psychological distance. The US is a stimulus that is experienced more directly and is thus perceived to be psychologically more proximal than a CS. As a consequence of the greater psychological proximity of a US, and in line with CLT (Trope & Liberman, 2003), low level construals should be more likely applied to the US than high level construals, which is exactly what was observed in the present experiment. The results confirm the prediction that concrete low level features are more salient when evaluating a US, and particularly when evaluating a US that possesses ambivalent concrete and abstract features. Furthermore, this result shows that the evaluation of ambivalent stimuli follows certain rules which can be directly derived from CLT. This first demonstration of a greater salience of low level features in a psychologically proximal stimulus has important implications for learning and attitude formation in general. One might conclude from these results that the presentation of any object along with concrete and abstract features generally leads to a focus on concrete features.

The second hypothesis regarding the evaluation of the CSs was partially supported by the data of Experiment 1. A conditioning effect was obtained indicating that the valence of the USs did transfer to the associated CSs. Moreover, results revealed that the main effect for the valence of high level construal was stronger than the main effect for the valence of the low level construal which indicates a stronger focus on abstract high level information when evaluating the CSs. However, the conditioning effect was limited to the CSs paired with unambiguously positive or negative USs. CSs that were paired with ambivalent USs were not evaluated significantly different from each other, which means that no significant difference regarding the importance of high versus low level information could be observed for the ambivalent CSs. However, the observed interaction effect of US and CS valence revealed a difference regarding the weighting of high level versus low level information in the US as compared to the CS. Specifically, the greater importance of low level information that could be observed in the evaluation of the USs disappeared when evaluating the CSs. Based on this interaction effect, one can conclude that USs and CSs are indeed perceived differently in terms of associative distance.

That US and CS differ with regard to perceived distance is further supported by the differential strength of the main effects for trait and state valence in the USs and CSs. The prediction that the salience of features changes as function of the distance of the stimulus that is to be evaluated is corroborated by the present results. When focusing on the US, the concrete features are more salient, whereas the abstract features are more salient when focusing on the CS. Even though the latter effect could not be found for the ambivalent CSs, results revealed that participants did take the abstract information into account when evaluating the CS as compared to when evaluating the US. If participants had concentrated only on the low level information, the evaluation of the CSs would have exactly mirrored the evaluation of the USs, which was apparently not the case. Thus, the abstract information became more relevant even though it was not focused on in such a way as to override the influence of the concrete features.

The finding that the abstract trait information was not more important than the concrete mood information when evaluating the ambivalent CSs might be attributed to the specific manipulation of construal level that was employed in the present study. The low level feature (mood) could be easily and intuitively recognized; when the creatures were holding their arms up, they were in a good mood, when their arms were hanging down they were in a bad mood. Learning about the high level feature was a little more complex. First of all, the specific trait was associated with tribe membership, meaning that participants had to actually learn the tribe membership of a creature as well as whether this tribe is warlike or pacific. Tribe membership itself (i.e., Trison or Pongal) was to be recognized by the headdress of the stimuli but whether a specific headdress indicated a positive or a negative trait had to be learned during the classification phase. After the classification phase, participants could recognize tribe membership by the headdress of the stimuli but they had to remember or infer the trait associated with this tribe. The mood state of the creatures, however, could be instantly recognized without having to make additional inferences or remembering previously given information. Hence, it might have been more difficult for participants to learn the high level as compared to the low level feature, particularly when its valence contradicts the valence of the low level feature. Therefore, the high level feature might have been not salient enough in order to have an advantage over the low level feature when evaluating the ambivalent CS. Of course, one could then argue that the obtained effects in the ambivalent USs could also be due to a generally higher salience of low level information and not to the perceived psychological proximity of the USs. However, this would not explain why the advantage of low level information was limited to the USs and did not equally apply to the CSs.

Another aspect that should be discussed with reference to the lack of an effect of temporal distance refers to the scenario participants were asked to imagine. Although the cover story stressed the similarity of the experiment to computer games and elaborately tried to persuade participants to imagine this scenario, it has to be admitted that it still was a highly hypothetical scenario taking place in the distant future (i.e., flying to a foreign planet). Hypotheticality is known to constitute another dimension of distance (Bar-Anan et al., 2006). Thus, three different distance dimensions (hypothetical, temporal, associative) were combined in one experiment. Considering that is not even clear yet how two distance dimensions might interact (see paragraph 3.7), this combination (or confounding) of three distance dimensions could be responsible for the (lack of) effects. Although the combination of a highly hypothetical scenario taking place in the distant future and hypothetical stimuli that are "associatively distant" (i.e., CSs) should seemingly enhance or enforce the application of high level as compared to low level construals, there is no research giving information about possible consequences of such a complex combination of three different dimensions of distance. Admittedly, this is a quite general explanation that does not directly refer to the lack of temporal distance effects. However, the application of a more realistic scenario with more realistic stimuli seems to be an interesting option in order to obtain the associative distance effects without confounding it with other distance dimensions such as hypotheticality.

Taken together, Experiment 1 provided evidence for the proposal that associative distance constitutes a dimension of psychological distance. Ambivalent USs were evaluated according to the valence of concrete low level features instead of abstract high level features, which can be taken as evidence for the psychological proximity of the US. Conversely, for the CSs associated with ambivalent USs, the focus on concrete features disappeared, which indicates that participants also took the valence of abstract high level information into account.

The second study intended to deconfound hypotheticality and associative distance by using other stimuli and another scenario that was more realistic as well as socially more relevant for participants. Furthermore, Experiment 2 tried to make the manipulation of high and low construal information similarly salient. As a consequence of these changes in manipulation, it was hypothesized that it is possible to condition attitudes even in CSs that were paired with ambivalent USs.

7.2 Experiment 2

The first aim of the second study was to replicate the US construal level effects observed in Experiment 1. The ambivalent USs should again be evaluated according to the valence of the concrete low level information. Moreover, it was hypothesized that the conditioning effect should depend on the valence of the high level information presented about the US with which the CS is associated. When the US has a positive high level and a negative low level feature, the positivity of the abstract high level feature should transfer to the CS. Conversely, when the US has a negative high level and a positive low level feature, the negativity of the high level feature should transfer to the CS. The basic procedure of Experiment 2 was similar to Experiment 1. However, several changes regarding the operationalization were applied in Experiment 2 in order to obtain the hypothesized effects.

First, the stimuli were pictures of human faces. Second, the scenario that was to be imagined by participants was more realistic and socially relevant. Specifically, the cover story told participants that they were about to move into a student dormitory and that it was their task to learn something about their future housemates. The manipulation of high and low level construal was also slightly different from Experiment 1. The high level of construal (trait information) was established by telling participants that their housemates could either belong to an aggressive student fraternity ("Alligators") or to a companionable student fraternity ("Woodchucks"). The low level of construal (state information) was established by telling participants that the fraternity members were either sober which indicates good mood or on drugs ("high") which indicates bad mood.

Another difference to Experiment 1 is that participants first underwent a formation phase in which they learned about the trait and state of the individual fraternity members. Subsequently, the classification phase followed and participants had to categorize the stimuli into the correct category. Participants then completed an EC task and subsequently rated all the stimuli with regard to their likeability. Temporal distance was again manipulated between-subjects in order to find out whether the lack of temporal distance effects in the first experiment was due to the hypothetical scenario.

7.2.1 Participants and Design

A total of 53 participants (35 female, 18 male) took part in the study. Participants were students at the University of Trier and received partial credit towards a course requirement. The experiment consisted of a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) × 2 (temporal distance: near future vs. distant future) design with the first two factors being manipulated within-subjects and the last factor being manipulated between-subjects.

7.2.2 Materials

The US and CS stimuli were black-and-white pictures of human male faces (see Appendix D for examples). A pretest revealed that all selected pictures were neutral with regard to their likeability.

The information about the high level construal information (i.e., trait) of each stimulus was given to participants during the newly established formation phase by displaying each stimulus along with the name of the fraternity (Alligator or Woodchuck) this person belonged to. There were two reasons for using names of animals as fraternity names. First, they do not constitute real fraternity names and do not remind people of specific fraternities they might have made experiences with or have knowledge about. Second, the names were thought to facilitate the ascription of a positive or negative attribute to the stimulus presented along with that name. Concretely, it was hypothesized that the name "Alligator" would facilitate the ascription of "aggressive" to a specific stimulus person belonging to that fraternity, whereas the name "Woodchuck" would facilitate the ascription of "companionable" to a person belonging to that fraternity. This way, the trait of a fraternity member could be inferred from the name of the fraternity. This is different to Experiment 1 in which the tribe name (Trison or

Pongal) revealed nothing about the trait associated with the tribe. Thus, participants learned something about the high level feature of the stimuli by learning to which fraternity a stimulus belonged to.

The information about the low level construal information (i.e., mood state) of each stimulus was again inherent in the specific look of the stimuli. Concretely, when a stimulus person was sober (i.e., in a good mood), the picture of this person was surrounded by a grey frame. When the stimulus person was on drugs (i.e., in a bad mood), the picture itself was slightly blurry but the person on the picture could still be easily recognized. Thus, participants first had to learn that a framed picture indicates good mood and a blurry picture indicates bad mood. Once this association was learned, they were able to recognize the valence of the low level construal simply by looking at the pictures. The results of Experiment 1 demonstrated that the high level construal might have been less salient and more difficult to learn than the low level construal. Although it seemed difficult to make high and low level information equally salient, the present manipulation intended to at least approximate this goal by making the high level information slightly easier to learn as in Experiment 1, whereas the low level construal was slightly more difficult to learn.

The CSs were also pictures of neutrally evaluated male faces but these pictures were not presented until participants encoded the trait and state information about the USs. The CSs were introduced as being members of another fraternity, the so-called "Finches". Pictures of the Finches were neither framed nor blurry. Participants were told that nothing is known about the Finches' traits or drug use (i.e., mood states). Thus, the Finches served as CSs because they were neutral on the high as well as on the low level of construal.

7.2.3 Procedure and Measures

As in Experiment 1, participants were greeted by an experimenter and seated in front of a computer screen. The experiment consisted of four sequential phases which were guided entirely by a computer program: a formation phase, a classification phase, a conditioning phase, and a test phase.

Cover Story: Participants were asked to imagine that they had just moved into town and found a room in one of the student dormitories. In the near future condition, they were told that they could move in tomorrow, whereas in the distant future condition they were told that they could move in six months from now. They were supposed to gather some information about all the other inhabitants of their dormitory.

Participants were told that the Alligators and Woodchucks were two different student fraternities living in the house. They were informed about the traits (aggressive vs. companionable) and drug use (sober = good mood vs. high = bad mood) of the fraternity members as well as how to recognize the specific trait and the specific mood. Participants were told that they would get to know the individual persons and learn to which fraternity the individuals belong to as well as whether an individual is sober or on drugs. They were instructed that it was important to encode both kinds of information because their own well-being in the dormitory depends on the fraternity membership as well as on the drug use of their housemates. Participants were then told to form impressions of their future housemates (see Appendix E for exact wording of the cover story).

Formation phase: Participants were presented with black-and-white pictures of human male faces. The pictures were presented on the left side of the computer screen and the information whether each individual belonged to the Alligators or to the Woodchucks was presented on the right side of the screen. To recognize the high level construal, participants had to read the name of the fraternity that was written next to each individual and to recognize the low level construal, they had to pay attention to the background of each picture. Four different combinations of high and low level construal valence were presented: positive low and positive high level, positive low and negative high level, negative low and positive high level, negative high and negative low level. Three stimuli of each combination were presented three times in a fixed randomized order with each stimulus being displayed for 5000 ms with an ITI of 1000 ms. This resulted in a total number of 36 presentations.

Classification Phase: The classification phase was identical to Experiment 1 except that different USs and different matrix descriptions were used. Each cell contained a fraternity name - drug use combination (e.g., Alligator sober, Woodchuck high, etc.). To recognize the high level of construal, participants had to remember the fraternity membership learned during the formation phase and to recognize the low level construal, they had to pay attention to whether the picture was framed or blurry. The task of participants was to classify the stimulus into the category they considered to be right by clicking on the cell with the corresponding description. The learning criterion was changed from one to three correct classifications per cell. This was done in order to ensure that participants indeed learned which stimulus belongs into which of the four categories. Hence, the classification phase was terminated when participants classified stimuli from each of the four categories correctly three times. Additionally, the maximum number of trials was adjusted downwards from 162 to 60 trials. The reason for this adjustment was that the formation phase that was added in

Experiment 2 should make the classification task easier as compared to Experiment 1 which did not have a separate learning (i.e, formation) phase.

Evaluative Conditioning: Participants were told that they were going to learn something about the interactions of the inhabitants of the dormitory. Besides, they learned that there is another fraternity living in the house (the Finches) and that nothing is known about their traits or about their drug use. Participants were then presented with pairs of already familiar stimuli from the initial formation and classification phases (USs) and yet unfamiliar, neutral stimuli (CSs). Three of the USs were unambiguously positive, three were unambiguously negative, three were positive on the high level and negative on the low level of construal and three were negative on the high level and positive on the low level of construal, resulting in a total number of 12 USs. The 12 CS-US pairs were presented six times in a trace conditioning procedure which resulted in a total of 72 trials. Each stimulus was displayed for 1500ms with an ISI of 300ms and an ITI of 1500 ms. Order of CS-US pairs was randomized for each participant. Participants' task was to form impressions of the targets presented on the screen.

Test Phase: After the conditioning task, one test phase followed. The trait and mood test phases of Experiment 1, which investigated whether participants correctly remembered high and low level information presented about each specific US, were dropped in Experiment 2. One reason for this was that it could already be successfully demonstrated in Experiment 1 that participants were able to correctly encode the presented information. Besides, the newly included formation phase and the higher learning criterion in the classification phase were additional measures that provide information about whether participants did encode all the relevant information.

The test phase assessed participants' evaluations of all USs and CSs. However, instead of assessing direct likeability ratings, participants were asked to indicate how much they would like to live with each of the persons presented. This more indirect assessment of valence was chosen because evaluations might be more accurate when participants are not asked about general likeability. Rather, the more specific question used in this test phase fits to the cover story and reduces the probability of demand effects that could possibly be obtained when participants become aware of the intention of the conditioning procedure. This test phase is subsequently referred to as desirability test phase. Each stimulus was presented in the middle of the screen. Below each picture the question: "How much would you like to live with him?" appeared together with the rating scale. The same graphic rating scale as in Experiment 1 was used (labeled "not at all" on the left and "very much" on the right).

Participants evaluated all 24 stimuli presented during conditioning. After the test phase, participants filled out a questionnaire assessing whether they had any guesses regarding the hypotheses of the study (see Appendix F).

7.2.4 Results

The between-subjects manipulation of temporal distance revealed no significant results in any of the following analyses, which is why it is refrained from reporting it in detail. Possible explanations for these non-results are outlined in the discussion section and in the General Discussion. The data were again collapsed over the two between-subjects conditions.

US-Attitudes: In order to investigate the effects of the positive and negative high and low level information on the desirability judgments of the USs, the mean ratings of the USs were submitted to a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with repeated measurement on both factors. This revealed a significant main effect of trait valence, $F(1,52) = 28.24$, $p < .001$, $\eta^2 = .35$, indicating that attitudes toward aggressive USs were more negative than attitudes toward companionable USs (*M*s = -39.56 vs. -7.96, respectively). The same ANOVA also revealed a highly significant main effect of valence of low level of construal, $F(1,52) = 58.09$, $p < .001$, $\eta^2 = .53$, indicating that attitudes toward USs who did not take drugs (i.e., were in a good mood) were significantly more positive than attitudes toward USs who took drugs (i.e., were in a bad mood) (*Ms* = -1.56 vs. -45.96, respectively). The main effect for low level construal was stronger than the effect for the high level construal, indicating that the valence of the low level construal was more strongly focused on when forming an attitude toward the US, thus supporting the hypothesis of the present work. Of less relevance for the present hypotheses is the significant interaction effect that emerged, $F(1,52) = 9.88$, $p < .01$, $\eta^2 = .16$, indicating that the difference in likeability of the good mood stimuli as compared to the bad mood stimuli was more pronounced for the Woodchucks than it was for the Alligators (see Figure 6). In other words, the valence of the low level information had a greater influence on the evaluation of the companionable as compared to the aggressive USs.

