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BEYOND MOVING ON: THE PERCEPTUAL AND COGNITIVE IMPACTS OF PSYCHOLOGICAL CLOSURE

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Beyond Moving On: The Perceptual and Cognitive Impacts of Psychological Closure

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Psychological closure is the feeling that a life experience is complete and a part of the past (Beike, Adams, and Wirth-Beaumont 2007). While research on psychological closure primarily deals with traumatic or highly aversive life experiences, psychological closure is frequently experienced and sought after in more typical consumption settings. My dissertation extends our current knowledge about the role of psychological closure by exploring emotional, cognitive, perceptual, and behavioral implications of psychological closure across a broad range of consumer experiences. The first essay aims to demonstrate that closure makes events seem distant in time and probability through emotion. It also explores resulting consumer decisions such as warranty purchase intentions. The second essay proposes and tests how psychological closure of a consumer learning experience can lead to an abstract representation of that learning experience, and consequently a heightened sense of subjective knowledge.

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INTRODUCTION

Amy: I've come up with a series of exercises to help with your compulsive need for closure.

Sheldon: What? I take issue with the word compulsive.

Amy: All I'm saying is, we live in a world where closure isn't always an op…

Sheldon: [annoyingly waits for Amy to finish her sentence] …TION! OK!

– From a Big Bang Theory episode "The Closure Alternative"

Psychological closure is the feeling that an experience is complete and a part of the past (Beike et al. 2007). Closure is also generally regarded as a desired end state (Beike 2002), as many people might resonate with Sheldon's character in the above scene from the Big Bang Theory. The lack of closure, on the other hand, can have negative consequences such as increased uncertainty, self-analysis, and rumination (Beike, Kleinknecht, and Wirth-Beaumont 2004).

With closure being an important and desirable psychological state, understanding the role of closure may be more important than ever for marketers and managers in the modern era. The significant growth of experiential goods consumption and increased interest in successful customer service and relationship (Sprague 2009; Wagner 2012) suggest that providing consumers with a proper sense of ending or resolution may have significant value. There are numerous examples of negative experiences that consumers may want to move on from such as service failures, product-related accidents or recalls, and painful medical treatments. Positive consumer events such as vacations, hobby activities, and learning experiences can also vary in the degree of closure they provide. Thus, depending on the goal, a manager could decide to facilitate or delay the experience

of closure to help their consumers move on from or prolong their relationship with a product or service.

My dissertation consists of two essays that examine different consequences of psychological closure. The first essay examines the role of closure in creating psychological distance and restoring future expectations after a negative consumer experience. The second essay examines the effect of closure on mental representation and perceived expertise in the context of consumer learning. To provide a theoretical background for my dissertation, I will first review the previous literature. I will begin with an introduction to the concept of closure as a psychological construct. Then I will move on to explaining the current knowledge about the antecedents and consequences of psychological closure.

CLOSURE AS A PSYCHOLOGICAL CONSTRUCT

Clinical dictionaries define closure a comforting or satisfying sense of finality, while the origin of the word can be traced back to the Latin word *clausus*, which means to close, confine, or block. People say they "have closure" in a variety of situations such as after watching a satisfying finale of a TV series (Nussbaum 2013), finding peace of mind regarding a previous romantic relationship (Eads 2008), or knowing that a dangerous terrorist has been captured (Londono and Williams 2011). These seemingly different events commonly relate to a realization that a series of moments that constitute a meaningful unit have come to an end. This sense of finality, because it enhances perceptions of wholeness and completeness, could enable individuals to "close" that part of their life. The notion that people see life events as objects in space they can contain is supported by the idea that our psychological states are grounded in our bodily experiences (Barsalou 2008). Hence, people feel as though they can move on from the past, bury a

memory, or close a chapter of their lives. Indeed, previous studies have demonstrated that feelings of closure can be induced by performing physical acts associated with closure such as sealing objects in an envelope or closing the lid (Gu, Botti, and Faro 2013; Li, Wei, and Soman 2010). People also set up and attend ritualistic events to feel a sense of closure (Brenner 2011; Lloyd 2011; Tavernise 2011).

In the academic literature, the experience of closure has been conceptualized as a state of psychological resolution or equilibrium that enables people to attend to other problems or concerns (Gold and Faust 2002; Skitka, Bauman, and Mullen 2004). As such, lack of closure can make people feel unresolved tension that prevent them from moving on (Savitsky, Medvec, and Gilovich 1997). This theory related to a tension resolution mechanism may explain why people eagerly seek answers despite the potential benefits of leaving positive events open-ended (Wilson et al. 2005). However, as a definition, psychological equilibrium or tension resolution does not capture the essential aspect of the closure experience which is the perception that one is sealing off or containing a part of their past. Rather, psychological equilibrium seems to be one of the many antecedents or consequences of closure. In other words, psychological equilibrium is a psycho-physiological process associated with the experience of closure rather than the experience of closure itself. To more closely capture the closure experience, I define psychological closure as a mental segmentation process which isolates a given event out of the subjective portfolio of ongoing experiences. Thus, achieving closure on an event means the event is no longer perceived as an ongoing experience, but is rather sealed in a mental space as a completed whole. Psychological equilibrium or resolved tension can certainty facilitate or enable this mental segmentation process, and it can also be a key consequence of psychological closure.

Given the similarity in their labels, one may naturally wonder how psychological closure relates to the need for cognitive closure (NFCC; Kruglanski and Webster 1996; Webster and Kruglanski 1994). Moreover, distinguishing these two constructs helps clarify the meaning of psychological closure and highlight the unique characteristics of the psychological closure experience. Need for cognitive closure refers to a motivational state in which an individual seeks to quickly seize a definite answer rather than leaving information ambiguous. This is apparent in the questions of the NFCC scale, asking the extent to which respondents agree with statements such as "I dislike questions which could be answered in many different ways; when I am confronted with a problem, I'm dying to reach a solution very quickly." As these examples illustrate, NFCC refers to individuals' need to immediately achieve closure in the cognitive domain.

While no research to date has examined the relationship between psychological closure and cognitive closure, theoretically, cognitive closure would be one way in which people could experience psychological closure because it is a specific type of closure related to cognitive satisfaction. Reducing uncertainty is a basic human motivation (Hogg 2000; Tobin and Raymundo 2010; Wilson et al. 2005) and thus, increased uncertainty rising from ambiguous information can bring tension and lack of closure. That is, the quest for certainty is likely to make an event very much an ongoing experience, rather than allowing it to be isolated out as a completed whole. In other words, lacking cognitive closure may naturally diminish experiences of psychological closure. However, it is important to note that psychological closure can be experienced and sought after even when there is no information uncertainty, suggesting the two are different constructs. Recall the opening quote where Sheldon becomes irritated by Amy not completing her sentence, and so feels that he must complete it for her. He already knows the complete sentence, but it irritates him to hear it in its incomplete form. In other words, holding information or

knowledge constant, one can independently have or lack closure, as I will consistently demonstrate in the studies of this dissertation.

Now I turn to review the current body of knowledge regarding the psychological effects of closure and how the experience of closure manifests.

CONSEQUENCES OF CLOSURE

People often say they "need closure" or that they "have closure" after a traumatic life event. Therefore, it is not surprising the majority of research on psychological closure focuses on the resolution of negative emotions. For example, studies have shown that psychological closure makes individuals feel less saddened by tragic news and less regretful about past decisions (Li et al. 2010). Likewise, a high sense of closure makes individuals less frustrated after solving a series of difficult and partially insoluble puzzles and helps them move on rather than reengage (Beike et al. 2007).

The experience of psychological closure, as mentioned earlier, is not limited to aversive life events and can be observed in a broader range of consumer experiences, including positive ones. For example, Beike and Wirth-Beaumont (2005) asked participants to recall open and closed memories of both positive and negative life events in order to show that more emotional details in memory lead to a lower sense of closure. Wilson et al. (2005) found that positive mood lasts longer when a pleasant surprise is accompanied by ambiguity (i.e., receiving an unexpected gift with an ambiguous message), as opposed to no ambiguity. This is consistent with prior work suggesting a lack of closure may result in rumination and stronger emotional intensity (Beike 2007; Beike and Wirth-Beaumont 2005; Li et al. 2010). Because of this tendency it is also likely that a lack of closure can take up significant cognitive and emotional resources.

Only recently have marketing researchers begun to explore psychological closure as it relates to consumption in more ordinary contexts, such as what to order for dessert. A large assortment of chocolates is attractive and is likely to excite people, but choosing from a menagerie of choices can generate a host of counterfactual thoughts (e.g., "What if I chose the white truffle instead?"). Gu et al. (2013) found that inducing high (vs. low) closure after such a choice heightened people's choice satisfaction as they focused on enjoying the chosen option, rather than on forgone alternatives. Why psychological closure reduces counterfactual comparisons remains an open question. One possibility is that closure psychologically isolates the closed event or creates a mental barrier, which then reduces the accessibility of information related to the closed event. Alternatively, closure may change levels of mental representations in a way that makes individual, lower-level information less salient (i.e., closure may create a more abstract representation of a closed event), which would be consistent with the mechanism demonstrated in this dissertation's second essay.