In a next step, the likeability ratings for the unambiguous and the ambivalent USs were analyzed separately with mean comparisons for repeated measures. For the unambiguous USs, this revealed a highly significant difference as a function of the valence manipulation, $t(52) = -9.81$, $p < .001$, $d = 2.04$, indicating that attitudes toward unambiguously positive USs were strongly positive and attitudes toward unambiguously negative USs were strongly negative (*M*s = 21.58 vs. –54.43, respectively). For the ambivalent USs, the analysis indicated that attitudes toward USs with a positive valence on the high level and a negative valence on the low level construal (Woodchucks in a bad mood) were more negative than attitudes toward USs with a negative valence on the high level and a positive valence on the low level (Alligators in a good mood) (*Ms* = -37.49 vs. -24.69, respectively). However, this effect failed to reach significance, $t(52) = 1.44$, $p = .07$ (one-tailed), $d = .32$. Thus, the effect observed in Experiment 1 that the construal level of the specific positive or negative feature is crucial in determining whether the US is judged positively or negatively could only be replicated on a descriptive level. The reason that the effect failed to reach significance might be due to the large amount of variance in the ambivalent USs, which was larger than the variance in the evaluations of the CSs.

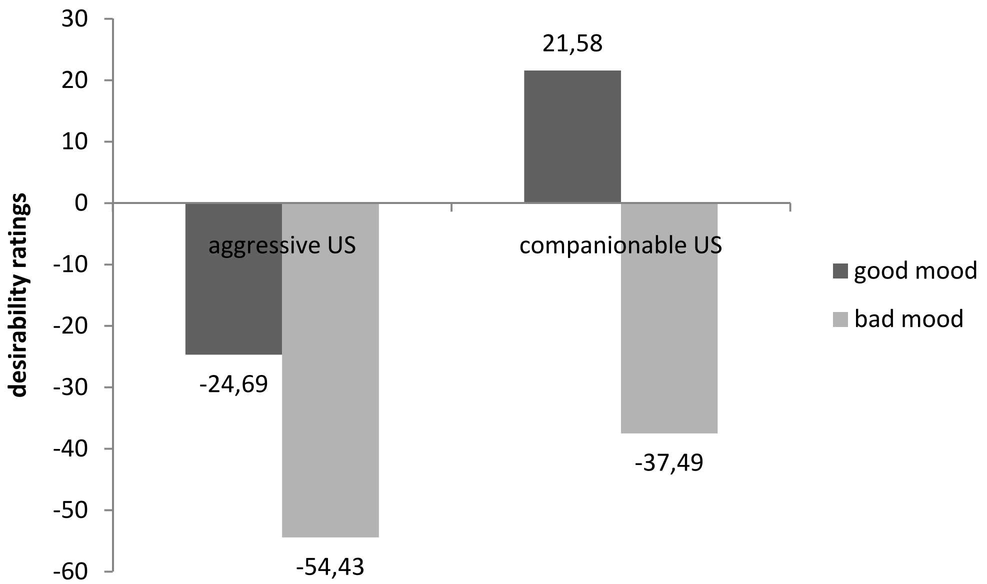


Figure 6. Mean desirability ratings of the USs as a function of valence of high level construal (i.e., trait) and valence of low level construal (i.e., mood). Higher values indicate more positive evaluations; Experiment 2.

CS-Attitudes: The desirability ratings of the CSs were analyzed next. Replicating Experiment 1, it was expected that the valence of the unambiguous USs was successfully transferred to the CSs as would be expected in a standard EC study. Due to the experimental variations, a conditioning effect in the ambivalent CSs was expected that should depend on the valence of the high level construal of the associated ambivalent USs.

Direct conditioning effects were analyzed by comparing desirability ratings for formerly neutral CSs that were paired with unambiguously positive and unambiguously negative USs as well as formerly neutral CSs that were paired with ambivalent USs. A 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with repeated measurement on both factors revealed a significant main effect of valence of high level of construal, $F(1,52) = 94.11$, $p < .001$, $\eta^2 = .64$, indicating that the repeated pairing of neutral CSs with aggressive USs evoked a negative attitude towards the CSs, whereas the repeated pairing of neutral CSs with companionable USs led to a more positive attitude towards the CSs (*M*s = -41.33 vs. -4.38, respectively). The same ANOVA also revealed a significant main effect of valence of low level of construal, $F(1,52) = 65.88$, $p < .001$, $\eta^2 = .56$, demonstrating that the repeated pairing of neutral CSs with USs in a bad mood evoked a negative attitude towards the CSs, whereas the repeated pairing of neutral CSs with USs in a good mood led to a more positive attitude towards the CSs (*M*s = -36.64 vs. -9.08, respectively). Although both effects were highly significant, a comparison of the two main effects again shows that the main effect for the trait valence is stronger than the effect for the mood valence. This supports the hypothesis that there is a stronger focus on abstract than on concrete features when evaluating CSs. As for the USs, the interaction effect between valence of high level construal and valence of low level construal was also significant, $F(1,52) = 23.41$, $p < .001$, $\eta^2 = .31$, indicating that the difference in desirability of the CSs paired with good mood USs as compared to the CSs paired with bad mood USs was more pronounced for the Woodchucks than it was for the Alligators (see Figure 7).

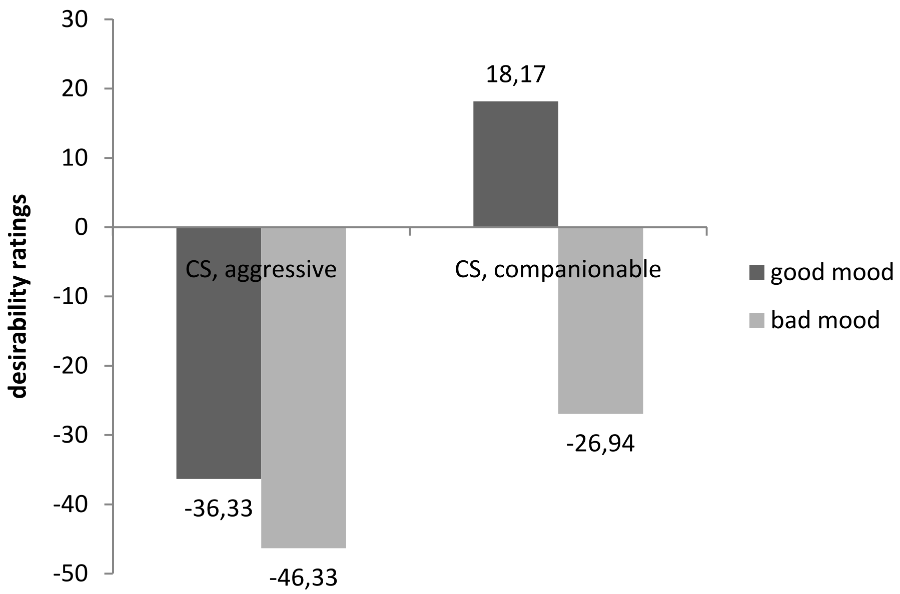


Figure 7. Mean desirability ratings of the CSs as a function of valence of high level construal (i.e., trait) and valence of low level construal (i.e., state) of the paired USs. Higher values indicate more positive evaluations; Experiment 2.

The valence ratings of the unambiguous and ambivalent CSs were also analyzed separately. A mean comparison for repeated measures for the unambiguous CSs revealed a highly significant conditioning effect, $t(52) = -11.77$, $p < .001$, $d = 2.12$, indicating that the CSs paired with positive USs were evaluated more positively, whereas the CSs paired with negative USs were evaluated more negatively (*Ms* = 18.17 vs. -46.33, respectively). When comparing only the ambivalent pairings (CSs that were paired with Woodchucks in a bad mood and CSs that were paired with Alligators in a good mood), the conditioning effect decreased in magnitude but remained significant, $t(52) = -2.0$, $p = .05$, $d = .31$. Thus, the CSs paired with Alligators in a good mood were evaluated more negatively than the CSs paired with Woodchucks in a bad mood (*Ms* = -36.33 vs. -26.94, respectively).

Interaction of US and CS valence: In order to take a closer look at the differential weighting of high and low level valence in the ambivalent USs as compared to the ambivalent CSs, a 2 (US: Alligator good mood vs. Woodchuck bad mood) × 2 (CS: Alligator good mood vs. Woodchuck bad mood) was conducted with repeated measurement on both factors. None of the main effects was significant but the predicted interaction effect emerged, $F(1,52) = 4.92$, $p < .05$, $\eta^2 = .08$, indicating that for the USs, the positive trait - negative state USs are judged more negatively than the negative trait - positive state USs (*Ms* = -37.49 vs. -24.69, respectively). For the CSs, the desirability ratings reversed with the CSs paired with positive trait - negative state USs being judged more positively than the CSs paired with negative trait - positive state USs (*Ms* = -26.94 vs. -36.33, respectively). The interaction effect is displayed in Figure 8. The interaction effect supports the interpretation of the main effects, namely that low level valence is more influential when forming an attitude toward USs, whereas high level valence is more important when forming an attitude toward associated CSs. Furthermore, extending the findings of Experiment 1, the interaction effect demonstrates that the valences of high and low level construal were not only differentially weighted when evaluating the USs but also when evaluating the associated CSs. More specifically, the greater importance of the low level feature when evaluating the USs not only disappeared but even reversed when evaluating the CSs.

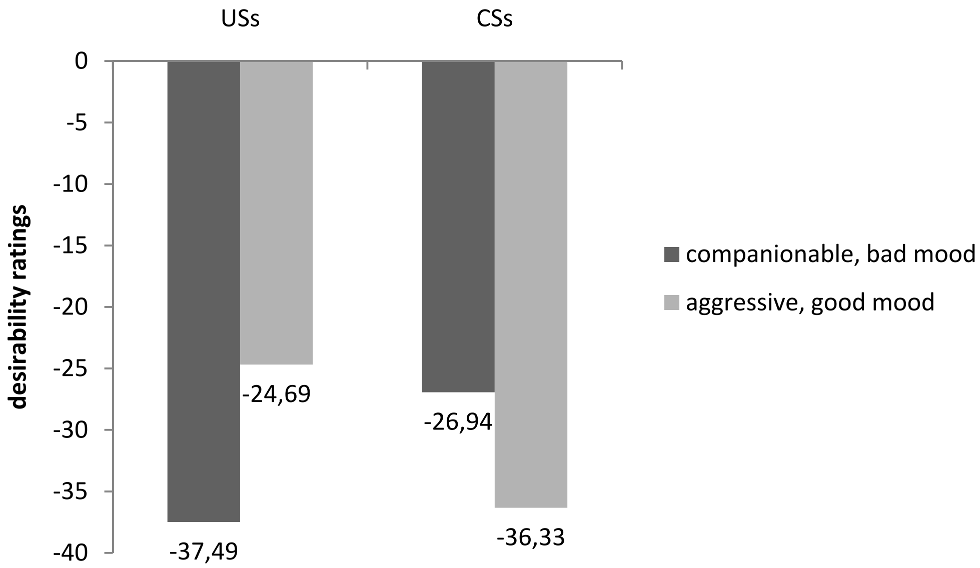


Figure 8. Mean desirability ratings of the ambivalent USs and CSs. Higher values indicate more positive evaluations; Experiment 2.

7.2.5 Discussion

The results of Experiment 2 replicate and extend the findings obtained in Experiment 1. Using different stimuli and cover story as well as a slightly modified procedure, it was again found that that the valence of low level construals had a stronger effect on the evaluation of USs than the valence of high level construals, irrespective of whether the USs were ambivalent or unambiguous. For the ambivalent USs, for which high and low level valence differed from each other, the valence of the concrete low level features determined the attitude toward the US. Furthermore, the evaluation of the CSs were generally stronger influenced by the valence of the high level construal, irrespective of whether they were paired with unambiguous or ambivalent USs. This entailed that the CSs associated with ambivalent USs were evaluated according to the high level valence that was provided about the US. Thus, the CSs that were associated with ambivalent USs did not simply take on the valence of the USs they were associated with. Rather, CS evaluations reflected the valence of the abstract feature of the US. Specifically, positive trait - negative state USs were evaluated more negatively than negative trait - positive state USs. Interestingly, the effect reversed for the CSs, which means that CSs associated with positive trait - negative state USs were evaluated significantly more positive than CSs paired with negative trait - positive state USs. These results confirm the predictions of the present work and provide strong evidence for the postulation that associative distance can be considered a dimension of psychological distance.

Furthermore, this result has important implications for learning and conditioning in general because it reveals that the valence of a stimulus does not have to be unambiguously positive or negative in order to serve as a US in a conditioning paradigm. Valence can also be transferred to associated CSs when the US is ambivalent. Moreover, when an ambivalent US was evaluated negatively due to a negative concrete feature, the associated CS was evaluated positively due to the positive abstract feature of the US. These findings contradict well-established learning theories by demonstrating for the first time that US and CS can become dissimilar instead of similar as a function of conditioning.

Regarding the temporal distance manipulation, Experiment 2 revealed no effects. It is possible that associative distance overrode the effects of temporal distance because it might be more relevant in the employed paradigm. However, there is little research yet on the question of what happens when two dimensions of distance are applied at the same time. Therefore, it is not clear yet how exactly different distance dimensions are interrelated and what possible implications such an interrelation carries (see also General Discussion). In order to learn more about possible interactions of temporal and associative distance, temporal distance was again manipulated in Experiment 3.

An unexpected result was the interaction effect of high and low level information in the evaluations of the USs as well as in the evaluations of the CSs. Specifically, the interaction effect revealed that the valence of the low level information seemed to exert a greater influence on positive trait stimuli as compared to negative trait stimuli (see Figures 6 and 7). One possible explanation for this effect could be that it is easier to change positive stimuli into the negative direction than vice versa. Put differently, a positive person (in this case, a person with a positive trait) can easily be made negative by telling something negative about that person (i.e., is in a bad mood). Conversely, it might be more difficult to make a negative person (i.e., person with a negative trait) more positive by telling one positive thing about that person (e.g., is in a good mood). That such asymmetries exist has been demonstrated in research on the US-revaluation effect (Walther et al., 2009) as well as in numerous studies on the negativity bias which refers to findings indicating that the impact of negative information is generally stronger than the impact of positive information (e.g., Baumeister, Bratlavsky, Finkenauer, & Vohs, 2001; Cacioppo & Berntson, 1994; Fazio, Eiser, & Shook, 2004; Gidron, Koehler, & Tversky, 1993; Ito, Larsen, Smith, & Cacioppo, 1998; Reeder & Brewer, 1979; Rozin & Royzman, 2001; Skowronski & Carlston, 1989). One explanation for the negativity bias could be that negative information is regarded as higher in diagnosticity than positive information (Fiedler, Walther, & Nickel, 1999). Applying this reasoning to the results of the present studies, the positivity of a generally positive person is stronger influenced by additional negative information, whereas the negativity of a generally negative person is less influenced by additional positive information. More concretely, a positive person in a bad mood is evaluated *much more* negative than a positive person in a good mood, whereas a negative person in a good mood is evaluated only *slightly more* positive than a negative person in a bad mood. Although this explanation is appealing it would also implicate that the trait information given about a person would be decisive in determining whether a person is initially positive or negative, whereas the state information would be additional information that is only considered after trait information is taken into account. This is not in line with our results and would contradict the hypothesis that USs are evaluated according to the low level state valence, whereas CSs are evaluated according to the valence of high level trait information. Thus, it is possible and plausible that the negativity bias and the greater diagnosticity of negative information might play a role when explaining the unexpected interaction effect but the present data does not give any information about how exactly the negativity bias could have exerted an influence in the present study. Although the finding of the above described interaction effect was not predicted and is quite interesting, it should be noted that it nonetheless is of minor importance for the present studies because the existence (or non-existence) of this interaction effect does not interfere with any of the postulated hypotheses.

Taken together, the results of Experiment 2 support the theoretical reasoning that associative distance constitutes another dimension of psychological distance. As such, associative distance should be related to construal level. The assumption that the US is perceived less distant than the associated CS could be corroborated by demonstrating that low level information was more important for psychologically proximal objects (USs), whereas high level information was more important for psychologically distal objects (CSs). In other words, the attitude toward USs was based on the concrete low level feature; the attitude toward the associated CSs, however, was based on the abstract feature that was provided about the USs. In the case of ambivalent stimuli, this resulted in evaluations of the CSs that were of opposite valence than the evaluations of the USs, despite (or actually because of) a successful conditioning procedure. Thus, the ambivalent USs and CSs did not become similar but dissimilar as a result of conditioning. Consequently, the present results question the validity and scope of traditional and contemporary learning theories which propose that conditioning makes the CS more similar to the US. However, a third experiment was conducted in order to investigate whether this conclusion is justified.

7.3 Experiment 3

The first aim of the third study was to replicate the construal level effects regarding the evaluations of the ambivalent USs and CSs. Specifically, the USs should again be evaluated according to the valence of the low level information, whereas the associated CSs should be evaluated according to the valence of the high level information. Second, Experiment 3 investigated whether cognitive load moderates the hypothesized effects. The basic procedure of Experiment 3 was very similar to Experiment 2 with the following exceptions.

First, only ambivalent USs were used in the conditioning phase in order to reduce the complexity of the design. The previous two studies demonstrated reliably that the unambiguous USs did elicit strong conditioning effects. Besides, the focus of the present work relates to the ambivalent and not to the unambiguous stimuli. However, the unambiguous USs were still presented in the formation and classification phase so that participants still had to learn the four possible combinations of high level and low level valence. This was done in order to leave the basic procedure of the formation and classification phase unchanged.

Second, the maximum number of trials during the classification phase was increased in order to maximize the possibility for each participant to correctly learn the high and low level information presented about the USs.

Third, cognitive load was manipulated because it was considered to be a potential moderator variable. There is evidence from former EC studies (e.g., Bakker-De Pree, Defares, & Zwaan, 1970; Walther, 2002) that EC effects can be more pronounced when participants are put under cognitive load. Distraction can even increase conditioning effects, which is an indication that evaluative learning is not mediated by attention processes or by resource-dependent cognitive operations (Walther, 2002). However, conditioning effects in the present studies should mainly be a function of the valence of high and low level information. There are two ways of how cognitive load could exert an influence on the differential effects of high and low level construal for US and CS evaluation. First, it seems possible that cognitive load impeded the encoding of high and low level information because people lack resources to attend to the information provided. This could subsequently lead to less pronounced differences in the weighting of high and low level information when evaluating USs and CSs. As a consequence, the hypothesized effects that USs are evaluated according to low level valence and CSs are evaluated according to high level valence might be less pronounced when participants have less cognitive capacity to encode the relevant information. However, the reverse direction of influence also seems possible. Concretely, it is not clear (and hasn't been investigated yet) whether the focus on low level information when evaluating a psychologically proximal stimulus and the focus on high level information when evaluating a psychologically distal stimulus is resource-dependent. It could also be that this effect is based on a process that occurs quite automatically and is independent of cognitive resources. This reasoning also seems quite plausible, especially when trying to generalize the effects found in the laboratory into real life where people often gather information about other persons without having full cognitive capacity. Instead, a lot of information we receive about other persons is given to us while we are busy doing other things. Given that people are able to differentially weigh high and low level information without extensive cognitive resources, this could also serve an adaptive function as it enables people to easily learn and encode information that is relevant for the formation of attitudes as well as for upcoming social interactions. Comparable to the effects of cognitive load on EC, it might even be possible that cognitive load enhances the observed US-CS construal level effects such that people, for instance, weigh low level information even more when they lack the cognitive resources to exactly encode the different information provided about a US. If this is the case, one would expect that the hypothesized effects regarding US and CS evaluation are enhanced under cognitive load.

7.3.1 Participants and Design

A total of 87 participants (69 female, 18 male) took part in the study. Participants were students at the University of Trier and received partial credit towards a course requirement. The experiment consisted of a 2 (valence: positive high level and negative low level vs. negative high level and positive low level) × 2 (distance: near future vs. distant future) × 2 (cognitive load vs. no cognitive load) design with the first factor being manipulated within-subjects and the other two factors being manipulated between-subjects.

7.3.2 Procedure and Measures

The procedure of Experiment 3 was largely identical to Experiment 2 with the following exceptions.

Cognitive Load: A successful procedure of depriving participants of processing resources is to ask participants to rehearse an eight-digit number (e.g., Gilbert & Hixon, 1991; Sherman & Frost, 2000; Wegner, Erber, & Zanakos, 1993). In the present experiment, the cognitive load instruction was given at the end of the cover story and before the beginning of the formation phase. Participants in the cognitive load condition were asked to remember a seven-digit number until the end of the experiment. It was decided to use one digit less than in the above cited studies in order to make the cognitive load task slightly easier. That is, participants should have less cognitive resources compared to the group without a cognitive load manipulation but should still have enough capacity left to attain to and encode the information presented about the US. After having rehearsed the number, participants had to click on a button to continue reading the cover story. Before participants could continue with the cover story, they were asked to type in the number they were supposed to remember. This served as an initial manipulation check in order to find out whether people correctly remembered the number at the beginning of the experiment, which serves as a precondition for correctly remembering the number at the end of the experiment. At the end of the experiment, before filling out the post-experimental questionnaire, participants had to write down the number they were supposed to remember (see Appendix G). Participants in the no cognitive load condition were not asked to remember a number and did not receive questions referring to the number.

Classification Phase: In the classification phase, the number of maximum trials was increased from 60 to 84. Thus, the 12 USs that were introduced during the formation phase were presented seven times. However, as in the previous study, the classification phase was terminated when participants reached the learning criterion of three correct classifications per cell.

Conditioning Phase: In the conditioning phase, only the ambivalent USs of the formation phase were paired with neutral CSs. Thus, three positive state - negative trait USs and three negative state - positive trait USs were presented six times, resulting in a total of 36 CS-US presentations.

Test Phase: Two explicit test phases followed the conditioning phase. Both the test phases of Experiment 1 and Experiment 2 were used in order to find out whether the ratings produce comparable results. The first test phase assessed desirability ratings and was identical to the one in Experiment 2 asking participants how much they would like to live with each person displayed on the screen. The second test phase assessed valence ratings and was identical to Experiment 1 asking participants to indicate how much they liked each person.

7.3.3 Results

Neither of the two between factors temporal distance and cognitive load significantly influenced the obtained effects in any of the analyses, which is why it is refrained from reporting these results in detail. The data were collapsed over the temporal distance and cognitive load conditions. Possible reasons for the non-results regarding the temporal distance and cognitive load manipulation are discussed in the discussion section.

All of the following analyses were first conducted separately for the valence and the desirability test phase, which led to comparable results. Moreover, correlations between these two test phases were all significant on the 0.1% level (range from $r = .45$ to $r = .84$). Thus, the desirability and valence test phases were combined into one scale. Subsequently, only the results from the analyses of the combined likeability ratings will be reported.

US-Attitudes: In order to check the effectiveness of the valence manipulation in the formation phase, mean likeability ratings for the USs were submitted to a one-way ANOVA with repeated measurement. A significant main effect emerged, $F(1,86) = 8.31$, $p < .01$, $\eta^2 = .09$, indicating that attitudes toward negative trait - positive state USs were more positive than attitudes toward positive trait - negative state USs (*M*s = -19.05 vs. -36.16, respectively).Thus, the companionable USs (i.e., Woodchucks) in a bad mood were judged more negatively than the aggressive USs (i.e., Alligators) in a good mood (see Figure 9, left side). Put differently, the hypothesis that ambivalent USs are evaluated according to the valence of the low level construal was confirmed by the present data.

CS-Attitudes: Direct conditioning effects were analyzed by comparing likeability ratings for formerly neutral CSs that were paired with ambivalent USs. The mean ratings were submitted to a one-way ANOVA. This revealed a significant main effect, $F(1,86) = 8.89$, $p < .005$, $\eta^2 = .09$, indicating that the repeated pairing of neutral CSs with positive state - negative trait USs evoked a more negative attitude towards the CSs, whereas the repeated pairing of neutral CSs with a negative state - positive trait USs led to a more positive attitude towards the CSs (*M*s = -22.26 vs. -12.15, respectively). Thus, the hypothesis regarding the evaluation of the ambivalent CSs could also be confirmed. CSs that were merely associated with ambivalent USs were evaluated according to the valence of the high level information that was provided about the USs (see Figure 9, right side).

Interaction of US and CS valence: In a next step, mean likeability ratings were submitted to a 2 (US: aggressive, good mood vs. companionable, bad mood) × 2 (CS: aggressive US, good mood vs. companionable US, bad mood) ANOVA. A significant interaction effect emerged, $F(1,86) = 14.21$, $p < .001$, $\eta^2 = .14$, indicating that for the USs, the companionable US in a bad mood judged more negatively than the aggressive US in a good mood (*Ms* = -36.16 vs. -19.5, respectively). For the CSs, the desirability ratings reversed with the CS being paired with an aggressive US in a good mood being judged more negatively than the CS being paired with a companionable US in a bad mood (*Ms* = -22.26 vs. -12.15, respectively). The mean likeability ratings of the ambivalent USs and CSs are displayed in Figure 9.

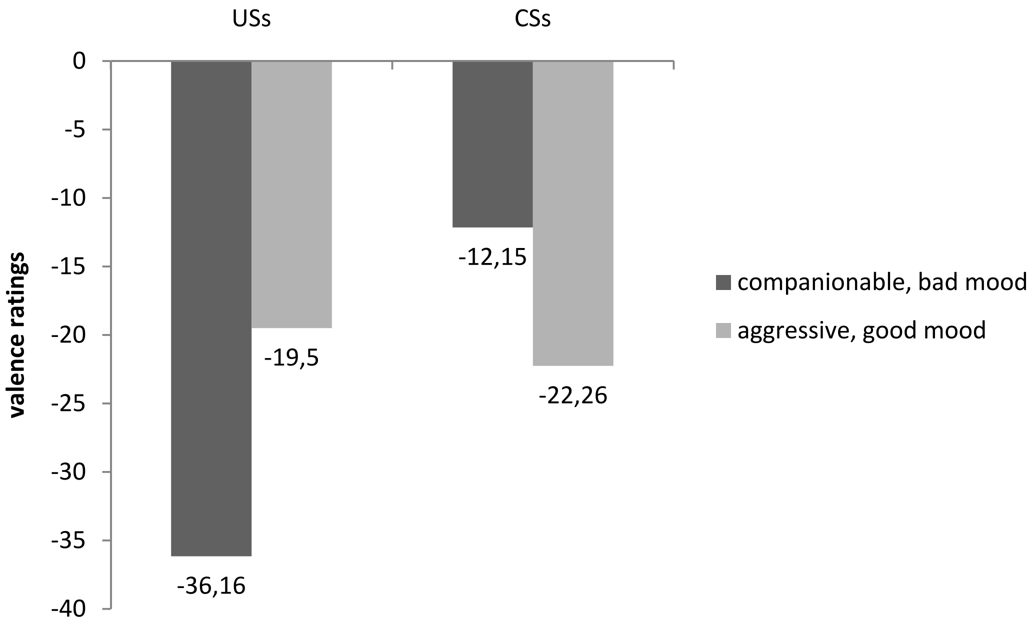


Figure 9. Mean valence ratings of the ambivalent USs and CSs. Higher values indicate more positive evaluations; Experiment 3.

7.3.4 Discussion

The results of Experiment 3 strongly support the hypotheses regarding the evaluation of psychologically more proximal stimuli (USs) and psychologically more distal stimuli (CSs). The USs were evaluated according to the valence of the concrete low level information, whereas the evaluation of CSs was stronger influenced by the valence of the high level information. Specifically, positive state - negative trait USs were evaluated significantly more positive than negative state - positive trait USs, whereas CSs that were associated with positive state - negative trait USs were evaluated significantly more negative than CSs that were associated with negative state - positive trait USs. Therefore, Experiment 3 replicates the findings of the previous experiments and provides convincing evidence for the hypothesis that associative distance constitutes a dimension of psychological distance. The US can be defined as a psychologically proximal stimulus and as such the attitude toward the US is defined by the valence of concrete features. This result per se is already interesting as it points to the rules underlying the evaluation of ambivalent stimuli; rules that can be directly derived from CLT (Liberman et al., 2007). However, the most promising finding refers to the evaluation of the CSs. The CS acquires its valence by means of an association to the US. However, when associated with an ambivalent US, it is not the valence of the concrete feature that transfers to the CS but rather the valence of the abstract feature. This can be explained with the greater psychological distance of the CS. Thus, the attitude toward the CS differs in valence from the attitude toward the ambivalent US with which it was paired. Although this result might seem counterintuitive and contradicts associative learning theories, it is in line with the predictions of the present work.

The present results could not confirm the hypotheses regarding cognitive load. These hypotheses were exploratory leaving open two possible ways of influence, none of which could be found in the present data. Cognitive load did neither enhance nor decrease the differential effects of high and low level construal for US and CS evaluation. One possible reason could be that the US-CS construal level effects are simply independent of cognitive load. Considering that it has been demonstrated in former studies that cognitive load does influence conditioning effects (e.g., Bakker-De Pree et al., 1970; Walther, 2002), one could have expected that (at least) the attitudes toward CSs should be influenced by load. However, the CSs in Experiment 3 differed from the CSs used in typical conditioning studies in which the CSs were only paired with USs that were unambiguously positive or negative and not with ambivalent USs. If CSs had been paired with unambiguously positive or negative USs in the present study, it would have been expected that cognitive load enhances conditioning effects for these CSs. Besides, effects of cognitive load on these conditioned CSs would have provided information about whether the manipulation of cognitive load itself was successful. Thus, it is not clear whether there is indeed no influence of cognitive load on the conditioned attitudes of CSs paired with ambivalent USs or whether the lack of influence of cognitive load in the present experiment is due to the specific manipulation or paradigm. Regarding the specific manipulation, for instance, most experiments that had used the cognitive load manipulation employed in the present study asked participants to remember an eight-digit number (e.g., Gilbert & Hixon, 1991; Sherman & Frost, 2000; Wegner et al., 1993). Due to the circumstance that participants in the present study had to not only remember the number but also had to encode a certain amount of other information, it was considered reasonable to reduce the number of to be remembered digits from eight to seven. However, this might have entailed that the load manipulation was not demanding enough. Unfortunately, the present experiment was not able to provide clear information about the role of cognitive load for the effects of high and low level information on the evaluation of USs and associated CSs.

Comparable to Experiment 2, the temporal distance manipulation did not lead to any significant effects in Experiment 3. Thus, the possible explanation that associative distance overrides the effects of temporal distance seems to be supported by the present data. However, this explanation has not been put to a direct empirical test, which is why it is only speculative at the moment. Future studies should investigate how exactly the distance dimensions, and especially associative and temporal distance, are interrelated and how the specific context in which distance is manipulated might influence the results (see also General Discussion).

Summing up the evidence from the experiments conducted so far, one can conclude that the first two hypotheses outlined in Chapter 6 are confirmed by the present data. Concretely, the three experiments provide consistent evidence that (1) the US is perceived to be psychologically closer than the CS and is evaluated according to the valence of concrete low level information and that (2) the CS is perceived to be psychologically more distal than the US and is evaluated according to the valence of the abstract high level information presented about the US. The three experiments consistently demonstrate that the interpretation of valence indeed depends on distance. That is, the valence of abstract and concrete features is interpreted differently depending on whether the to-be-evaluated stimulus is psychologically near or distant. As has been demonstrated, this can lead to an evaluation of the CS that is in direct contradiction to the evaluation of the US even though the CS acquired its valence by means of an association to the US. Hence, the results reveal that under certain circumstances, namely when the US is ambivalent, conditioning can lead to a dissimilarity of US and CS.

The third hypothesis that hasn't been addressed so far refers to the question of whether there is indeed an association between associative distance and level of construal that is comparable to other dimensions of psychological distance. The next study investigates this question.

7.4 Experiment 4

Although the first three experiments successfully demonstrated that the US is evaluated according to the valence of the low level construal and the CS is evaluated according to the valence of the high level construal, the design of these studies does not allow to provide direct evidence for the hypothesis that the associative relation of US and CS constitutes a dimension of psychological distance. Specifically, the assumption that the US is perceived to be psychologically more proximal and is therefore associated with low level construals, whereas the CS is perceived to be psychologically more distal and is therefore associated with high level construals needs to be put to a more direct test.

Experiment 4 intended to replicate the US-CS construal level effects of the previous studies. More importantly, it aimed to test whether there is indeed an association between associative distance and construal level by applying a picture-word version of a Lexical Decision Task (LDT). In the LDT, the ambivalent USs and CSs were used as primes and abstract and concrete words as well as non-words served as target stimuli. Given that the US is a more proximal stimulus than the CS, it is assumed that the presentation of a US prime followed by a concrete word (low level construal) would result in a faster categorization of the concrete word as compared to when this concrete word was preceded by a CS prime. Conversely, reaction times should be faster when an abstract target word (high level construal) is preceded by a CS prime as compared to a US prime.

Apart from the LDT, the procedure of Experiment 4 was similar to Experiment 3. However, temporal distance and cognitive load were not manipulated. Participants first read the cover story and completed the formation and classification phases. Different from the previous experiments, a first test phase was included that assessed likeability ratings of the USs and CSs before conditioning took place. This was done in order to check whether the USs indeed acquire valence during the formation phase and whether the CSs undergo a change in valence from the first to the second test phase. Subsequently, conditioning took place, including the unambiguous as well as the ambivalent USs. The second test phase that followed conditioning assessed the valence ratings of USs and CSs and was identical to the first test phase. No desirability ratings were assessed because Experiment 3 revealed that the two test phases (i.e., desirability and valence) produced comparable results. The LDT was administered at the end of the study. Finally, participants completed the post-experimental questionnaire that assessed demographical data as well as questions pertaining to the procedure of the study such as whether participants were aware of the hypothesis of the study.