In sum, existing research on psychological closure focuses predominantly on its emotional consequences while some studies show that psychological closure makes the closed event less frequently remembered.

ANTECEDENTS OF CLOSURE

From where does psychological closure originate? Sometimes, closure occurs naturally with time. When people are asked to recall closed (vs. open) life events, they tend to remember things that happened a longer time ago (Beike et al. 2004). As someone carries on a busy life filling it with new relationships, places, and memories, it may come one day as a surprise that what used to be a painful memory is no longer hurtful. This leads to a perception of closure (Beike and Wirth-Beaumont 2005).

However, psychological closure can also be facilitated or inhibited through various interventions, making the topic particularly relevant to marketers. In fact, many businesses already attempt to sell products or services under the promise of providing closure and peace of mind (Berns 2011). Some examples include the "marketing" of autopsies, private investigations, divorce parties, and relationship obituaries that symbolically announce the end of relationships.

Several prior works have also discovered new ways to induce high or low psychological closure. For example, directing individuals' attention to closed (vs. open) aspects of an identical experience (e.g., "I will not be seeing them again anyway" vs. "They are going to remember me forever") has been used successfully in prior studies to increase feelings of closure (Beike et al. 2007; Beike and Crone 2008). These manipulations resemble the internal thought process people may naturally go through when pursuing closure.

Certain sensations or behaviors can also bring about feelings of closure to consumers. For example, Thompson, Russo, and Sinclair (1994) used melodic ending-tunes to deliver feelings of closure. Recent studies in the embodiment literature show that psychological closure can also be achieved through actions associated with closure or moving on, such as sealing an envelope, turning a page, or closing a lid (Gu et al. 2013; Li et al. 2010). In fact, individuals use similar tactics to achieve closure in their lives; people bury or encase meaningful objects, attend funerals, and delete old contacts and messages as a symbolic gesture of closure. These behavioral methods can be adapted and used to enhance feelings of closure in both on- and offline settings. Closing a web browser, logging out from a session, or disposing a product in a particular way, and other symbolic actions could also deliver a sense of closure to consumers.

In sum, the experience of psychological closure or lack thereof can be externally induced, and people also seem to use closure as a self-regulation strategy as they spontaneously attempt to move on when needed. Further, various closure induction techniques suggest there is a broad range of practical implications for managers who want to facilitate or delay the closure experience of their customers.

OVERVIEW OF ESSAYS

Despite the increasing managerial relevance of and interest in this topic, we do not know enough about the role of closure in consumers' lives. As reviewed earlier, existing research on closure primarily focuses on traumatic or highly aversive life experiences, while less than a handful of research examine the role of psychological closure on consumers' mundane, daily lives. However, as noted earlier, psychological closure may be frequently experienced and sought after in everyday consumption settings that are not necessarily negative. Thus, graduation ceremonies, wrap-up sessions at the end of a lecture series, and finales of entertainment products are all influential and important moments in the overall consumption experience (Clayton 2007; Giantis 2004; Pow 2011). Moreover, psychological closure may have other consequences beyond reducing negative emotion and rumination.

Because of this gap in the literature, many questions remain unanswered. How does psychological closure on a product or service-related experience affect quality evaluation and future performance expectation? How does closure on a consumer learning experience affect people's sense of expertise and memory? To capture the richness of this topic, my dissertation aims to answer these questions via exploring the influence of psychological closure across a broad range of consumer experiences including both negative and non-negative ones. More specifically, my first essay demonstrates that closure on a negative

consumer experience, such as a product or service failure, makes people feel the experience happened further in the past and is less likely to happen again (a heightened sense of temporal and probabilistic psychological distance). The second essay shows that closure on a consumer learning experience (e.g. reading an educational brochure about a product category) facilitates the formation of summary representation of the learning experience and consequently, a heightened sense of subjective knowledge.

To illustrate the value of this research, consider the case where a consumer experienced a product or service failure. My first essay will provide guidance to a marketer on how facilitating closure on such an experience may help restore brand perception through a perceived sense of "pastness" from the mishap, which is also associated with more optimistic expectations of the brand's future performance. In another situation, consider a marketer who is creating an educational program to help consumers learn safety information about the product. My second essay would help a marketer by suggesting how instilling a feeling of closure (or the lack of it) at the end of the program can influence consumers' perceptions of their own degree of knowledge regarding the product category, which then can influence consumers' decision timing and search effort.

My dissertation as a whole aims to contribute to the existing body of literature by exploring cognitive, perceptual, and behavioral implications of psychological closure across a wide range of consumer experiences. The dissertation includes two essays that each carves out a unique piece of this overall program of research. The following sections describe each essay in greater detail, including information about the theory, findings, and future research directions.

1ST ESSAY – MOVING ON & AWAY: HOW PSYCHOLOGICAL CLOSURE INFLUENCES PERCEPTIONS OF DISTANCE

A new computer with a broken keyboard, a favorite football team that delivers a disappointing season, a trusted pair of jeans with embarrassing split seams. These are a few examples of many consumer experiences spoiled by negative outcomes. For consumers, these experiences may negatively influence attitudes, repurchase intentions, and future expectations about the products and services. For marketers this could lead to a decrease in brand equity, sales, and negative word of mouth. The present research examines the impact of psychological closure on the evolutions of such negative consumer events. Specifically, I demonstrate that psychological closure not only helps alleviate negative emotion, but also increases psychological distance. Thus, psychologically closed events seem like they happened a longer time ago, at a more distant location, and are less likely to happen again in the future or to other people. This is also reflected in consumers' perceptions of product quality, repurchase intentions, and willingness to get insurance or invest in safety features in case of future negative outcomes.

As reviewed earlier, psychological closure is a sense that one has completed an experience and can effectively move on to something else (Beike et al. 2007). The present research explores the notion that closure on negative consumer experiences will increase psychological distance, the "subjective experience that something is close or far away from the self, here, and now" (Trope and Liberman 2010, 1). Prior research has shown that psychological closure can reduce negative emotion associated with significant personal life events such as regretted decisions, unsatisfied desires, and traumatic experiences such as the death of a child (Li et al. 2010), and that increased emotional intensity in thinking about events such as embarrassing experiences, visiting the dentist, or having to perform in public can make such events seem closer (Van Boven et al. 2010). I build on these findings and

examine the link between closure and psychological distance, in the context of negative consumer experiences.

Among the many psychological distance dimensions, including subjective distance in time, space, probability, and social relationships (Trope and Liberman 2010), the present research focuses on the role of closure on the first three dimensions. For instance, as a result of closure, a negative consumer event such as a product failure may feel more psychologically removed from the present, leading it to seem older (Trope and Liberman 2000), physically further away (spatial distance; Henderson 2011), and less likely or common (i.e., probabilistic distance; Todorov, Goren, and Trope 2007; Wakslak et al. 2006). To illustrate, imagine a consumer with a broken laptop. If she is able to psychologically move on from her frustrating experience, she will not only feel that the event is behind her, but may also be less likely to abandon the brand in future purchases because she sees the product failure as an isolated event with a low chance of reoccurrence.

Exploring psychological closure as a determinant of consumer perceptions of temporal distance is important because prior work has shown that these perceptions can influence variables related to attention, evaluation, and choice. For example, increased perceptions of temporal distance have been shown to influence preferences for value-laden (vs. neutral) messages, to direct attention to central (vs. peripheral) features of products, and to increase concern for desirability (vs. feasibility) during choice (Fujita et al. 2008; Liberman and Trope 1998; Trope and Liberman 2000). Additionally, increased temporal perceptions may also increase impatience for, or discounting of, future rewards because they seem further away (Kim and Zauberman 2013). Through similar mechanisms, spatial distance has been shown to enhance creative problem solving abilities (Jia, Hirt, and Karpen 2009) and negotiation outcomes (Henderson 2011).

Exploring psychological closure as it relates to probabilistic distance is also important. Greater probabilistic distance means that a given event seems less likely to exist or occur (Todorov et al. 2007). If closure reduces probabilistic distance related to negative consumer experiences, then negative effects of isolated product and service failures can be mitigated as consumers expect similar events are less likely to happen again or to other consumers. In other words, the problem will seem less prevalent or pervasive. Importantly, a variety of consumer evaluation dimensions and behaviors would reflect such probabilistic perceptions, including quality inferences, repurchase intentions, word of mouth, as well as decisions to purchase insurance or use protective equipment.

The present research demonstrates that induced psychological closure can mitigate negative consumer experiences by making these problems seem further distant in time and space, and unlikely to reoccur. In the following sections, I review the literature on closure and psychological distance and introduce hypotheses about the mediating mechanism of emotional intensity that accounts for how closure increases psychological distance.