7.4.1 Participants and Design

A total of 45 participants (34 female, 11 male) took part in the study. Participants were students at the University of Trier and received partial credit towards a course requirement. The experiment consisted of a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) design with both factors being manipulated within-subjects.

7.4.2 Procedure and Measures

The procedure of Experiment 4 was largely identical to Experiment 3 with the following exceptions.

First Test Phase: Right after the formation and the classification phase, participants were asked to provide valence ratings for all stimuli. Thus, they had to evaluate the USs they already knew from the formation and classification phases as well as the CSs which they saw for the first time during this first rating. The rating scale was identical to the one used in previous studies, asking participants to indicate how much they liked each person.

Conditioning Phase: In the conditioning phase, both unambiguous and ambivalent USs were paired with neutral CSs. Thus, six unambiguous USs (three positive and three negative) and six ambivalent USs (three positive state - negative trait and three negative state - positive trait) were presented six times, resulting in a total of 72 CS-US presentations.

Lexical Decision Task (LDT): Following the completion of the second test phase, participants had to perform the LDT. On the presentation of a letter string in the center of the computer screen, participants had to judge, by means of a key press, whether the letter string was a word or a non-word. The list of letter strings comprised four words and four non-words. Of the four words, two were concrete and two were abstract. It was decided to use names of two categories as abstract words (i.e., nutrition and botany) and names of two exemplars from those categories as concrete words (i.e., pea and tulip) (see Appendix H for instructions and a list of stimulus items). Bar-Anan et al. (2006) demonstrated in their studies that categories represent abstract high level construals, whereas exemplars represent concrete low level construals. The four non-words were created by exchanging two letters in the original words (e.g., word: tulip, non-word: talig). The words and non-words were preceded by US and CS primes. Each prime was presented for 150 ms. The ISI between prime and target word was 150ms. The target words remained on the screen until participants pressed a key. The ITI was 1000ms. Each of the six ambivalent USs and six ambivalent CSs was presented once with every word and once with every non-word in randomized order. These 96 trials were presented twice to participants, resulting in a total of 192 trials. Only the ambivalent stimuli were used in the LDT because an inclusion of all USs and CSs would have resulted in a number of 384 trials which was considered to be too large to be presented to participants. Thus, considering that the ambivalent stimuli are most interesting with regard to the hypotheses, only these stimuli were used as primes. At the end of the study, participants filled out a post-experimental questionnaire (see Appendix I).

7.4.3 Results

In contrast to the previous studies, US and CS evaluations from two test phases (before and after conditioning) were analyzed. As the positive and negative information about the USs was presented before the first test phase, it was expected that the evaluations of the USs in the first test phase already reflect the valence of the information they were presented with and do not considerably change during conditioning. The evaluations of the CSs, however, should change from the first to the second test phase as a function of conditioning. The US and CS evaluations are considered first. The reaction time data of the LDT is analyzed in a second step.

US-Attitudes: In order to check the effectiveness of the valence manipulation, the mean likeability ratings of the first test phase for the USs were submitted to a 2 (trait valence: positive vs. negative) × 2 (mood valence: positive vs. negative) ANOVA with repeated measurement on both factors. This revealed a significant main effect of trait valence, $F(1,44) = 7.27$, $p < .01$, $\eta^2 = .14$, indicating that attitudes toward companionable USs (i.e., Woodchucks) were more positive than attitudes toward aggressive USs (i.e., Alligators) (*M*s = -3.51 vs. -14.41, respectively). The same ANOVA also revealed a highly significant main effect of mood valence, $F(1,44) = 49.27$, $p < .001$, $\eta^2 = .53$, indicating that attitudes toward USs in a good mood were significantly more positive than attitudes toward USs in a bad mood (*Ms* = 7.73 vs. -25.65, respectively). Comparable to Experiment 1 and 2, the effect size for the main effect for low level valence was larger than for the main effect for high level construal. That is, participants did take both kinds of information into account when evaluating the US but the valence of the low level feature was focused on more strongly. This result supports the hypothesis of a higher salience of low as compared to high level information when a psychologically proximal stimulus is in the focus of attention. As in Experiment 2, a significant interaction emerged, $F(1,44) = 7.41$, $p < .005$, $\eta^2 = .14$, indicating that the difference in likeability of the good mood stimuli as compared to the bad mood stimuli was more pronounced for the companionable than for the aggressive USs. A possible explanation for this interesting (but for the present hypotheses less relevant) effect was provided in the discussion section of Experiment 2 (see paragraph 7.2.5).

Next, the same ANOVA for the US ratings of the second test phase was conducted. The data pattern resembled the first test phase. The main effect for valence of low level construal was still highly significant, $F(1,44) = 38.65$, $p < .001$, $\eta^2 = .47$, whereas the main effect for high level construal pointed into the same direction but only approached significance, $F(1,44) = 2.98$, $p = .09$, $\eta^2 = .06$. This is even more evidence for a strong focus on the low level (vs. high level) information when evaluating the US. There was no significant interaction effect in the second test phase, $F(1,44) = 1.39$, $p = .24$.

Additionally, the valence ratings of the second test phase for the unambiguous and the ambivalent USs were analyzed separately with mean comparisons for repeated measures. For these comparisons it was decided to use the US evaluations of the second (and not the first) test phase in order to be able to compare the results with data of the previous experiments. For the unambiguous USs, this revealed a highly significant difference as a function of the valence manipulation, $t(44) = -5.57$, $p < .001$, $d = 1.09$, indicating that attitudes toward unambiguously positive USs were positive and attitudes toward unambiguously negative USs were negative (*M*s = 12.04 vs. –23.26, respectively). Of greater interest, the analysis for the ambivalent USs revealed a highly significant difference as a function of the construal level manipulation, $t(44) = 3.79$, $p < .001$, $d = .88$, indicating that attitudes toward USs with a positive valence on the high level and a negative valence on the low level construal were more negative than USs with a negative valence on the high level and a positive valence on the low level (*Ms* = -20.42 vs. 1.32, respectively). Thus, the companionable USs in a bad mood were judged more negatively than the aggressive USs in a good mood (see Figure 10). Conducting the same analyses for the US evaluations of the first test phase led to comparable effects, indicating that the ratings of the US did indeed not differ considerably in the first and second test phase. No other main or interaction effect reached statistical significance.

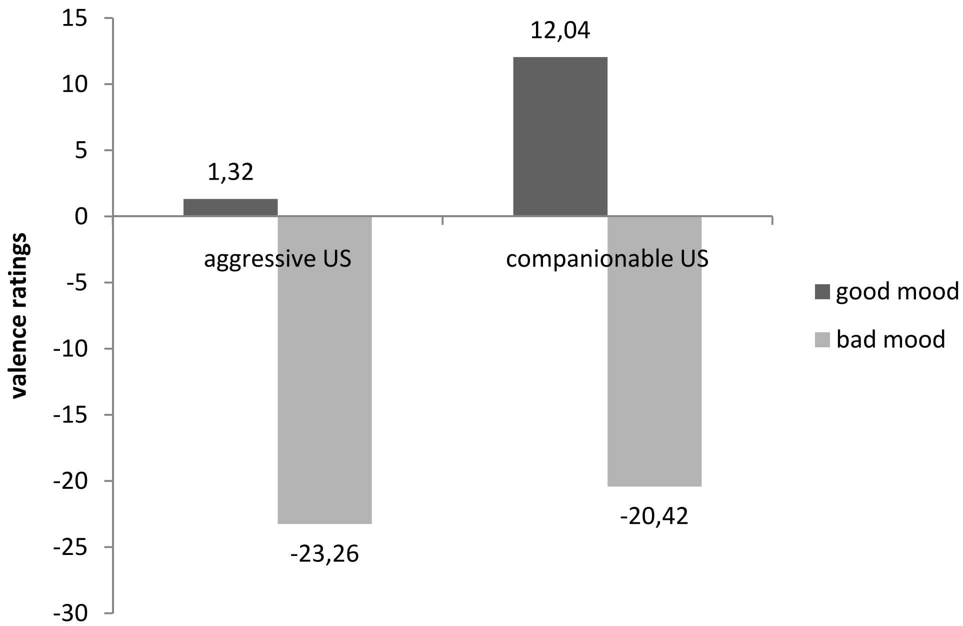


Figure 10. Mean valence ratings of the unambiguous and ambivalent USs after conditioning. Higher values indicate more positive evaluations; Experiment 4.

CS-Attitudes: Difference scores (test phase 2 – test phase 1) for the CSs were computed in order to investigate whether the evaluations of the CSs changed from the first to the second test phase as a function of conditioning. These difference scores were submitted to a 2 (valence of high level construal: positive vs. negative) × 2 (valence of low level construal:

positive vs. negative) ANOVA with repeated measurement on both factors. No significant conditioning effects were obtained, neither for the valence of high level construal, $F(1,44) = .16$, $p = .69$, nor for the valence of the low level construal, $F(1,44) = 1.19$, $p = .28$. Thus, the conditioning procedure was not successful in the present study.

Reaction time data: First, false categorizations (words categorized as non-words and non-words categorized as words) and reaction times that deflected more than two standard deviations from the mean were substituted with the mean reaction time for each variable. Four participants showed extreme deviations from the mean and were excluded from the analyses.

Mean reaction times were submitted to a 2 (prime: US vs. CS) × 2 (target: abstract vs. concrete) ANOVA with repeated measurement on both factors. This revealed a significant main effect for prime, $F(1,40) = 5.32$, $p < .05$, $\eta^2 = .12$, indicating that reaction times were generally faster when the prime was a CS as compared to a US. A significant main effect for abstractness revealed that the reaction times toward concrete stimuli were generally faster as compared to abstract stimuli, $F(1,40) = 28.15$, $p < .001$, $\eta^2 = .41$. Most importantly, however, these two main effects were qualified by significant interaction, $F(1,40) = 6.71$, $p < .05$, $\eta^2 = .14$, indicating that the difference in reaction times for concrete and abstract words was more pronounced when the prime was a US as compared to a CS (see Figure 11).

In a next step, the reaction times toward concrete and abstract words were analyzed separately. When abstract words were preceded by a CS prime reaction times were significantly faster than when preceded by a US prime (*Ms* = 570.87 vs. 584.91, respectively), $t(40) = 3.4$, $p = .001$, $d = .26$. The reaction times toward concrete words did not differ as a function of the preceding prime (see Figure 11). Thus, reaction times toward concrete words were always faster than reaction times toward abstract words but reaction times toward abstract words were influenced by perceived psychological distance of the prime such that a CS prime led to a faster categorization of the abstract word as compared to a US prime.

In order to find out whether both of the abstract words (i.e., nutrition and botany) and both of the concrete words (i.e., pea and tulip) are comparable and elicit similar effects, separate analyses for the specific concrete and abstract words used in the LDT were conducted. A mean comparison for repeated measures with reaction times toward the word nutrition as dependent variable revealed that the word nutrition elicited the predicted effect such that the reaction time was faster when the word was preceded by a CS as compared to a US, $t(40) = 3.37$, $p = .002$, $d = .41$ (*Ms* = 540.25 vs. 563.79, respectively). The same comparison for the reaction times toward the word botany revealed no significant differences in reaction time depending on prime type, $t(40) = .64$, $p = .52$ (*Ms* = 601.49 vs. 606.02, respectively). Hence, the obtained effect of faster reaction times toward abstract words that were preceded by a CS prime compared to a US prime is mainly driven by the differences in reaction times toward the word nutrition and not toward the word botany. Additionally, taking a closer look at the reaction times toward nutrition and botany irrespective of prime type reveals that it took significantly longer to react to the word botany as compared to nutrition, $t(40) = -8.38$, $p < .001$, $d = .93$ ($Ms = 603.76$ vs. 552.02, respectively). Possible reasons for these differences are outlined in the discussion section. For the concrete words, no differences in reaction times were found.

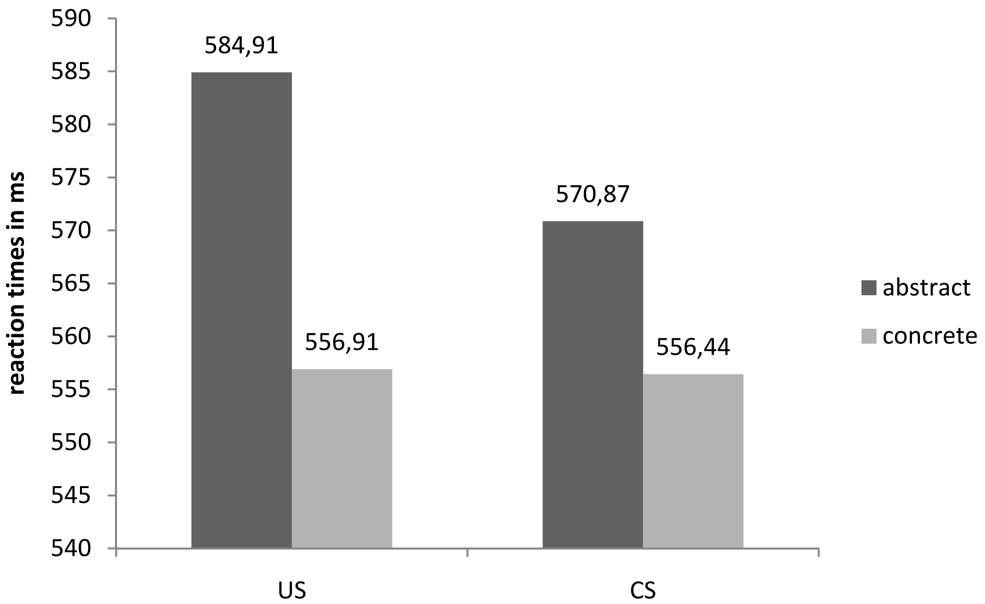


Figure 11. Mean reaction times in ms for concrete and abstract words as a function of prime type; Experiment 4.

Taken together, the LDT partly confirmed the hypotheses. Reaction times toward abstract words were facilitated when these words were preceded by a CS prime as compared to a US prime, indicating an association between CSs and abstract high level construals. This effect seemed to be driven by the characteristics of the abstract word nutrition as compared to the abstract word botany. However, the hypothesis that the association between USs and concrete low level construals facilitates reaction times toward a concrete word when this word is preceded by a US prime as compared to a CS prime could not be confirmed.

7.4.4 Discussion

The results of Experiment 4 partly support the hypotheses regarding the evaluation of USs and CSs. Specifically, the hypotheses about the USs could be confirmed. The ambivalent

USs were evaluated according to the valence of the concrete low level information. As predicted, this effect emerged in the first as well as in the second test phase. Thus, the effect that the valence of concrete low level features is decisive when forming an attitude toward ambivalent USs could again be replicated. The focus on concrete features in the US has been reliably obtained in all four experiments, leading to the conclusion that this effect is quite robust. Moreover, it confirms the theoretical reasoning of the present work that the psychological proximity of the US leads to a higher salience of concrete versus abstract features when evaluating the US.

However, in the present study, no significant conditioning effect for the CSs could be obtained, which means that the evaluations of the CSs did not significantly change from the first to the second test phase as a function of conditioning. This was probably due to stimulus material effects. Although the CS stimuli were randomly selected from a pool of stimuli that were all evaluated neutrally and although these stimuli have been successfully used as CSs in previous conditioning studies, the assignment of specific CSs to specific USs seems to have been unintentionally biased with the consequence that the conditioning procedure was not successful. In order to rule out such effects, the assignment of a specific CS to a specific US should be permuted in future studies.

The major aim of Experiment 4 was to demonstrate that there is an association between associative distance and construal level that manifests itself in faster reaction times when US and low level construal are paired and when CS and high level construal are paired. The reaction time data of the LDT is partly in line with this hypothesis. Specifically, the assumption that the CS is associated with high level construal was confirmed by faster reaction times toward an abstract word when the word was preceded by a CS as compared to a US. Based on this result, one can conclude that the CS is indeed perceived to be more distant than the US. This result provides direct evidence that association constitutes a dimension of psychological distance that is comparable to other distance dimensions. Specifically, there is an association between associative distance and construal level on a conceptual level, indicating that this association does not only exist as an effect of associative distance or construal level on the way people evaluate ambivalent target stimuli.

The hypothesis that the US is associated with low level construal could not be supported. The reaction times when categorizing concrete target words were always faster than the reaction times toward abstract target words, irrespective of the prime preceding the target word. Such a concreteness main effect is well known in the literature. It has been demonstrated in numerous studies that there is a processing advantage of concrete over abstract words (see Balota, Ferraro, & Connor, 1991, for a review). For instance, in word association (de Groot, 1989), lexical decision (Kroll & Merves, 1986; Schwanenflugel, Harnishfeger, & Stowe, 1988; Schwanenflugel & Shoben, 1983), naming (de Groot, 1989; Schwanenflugel & Stowe, 1989), and free recall (Paivio, 1986; Ransdell & Fischler, 1987), it is generally found that abstract words are processed more slowly or remembered less than are concrete words. The source of the concreteness effect, however, remains controversial (van Hell & de Groot, 1998). The dual coding theory of Paivio and his co-workers (e.g., Paivio, 1986) explains concreteness effects in terms of differential availability of imaginal codes, meaning that both abstract and concrete words are represented in a verbal system but that concrete words are more likely to additionally arouse an imaginal mental representation. The context availability hypothesis, on the other hand, claims that concreteness effects emerge from a differential availability of contextual information for abstract and concrete materials presented in isolation (e.g., Kieras, 1978; Schwanenflugel & Stowe, 1989). Specifically, this model assumes that it is more difficult to retrieve contextual information from memory for abstract than for concrete materials. Although studies by now favor the context availability hypothesis (van Hell & de Groot, 1998), the exact processes underlying the concreteness effect are of less relevance in the present work. The important point is that the concreteness main effect in the present study can be explained with a general processing advantage of concrete words. In Experiment 4, a floor effect for concrete words could be responsible for the lack of a difference in reaction times depending on the specific prime. This is corroborated when looking at the mean reaction time toward concrete stimuli ($M = 556$), which indicates a very fast reaction time compared to other lexical decision studies that also used concrete and abstract words (e.g., Kroll & Merves, 1986). It seems that the use of abstract versus concrete stimuli already facilitates the reaction times toward concrete stimuli such that the specific prime preceding the concrete word (US or CS) is not able to elicit an even greater facilitation. Considering the reaction times toward abstract words, however, it is evident that it takes longer for participants to categorize these abstract words as compared to concrete words, which is in line with studies on the concreteness effect demonstrating longer processing times for abstract words. Therefore, abstract words can profit from the use of a CS prime because the prime facilitates the reaction toward the target.

Furthermore, there was an unexpected difference within the category of abstract words such that the abstract word nutrition did elicit the predicted effects, whereas the word botany did not. At this point, it can only be speculated about reasons for this. Intuitively, it seems that the word nutrition is more commonly used in daily life, whereas botany is used rarely. It is possible that participants were simply less familiar with the word botany. This reasoning is supported by the finding that it took significantly longer to categorize the word botany as compared to nutrition, irrespective of prime type. Although both words clearly fall into the category "abstract words", the word botany seems to be more difficult to process than the word nutrition. These processing difficulties could have made the prime less effective, possibly even overriding an influence of prime type. Future studies should investigate whether this effect replicates, or in other words, whether the facilitation effect in the reaction times toward abstract words depends not only on prime type but also on the specific word used.

Taken together, Experiment 4 was successful in replicating the finding that the valence of low level information is more important than the valence of high level information when evaluating the US. The effect that the valence of an ambivalent US is defined by its concrete features and not by its abstract features could be demonstrated reliably in all four experiments. Therefore, one can conclude that the US is a psychologically proximal stimulus. As such, a focus on the US, as during the evaluation of the US, makes the concrete features of the US more salient. This reasoning is in line with CLT which postulates that a psychologically proximal stimulus is represented more concretely as compared to a psychologically distal stimulus. The evaluations of the ambivalent USs in the present studies corroborate the assumption that associative distance constitutes a dimension of psychological distance. However, due to stimulus material effects, no conditioning effect for the CSs was obtained. Most importantly, Experiment 4 provided first reaction-time based evidence for the assumption that associative distance and construal level are associated, thus demonstrating that associative distance is indeed comparable to other dimensions of psychological distance as they are postulated by CLT (Liberman et al., 2007). However, this association could only be found for CSs and high level construal and not for USs and low level construal which can probably be attributed to the specific features of the low level construal (i.e., concrete words) used in the present study. Nevertheless, the reaction time data strongly support the idea of association as a dimension of psychological distance.

Interestingly, when considering the evaluations of the ambivalent stimuli of all four studies, the most reliable conclusion is that the USs are evaluated according to the valence of the low level feature. This corroborates the assumption that the US is a psychologically proximal stimulus. However, when considering the reaction time data of the LDT, a significant effect was obtained for the CSs, indicating that CSs are associated with high level construals. This, in turn, supports the hypothesis that the CS is a psychologically more distal stimulus. Thus, combining the findings of the conditioning studies with the reaction time data provides compelling evidence for the predictions of the present work.

8 General Discussion

8.1 Summary and discussion of results

The basic assumption of the present work was that perceived psychological distance influences the evaluations of US and CS in an associative evaluative learning paradigm. The aim of the present research was to provide evidence for the following three hypotheses: (1) The US is perceived to be psychologically closer than the CS. According to CLT, a proximal stimulus should be associated with low level construal. Thus, the US should be evaluated according to the valence of concrete low level information that is provided about the US. (2) The CS is perceived to be psychologically more distal than the US and is thus associated with high level construal. As a consequence, the CS should be evaluated according to the valence of the abstract high level information presented about the US. (3) Comparable to other dimensions of psychological distance, there exists an association between associative distance and level of construal. The next paragraphs briefly summarize the four experiments that were conducted in order to investigate these hypotheses.

In Experiment 1, an associative learning paradigm was employed that used drawings of alien creatures as US and CS stimuli. Participants received positive or negative trait information (high level construal) and positive or negative state (mood) information (low level construal) about the USs. In the following conditioning phase, the already familiar USs were repeatedly paired with yet unknown neutral CSs. The effect of this conditioning procedure was subsequently tested by assessing likeability ratings for USs and CSs. The results provided first evidence for the hypothesis regarding the evaluation of the ambivalent USs. Specifically, USs that possessed a negative low level feature and a positive high level feature were evaluated more negatively as compared to USs that possessed a positive low level feature and a negative high level feature. The evaluations of the unambiguous CSs revealed a significant conditioning effect, indicating that an association was formed between USs and CSs that led to a transfer of valence from the USs to the associated CSs. However, the evaluation of the ambivalent CSs did not differ as a function of the valence of high versus low level information. Thus, Experiment 1 confirmed the hypothesis that USs are evaluated according to the valence of low level information provided about them.

Experiment 2 used different stimulus materials but employed the same general procedure. Pictures of human faces were used as USs and CSs. The US stimuli were again presented together with positive and negative trait (high level construal) and state (low level construal) information. An additional formation phase was employed in which participants were presented with high and low level information provided about each US. USs were then paired with yet unknown CSs during the conditioning phase and explicit evaluations of USs and CSs were assessed at the end of the study. Results replicated the US construal level effect of Experiment 1 by demonstrating that ambivalent USs were evaluated according to the valence of the low level information. A highly significant conditioning effect was observed for the unambiguous as well as for the ambivalent CSs. The evaluation of the ambivalent CSs was significantly influenced by the valence of the high level information (as compared to the low level information) that was provided about the USs.

Experiment 3 aimed to replicate the construal level effects regarding the evaluations of the ambivalent USs and CSs and additionally investigated cognitive load as a possible moderating variable. The basic procedure was very similar to Experiment 2. However, during the conditioning phase, only ambivalent USs were paired with CSs. The construal level effects for the ambivalent stimuli were again observed in Experiment 3. The USs were evaluated according to the valence of the low level information, whereas the associated CSs were evaluated according to the valence of the high level information. No moderating influence of cognitive load was found. Experiment 3 provided strong evidence for the assumption that participants focus on low level features when evaluating the USs, whereas they focus on high level features when evaluating the associated CSs.

After having reliably demonstrated the hypothesized construal level effects regarding the evaluation of ambivalent USs and CSs, Experiment 4 investigated whether there is indeed an association between construal level and associative distance by employing a picture-word version of a lexical decision task (LDT). Participants first learned about the traits and mood states of the USs and then evaluated all USs and CSs in a first test phase. In the conditioning phase, unambiguous and ambivalent USs were paired with neutral CSs and the evaluations of USs and CSs were assessed in a final test phase. Subsequently, the LDT was administered. The ambivalent USs and CSs were used as primes and abstract and concrete words as well as non-words served as target stimuli towards which reaction times were measured. Regarding the evaluation of the ambivalent USs, the construal level effect of the previous experiments was replicated. However, no conditioning effects were observed for the CSs. Most importantly, the reaction time data of the LDT revealed faster reaction times toward abstract words when these were preceded by a CS prime as compared to a US prime, demonstrating the predicted association of CS and high level construal. However, the reaction times toward concrete words did not differ as a function of the preceding prime.

Summing up, the results of the four experiments strongly support the prediction that associative distance (i.e., the associative relation of US and CS) constitutes another dimension of psychological distance. Evidence for this conclusion can be drawn from the differential evaluation of ambivalent USs and associated CSs as well as from the reaction times observed in the LDT. Stimuli about which ambivalent high and low level information was provided were reliably evaluated according to the valence of the low level information. This can be explained in terms of distance. The US (i.e., the stimulus about which valenced information is provided) elicits a more direct affective reaction and is thus perceived to be more proximal than an associated stimulus. This perceived proximity makes the concrete low level features more salient when evaluating the US. This result has been reliably and consistently obtained in all four studies and provides important implications for learning. Particularly, the present studies are the first to demonstrate how ambivalent USs are evaluated. The evaluation of these ambivalent stimuli is not random but follows certain rules that can be directly derived from CLT (Trope & Liberman, 2003). Specifically, these rules postulate that a directly experienced stimulus is represented more concretely. As associative distance constitutes a dimension of psychological distance, the assumptions of CLT also apply to the proximal USs with the consequence that low level features are more salient when evaluating the US. One interesting question is whether ambivalent stimuli can also serve as USs in an evaluative learning paradigm. The present work showed that this is not only possible but has astounding implications for the evaluations of the associated CSs.

The assumption of the present work was that the CS is experienced indirectly because it only receives evaluative meaning by means of its association to the US. As a consequence, the CS is perceived to be more distal than the US, which subsequently leads to a focus on more abstract high level features when evaluating the CS. Thus, the valence of abstract high level information is focused on more strongly when forming an attitude toward a psychologically distal object. Thinking in terms of well-established learning theories (see paragraphs 4.1.3 and 4.2.5), this result is counterintuitive and in contrast to the predictions of these theories. Specifically, associative learning models (e.g., Baeyens et al., 1992a; Martin & Levey, 1978) would predict that the valence of the US would transfer to the CS. The evaluation of an ambivalent US should be guided by the valence of low level features and this valence should transfer to the CS, irrespective of the source of valence. However, the present work predicted and showed that this is not the case. Rather, the construal levels of the features provided about the US are taken into account. Thus, the presentation of the CS activates the representation of the US which consists of abstract and concrete features. Although the US is evaluated according to the concrete features, the abstract feature is more salient when the CS is evaluated. This is due to the observation that the CS is associatively more distant than the US and is therefore represented more abstractly. For ambivalent stimuli, this reasoning leads to a remarkable result: The CSs associated with ambivalent USs are evaluated *oppositely* to the USs from which they receive their evaluative meaning. Put differently, conditioning does not make US and CS more similar as is assumed by all associative learning models but rather makes US and CS more dissimilar. Importantly, this cannot be explained by a failure of the conditioning procedure. The CSs systematically acquired valence as a function of their association to the US. However, the abstract and concrete features were focused on differently depending on whether a proximal or a distal stimulus was evaluated.

The prediction that associative distance is a dimension of psychological distance received further support from the data of the LDT which directly tested for an association of associative distance and construal level. The assumption that the CS is associated with high level construal was confirmed by faster reaction times toward an abstract word when the word was preceded by a CS as compared to a US. This evidence confirms that the CS is indeed perceived to be more distant than the US. The hypothesis that the US is associated with low level construal was not supported by the data. However, this can probably be attributed to a floor effect which can be explained by the general processing advantage of concrete over abstract words. The reaction time data are particularly interesting because they demonstrate that there is an association between distance and construal level that is independent of specific contexts and exists on the level of concepts, which means that the association between associative distance and construal level does not only have implications for the evaluations of USs and CSs. Similar results have already been obtained by Bar-Anan et al. (2006) who demonstrated associations between construal levels and all four dimensions of distance postulated by CLT. The present research extends these findings and provides evidence that associative distance can be conceptualized as another dimension of psychological distance.

Taken together, the results of the present studies provide converging evidence for all of the three outlined hypotheses. The present work is the first one that predicted and found that evaluative learning is influenced by perceived distance and that US and CS can become dissimilar rather than similar as a function of conditioning. Before discussing further ideas and studies that could fruitfully corroborate and extend the present work, some methodological issues will be considered first.

There are some objections that can be raised against the specific procedures applied in the present studies. One of these objections refers to the way high and low level information was communicated to participants. Except for Experiment 1, participants learned about high and low level construal of the stimuli in a formation phase. Information about the low level construal could be inferred from the way the picture looked like, whereas information about the high level construal was presented via semantic information. Specifically, participants were presented with a blurry (i.e., bad mood) or a framed (i.e., good mood) picture along with semantic information of whether this stimulus belonged to a companionable or aggressive fraternity. Thus, the low level information was presented visually, whereas the high level information was presented semantically. Although it is not clear how specifically this should have influenced the results, one cannot completely rule out that the observed construal level effects are due to the specific mode of presentation of the construal level information. Intuitively, it seems to be a more precise and less error-prone manipulation to present both kinds of information either semantically or visually. However, this entails other problems such as the possible occurrence of order effects. For instance, when high and low level information are presented semantically, the two pieces of information can’t be encoded simultaneously but rather one after the other, thus leaving way for presentation order effects. One way to counter this argument in future studies would be to counterbalance presentation order. Another possibility to rule out the alternative explanation that the effects are due to the mode of presentation would be to interchange the assignment of construal level and mode of presentation such that the low level construal is presented semantically and the high level construal is presented visually. Given that the reasoning of the present work is correct, future studies using this procedure should reveal the same effects as the present research.

A related issue concerns the fact that high level trait information was manipulated on a group level, whereas low level state information was manipulated on an individual level. Regarding the high level information, the stimuli were described as possessing a positive or negative trait because they belonged to a certain group (i.e., tribe or fraternity). One could argue that a characteristic that results from being part of a certain group differs from an individual characteristic and that this difference could have contributed to or caused the results, independently of whether these characteristics are construed on a high or on a low level. Although the present data cannot completely rule out such influences there seems to be no theoretical reason why a US should be evaluated according to its individual characteristic, whereas a CS should be evaluated according to a group characteristic, unless one considers a group characteristic to be more general and abstract than an individual characteristic.

However, this reasoning would then again be in line with the hypotheses of the present work, namely that USs are evaluated according to low level valence and CSs are evaluated according to high level valence.

Another possible objection of a critical reader could be that the order of presentation of US and CS might be responsible for the differential distance perception of US and CS. It is argued that the US is more proximal than the CS because the US elicits an affective reaction whereas the CS does not until it is paired with the US. However, in all of the present studies, the USs were presented in the formation and classification phase and thus before the CSs were presented. Therefore, one could argue that it is not the directness of experience of the US that makes it more proximal but simply the order of presentation. A stimulus that is experienced first might be perceived to be more proximal than a stimulus that is experienced second. One possibility to counter this argument from an empirical point of view would be to reverse presentation order. From a theoretical point of view, however, the perception of associative distance can only occur once the two stimuli (US and CS) are put into a meaningful relation to each other. At this point, the initial presentation order should be irrelevant. In other words, presenting a neutral stimulus and subsequently a valenced stimulus, or presenting a valenced stimulus and subsequently a neutral stimulus should not lead to any perception of distance. Only when US and CS are put into an associative relation, the perception of distance can arise. However, in order to completely rule out the alternative explanation of presentation order, future studies should vary presentation order of CS and US.

8.2 Implications and ideas for future studies

Temporal distance was hypothesized to influence the results of the present studies. Although hypotheses were exploratory, it was quite unexpected that the manipulation of temporal distance did not lead to any significant effect in the three studies. Regarding the question of how temporal distance could have influenced the evaluations of USs and CSs, several directions of influence appeared to be possible. For instance, associative and temporal distance could have interacted in such a way that in the temporally near condition (as compared to the temporally distant condition) participants would pay more attention to the concrete information when evaluating the US and less attention to the abstract information when evaluating the CS. Alternatively, it could have been possible that temporal distance leads to a main effect such that concrete information is in the focus of attention in the temporally near condition and abstract information is in the focus of attention in the temporally distant condition, irrespective of whether US or CS is evaluated. In this case, temporal distance would override the effects of associative distance.