THE ROLE OF CLOSURE IN PSYCHOLOGICAL DISTANCE

The perception of distance, whether it is in the dimension of time, space, social relationships, or likelihood of events, is highly subjective. For instance, the same event in the future or a given location can feel nearer or further away. A same target person can seem more or less similar or close. And the existence or occurrence of events can seem more or less likely (for an extensive review, see Trope and Liberman 2010). While there are many dimensions of psychological distance, empirical findings suggest they are related under the general experience of feeling removed from immediate experience (Bar-Anan et al. 2007; Matthews and Matlock 2011; Stephan, Liberman, and Trope 2010). Germaine to the present research, Van Boven et al. (2010) show that intensified emotion reduces

psychological distance; e.g., events described emotionally (vs. objectively) feel like they "just happened yesterday" (vs. a long time ago).

Building on these findings, I suggest that closure has an impact on psychological distance at a general level. I propose that a heightened sense of closure on a negative consumer event will increase psychological distance, making that event seem further away in judgments of time, space, and probability. So, for example, I expect if a favorite sports team has a losing season, or if a computer malfunctions, or if an embarrassing situation occurs, then people with closure on these events will feel more distant from these experiences temporally and physically, and will judge them as less likely to happen again. This should also impact consumers' attitudes towards and repurchase intentions of associated products and brands, as well as insurance and other safety-related decisions. Based on prior research demonstrating that heightened emotional intensity can make events feel closer (Van Boven et al. 2010) and that closure can reduce regret, sad feelings, and frustration (Beike et al. 2007; Li et al. 2010), I propose emotional intensity is the key mechanism that allows psychological closure to alter people's perception about time, space, and probability, or more generally, psychological distance. Specifically, I hypothesize that decreases in emotional intensity mediate the effect of closure on psychological distance, and that this effect significantly dampens when emotional recall is proscribed.

Predictions and Studies Overview

I systematically test my hypotheses using multiple closure manipulations adapted from prior literature, and through both measurement and manipulation of emotions. Across these studies I also explore a number of different types of consumer product and service failures, using both actual participant experiences and manipulated presentation of product

failures. In addition I examine multiple consumer-related negative emotions including disappointment, frustration, anger, and embarrassment. Study 1 demonstrates having closure on a disappointing football season leads to greater temporal distance, mediated by reduced emotional intensity. Study 2 replicates the mediation result of study 1 in the context of a product failure's influence on probabilistic distance. Studies 3-5 examine the moderating role of emotional intensity. Since I predict that closure increases psychological distance through reducing emotional intensity, the effect of closure should be more prominent when the recalled consumer event is emotional (vs. non-emotional). In study 3, I apply an embodiment paradigm to provide people with a sense of closure (by enclosing a service complaint letter in a sealed envelope) while using people's natural emotional reaction before closure induction as a moderator. Studies 4 and 5 both manipulate emotion prior to closure and measure emotion after closure to further examine the key mechanism. Moderated mediation results show that closure increases temporal (study 4) and probabilistic (study 5) distance judgments by reducing emotional intensity when events are recalled emotionally (vs. objectively) prior to closure manipulation. Study 6 extends the findings to physical distance and probabilistic distance related to safety concerns. Study 7 demonstrates the role of product disposal in the experience of psychological closure and restoring positive future expectations, while also highlighting some natural boundary conditions associated with product usage.

Chapter 1: Study 1

The purpose of Study 1 was to test whether psychological closure of an unpleasant consumer event leads to greater perceived temporal distance from the event. I also sought to demonstrate that this relationship is explained by reduced emotional intensity when contemplating the event. Therefore, in this study I manipulated closure and measured psychological distance as well as emotional intensity. In later studies, I apply manipulations to both closure and emotional intensity.

Study 1 takes advantage of the culmination of an extremely poor season of a top ranked college football team and the frustration felt by its college fans. Consumer evaluations of such team performance is important to marketers because revenues from the top 15 college football teams totaled more than a billion dollars in 2012, and studies show that schools' with winning teams further benefit from increased alumni donations (Donahoe 2012; Tucker 2004). The study took place early in the semester following the abnormally poor football season. Depending on condition, participants' sense of closure on the football season was either increased or decreased, after which measures of emotion and perceived temporal distance were taken.

METHOD

Participants and design

Sixty-five undergraduate students (36 females) from a large American public university participated in this study in exchange for extra course credit. They were randomly assigned to either a high closure or low closure condition.

Procedure

Participants used a computer in a lab setting and completed the study at their own pace, isolated from other participants. All participants were reminded of how poorly their

football team performed in the prior season by first reading a real single-page news article about the team's loss to a long standing rival, and then watching a short video clip of two sports analysts criticizing the team. Next, participants were randomly assigned to either the high or low closure manipulation. Following Beike et al. (2007), closure was manipulated in this study by having participants write about the event. Specifically they were told:

> Sometimes people say that they have [do not have] "closure" on an experience; that the experience is like a "CLOSED CHAPTER [UNFINISHED BUSINESS]" to them. They say this when the experience feels [doesn't feel] complete, and they feel ready to move on from it. Please describe why the last year's football season could be considered "CLOSED [NOT CLOSED]" to you.

Following the closure manipulation, participants provided ratings of self-reported closure, also adapted from previous literature (Beike et al. 2007). Participants used 7-point scales to indicate agreement with the statements, "I have closure on the last year's college football season," "I can put the last year's college football season behind me," "The last year's college football season feels like a 'closed book' to me," and "The last year's college football season feels like 'unfinished business' to me" (1 = not at all, 7 = very much). Participants' emotional intensity when thinking about the prior year's football season was measured by having them use 11-point scales to indicate the extent of feeling frustrated, upset, angry, anxious, and unsettled (1 = not at all, 11 = very much).

Finally, participants provided measures of temporal distance from the prior football season. The questions were adopted from prior research on psychological distance (Van Boven et al. 2010); participants used two 11-point scales anchored from 1 = "feels like

yesterday" to 11 = "feels far away" and from 1 = "feels very close" to 11 = "feels very distant."

Results and Discussion

Manipulation check

The four perceived closure items were averaged to create a single measure of psychological closure (α = .92). As expected, participants reported a greater sense of closure in the high (M = 3.77) versus low closure condition (M = 2.32; $t(63) = 3.86$, $p < .001$).

Negative emotion

Factor Analysis revealed that participants' responses to the five negative emotional states loaded together as a single factor (α = .94), so they were averaged and used as a single measure of negative emotional intensity. As predicted, participants in the high closure condition reported significantly less negative emotion (M = 4.00) compared to those in the low closure condition (M = 5.59; $t(63) = 2.53$, $p = .01$).

Temporal distance and mediation analysis

The two temporal distance scales were averaged to form a single temporal distance measure (α = .88). Consistent with my prediction, participants in the high closure condition reported a greater sense of temporal distance (M = 7.14) than in the low closure condition (M = 5.48; $t(63) = 2.97$, $p < .01$).

Using the bootstrapping method (Preacher and Hayes 2008), I tested whether the effect of the closure manipulation on perceived temporal distance was mediated by changes in negative emotion. Consistent with my prediction, the indirect effect of closure on temporal distance through emotion was positive and significant with a confidence interval

excluding zero (n boots = 5,000, 95% BCa CI[.05, .66]; figure 1.1). The direct effect of closure on the temporal distance (c' path), after the path through emotion was accounted for, was marginally significant (b = .56, t = 2.05, p = .05).

Discussion

Study 1 shows that closure on a negative event indeed leads to greater temporal distance and that this relationship is mediated by changes in the intensity of negative emotion when thinking about the event. This finding supports my thesis which is that closure increases psychological distance by reducing emotional reactions to the closed event. To extend my finding to other psychological distance dimensions, the following study aims to replicate this pattern in a product failure context and examines the effect of closure on probabilistic distance, mediated by emotional intensity.

Chapter 2: Study 2

An important dimension of psychological distance is that related to perceived probability or hypotheticality of events (Todorov et al. 2007). Estimates of probability may be particularly important for consumers following a product failure because these estimates may influence consumers' likelihood of repurchasing the same brand or their intent to purchase insurance or maintenance contracts to cover similar negative events. Thus, in this study, I examined a product failure scenario – a computer with a malfunctioning keyboard. As in study 1, I manipulated closure on the experience and measured emotional intensity, but in this study I measured perceptions of probabilistic distance as it relates to the likelihood of reoccurrence of the problem.

METHOD

Participants and design

Seventy-six undergraduate students (50 females) from a large university and thirty-seven Amazon Mechanical Turk respondents (27 females) participated in this study in exchange for extra course credit or a small monetary reward. For Amazon Mechanical Turk participants, I selected users who were located in the U.S. and had a 95% prior HIT acceptance rate. I applied the same selective criteria to other studies using Amazon participants in the present research. None of the effects were qualified by data source nor did adding data source as a covariate alter my results; hence datasets from two sources were consolidated. Participants were randomly assigned to either a high or low closure condition.