Possible reasons for why temporal distance did not influence any of the results range from methodological problems to more theoretical considerations. Considering methodological problems first, the failure to observe temporal distance effects might have been due to the specific procedure employed in the present studies. The typical temporal distance manipulation in CLT studies is to tell participants to imagine a certain scenario taking place either in the near future (e.g., tomorrow) or in the distant future (e.g., six months from now). In the present work, participants were asked to imagine that they were to encounter the scenario described in the cover story either tomorrow or in six months. Although this manipulation was basically identical to successful temporal distance manipulations in other studies (e.g., Liberman et al., 2002; Trope & Liberman, 2003) the procedural details of the present studies might have weakened the temporal distance manipulation. In typical CLT studies, participants read brief instructions about the distance manipulation and the task they are asked to perform in the experiment. In the present studies, participants had to read a long and quite elaborate cover story. Additionally, they had to encode a large amount of new information about the stimuli and the specific scenario. The manipulation check in the post-experimental questionnaire revealed that participants did encode the relevant temporal distance information. However, this does not necessarily entail that they followed the instructions and did indeed *imagine* the scenario taking place at a certain point in time. Instead, it is conceivable that participants were busy learning the relevant high and low level information and, as a consequence, neglected the temporal distance instruction. This is particularly likely when considering that participants were told explicitly that it is very important for them to correctly encode the high and low level information, whereas it might have been not clear why it should be important to imagine the scenario taking place at a certain point in the future. Therefore, participants may did not follow the instructions because too many other important information had to be considered. If this is the reason for the lack of temporal distance effects in the present studies, it would be fruitful for future studies to place more emphasis on the importance of the temporal distance information, thus making the distance information as important for participants as the high and low level information.

A more theoretical concern regarding the lack of temporal distance effects pertains to the interrelation of different distance dimensions. Specifically, it is unclear whether temporal distance effects even have a chance in an associative learning paradigm. It seems plausible that associative distance overrides the effects of temporal distance because associative distance is more relevant in a paradigm dealing with the formation of interpersonal attitudes. Concretely, when forming attitudes toward persons, it could be that the association between these two persons is more relevant than the point in time at which a participant is asked to imagine meeting these persons. This reasoning suggests that some distance dimensions may be more important than others, depending on the specific context in which distance is manipulated. If this is indeed the case, it would carry important implications for CLT and for the interactions of different distance dimensions, suggesting that some distance dimensions are more important than others. So far, CLT (Liberman et al., 2007) merely assumes that the dimensions of psychological distance are mentally associated (see paragraph 3.7). Although the studies of Bar-Anan et al. (2007) provided initial support for the interrelation of the distance dimensions, it remains unclear *how* the distance dimensions interact. Moreover, what happens in a paradigm that does not directly assess the interrelations but employs two distance dimensions and investigates the effects of these distance manipulations on psychological phenomena typically studied in CLT research (e.g., categorization, choice, preferences, judgments, decision making)? For instance, one typical measure often used in CLT research to demonstrate the effects of temporal distance on construal level is the categorization task in which participants have to sort objects into as many categories as they deem appropriate (see paragraph 3.4.1; Liberman et al., 2002). The result that has been repeatedly obtained is that people sort objects into more categories when temporal distance is low rather than high. However, it has never been investigated what would happen in the categorization task (or any other CLT task) if two dimensions of distance are applied simultaneously. Future studies should manipulate two dimensions of distance simultaneously and also in different contexts. In a first step, "classical" CLT tasks such as the categorization task should be used as dependent measures. For example, participants could be asked to imagine a certain event (e.g., a party) taking place at their house (spatially near) in a year from now (temporally distant) versus taking place in another town (spatially distant) tomorrow (temporally near). There should also be control conditions in which spatial or temporal distance is held consistent (i.e., both near or both distant). Participants' task would be to categorize a list of objects typical for a party into as many categories as they consider appropriate. The question is whether temporal or spatial distance is more relevant when categorizing the objects. When the party takes place at my house in a year from now, I should form more categories when focusing on the spatial distance information but fewer categories when focusing on the temporal distance information. Another possibility would be that the distance manipulations cancel each other out such that no differences between "inconsistent" conditions are obtained. Based on results of such studies, it should be possible to derive precise predictions regarding the interaction of two distance dimensions in general and also regarding the interaction of associative distance with another dimension of distance in an evaluative learning paradigm. Furthermore, these results would allow expanding (or maybe even correcting) the assumptions of CLT by providing important insight into the question of whether different distance dimensions are equal and elicit similar construal effects or whether they are asymmetrically related in terms of structural properties as well as with regard to construal level (see also paragraph 3.8).

So far, the implications for future studies that have been discussed are all based directly on the results obtained in the present work. However, there are more ideas for future studies whose results can corroborate the underlying hypotheses of the present work. For instance, including a sensory preconditioning phase could support the assumption of an associative distance dimension. Sensory preconditioning refers to the phenomenon that affective value of the CS can be transferred to stimuli that have never been directly paired with the US but are pre-associated with the CS (Barnet et al., 1991; Hammerl & Grabitz, 1996; Walther, 2002). Based on the present studies, a CS2 should be paired with a CS1 prior to the conditioning phase during which CS1 is paired with an unambiguous or ambivalent US. The hypothesis regarding the pre-associated CS2 would be that the CS2 is at least equally or maybe even more distant than the CS1 because the CS2 is not directly associated with the US. The perceived distance of the CS2 should result in a strong focus on the abstract high level information presented about the US, thus leading to an evaluation of the CS2 that is based on the abstract trait information. In other words, there should be an interaction effect of CS2-US valence that is at least as pronounced (if not more) as the interaction of CS1-US valence. By demonstrating that the US-CS construal level effects can also be observed for the CS2 that is only pre-associated with the CS1, one would provide additional evidence that the USs are psychologically more proximal stimuli that are evaluated according to the valence of low level construals, whereas stimuli that are merely associated with the US or pre-associated with other CSs are perceived to be more distal and are thus evaluated according to the valence of high level construals.

Furthermore, in order to find out more about the processes underlying the observed effects, participants' attitudes should be assessed with an unobtrusive measure of evaluation such as the affective priming task (Fazio et al., 1995). Such an indirect measure of evaluation should be included in future studies in order to find out whether the advantage of low level information over high level information in the evaluation of the US (and vice versa in the evaluation of the CS) can also be obtained when participants do not state their evaluations in an explicit manner. The Associative Propositional Evaluation Model (APE model; Gawronski & Bodenhausen, 2006) assumes that explicit attitude measures tap evaluations that have their roots in propositional processes, whereas implicit attitude measures tap evaluations that have their roots in associative processes (Gawronski, Strack, & Bodenhausen, 2009). However, the APE model also postulates that associative and propositional processes mutually influence each other (Gawronski et al., 2009), which entails that an associative phenomenon can have a direct effect on an implicit measure and an indirect effect on an explicit measure that is mediated by the effect on the implicit attitude measure. Obtaining the US-CS construal level effects on both explicit and implicit measures would allow no definite conclusion regarding the process underlying the effect, although one could investigate whether the explicit effects are mediated by the implicit effects and vice versa. However, a possible dissociation of implicit and explicit measure would be a first hint that the processes underlying the US-CS construal level effects do depend on propositional reasoning. Although shedding light on the question of the processes underlying the effect of a differential weighting of high and low level information was not the primary aim of the present work, the addition of an implicit measure would be interesting in order to provide initial insight into this question.

8.3 Theoretical perspectives and implications

Implications for associative evaluative learning

First, it has to be mentioned that the present work adds associative evaluative learning to the already rich list of phenomena and paradigms known to be influenced by psychological distance. Whereas previous CLT research has focused on areas such as judgments, choices, preferences, and decision making (to name only a few), the area of evaluative learning (or of learning in general) has been completely neglected. By demonstrating that there is an influence of psychological (i.e., associative) distance on learning, it could be demonstrated in the present research that our attitudes, as a product of evaluative learning, are also influenced by perceived distance.

In EC studies so far, the US has always been unambiguously positive or negative. However, when information with positive and negative valence is equally available, things become more complicated. Whether we acquire a positive or negative attitude toward a certain stimulus depends not only on the valence of the information but on the abstractness or concreteness (in other words, on the high and low level construal) of the information. One piece of positive information and one piece of negative information can lead to a positive *or* a negative attitude depending on which information is more abstract. When evaluating the person about which we receive information, results revealed that the valence of the concrete information was more important for the formation of an attitude toward this person. The present work contributes to existing models of EC by demonstrating that ambivalent stimuli can serve as USs in an evaluative learning paradigm. Moreover, the evaluation of ambivalent USs is governed by certain rules that could be identified in the present work; namely that the evaluation of an ambivalent US depends on the valence of concrete information. This is also quite interesting from an applied perspective because it entails that people, products, or other objects about which we receive ambivalent information should generally be evaluated according to the valence of the more concrete (vs. abstract) information.

Interestingly, the evaluation of the CS did not mirror the evaluation of the US. When evaluating the CS, the abstract trait information was more salient. This is counterintuitive at first sight because associative learning theories would predict that the valence of the US would simply transfer to the CS, which was not the case. Instead, the weight given to each piece of information was reversed such that the CS was evaluated according to the abstract information. Specifically, the CS activated the representation of the associated US which consisted of both abstract and concrete features. The associative distance of the CS subsequently led to a focus on the abstract features. Thus, participants encoded both kinds of information but assigned different weight to each piece of information, depending on whether they evaluated the person directly (i.e., US) or another associated person (i.e., CS). Most importantly, this led to attitudes toward the USs and CSs that were of opposite valence. For instance, an ambivalent US was evaluated positively because it possessed a positive low level feature, whereas an associated CS was evaluated negatively because the abstract feature of the US was negative.

These results are particularly remarkable because they contradict one major assumption of all theories of associative learning (e.g., Baeyens et al., 1992a; Martin & Levey, 1978), namely that US and CS become similar as a result of conditioning. In other words, these models propose that a neutral CS becomes more positive (negative) after being paired with a positive (negative) US. The present research predicted and found that this assumption does not hold true when the US is ambivalent. In these cases, a neutral CS takes on the valence opposite to the valence of the US. Thus, US and CS can also become dissimilar after successful conditioning. These findings reveal that traditional learning theories cannot capture the effects of ambivalent USs on associated CSs. Although the assumption of a similarity of US and CS after conditioning is reliably confirmed in a plethora of conditioning studies (e.g., Baeyens et al., 1989a,1992a, 1998; De Houwer et al., 2001; Walther, 2002), the explanatory power of associative learning theories reaches a limit when the US is ambivalent. In other words, the present research was able to identify a boundary condition under which the predictions of established learning theories do not apply, namely when the US is ambivalent.

Furthermore, the present results also bear some other important implications for conditioning in general because they make clear that it is not only valence that is encoded and subsequently transferred to an associated stimulus. The present research adds to the already existing evidence that conditioning is no low level mechanical process during which a simple association between two events is learned and a response is simply passed from one stimulus to another (e.g., Field, 2006a; Rescorla, 1988). In other words, the fact that participants in the present studies were able to encode both kinds of valences and, even more importantly, were able to differentially weigh high and low level information depending on which stimulus had to be evaluated provides further evidence that conditioning does not represent an extremely restricted form of learning in which a single stimulus becomes associated with a single outcome. Rather, associations between representations of multiple events are formed during conditioning. However, although it is evident that conditioning is more complex than assumed by traditional learning theorists, it is still a topic of debate which theoretical processes are actually underlying EC effects. It seems indisputable that associative evaluative learning is accomplished by the formation of associations between representations in memory (De Houwer, 2009a). However, although EC effects are by definition associative, they are not necessarily due to the automatic formation of associations in memory. Some researchers claim that conditioning effects are mainly based on propositional processes (De Houwer, 2009a), whereas others postulate that conditioning is mainly based on associative processes (Rescorla & Wagner, 1972). Given that there is abundant evidence for both kinds of assumptions (e.g., Dawson & Schell, 1987; De Houwer, 2009a; De Houwer, Vandorpe, & Beckers, 2005; Rescorla, 1974; Walther et al., 2005), it seems most fruitful for future research to identify the conditions under which associative versus propositional processes prevail. Although the results of the present work suggest that propositional processes do play a role in associative learning, this conclusion is tentative. Specifically, it is not clear yet whether the differential weighting of high and low level information when evaluating a proximal versus a distal stimulus occurs automatically, which would favor a purely associative account, or needs cognitive resources, which would speak for a propositional account.

Associative distance as a dimension of psychological distance

An important issue is whether and how associative distance fits into the framework of CLT. As outlined in paragraph 3.1, CLT defines psychological distance as something that cannot be experienced directly but needs to be constructed or reconstructed (Liberman et al., 2007). Put differently, the directness of experience determines whether an object or event is psychologically near or distant. Starting from this definition of psychological distance, associative distance can easily be regarded as a dimension of psychological distance. The US is more proximal than the CS because it can be experienced more directly. A critical reader might argue that the experience of the US also involves construal because the attitude toward the US is inferred from the information provided about the US. It is true that the US in the present studies is not directly experienced in the sense that it constitutes the so-called zero-distance point. However, the critical point is that a US is always experienced *more directly* than a CS. Thus, in a relative sense, the US is more proximal than the CS. From a definitional point of view, associative distance can be considered an instance of psychological distance just as temporal, spatial, social, and hypothetical distance. The question that remains is how the inclusion of associative distance as a dimension of psychological distance can contribute to or extend the theoretical framework of CLT. First of all, it extends CLT by demonstrating that there are forms of psychological distance that differ in several respects form the other dimensions but still produce construal level effects. Some aspects clearly differentiate associative distance from the "traditional" forms of psychological distance.

First, due to its definition, associative distance seems to be restricted to one certain paradigm, namely (evaluative) conditioning. Specifically, associative distance effects can only be demonstrated in a conditioning paradigm, which means that the domain in which the effects show (evaluative learning, attitude formation) is interwoven with the dimension of distance (i.e., associative distance). However, considering that evaluative conditioning not only takes place in the laboratory but in various instances in everyday life in which attitudes toward all different kinds of attitude objects are formed, it might be incorrect to speak of a restriction. Rather, the fact that the paradigm is interwoven with the distance dimension is a special characteristic that differentiates associative distance from all other forms of psychological distance whose effects do not depend on the application of one specific paradigm. A closely related aspect refers to a more methodological difference: Associative distance can only be realized within- and not between-subjects because no association of CS and US can be established if only one of these two stimuli is presented. As a consequence, none of these stimuli would be perceived to be more proximal or more distant than the other one. In other words, the perception of associative distance establishes relatively, meaning that one stimulus or event can only be perceived to be distant when it is put into an associative relation to another stimulus or event. The CS is perceived to be distant when being put into an associative relation with the US. In previous research, the other dimensions of distance have always been realized between-subjects although a within-subject manipulation is thinkable as well. Regarding temporal distance, for instance, participants could be asked to imagine two or more scenarios, with some taking place in the near and some in the distant future. From a theoretical point of view, there seems to be no a-priori reason why psychological distance (e.g., temporal) should not lead to the hypothesized results when manipulated within-subjects. On the contrary, considering that estimations of distance are subjective, it is surprising that CLT studies so far have only manipulated distance between-subject, thus preventing a differential perception of distance (i.e., near vs. distant) within the same participants. Trying to establish representations of near and distant future events in the very same participants seems to be a fruitful idea for further studies in order to test the robustness and possible limitations of CLT.

A second interesting difference of associative distance concerns the circumstance that the psychological meaning of the distal stimulus (the CS) changes during the experiment. As outlined above, the CS acquires its meaning via association with the US. Thus, the CS is by definition meaningless at the beginning of the experiment and acquires affective meaning throughout the course of the experiment. Once the association to the US is established, the CS also elicits positive or negative reactions. Based on the fact that the CS becomes affectively meaningful, one could argue that the CS also becomes more proximal. This is quite different to all the other distance dimensions in which both poles of distance are held constant throughout the experiment. For example, in a temporal distance study, a participant is asked to imagine an event either tomorrow or in a year from now. This does not change throughout the whole experiment as the distance that is to be imagined remains constant. However, the fact that the affective meaning of the CS changes does not necessarily and imperatively mean that the perceived distance towards the CS changes. Particularly, it is not the perceived distance towards the CS but only the affective meaning of the CS that changes. The CS should always be perceived as being more distant than the US, be it at the beginning of the study when the CS is a neutral stimulus or be it at the end of the study when it has acquired some meaning. What matters regarding the perception of the CS as a distal stimulus is not its affective meaning but its association to the US. The CS is always and only introduced in relation to the associated US; there is no direct "contact" of participant and CS. Thus, the US-CS association mediates the relation of the participant to the CS.

A third aspect relates to the question of whether associative distance is a separate dimension of psychological distance or whether it constitutes a special kind of social distance. Social distance itself differs from the three other dimensions of psychological distance (temporal, spatial, hypotheticality). Whereas temporal distance, for example, always and only refers to a temporal aspect that can be expressed in different units of time measurement (e.g., weeks, months, years), social distance refers to many different kinds of social relations or interactions, such as self and other, similar and dissimilar others, in-group and out-group members, as well as status differences. It seems that social distance is more of a superordinate concept under which different instances of social distance can be subsumed. Does associative distance fit under the umbrella of social distance? Most generally, one could argue that the fact that associative distance is part of an evaluative learning paradigm that leads to the formation of interpersonal attitudes already makes it an instance of social distance. A more specific pro argument is that in associative distance as well as in social distance, the two poles of the dimensions constitute "social stimuli". The instances of social distance all refer to persons (i.e., self-other, similar-dissimilar, etc.) or characteristics of persons (i.e., powerful vs. powerless). This clearly differentiates social distance from the other dimensions of psychological distance. Although USs and CSs in the present studies have been persons (or at least living creatures) one could argue that in EC the US and CS stimuli can also be objects or events. This is true but as long as these stimuli do possess certain characteristics, namely high and low level features, the US-CS construal level effects should still be observed. Thus, in associative as well as in other instances of social distance, the two poles of distance are either persons or objects possessing certain characteristics (e.g., characteristics that make them similar or dissimilar; high and low level characteristics).

An argument that possibly speaks against the conceptualization of associative distance as an instance of social distance is that in associative distance more preconditions need to be met in order to obtain construal level effects. For instance, for the similar-dissimilar dimension of social distance, the precondition is that one stimulus is perceived to be similar and one stimulus is perceived to be dissimilar by participants. In associative distance, however, the preconditions are more complex. Specifically, one needs a valenced stimulus and a neutral stimulus which are put into an associative relation to each other. Additionally, the valenced stimulus has to possess high and low level features in order to demonstrate the differential influence of the valence of high and low level feature on the evaluation of US and CS.

Taken together, the question of whether associative distance can be regarded as an instance of social distance remains a subject of speculation at the present moment. In order to emphasize its significance and its special characteristics, it is proposed to conceptualize associative distance as a separate dimension of psychological distance. However, the more important, superordinate question is whether associative distance does indeed constitute a dimension of psychological distance at all. Although one could argue that the above mentioned differences to the other distance dimensions are reasons to exclude associative distance from the framework of CLT, it seems more fruitful for further theoretical development to choose a different perspective. The first and foremost reason to include associative distance into CLT is that the effects observed in the present work can be explained with an association between distance and construal level as postulated by CLT. Including associative distance into the theoretical framework of CLT should encourage researchers to keep their eyes open and search for still other distance dimension that at first sight might seem not suitable to fit into CLT but that can nonetheless produce construal level effects. Including associative distance not only broadens the theory but also extends the concept and the understanding of distance. And just as evaluative learning and attitude formation have been discovered as being influenced by psychological distance there might be other phenomena or areas that have so far been neglected in CLT research but that might be influenced by a yet to be discovered instance of psychological distance.

Social communication and interaction

The results of the present studies also bear interesting implications for social communication and interaction. With the use of language we can regulate our relationships with friends, acquaintances, and strangers. Several studies have shown that the use of concrete words, e.g. verbs, leads to more proximity, whereas the use of abstract words leads to more distance (for an overview see Semin, 2007). A number of experiments have addressed the relationship between language use and quality of interpersonal rapport. One experimental paradigm that has been used in this context is the question-answer paradigm (Semin, 2000). This research has shown that the abstractness of the verb used in a question influences the abstractness of the answer provided. More important for the present research, it was shown that the use of concrete questions leads to stronger feelings of proximity and friendliness toward the interviewer (Rubini & Kruglanski, 1997). Thus, abstract or concrete language use seems to influence whether we perceive others to be proximal or distal to us. We use more concrete words when we describe people close to us and use more abstract words when describing people more distal to us. One study by Fiedler et al. (1995), for example, showed that couples changed the abstractness of their interpersonal language over time, such that short-term couples used more abstract words compared to couples who knew each other for a longer period and who displayed proximity by using more concrete language. Although the present research is not exactly dealing with language use but rather with abstract and concrete information that can be conveyed by means of specific linguistic devices, the results can nonetheless be considered an important addition to the existing data on interpersonal communication. When communicating positive or negative information about a person X, the abstraction of language is one determinant of the attitude formed toward X. Moreover, the abstraction of the information not only influences the attitude toward X but possibly also the attitude toward people merely associated with person X. The attitude toward a person does not only depend on the valence of the presented information about that person but also on the abstractness of the provided information. A possible implication of the present results is that we can influence how others are evaluated simply by communicating information about others either abstractly or concretely. For instance, if you want others to like your new friend you should describe your friend in concrete positive terms rather than in abstract positive terms. This should lead to a feeling of greater proximity of your new friend (Semin, 2007). Based on the results of the present research, it should also lead to a more positive evaluation of your friend as compared to when the positive information is communicated in a more abstract way. Going one step farther, the way you communicate information about your friend not only influences the evaluation of your friend but also the evaluation of people merely associated with him. These findings of the present work extend the research on social communication and interaction by providing evidence that the use of concrete versus abstract language influences how we evaluate a person about which information is conveyed as well as others that are merely associated with this person.

Conclusion

The present results provide important implications for the formation of attitudes. Research on EC has already shown that an association to a liked or disliked individual can influence and even reverse the attitude we have about a target person (Walther, 2002; Walther et al., 2007). If an unknown (and neutral) person is seen in the presence of a person the perceiver dislikes, the perceiver may also come to dislike the innocent individual. The results of the present work add to these findings by demonstrating that knowing whether a person is liked or disliked might not be enough to predict whether an associated individual will also be liked or disliked. There are cases when it is necessary to know why a person is liked or disliked, or more specifically, which information led to this attitude. In general, if a person is disliked, it might be advisable for you to stay away from this person because others could dislike you as well. However, if you know that this person is disliked because he is in a bad mood but is usually known to be a kind and generous person, you may want to reconsider your decision. Being associated with this person might lead to a negative evaluation of the person itself but to a more positive (or at least less negative) evaluation of you.

This brings us back to the scenario introduced in the first paragraph of the present work. Remember Tom who has been described as a person who is generally helpful but who behaved negatively in a certain situation. Tom was associated with a woman about which no information was provided. The results of the present research allow giving an answer to the question of how Tom and the associated woman would be evaluated. In order to form an attitude toward Tom and the woman accompanying him, it is not enough to know that Tom possesses a positive and a negative feature. Rather, the abstractness of the features is crucial. Applying the results from the present studies, it is most likely that Tom would be evaluated rather negatively because he behaved badly in the restaurant. However, the woman associated with Tom should be evaluated quite positively because she is associated with a helpful person.

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Appendix A

Cover Story and instructions of the temporally near (and distant) future conditions – Experiment 1

Cover Story

Lieber Erdling,
versuche bitte, Dich in folgende Situation hineinzuversetzen: Die Ressourcen auf der Erde sind zum größten Teil ausgebeutet. Die Erdlinge hoffen auf neue Energien aus dem Weltall und die Weltraumforschung sucht nach Möglichkeiten für Erdlinge, auf anderen Planeten zu leben. Nach jahrelanger Forschung haben Wissenschaftler herausgefunden, dass es Leben auf einem fremden Planeten namens Elpo gibt.
Erdling, du hast gerade eine Arbeitsstelle als wissenschaftlicher Mitarbeiter bei dem International Committee Investigating Extraterrestrial Life - ICIEL - einer Einrichtung zur Erforschung außerirdischen Lebens angetreten. ICIEL hat dich eingestellt, um die Planung und Einrichtung einer neuen Forschungsstation auf Elpo zu leiten. Dazu wirst du morgen (*in 6 Monaten*) zu Elpo fliegen!

Erdling, du fliegst morgen (*in 6 Monaten*) zu Elpo. Deine Aufgabe ist es, dich durch drei unterschiedliche Phasen zu kämpfen, um auf Elpo überleben und sicher zur Erde zurückkehren zu können.
In Phase 1 wirst du ein Training erhalten, damit du dich auf dem fremden Planeten zurechtfindest.
In Phase 2 wirst du etwas über die Interaktionen der Bewohner Elpos lernen.
In Phase 3 geht es dann richtig los. Du wirst dich alleine auf Elpo durchschlagen müssen. Um zu überleben, musst du umsetzen, was du vorher gelernt hast. Am Ende des Spiels werden wir dir mitteilen, wie gut du dich auf Elpo geschlagen hast.
Bitte klicke auf „Weiter“ und wir starten Phase 1!

Erdling, damit du dich auf dem fremden Planeten zurechtfindest, wirst du auf Elpo zunächst ein Trainingscamp besuchen. In dem Trainingscamp musst du dich so schnell und gründlich wie möglich mit allen Informationen über Elpo vertraut machen. Bisher weiss man, dass es zwei verschiedene Stämme auf Elpo gibt.
Es gibt die TRISONS, erkennbar an der Antenne auf ihrem Kopf. Und es gibt die PONGALS, die alle abstehende Haare haben.
Um auf Elpo überleben zu können, musst Du zwei elementare Dinge
über die Bewohner von Elpo lernen:

1. Welchem Stamm sie angehören und

2. in welcher Stimmung sie sich befinden.

Auf Elpo gibt es einen Stamm, der kriegerisch, also gefährlich für dich ist und einen Stamm, der friedfertig, also ungefährlich ist. Erdling, du sollst nun herausfinden, welches der Lebewesen zu welchem Stamm - kriegerisch oder friedfertig - gehört. Du wirst also einen Pongal oder Trison beobachten können und Informationen über die Eigenschaft des jeweiligen Stammes erhalten. Neben den typischen Stammeseigenschaften unterscheiden sich die Stammesangehörigen auch in ihrem momentanen Gefühlszustand. Dieser lässt sich anhand der Körperhaltungen der Lebewesen erkennen.

Erdling, um auf Elpo zu überleben, ist es wichtig, dass du nicht von den Bewohnern angegriffen und getötet wirst. Weiterhin musst du wissen, mit welchen der Lebewesen du Nahrungsmittel tauschen und Handel treiben kannst. Da du nicht genügend Vorräte für deinen Aufenthalt mitnehmen kannst, wirst du auf die Hilfe der Bewohner Elpos angewiesen sein. Ob du von den Bewohnern von Elpo angegriffen wirst oder Hilfe von ihnen erhältst, hängt sowohl von der Stammeszugehörigkeit als auch von der Stimmung ab. Um zu wissen, ob es sich um eine gefährliche oder gewinnbringende Situation handelt, musst du in Phase 1 also sowohl die STAMMESZUGEHÖRIGKEIT als auch die STIMMUNG der Lebewesen richtig identifizieren können.

Denk daran, Erdling: Du beginnst morgen (*in 6 Monaten*) mit deiner Arbeit auf Elpo.
Du musst vermeiden, von den Bewohnern Elpos angegriffen zu werden und musst gleichzeitig Handelsbeziehungen zu ihnen aufnehmen. Damit dir das gelingt, musst du dir sowohl von der Stammeszugehörigkeit als auch von der Stimmung der Lebewesen ein Bild machen. Dann und nur dann hast du eine Überlebenschance!

Bevor es nun aber endgültig losgehen kann,
muss das Intergalaktische Reisebüro nochmals Deine Flugdaten überprüfen.
Bitte Klicke auf Weiter und gib Dein korrektes Flugdatum an!

Instructions Classification Phase

Du siehst also im folgenden ein Lebewesen, das zum Stamm der Trisons ODER Pongals gehört und das entweder freundlich ODER unfreundlich ODER neutral gestimmt ist.
Du hast also genau 6 Antwortmöglichkeiten:

------ gut gelaunt
Trison ------ neutral gelaunt
------ schlecht gelaunt

------ gut gelaunt
Pongal ------ neutral gelaunt
------ schlecht gelaunt

All diese Antwortmöglichkeiten werden dir in Form einer Matrix vorgegeben. Bitte klicke dann mit der Maus auf die Antwortmöglichkeit, die dir richtig erscheint. Sobald du auf ein Feld geklickt hast, erhältst du eine Rückmeldung, ob deine Antwort korrekt war.

Viel Glück, Erdling!

Instructions Conditioning Phase

Herzlichen Glückwunsch Erdling! Du hast Phase 1 erfolgreich überstanden und hast damit bewiesen, dass du bereit bist für Phase 2.

Morgen (*In 6 Monaten*) musst du dich auf Elpo schon alleine zurechtfinden und musst um dein Überleben kämpfen. Du bekommst jetzt noch einmal die Gelegenheit, dir durch den Kopf gehen zu lassen, was du bereits gelernt hast. Du weißt bereits, welche Eigenschaften die Stämme auf Elpo besitzen und in welcher Stimmung die Lebewesen sich befinden. Nun wirst Du etwas über die Interaktionen der Lebewesen untereinander lernen. Du wirst erfahren, welche Lebewesen von den Forschern bisher bereits zusammen gesehen wurden.

Dabei ist den Wissenschaftlern aufgefallen, dass es einen weiteren Stamm auf Elpo gibt – die METIS. Du wirst diesen Stamm an dem dreieckigen Hut auf ihrem Kopf erkennen. Allerdings haben die Wissenschaftler über diesen Stamm bislang keine weiteren Informationen, da die Metis weder positiv noch negativ aufgefallen sind. Es ist also davon auszugehen, dass sie weder besonders gefährlich noch besonders friedfertig sind.

Damit du dir schon genaue Vorstellungen vom Planeten Elpo machen kannst, hast du jetzt auch einmalig die Gelegenheit noch unveröffentlichte Aufnahmen vom Planeten Elpo zu sehen. Da die Bewohner Elpos Fremden gegenüber anfangs scheu sind, zeigen sie sich dir immer nur kurz und verschwinden dann wieder.

Erdling, schau dir die Lebewesen und Informationen gut an, denn bereits morgen (*in 6 Monaten*) geht es aufs Ganze und du musst beweisen, dass du in der Lage bist, auf Elpo zu überleben.

Bitte klicke auf „Weiter“ und starte Phase 2!

Instructions Trait Test Phase

Erdling, du hast auch Phase 2 überstanden und hast dich deiner Aufgabe würdig erwiesen. Bevor Du aber morgen (*in 6 Monaten*) endgültig auf Elpo ausgesetzt wirst, wollen wir wissen, welche Eindrücke du aus den bisherigen Phasen von den Lebewesen gewonnen hast.

Du wirst eine Reihe der Lebewesen der unterschiedlichen Stämme sehen. Bitte beurteile, ob das jeweilige Lebewesen zu einem Stamm gehört, der kriegerisch oder friedfertig ist. Dazu kannst du den Balken mit der Maus bewegen.

Instructions Mood Test Phase

Sehr gut, Erdling! Du wirst nun wieder eine Reihe der Lebewesen der unterschiedlichen Stämme sehen. Bitte beurteile nun, ob das jeweilige Lebewesen gut oder schlecht gelaunt ist. Dazu kannst du den Balken mit der Maus bewegen.

Instructions Valence Test Phase

Erdling, du machst deine Sache gut! Wir glauben, dass du bereit bist, auf Elpo zu leben.
Zum Abschluss wollen wir aber noch etwas über deine ganz persönliche Einschätzung der Lebewesen wissen. Wir werden dir noch mal die Lebewesen zeigen. Bitte beurteile,
wie sympathisch oder unsympathisch dir diese Lebewesen sind. Dazu kannst du den Balken mit der Maus bewegen. Bitte urteile so spontan wie möglich!

Appendix B

Adjectives presented during the classification phase – Experiment 1

Adjectives presented for the warlike Trisons:

aggressiv, kämpferisch, angriffslustig, zanksüchtig, streitsüchtig, kampfesfreudig, kampfbereit, kampflustig, angreiferisch, rachsüchtig, jähzornig, herrschsüchtig, kaltblütig, grausam, barbarisch, gnadenlos, brutal, zänkisch, herzlos, mitleidlos, hitzig, militant, kriegsliebend, rücksichtslos, gewalttätig, erbarmungslos, unbarmherzig

Adjectives presented for the pacific Pongals:

Friedlich, friedliebend, verträglich, harmlos, sanft, behutsam, liebenswürdig, gutmütig, sanftmütig, friedvoll, versöhnlich, barmherzig, gütig, harmoniebedürftig, milde, sorgsam, herzlich, empfindsam, warmherzig, gnädig, entgegenkommend, zuvorkommend, wohlwollend, einfühlsam, besonnen, liebevoll

Appendix C

Post-experimental questionnaire and debriefing – Experiment 1

Liebe Teilnehmerin, lieber Teilnehmer!

Vielen Dank für die Teilnahme an unserem Experiment!
Wir möchten Sie jetzt noch bitten, einige Fragen zu beantworten.