Procedure

All participants first read a negative product review that was allegedly written by an actual consumer who participated in a previous research. The review was written to

provide an emotionally charged description of a frustrating experience with a computer keyboard and was based on actual consumer reviews of a computer found on Amazon.com. Below is an excerpt of the review read by the participants:

> "I bought this laptop online on Amazon.com because it was a well-known brand (ranked one of the top 5 in laptops) and had good ratings... The laptop worked very well for about 8 months and then I started having some serious issues with the keyboard. The letters g, h, b, n will occasionally delete an entire sentence if I hit them. I didn't understand why… It was EXTREMELY frustrating. I use this laptop for work and it was the only computer I owned… Out of nowhere, my keyboard would start acting out like this, making it impossible for me to work on anything. I had some important due dates that I almost missed because of this issue. I was furious!"

After reading the product review, participants were assigned to either the high closure or low closure manipulation (same as study 1) with participants asked to write why the consumer who wrote the review might consider the product experience as closed or not closed. The four manipulation check questions were also adapted from study 1 to fit the product-failure context and were anchored on a scale from -5 (not at all) to 5 (very much). Following the manipulation check, participants provided their own emotional reactions to the consumer's experience. Specifically they were asked, "How does thinking about this consumer's experience make YOU feel right now?" to which they indicated how angry, upset, frustrated, irritated, and annoyed they felt (1 = not at all, 11 = extremely).

Finally, I measured participants' probabilistic distance perceptions. These questions included the perceived likelihood that the same keyboard problem would

reoccur, the overall quality of product and brand, and purchase intention. Given the fact that participants read an identical product review, quality evaluation and purchase intention should reflect the perceived prevalence of the keyboard problem. Specifically, they were asked “How likely do you think this consumer's laptop keyboard problem will reoccur?” (reverse-coded), “What do you think of the brand of this laptop in terms of overall product quality?”, “When thinking about future laptop purchases, do you think this consumer should consider buying from this brand again?”, and “If you knew the brand of this laptop, would you consider buying one of their laptops in the future?” (1 = not at all, 7 = very much). Higher scores indicated lower perceived likelihood of the keyboard problem being prevalent, meaning greater probabilistic distance.

Results and Discussion

Manipulation check

The four psychological closure items were averaged to form a single measure of self-reported closure (α = .81). Confirming the manipulation, participants in the high closure condition reported a greater sense of closure (M = .77), compared to those in the low closure condition (M = -1.06; $t(111) = 5.07$, $p < .001$).

Negative emotion

The five negative emotion questions (angry, upset, frustrated, irritated, annoyed) loaded together as a single factor and were averaged to create a single measure of negative emotion (α = .94). As predicted, participants in the high closure condition reported significantly lower negative emotion (M = 4.54) compared to those in the low closure condition (M = 5.95; $t(111) = 2.97$, $p < .01$).

Probabilistic distance

As expected, a single factor emerged from the four probabilistic distance questions; therefore, I averaged across these questions to create a single measure (α = .70). As predicted, participants in the high (vs. low) closure condition exhibited greater probabilistic distance (M = 3.79 *vs.* M = 3.34; $t(111) = 2.23$, $p < .05$). That is, participants in the closed (vs. not closed) condition perceived the probability of the same laptop keyboard problem happening again as lower, which was also reflected in their relatively more positive evaluation towards the product and brand.

Mediation analysis

To test whether the effect of closure on probabilistic distance is mediated by changes in negative emotion, I conducted a mediation analysis (Preacher and Hayes 2008). As predicted, the bootstrapping test (n boots = 5,000) showed the indirect effect of closure on probabilistic distance through emotion is positive and significant with a 95% BCa confidence interval excluding zero (.003, .162; figure 1.2). The direct effect of the closure on the dependent variable (c' path) was not significant (b = .17, t = 1.65 p = .10).

Discussion

Study 2 extends my findings by showing the robustness of the relationship between closure and psychological distance. In study 1 I observed that closure on a negative consumer event influences perceptions of temporal distance mediated though emotion. Here, closure on a negative product experience influences perceptions of probabilistic distance also mediated through emotion. When people were instructed to consider a product failure as closed (vs. open), their negative emotional reaction became less intense, and they reported that the problem is less prevalent and less likely to happen again.

A further test of the role of emotion in the relationship between closure and psychological distance would involve examining moderation by emotional intensity. If closure affects psychological distance by reducing emotion, the effect of closure should be stronger when the event is recalled with (vs. without) emotion prior to the closure manipulation. I examine this prediction in studies 3 to 5 across a number of psychological distance dimensions.

Chapter 3: Study 3

The purpose of study 3 was threefold. In studies 1 and 2, I held the negative event constant across participants by relying on a shared outcome (the poor football season in study 1) or a common negative outcome experienced by another consumer (the defective laptop in study 2). A drawback of these studies is that, in study 1, I could not be certain that all participants evaluated the football season as a negative event, and in study 2, the negative event was described, but not actually experienced by the participant. Therefore in study 3, I relax the control of the specific negative event, and elicit events from participants' own experiences as consumers that they deem negative.

The second purpose was to examine closure using a behavioral manipulation. To manipulate closure in studies 1 and 2, I used a reason-listing task that is accepted and commonly used in the existing literature (Beike et al. 2007; Beike and Crone 2008). While there is nothing in the instructions of this manipulation that asks for consideration of one's emotions, or temporal and probabilistic judgments, I wish to rule out the possibility that, for the observed results to hold, this specific closure manipulation is required. So in study 3, closure is manipulated by embodied cognition. Prior work has shown that bodily experiences that are connected to the psychological experience of closure (e.g., enclosing a tragic story in an envelope and sealing it, turning the page, closing the lid) can effectively provide closure. In this study, participants write about a personally experienced service failure after which they either do or do not seal what they have written in an envelope (Li et al. 2010). This paradigm is useful in this context of service failure as it resembles real life situations that participants may encounter as consumers. Hence, for generalizability, this task was designed to be similar to a consumer writing and sending a letter of complaint to a service provider.

Another important purpose of this study was to examine people's natural emotional experiences related to an actual service failure as a moderator. I predicted the effect of closure on psychological distance would be positively related to the extent of emotionality of the recalled service failure.

METHOD

Participants and design

Sixty-seven undergraduate students (42 females) of a large American public university participated in this study in exchange for extra course credit. They were randomly assigned to a high or low closure condition.

Procedure

All participants were asked to identify and answer some basic questions about an instance in which they recently had a negative service experience. Next, they were given a paper survey, resembling a customer service complaint survey. They were told "first describe the service experience you had" and then "with vivid details, describe how you felt." After completing the service complaint survey, they were randomly assigned to either a high or low closure condition. In the high closure condition, participants were instructed to put their service complaint survey in an envelope, seal the flap with a sticker, and to submit the writing to the experimenter. In the low closure condition, participants did not put their writing in an envelope and simply submitted the paper to the experimenter.

Participants were then asked questions on probabilistic distance. Specifically, participants were asked "If you were to receive the service (you wrote about [insert service category]) from the same store/company again, how likely do you think a similar problem will reoccur?" (1 = highly unlikely, 7 = highly likely) and "How common or uncommon do you think your bad service experience was?" (1 = highly uncommon / isolated incident,

7 = highly common / widely experienced). For the latter question, additional information was given on what a common or uncommon experience meant. Participants were told "Common experience means that the problem was profuse and was widely experienced by other people; uncommon experience means that it was an isolated incident, and you just got unlucky." This was to capture, as in study 2, the pervasiveness of the service failure problem.

To measure the emotional intensity of the service failures, three independent coders unaware of the research hypotheses and of the participants' closure manipulation conditions were employed. Specifically, the coders were asked to read each participant's entire complaint and provide a holistic evaluation of the overall emotion expressed in it using a 7-point scale (1 = not at all emotional; 7 = very emotional). The inter-coder reliability was sufficiently high (α = .71); hence, I averaged the three coders' responses to form a single measure of complaint emotionality.

RESULTS AND DISCUSSION

Probabilistic distance

The two probabilistic distance items were averaged to create a single measure (α = .76). Psychological closure increased probabilistic distance as indicated by the lower perceived likelihood of the service failure reoccurring (b = -.36, t = -1.84, p < .10), but more importantly, this effect was qualified by the predicted interaction between recall emotionality and closure manipulation (b = -.45, t = -2.30, p < .05; figure 1.3). Further examination using the spotlight analysis method (Irwin and McClelland 2001) revealed that, for those who described the service failure with strong emotional intensity (spotlighted at 1 SD above the mean), psychological closure increased probabilistic distance, meaning it decreased probabilistic estimates (b = -0.81, t = -2.92, p < .01). When the failure was

described with lower emotional intensity (spotlighted at 1 SD below the mean), closure had no impact on probabilistic judgments (b = .09, t = .32, p > .50).

Discussion

Study 3 was different from studies 1 and 2 in several important ways. Consistent with previous research using physical actions to induce closure (Gu et al. 2013; Li et al. 2010) I provided further evidence that a sense of closure can be obtained not only through internal thought processes or cognitive reappraisals (e.g., the reason-listing activity) but also through behaviors that embody the closure construct. Specifically, this study mimicked a consumer complaint context, providing support for practical implications. My finding suggests that consumers may end up with a very different perception about the likely reoccurrence and prevalence of a problem as a result of simply providing an envelope with a seal when collecting service evaluations.

More importantly, unlike studies 1 and 2 that provided a single negative consumer experience for all participants, those participating in this study wrote about their own unique negative experience before they were induced to feel a high or low sense of closure. This allows me to observe natural variation in participants' emotional intensity associated with negative events. As predicted, participants who spontaneously recalled more emotional experiences were the ones who benefitted most from closure; the act of writing a negative experience and sealing it in an envelope significantly decreased negative emotion and increased probabilistic distance judgments. Participants who wrote about events low in negative emotional intensity, on the contrary, were not affected by the act of closure. This is consistent with my hypothesis that closure increases psychological distance through reduction of emotional intensity; when emotional intensity is lacking in the first place, closure has less of an effect.

While using natural emotional variation as a moderator of closure benefits from high external validity, it is possible that more emotional service failures are inherently different from less emotional ones. To address this possibility and strengthen internal validity of theory-testing, studies 4 and 5 aim to replicate the result of study 3 while directly manipulating levels of emotionality prior to manipulating closure.

Chapter 4: Study 4

Study 4 was designed with two purposes in mind. The first was to further explore the role of emotion in the relationship between closure and psychological distance by introducing a manipulation of emotional intensity in recalling a negative event. Based on my argument that emotion is a mediator of closure on psychological distance, I expect closure to increase the sense of distance from a negative event to a greater extent when the event is initially recalled in an emotional (vs. emotionless) manner. This should result in a moderated mediation. In other words, measures of emotion will mediate the relationship between closure and distance when a negative event is recalled in an emotional manner. This will not be observed in the emotionless recall condition as there will be little negative emotion to alleviate.

Second, toward understanding the robustness of the effect of closure on psychological distance from negative events, in this study, I explore personally embarrassing experiences as negative outcomes. Prior researchers exploring feelings of embarrassment in consumer settings have suggested that felt embarrassment may delay purchases, reduce purchase quantity, and lead consumers to employ strategies to avoid others (Dahl, Gorn, and Weinberg 1998; Dahl, Manchanda, and Argo 2001). Additionally, this domain is relevant for comparison to other recent work on the direct relationship between emotional intensity and psychological distance that has also examined embarrassment (Van Boven et al. 2010).

METHOD

Participants and design

One hundred and ninety-three people participated in this study. Among them, 92 people (40 females) were undergraduate students at a large university who participated in

exchange for extra course credit. The remaining 101 people (63 females) were from Amazon Mechanical Turk, who completed the surveys online in exchange for a small monetary reward. Data from both sources was collected during the same one month period. None of my analyses were qualified by respondent source; hence the datasets from the two sources were consolidated. The experiment was a 2 (description emotionality: high vs. low) x 2 (closure: high vs. low) between-participants design.

Procedure

All participants completed the study on a computer and progressed at their own pace. Participants were first instructed to recall one specific embarrassing moment that they had experienced recently within the past two years. To ensure participants came up with a specific incident, they were first asked to provide some basic information about the event including when and where it happened.

Next, on a new page, they were asked to describe their event either emotionally or non-emotionally. The emotionality manipulation was adapted from Van Boven et al. (2010). In the high emotionality condition participants were told "describe the embarrassing moment you had in an EMOTIONAL way. Write about it as though you are actually re-experiencing what happened to you. Please write about it in such a way that someone would feel embarrassed just by reading your description. Also write about how other people around you may have thought negative things about you at the moment." In the low emotionality condition participants were told to "describe the embarrassing moment you had in an OBJECTIVE way. Avoid using emotional words in your writings and simply list facts about the event. Write about the experience from a detached perspective."

Next, participants completed either the high or low closure manipulation task used in studies 1 and 2. To check whether the closure manipulation was successful, participants used Likert-type scales anchored from -10 to +10 to show agreement with the statements related to closure on the negative event.

Emotionality was measured by having participants use 11-point scales anchored with "Not at all" to "Extremely" to rate feelings of being embarrassed, unsettled, anxious, and nervous when thinking about the embarrassing moment. Finally, temporal distance was measured with the same two items used in study 1, adapted from Van Boven et al. (2010).

Results and Discussion

Manipulation check

All four questions measuring participants' feeling of closure on their embarrassing moments loaded together as a single factor (α = .90). The psychological closure manipulation was successful. The average self-reported closure was higher in the high (M = 6.88) versus low closure condition (M = 2.95; $t(191) = 5.63$, $p < .001$).

Embarrassment

All four emotion measures loaded together as a single factor; hence, the items were averaged to form a single index of experienced embarrassment (α = .90). An ANOVA with embarrassment as the dependent variable revealed main effects of description emotionality and closure manipulation, as well as a significant interaction between the two. Describing the story emotionally (vs. objectively) led to stronger feelings of embarrassment (M = 3.98 vs. M = 3.22; $F(1, 189) = 4.36$, $p < .05$). The same happened when participants wrote about the event as open versus closed (M = 4.11 vs. M = 3.08; $F(1, 189) = 7.93$, $p < .01$). Importantly, further examination of the two-way interaction supported my theory ($F(1, 189) = 5.63$, $p < .05$). Manipulating high psychological closure (vs. lack of closure)

significantly decreased reported embarrassment intensity in the emotional description condition (M = 3.04 vs. M = 4.82, $F(1, 189) = 14.61$, $p < .001$), but not in the non-emotional description condition (M = 3.13 vs. M = 3.29; $F(1, 189) = .09$, *NS*).

Actual and subjective temporal distance

Across all conditions, the average amount of time since the participants' embarrassing experience was 11 months (SD = 18.7). This did not differ by condition (*ps* > .1) nor did it alter the results when controlled for. That is, participants reported events that were similarly distant in time.

To measure subjective temporal distance, I averaged the two questions on perceived temporal distance (α = .91). An ANOVA was performed with psychological closure and manipulated emotionality as between-participants factors predicting temporal distance. This revealed the predicted interaction between description emotionality and psychological closure ($F(1, 189) = 5.06$; $p < .05$; figure 1.4a). When the embarrassing event was described emotionally, having psychological closure (vs. lacking closure) increased perceived temporal distance (M = 6.84 vs. M = 5.24; $F(1, 189) = 9.35$, $p < .01$). There was no effect of closure when the event was described with low emotion (M = 6.44 vs. M = 6.57; $F(1, 189) = .06$, *NS*).

Moderated mediation

To test whether or not there is a conditional mediating effect of emotional intensity, I performed a moderated mediation analysis using the bootstrapping method with measured emotional intensity as the mediator (Preacher and Hayes 2008). The interacting effect of closure and description conditions on perceived temporal distance with a 95% confidence interval excluding zero (n boots = 5,000, BCa CI [.021, .183]; figure 1.4b) indicates statistical significance of the moderated mediation result. I probed further to examine the

direction of the effect. As predicted, embarrassment intensity significantly mediated the effect of closure on temporal distance under high description emotionality (n boots = 5,000, 95% BCa CI [.192, .688]), but not under low description emotionality (n boots = 5,000, 95% BCa CI [-.185, .282]). The direct effect (c' path) of closure x description emotionality on temporal distance was not significant (b = .12, t = 1.38, p > .1).

Discussion

Study 4 goes beyond the results of prior studies to explore the mechanism underlying the effect of closure on psychological distance. Not only do the findings replicate the mediation by emotional intensity as shown in studies 1 and 2, but they also demonstrate that, for low emotion events, closure has a weaker impact on temporal distance. This moderation replicates the findings of study 3 except with manipulated (vs. spontaneously selected) event emotionality prior to closure. The next study replicates the same moderated mediation pattern but does so by examining perceptions of probabilistic distance in a context involving a personal product failure experience.

Chapter 5: Study 5

Study 5 aims to replicate the findings of the previous study with probabilistic distance as the key dependent variable. Like the moderated mediation result of study 4, I expected that psychological closure should increase probabilistic distance when a negative event is recalled emotionally, and within the emotional description condition, change in emotional intensity should mediate the effect of closure.

In this study, I used participants' actual product failure experiences as the negative consumer event. Unlike studies 2 and 3 that asked how likely participants think a problem would reoccur, this study captured probabilistic perception in a more practical manner using a measure directly relevant to a product failure context – by asking about intention to purchase a warranty to cover the potential problem in the future.