1. Wann genau sollen Sie zu Elpo fliegen?

2. Haben Sie eine Vermutung, worum es in dem Experiment ging?

O Ja

O Nein

3. Falls ja, was meinen Sie, was wir herausbekommen wollen?

4. Was glauben Sie, wie wohl Sie sich auf Elpo fühlen würden?

5. Hat sich Ihrer Meinung nach die Bewertung von einigen Lebewesen im Laufe der Studie verändert? Wenn ja, wie hat sich Ihre Bewertung verändert?

6.Haben Sie bei der Beurteilung der Lebewesen hinsichtlich der Sympathie eine bestimmte Strategie verfolgt? Wenn ja, welche?

7. Was glauben Sie, weshalb wir Ihnen zwischendurch die Bilder von Elpo gezeigt haben? Hat sich dadurch Ihre Bewertung der Lebewesen verändert?

8. Haben Sie sonst noch Anmerkungen zur Studie?

Zum Schluss hätten wir für die Statistik gerne noch einige Angaben zu Ihrer Person:

Alter:

Geschlecht:

Beruf bzw. Studienfach / Semester:

Vielen Dank für Ihre Teilnahme!

Informationen zur Studie

Liebe Teilnehmerin, lieber Teilnehmer!

In unserer Studie haben wir untersucht, wie unterschiedliche Arten von Informationen den Erwerb von Einstellungen, also in diesem Fall die Beurteilung der Lebewesen, beeinflussen.

Weiterhin sind wir daran interessiert, ob sich zeitliche Distanz (also ob Sie morgen oder in 6 Monaten zu Elpo fliegen) auf den Einstellungserwerb auswirkt.

Wir freuen uns, dass Sie an unserer Untersuchung teilgenommen haben und bedanken uns im Namen des ganzen Teams recht herzlich!

Appendix D

Examples of stimulus materials – Experiment 2

Example 1: negative US (Alligator in a bad mood)

Example 2: positive US (Woodchuck in a good mood)

Example 3: ambivalent US (Alligator in a good mood)

Example 4: ambivalent US (Woodchuck in a bad mood)

Example 5: CS (Finch)

Appendix E

Cover Story and instructions of the temporally near (and distant) future conditions – Experiment 2

Cover Story

Liebe Teilnehmerin, lieber Teilnehmer,

Bitte versuche, Dich in folgende Situation zu versetzen:
Du hast Dich für eine WG im Studentenwohnheim beworben und hast jetzt Bescheid bekommen, dass Du tatsächlich eines der begehrten Zimmer ergattert hast. Du musst morgen (*in einem halben Jahr*) einziehen.
Da die einzelnen Wohnheim-Trakte gerade neu zusammengesetzt werden, hast Du die Möglichkeit, mitzuentscheiden, mit wem Du morgen (*in einem halben Jahr*) zusammenwohnen wirst. Daher sammelst Du Informationen über die derzeitigen Bewohner des Wohnheims. In dem Wohnheim leben hauptsächlich Mitglieder verschiedener studentischer Verbindungen. Du wirst zunächst Informationen über zwei dieser Verbindungen erhalten.

Zum einen gibt es die "Alligatoren" - eine Verbindung, die bisher hauptsächlich durch aggressives Verhalten aufgefallen ist. Zum anderen gibt es die "Murmeltiere", die sich durch ein besonders umgängliches Verhalten auszeichnen. Du ziehst morgen (*in einem halben Jahr*) in das Wohnheim ein. Ob Du Dich in Deiner WG wohlfühlen wirst, hängt davon ab, ob Du mit einem Mitglied der Alligatoren oder der Murmeltiere zusammenlebst.

Wichtiger Hinweis:
Im gesamten Wohnheim scheint der Gebrauch gewisser Drogen weit verbreitet zu sein. Sowohl die Alligatoren als auch die Murmeltiere konsumieren hin und wieder diese Drogen. Die meisten Bewohner des Wohnheims sind in der Regel guter Laune. Unter dem Einfluss von Drogen kann sich das aber schlagartig ändern und die Stimmung der einzelnen Personen kann ins Gegenteil umschlagen. Das heißt konkret, dass die Alligatoren recht umgänglich sein können, solange sie keine Drogen nehmen und die Murmeltiere unangenehm werden können, wenn sie Drogen nehmen.
Ob eine Person gerade Drogen konsumiert hat, kannst Du am jeweiligen Hintergrund des Fotos erkennen. Ein Hintergrund mit viel Licht und Schatten bedeutet, dass die jeweilige Person gerade Drogen genommen hat. Sind die Personen gerade nüchtern, kannst Du das daran erkennen, dass ihr Foto mit einem hellgrauen Rahmen umrahmt ist.

Denk daran:
Du ziehst morgen (*in einem halben Jahr*) in die WG im Wohnheim ein.
Wie wohl Du Dich fühlen wirst, hängt sowohl von der Verbindung - Alligatoren oder Murmeltiere - als auch vom Drogenkonsum Deines zukünftigen Mitbewohners ab.
Deine Aufgabe im folgenden ist es nun, Dir einen Eindruck von den Personen zu machen und dann am Ende zu entscheiden, mit wem Du morgen (*in einem halben Jahr*) gerne zusammenwohnen möchtest. Zunächst erhältst Du jetzt Informationen über die Personen.
Wenn Du keine Fragen mehr hast, klicke bitte auf "Weiter"!

Instructions Classification Phase

Weißt Du noch, wer zu welcher Verbindung gehört und wer gerade Drogen konsumiert hat? Im folgenden kannst Du Dein bisheriges Wissen überprüfen, damit Du gut vorbereitet bist, wenn Du morgen (*in einem halben Jahr*) einziehst.

Du siehst gleich eine Person, die entweder Mitglied der Alligatoren oder der Murmeltiere ist und die entweder gerade high oder gerade nüchtern ist.
Du hast also genau 4 Antwortmöglichkeiten:

Alligator high
Alligator nüchtern
Murmeltier high
Murmeltier nüchtern

Diese Antwortmöglichkeiten werden Dir in Form einer Matrix vorgegeben. Bitte klicke dann mit der Maus auf die Antwortmöglichkeit, die Dir richtig erscheint. Sobald Du auf ein Feld geklickt hast, erhältst Du eine Rückmeldung, ob Deine Antwort korrekt war.

Bitte klicke auf "Weiter"!

Instructions Conditioning Phase

Im Folgenden lernst Du jetzt etwas über die Interaktionen der einzelnen Verbindungsmitglieder untereinander. Ausserdem hat sich herausgestellt, dass in dem Wohnheim auch viele Mitglieder einer neu gegründeten Verbindung, den "Finken", leben. Über die Finken weiß man bisher recht wenig. Es ist nichts über ihr generelles Verhalten und auch nichts über ihren Drogenkonsum bekannt. Du wirst nun auch Mitglieder dieser Verbindung sehen.

Deine Aufgabe ist es, Dir die Interaktionen der Bewohner anzuschauen. Einige Bilder können auch mehrmals erscheinen. Denk daran, dass Du bereits morgen (in einem halben Jahr) mit einer dieser Personen zusammenleben musst.

Bitte klicke auf "Weiter"!

Instructions Desirability Test Phase

Nun hast Du alle zur Verfügung stehenden Informationen gesehen. Bitte gib jetzt auf der folgenden Skala an, wie gerne Du mit jeder dieser Personen in einem halben Jahr zusammenleben möchtest. Dazu kannst Du den Balken auf der Skala mit der Maus bewegen. Bitte antworte so spontan wie möglich. Es gibt kein richtig oder falsch, sondern wir sind an Deiner persönlichen Meinung interessiert.

Bitte klicke auf "Weiter"!

Appendix F

Post-experimental questionnaire and debriefing – Experiment 2

Liebe Teilnehmerin, lieber Teilnehmer!

Vielen Dank für die Teilnahme an unserem Experiment!
Wir möchten Sie jetzt noch bitten, einige Fragen zu beantworten.

1. Wann genau sollen Sie in das neue Wohnheim einziehen?

2. Haben Sie eine Vermutung, worum es in dem Experiment ging?

O Ja

O Nein

3. Falls ja, was meinen Sie, was wir herausbekommen wollen?

4. Haben Sie schon einmal in einer WG oder einem Wohnheim gewohnt?

O Ja

O Nein

5. Was glauben Sie, wie wohl Sie sich in dem Wohnheim fühlen würden?

6. Könnten Sie sich prinzipiell vorstellen, mit jemandem zusammenzuwohnen, der hin und wieder Drogen nimmt?

7. Hat sich Ihrer Meinung nach ihr Eindruck von einigen Personen im Laufe der Studie verändert? Wenn ja, wie hat sich Ihre Bewertung verändert?

8. Haben Sie bei der Einschätzung, mit wem Sie gerne zusammenwohnen würden, eine bestimmte Strategie verfolgt? Wenn ja, welche?

9. Haben Sie schon einmal an einer ähnlichen Studie teilgenommen? Falls ja, was mussten Sie in dieser Studie tun?

10. Haben Sie sonst noch Anmerkungen zur Studie?

Zum Schluss hätten wir für die Statistik gerne noch einige Angaben zu Ihrer Person:
Alter:
Geschlecht:
Beruf bzw. Studienfach / Semester:

Vielen Dank für Ihre Teilnahme!

Informationen zur Studie

Liebe Teilnehmerin, lieber Teilnehmer!

In unserer Studie haben wir untersucht, wie unterschiedliche Arten von Informationen den Erwerb von Einstellungen, also in diesem Fall die Beurteilung der Personen, beeinflussen.

Weiterhin sind wir daran interessiert, ob sich zeitliche Distanz (also ob Sie morgen oder in 6 Monaten in dem Wohnheim einziehen) auf den Einstellungserwerb auswirkt.

Wir freuen uns, dass Sie an unserer Untersuchung teilgenommen haben und bedanken uns im Namen des ganzen Teams recht herzlich!

Appendix G

Post-experimental questionnaires for the no-load and load conditions – Experiment 3

Liebe Teilnehmerin, lieber Teilnehmer!

Wir möchten Sie jetzt noch bitten, einige Fragen zu beantworten.

1. Wann genau sollen Sie in das neue Wohnheim einziehen?

2. Haben Sie eine Vermutung, worum es in dem Experiment ging?

O Ja

O Nein

3. Falls ja, was meinen Sie, was wir herausbekommen wollen?

4. Haben Sie schon einmal in einer WG oder einem Wohnheim gewohnt?

O Ja

O Nein

5. Was glauben Sie, wie wohl Sie sich in dem Wohnheim fühlen würden?

6. Könnten Sie sich prinzipiell vorstellen, mit jemandem zusammenzuwohnen, der hin und wieder Drogen nimmt?

7. Hat sich Ihrer Meinung nach ihr Eindruck von einigen Personen im Laufe der Studie verändert? Wenn ja, wie hat sich Ihre Bewertung verändert?

8. Haben Sie bei der Einschätzung, mit wem Sie gerne zusammenwohnen würden, eine bestimmte Strategie verfolgt? Wenn ja, welche?

9. Haben Sie schon einmal an einer ähnlichen Studie teilgenommen? Falls ja, beschreiben Sie bitte kurz, was Sie in dieser Studie tun mussten.

10. Haben Sie sonst noch Anmerkungen zur Studie?

Zum Schluss hätten wir für die Statistik gerne noch einige Angaben zu Ihrer Person:

Alter:

Geschlecht:

Beruf bzw. Studienfach / Semester:

Muttersprache: O Deutsch

O ____________

Vielen Dank für Ihre Teilnahme!

Liebe Teilnehmerin, lieber Teilnehmer!

Wir möchten Sie jetzt noch bitten, einige Fragen zu beantworten.

1. Bitte schreiben sie die Zahl auf, die Sie sich zu Beginn des Experiments merken sollten:

2. Wann genau sollen Sie in das neue Wohnheim einziehen?

3. Haben Sie eine Vermutung, worum es in dem Experiment ging?

O Ja

O Nein

4. Falls ja, was meinen Sie, was wir herausbekommen wollen?

5. Haben Sie schon einmal in einer WG oder einem Wohnheim gewohnt?

O Ja

O Nein

6. Was glauben Sie, wie wohl Sie sich in dem Wohnheim fühlen würden?

7. Könnten Sie sich prinzipiell vorstellen, mit jemandem zusammenzuwohnen, der hin und wieder Drogen nimmt?

8. Hat sich Ihrer Meinung nach ihr Eindruck von einigen Personen im Laufe der Studie verändert? Wenn ja, wie hat sich Ihre Bewertung verändert?

9. Haben Sie bei der Einschätzung, mit wem Sie gerne zusammenwohnen würden, eine bestimmte Strategie verfolgt? Wenn ja, welche?

10. Haben Sie schon einmal an einer ähnlichen Studie teilgenommen? Falls ja, beschreiben Sie bitte kurz, was Sie in dieser Studie tun mussten.

11. Haben Sie sonst noch Anmerkungen zur Studie?

Zum Schluss hätten wir für die Statistik gerne noch einige Angaben zu Ihrer Person:

Alter:

Geschlecht:

Beruf bzw. Studienfach / Semester:

Muttersprache: O Deutsch

O ____________

Vielen Dank für Ihre Teilnahme!

Appendix H

Instructions and Stimulus Items of the Lexical Decision Task – Experiment 4

Instructions Lexical Decision Task

Im Folgenden zeigen wir Dir Worte, die entweder eine Bedeutung haben oder frei erfunden sind. Deine Aufgabe besteht darin, möglichst schnell zu entscheiden,
ob es sich um ein Wort oder um ein sogenanntes Nicht-Wort handelt.

Kurz vor der Darbietung der Worte wird jeweils ein Bild eingeblendet werden. Bitte versuche, Dich möglichst wenig von diesem Bild ablenken zu lassen und gleichzeitig möglichst schnell auf die eingeblendeten Worte zu reagieren.

Bitte drücke die rechte Antworttaste, sobald Du ein Wort erkennst, und bitte drücke die linke Antworttaste, sobald Du ein Nicht-Wort erkennst. Lege Deine Zeigefinger bitte auf die markierten Tasten. Das wird Dir helfen schnell zu sein. Um sich bestmöglich auf die Wörter konzentrieren zu können, fixiere bitte das Kreuz in der Mitte des Bildschirms. Bitte reagiere so schnell und akkurat wie möglich.

Stimulus Items of the Lexical Decision Task

Words: "Tulpe", "Erbse" (concrete)
"Nahrung", "Botanik" (abstract)

Non-words: Tidpe, Eibso, Nosgung, Bolanok,

Appendix I

Post-experimental questionnaire – Experiment 4

Liebe Teilnehmerin, lieber Teilnehmer!

Wir möchten Sie jetzt noch bitten, einige Fragen zu beantworten.

1. Wie erschöpft fühlen Sie sich im Moment?

gar nicht ⟷ sehr

2. Haben Sie eine Vermutung, worum es in dem Experiment ging?

O Ja

O Nein

3. Falls ja, was meinen Sie, was wir herausbekommen wollen?

4. Was glauben Sie, wie wohl Sie sich in dem Wohnheim fühlen würden?

5. Hat sich Ihrer Meinung nach ihr Eindruck von einigen Personen im Laufe der Studie verändert? Wenn ja, wie hat sich Ihre Bewertung verändert?

6. Haben Sie bei der Einschätzung, mit wem Sie gerne zusammenwohnen würden, eine bestimmte Strategie verfolgt? Wenn ja, welche?

7. Haben Sie schon einmal an einer ähnlichen Studie teilgenommen? Falls ja, beschreiben Sie bitte kurz, was Sie in dieser Studie tun mussten.

8. Haben Sie sonst noch Anmerkungen zur Studie?

Zum Schluss hätten wir für die Statistik gerne noch einige Angaben zu Ihrer Person:

- Alter:
- Geschlecht:
- Beruf bzw. Studienfach / Semester:
- Muttersprache: O Deutsch
  O _____________
- Händigkeit: O RechtshänderIn
  O LinkshänderIn
- Ist Ihre Sehfähigkeit eingeschränkt?
  O nein
  O ja, mit _____ Dioptrien
- Falls Ihre Sehfähigkeit eingeschränkt ist: Haben Sie während des Experiments eine entsprechende Sehhilfe getragen?
  O ja
  O nein

Teilnahme-Code		(Bitte hier eintragen)
1.	Erster Buchstabe des Vornamens der MUTTER	
2.	Erster Buchstabe des Vornamens des VATERS	
3.	Eigener GeburtsTAG (z.B. 6. Januar → 06)	
4.	Erster Buchstabe Ihres GeburtsORTes (z. B. Trier → T)	

Vielen Dank für Ihre Teilnahme!

Erklärung

Hiermit erkläre ich, dass ich die vorliegende Dissertation selbständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel verwendet habe. Zudem wurde die Arbeit an keiner anderen Universität zur Erlangung eines akademischen Grades eingereicht.

Trier, den 20.07.2009

Tina Langer