METHOD

Participants and design

One hundred and one students (54 females) from a large university participated in the study in exchange for extra course credit. As in study 4, the experiment was a 2 (description emotionality: high vs. low) x 2 (closure: high vs. low) between-participants design.

Procedure

Participants were first asked to recall a frustrating product failure that they had experienced with an electronics product within the past 2 years. After answering some basic questions about the failed product (e.g., what the product category was), participants continued to the next page where they were asked to describe the frustrating product experience in either an emotional or an emotionless manner, depending on condition, as in study 4. Next participants completed the closure manipulation reason-listing task inducing

either high or low closure and responded to the four closure manipulation check questions anchored from -10 (strongly disagree) to 10 (strongly agree) as in the prior studies. Emotion was measured by having participants use an 11-point scale (1 = not at all, 11 = extremely) to indicate how frustrated, angry, annoyed, upset, and uneasy they felt when thinking about the product experience they wrote about.

Probabilistic distance from the product failure experience (how prevalent the problem is and how likely the same failure would happen again) was captured in this study by asking participants' inclination to purchase insurance or warranty for the same problem in the future. Specifically, participants were asked "If you were to buy a(n) [the reported product] from this brand again, would you consider getting insurance/warranty that covers the same kind of problem you experienced?" (1 = not at all, 7 = very much). Lower intention to purchase a warranty indicates greater psychological distance.

RESULTS AND DISCUSSION

Manipulation check

The four questions measuring psychological closure were averaged to form a single measure of closure (α = .92). The closure manipulation was successful; participants in the high closure condition reported a greater sense of closure (M = 3.48) than those in the low closure condition (M = -.12; $F(1, 92) = 8.95$, $p < .01$).

Negative emotion

A single factor emerged from the five emotion items. An average of these items was used as a measure of negative emotional reaction to the recalled event (α = .92). As predicted and consistent with the findings of study 4, a significant two-way interaction between description emotionality and closure emerged ($F(1, 97) = 4.56$; $p < .05$). Further comparisons revealed that high (vs. low) closure manipulation significantly reduced

participants' negative emotion in the emotional description condition (M = 4.13 vs. M = 5.78; $F(1, 97) = 5.51$, $p < .05$) but not in the objective description condition (M = 5.03 vs. M = 4.62; $F(1, 97) = .39$, *NS*).

Probabilistic distance

Probabilistic distance was captured through participant's warranty purchase intention; lower intention to purchase a warranty indicates greater probabilistic distance. An ANOVA on the two manipulated factors and their interactions yielded a marginal main effect of closure and a two-way interaction between description emotionality and closure. Participants in the high closure condition were somewhat less inclined to purchase warranty (M = 4.35) than those in the low closure condition (M = 5.06; $F(1, 97) = 3.65$, $p < .1$); but importantly, this effect was qualified by description emotionality ($F(1, 97) = 4.91$; $p < .05$; figure 1.5a). As predicted, only when the product failure was described emotionally, those in the high closure condition were less likely to purchase a warranty to protect against a similar product failure (M = 3.78) compared to those in the low closure condition (M = 5.38; $F(1, 97) = 8.06$, $p < .01$). However, when the product failure was described with low emotion, there was no significant difference between the high versus low closure conditions (M = 4.93 vs. M = 4.81; $F(1, 97) = .05$, *NS*).

Moderated mediation

As in study 4, a moderated mediation analysis was performed using the bootstrapping method (Preacher and Hayes 2008). As predicted, the mediation testing the relationship between closure, negative emotion, and psychological distance was moderated by description emotionality manipulation (figure 1.5b). The interacting effect of closure and description conditions on perceived probabilistic distance (lower intention to purchase warranty indicate greater probabilistic distance perception) with a 95% confidence interval

excluding zero (n boots = 5,000, BCa CI [.002, .276]; figure 4b) indicates statistical significance. When probed at the level of emotional description condition, reduced negative emotion mediated the effect of closure on probabilistic distance (n boots = 5,000, 95% BCa CI [.008, .430]). The mediation was unsuccessful when probed at the objective description condition (n boots = 5,000, 95% BCa CI [-.210, .058]).

Discussion

Study 5 replicated the moderated mediation effect of study 4 in a probabilistic distance domain. Closure increased probabilistic distance (i.e., reduced people's intention to purchase a warranty for the same product failure in the future) only when a negative event was described emotionally (vs. without emotion) prior to the closure manipulation. Within the emotional description condition, reduced emotional intensity mediated the negative effect of closure on warranty purchase intention. The finding further supports my theory that closure increases psychological distance by reducing the intensity of emotional reaction to the closed event.

Thus far, across a range of negative consumer events, I have shown that psychological closure increases perceptions of both temporal and probabilistic distance. I have also demonstrated the role of emotionality in this effect by both measuring changes in emotion and manipulating emotionality prior to closure. Still psychological distance can be expressed beyond time and probability. In the next study, I demonstrate further robustness of the influence of closure on psychological distance by including measures of perceived physical distance from a negative event.

Chapter 6: Study 6

The purpose of this study was to extend the scope of my findings beyond temporal and probabilistic distance to show the role of closure on negative consumer events in estimates of physical (or spatial) distance. I predicted a heightened sense of closure on a given event would increase the perceived spatial distance from the event. In other words, it would be perceived that the event happened in a more distant location. In terms of probabilistic distance, this study explores the effect of closure in a context where lowered perception of risk has important safety implications.

METHOD

Participants and design

One hundred and ninety undergraduate students (105 females) from a large university participated in the study in exchange for extra course credit.

Procedure

Participants first read an actual news story about a tragic accident. The story described how a 10-month old baby girl drowned when she fell from a pier as her mother fainted. To ensure participants' psychological distance judgments were not influenced by factors other than my experimental treatments, all mentions of locations were removed from the article and I told participants that all names were disguised to protect the victims' privacy.

After reading the news story, participants were randomly assigned to either a high or low closure condition. The reason-listing task and the manipulation check questions measuring self-reported experience of closure were identical to those used in previous studies. The manipulation check items were anchored from -10 (strongly disagree) to 10 (strongly agree). After the closure manipulation, participants indicated the extent to which

the news story made them feel sad, upset, anxious, distressed, unsettled, disrupted, shocked, and angry on 11-point Likert-type scales (1 = not at all, 11 = very much).

Perceived physical distance and probabilistic distance were each measured on 100-point sliding scales. For physical distance, the instruction read "Consider how near of far from here you feel the events in the news story took place," with the sliding scale anchored from 0 ("near to where I am now") to 100 ("far from where I am now").

Similar to study 5, probabilistic distance was measured in a manner of high practical relevance. I asked participants the importance of additional safety features on the pier where the accident took place. To avoid ceiling effects I said the city already met all federal and state safety regulation standards. The sliding scale asked "…how important is it that the city builds additional safety features on the pier?" and was anchored from 0 ("not important") to 100 ("very important").

Results and Discussion

Manipulation check

One participant noted being familiar with the news story prior to participating in the experiment, and therefore was excluded from further analyses. Including this respondent did not alter the pattern of results. I averaged the four closure items (α = .83) and found that the manipulation was successful; participants in the high (vs. low) closure condition reported a greater sense of closure than those in the low closure condition (M = 3.28 vs. M = -.54; $F(1, 187) = 37.22$, $p < .001$).

Negative emotion

The eight questions on negative emotional reaction towards the news story loaded together highly as a single factor; hence, I averaged them into a composite measure of negative emotion (α = .92). Consistent with my proposed mechanism, participants in the

high psychological closure condition reported feeling less intense negative emotion when thinking about the news story (M = 4.23), compared to those in the low closure condition (M = 4.88; $F(1, 187) = 4.23$, $p < .05$).

Psychological distance and mediation analyses

Consistent with my prediction, high (vs. low) psychological closure led people to feel that the accident in the news story happened in a more distant location (M = 72.14 vs. M = 61.19; $F(1, 187) = 8.62$, $p < .01$). In addition, conceptually replicating the results of prior studies, participants in the high (vs. low) closure condition indicated that it is less important to install additional safety features that could prevent similar accidents from happening again (M = 50.23 vs. M = 62.21; $F(1, 187) = 6.06$, $p < .05$).

Importantly, changes in negative emotion as a function of closure mediated the above effects. Using the bootstrapping method (Preacher and Hayes 2008), I found that negative emotion significantly mediated the effect of closure on physical distance (n boots = 5,000; 95% BCa CI [.009, 1.903]) and safety investment (n boots = 5,000; 95% BCa CI [-2.994, -.171]). The direct effect of closure on the psychological distance (c' path) after the mediation through emotion was accounted for was also significant for both physical (b = 4.83, t = 2.59, p = .01) and probabilistic distance domains (b = -4.75, t = -1.99, p = .05).

Discussion

These results demonstrate that psychological closure affects psychological distance at a general level, broadening the theoretical and practical implications of the role of closure in consumer experiences to include spatial distance in addition to probabilistic and temporal distance.

Chapter 7: Study 7

The purpose of this study was to examine the role of product disposal in the context of closure and psychological distance. People sometimes decide to keep products (instead of disposing them) because of emotional attachments or thrifty considerations (Haws et al. 2012). Products that have special meaning are often disposed strategically and thoughtfully to reflect their meaningful nature (Naylor 2006). This prior research suggests that product disposal could be a manifestation of psychological closure regarding the product, or a way in which people gain a sense of closure. This could explain why people decide to get rid of certain products at the end of the year or when they want to have a fresh new start (Jenkins 2012; O'Dea 2011). Indeed, our pilot study described in the following Methods section demonstrates that product disposal is an effective way to manipulate high versus low psychological closure.

But when would product disposal be most effective in restoring damaged product evaluations in terms of probabilistic risk judgments? What my theory and prior studies of the present research suggest is that disposing products that trigger stronger (vs. weaker) negative emotional reactions would be more effective in this regard. This is because closure increases psychological distance through dampening the associated emotional intensity.

Similar to Study 3, this study uses natural variation in people's emotional intensity associated with products to moderate the effect of closure on probabilistic distance. Products' problems will likely provoke stronger negative reactions if they occur prematurely, that is, before the consumer feels she got her money's worth. Okada (2001) utilizes the term *residual value* to explain this idea. As people purchase a product, they open a mental account and keep track of their product usage. For example, a consumer who acquires a $50 sweater may feel that every time she wears the sweater she gets a utility

equivalent to $5. On the tenth wear she breaks even and the mental book value (residual value) of the sweater would reach zero. This break-even point is when a consumer feels that she has gotten her money's worth from the product. However, in many cases consumers face problems that prevent them from continuing to use the product until they break-even, and this state would be associated with high negative affect.

Another important factor that can be linked to high negative emotion is the inconclusiveness of a products' problem. Some products develop problems that make consumers feel certain they will never use the product again (conclusive problems), while other products have problems that are ongoing struggles (inconclusive problems). Inconclusive (vs. conclusive) problems would make consumers think they may be able to continue to use the product. However, such problems are associated with greater uncertainty and are likely to be highly salient because of their ongoing nature. For example, a printer that works only sometimes will likely cause greater, more prolonged frustration than a printer that, without a doubt, stopped working completely. Of course, we predict there would be an interaction between the two aforementioned factors because high problem inconclusiveness would not prompt strong negative emotion if the consumer has already gotten her money's worth from the product. That is, if a consumer has already gotten her money's worth from a product, any further usage would be perceived as a gain.

My pretest results showed exactly this pattern. Ninety-six respondents (53 females) on Amazon Mechanical Turk completed an online survey in exchange for a small monetary reward. Participants simply recalled a product that has a problem preventing them from using the product. Then they answered some basic questions, including a question asking the extent to which they felt they got their money's worth from this product (residual value), and a question asking the extent to which they thought they would use the product again in the future (problem inconclusiveness), both on 7-point scales. Then I asked

participants to what degree the product made them feel frustrated, annoyed, upset, and angry (α = .92) using 11-point scales.

I ran a linear regression model with the two key variables (getting money's worth and problem inconclusiveness) and their interaction as independent variables, and the average negative emotion as the dependent variable. The analysis showed that participants felt stronger negative emotion if they did not get their money's worth (i.e. high residual value remaining in product; b = -.36, SE = .14, p = .01), and if the problem was more inconclusive (b = .35, SE = .17, p = .04). More importantly, there was an interaction between two factors when predicting negative emotion (b = -.13, SE = .07, p = .07; figure 6a). Further examination of the interaction using the spotlighting method (Irwin and McClelland 2001) revealed that, among participants experiencing high problem inconclusiveness (+1 SD), people who did not get their money's worth experienced stronger negative emotion than those who did get their money's worth (b = -.58, SE = .12, p < .01). Moreover, when spotlighted at people who did not get their money's worth (-1 SD), greater problem inconclusiveness led to stronger negative emotion (b = .61, SE = .24, p = .01).

In sum, products with inconclusive problems that begun to occur prematurely, before participants' got their money's worth, were associated with the strongest negative emotion. Thus, I predicted that a psychological closure manipulation in the form of product disposal would be most effective in shifting people's future probabilistic estimations under such circumstances.

METHOD

Participants and design

Eighty-seven participants (42 females) using Amazon Mechanical Turk completed the survey online for a small monetary reward. The study was a two-cell design that compared completing versus not completing a product disposal simulation exercise as a way of manipulating high versus low closure, respectively.

Procedure

Participants were told they are taking part of a research project on "decluttering and recycling." Then they recalled a product they own but do not feel ready to get rid of, even though "the product has a problem that makes you upset when thinking about it and prevents you from using it." Next, participants answered some questions about this product. They reported what the product was, what the problem of the product was, and as a control variable, how long they had owned the product (in months) because older brands or products may naturally be associated with lower quality.

For key independent variables, I asked the extent to which participants felt they got their money's worth from the product (residual value; 1 = definitely not, 7 = definitely yes), and the extent to which they thought they would use the product again in the future (problem inconclusiveness; 1 = highly unlikely, 7 = highly likely). Then, to measure probabilistic distance, I asked the same two questions from Study 3. That is, I asked participants if they were to purchase a product from the same store or company again how likely they think the problem would reoccur (1 = highly unlikely, 7 = highly likely), and how common or uncommon they think the problem with their product is (1 = highly uncommon / isolated incident, 7 = highly common / widely experienced).

To study the effect of product disposal on probabilistic expectations, I introduced a product disposal simulation exercise either before or after taking the probabilistic distance measures. The instructions of this simulation exercise read:

> "Imagine that you are getting rid of this product by either throwing it away or recycling it. For the purpose of this study, do not consider giving it away or donating. Vividly think about how you would get rid of this product in a step by step manner. Describe each of these steps, using the boxes below. For example, how would you clean or pack the product, and how would you take it out? Be as detailed and as specific as possible in your descriptions so that someone can follow exactly what you did by simply reading them."

Below the instruction, participants were shown text boxes where they could type in the answers. Total 5 text boxes were shown in the following format: "First I would…" [text box #1] "Then I would…" [text box #2] "Then I would…" [text box #3] "Then I would…" [text box #4] "Then I would…" [text box #5] "... and then finally it is gone, and I will never see it again." Participants were encouraged to use all of the text boxes to facilitate mental simulation.

To ensure that indeed the product disposal simulation induces psychological closure, I ran a separate pilot study with 107 participants from Amazon Mechanical Turk (51 females) who participated in exchange for a small monetary reward. In this pilot study, I measured participants' experience of closure either before or after the product disposal simulation exercise. The product disposal simulation procedure in this pilot study was identical to that of the main study. Experienced closure was measured using the four manipulation check questions from Study 1, adapted to fit the product disposal context, e.

g. “My experience or time with this product feels like a ‘closed book’ to me” (α = .89). An Analysis of Variance revealed a significant main effect of the product disposal manipulation. Participants reported feeling a greater sense of closure if they were asked after (vs. before) completing the product disposal exercise (M = 4.29, SD = 1.55 vs. M = 3.60, SD = 1.36; $F(1, 105) = 6.00$, p = .02).

RESULTS AND DISCUSSION

Using a linear regression model, I examined the predicted three-way interaction in the main study to see whether the effect of closure (or product disposal) on probabilistic distance depended on the extent to which people felt like they got their money’s worth from the product and the inconclusiveness of the product’s problem. The ownership duration measure (how long participants have owned the product) was also included in the model as a covariate. None of the independent variables were correlated with each other (ps > .1). The dependent variable was probabilistic distance, created by averaging the two items because their scores were highly correlated (r = .42, p < .0001). Note that, since the dependent measure captures how likely or prevalent the problem is, a high (low) score means low (high) probabilistic distance.

The three-way interaction was significant (B = .10, SE = .05, p = .03; figure 1.6b) as well as the effect of the covariate (B = .001, SE < .0001, p = .03). Therefore, I conducted further analyses using the spotlight method (Irwin and McClelland 2001) to more closely examine the three-way interaction. Consistent with my prediction, the closure (product disposal) exercise significantly improved future expectations when participants did not get their money’s worth (-1SD) and the product’s problem was highly inconclusive (+1SD; B = -.98, SE = .37, p = .01). The effect of product disposal was not significant in any other spotlight analyses (ps > .2)

This study conceptually replicates the previous studies of the present research while highlighting a natural boundary condition of closure in a product disposal context. Specifically, I demonstrate that product disposal (as a way of inducing psychological closure) is effective in reducing perceptions of risk, or increasing probabilistic distance, when the product elicits strong negative emotional reactions. I show that this condition exists naturally among products with inconclusive problems that started to occur prematurely before consumers' got their money's worth from the products.

Chapter 8: General Discussion

The present research examines the role of closure on psychological distance and the mediating role of emotion in this relationship. I demonstrate that enhanced psychological closure causes events to seem more temporally distant (studies 1 and 4), probabilistically distant (studies 2, 3, 5, and 7), and physically distant (study 6). Specifically, these studies show that closure can make disappointing and embarrassing experiences seem further in the past and that closure can reduce the impact of product failure by making it seem less likely to reoccur. This is reflected in improved evaluations of product quality, reduced perceptions of how prevalent a product's problem is, and lowered intention to purchase a warranty that covers similar issues. I also show that psychological closure can increase perceived physical distance from a tragic accident and decrease people's willingness to take actions that can prevent future accidents from happening in that location.

Importantly, I also demonstrate the role of emotional intensity as a process variable in the relationship between closure and psychological distance. This is accomplished through mediation analyses (studies 1 through 6), moderation by measured intensity of negative emotion (study 3), and moderation by manipulated intensity of negative emotion (studies 4 and 5). Finally, I observe these effects using multiple methods of inducing a sense of closure. These include a cognitive reappraisal task (Beike et al. 2007; Beike and Crone 2008), a behavioral task applying the embodiment paradigm (Gu et al. 2013; Li et al. 2010), and product disposal (Naylor 2006).

Theoretical Contributions

While prior work has examined the role of closure in coping with negative events (Beike et al. 2007; Li et al. 2010), moving on from difficult consumer choices (Gu et al.

2013), and making assessments of subjective knowledge after product learning (Namkoong and Gershoff 2013), the present research is the first to examine how closure affects consumer's perceptual experiences. Despite a common need among people to achieve a sense of closure, and the existence in the marketplace of many services aimed at helping consumers gain closure (Berns 2011), there is very little research exploring this topic. The present research is one of the few to take a pioneering step in understanding the role of closure for consumers.

There are important practical and managerial implications that flow from this research. Notably, the finding that closure decreases negative effects of product failure could be used by managers as part of a service recovery effort. More generally, however, understanding and influencing whether individuals have closure on any negative events could allow improved prediction of, and impact on, consumer behavior. For example, flood insurance purchases are said to decline after periods without flooding because consumers develop a "false sense of security" (Sulzberger 2011). Likewise, natural disasters often bring about an increase in blood donation, but as time passes the donations decline (Miller 2013). Potentially, efforts to keep these events from seeming closed, or in the past, could influence insurance purchase and donation behaviors so consumers might properly take care of themselves and others.

FUTURE RESEARCH

Future research should examine the effect of closure on other distance dimensions that were not included in the present research. For instance, in terms of social distance, I can predict that facilitating closure on social conflicts or social events will increase perceived dissimilarity with the others involved in the conflict, or decrease the strength of identification with the social group.

This research also opens up another question which is about the role of psychological distance in the experience of closure. Although the present research examines the impact closure has on psychological distance, it is also possible that a bidirectional relationship exists between the two constructs. For example, if psychological distance is increased, will the feeling of closure also be increased? The theory seems plausible. Prior research suggests there is a bidirectional relationship between psychological distance and emotional intensity; not only does emotional intensity decrease psychological distance (Van Boven et al. 2010), but psychological distance decreases emotional intensity (Williams and Bargh 2008). Based on these findings, one can make a prediction that creating psychological distance, and hence reducing negative emotional intensity, would help people feel closure more easily.

Furthermore, in order to better understand the role of closure in consumers' judgments, future research should expand the scope to include examinations of positive experiences. For example, a well-liked video game called Mass Effect 3 abruptly ended, leaving consumers feeling so disappointed by a lack of closure that the video game developer BioWare agreed to release an "extended cut" with an alternative ending (Lejacq 2012). Applying the findings of the present research to this context, it is plausible that consumers of entertainment products with dramatic story arches (e.g., video games, movies, novel series) are highly influenced by the experience of closure or lack thereof, leading them to develop extreme psychological distance judgments. Closure's influence on perceived temporal distance from positive events may be especially relevant, since it can influence consumers' impatience or scheduling of the next similarly enjoyable experience. In terms of probabilistic or physical distance, making a positive event seem unlikely to reoccur by means of closure may make the event seem more scarce, exotic, or one-of-a-

kind. This may increase the desire to better protect and preserve the experience by obtaining memory pointers such as souvenirs (Zauberman, Ratner, and Kim 2009).

Broader Implications

More generally, the topic of psychological closure offers to contribute to a number of other areas of research. First, closure contributes to the literature that emphasizes the importance of endings. Prior research highlights the critical role of gestalt profiles in the evaluation and planning of sequential events. For instance, gestalt properties, including whether experiences have relatively positive or negative endings, influence consumers' hedonic evaluations (Ariely and Carmon 2000). Directly related are findings that show when a series of future events are presented as components of an integrated sequence, consumers arrange these events so that more pleasant ones come later in the sequence (Loewenstein and Prelec 1993). While research on gestalt profiles emphasizes the role of valence and intensity during the final moments of experiences, psychological closure examines how endings that provide (or do not provide) psychological resolution affect subsequent judgments, feelings, and behaviors.

Second, research on psychological closure also contributes to the literature of the need for cognitive closure by considerably expanding the scope of thinking about the closure construct. Need for cognitive closure is a motivational construct specifically related to individuals' need to reduce informational uncertainty or ambiguity (Webster and Kruglanski 1994). While related, psychological closure, or the lack of it, can arise from sources other than informational uncertainty. To illustrate, most people would find it unsettling to be missing the final piece from a jigsaw puzzle, even though having that piece presents no new information about the full image. Similarly, providing people with a sense of closure in the present research did not involve any learning of new information, but did

include cognitive reframing of events or behavioral procedures that could resolve psychological tension.

In conclusion, the present research expands our knowledge about the role of psychological closure by demonstrating its effects on psychological distance judgments across dimensions of time, space, and risk. Despite the recent contributions in the fields of marketing and psychology, this is still a novel area with the potential for numerous future research opportunities. Practically, marketers may benefit from this research by recognizing how closure can influence people's evaluations and future expectations regarding their products and brands.

2ND ESSAY – IT'S A WRAP! HOW CLOSURE INCREASES SUBJECTIVE KNOWLEDGE THROUGH SUMMARY REPRESENTATION

Consumers often gather information to learn about products before making purchase decisions (Punj and Staelin 1983). At some point, they may encounter a cue that delivers a sense of closure to their learning. To illustrate, imagine a consumer who is learning about a complex product category, such as cheese at a gourmet tasting event. Upon finishing the last piece of cheese on the tasting list, seeing the server close the lid of the cheese plate, or reading the final sentence in an educational brochure, the consumer may experience a sense of closure. Likewise, a mother reading an online article about a potentially dangerous insect repellant chemical in a child-safety manual may feel a sense of closure as she closes the web browser before leaving the computer. How confident is the cheese-tasting consumer in his knowledge to select the right type of cheese for an upcoming party? Does the mother think she now knows enough to choose a safe insect repellent for her children?

In this research I examine the role of psychological closure on subjective knowledge. More specifically, this research examines how psychological closure on a learning experience affects the way the learning experience becomes mentally represented and how knowledgeable consumers feel. I argue that even when actual learning is held constant, the increased feeling of closure on a learning experience can cause consumers to think they are more knowledgeable about the topic as a result of mental summarization or "wrapping up" of the learning experience.

This is important to marketers because consumers' assessments of their own knowledge may influence various aspects of decision-making. For instance, when lacking confidence about their product knowledge, consumers may delay making decisions. On the other hand, feeling highly knowledgeable may cause consumers to make decisions without

sufficient consideration, possibly compromising their safety or the quality of the decision. Indeed, consumers who feel subjectively knowledgeable make decisions more quickly, engage in more brief and selective information search, and are less likely to ask others for assistance (Brucks 1985; Moorman et al. 2004; Park and Lessig 1981; Radecki and Jaccard 1995; Wood and Lynch 2002).

As reviewed earlier, psychological closure has largely been studied in the context of coping with traumatic experiences such as regretful decisions, death of loved ones, relationship breakups, or national tragedies (Crawley 2010; Li et al. 2010; Melnick and Roos 2007). I draw upon this literature and extend it in two ways: by examining the effect of closure on a non-emotional consumer experience, i.e., product learning, and by examining the effect of closure on cognitive representations and meta-cognitive evaluations. Importantly, I demonstrate a mediating process by which closure influences subjective knowledge, that of summarized representation of learned material and extraction of higher "gist-level" cues. Now I review the literature that forms the basis of my theoretical prediction.

PSYCHOLOGICAL CLOSURE AND SUMMARY REPRESENTATION

Researchers have suggested the extraction of summary-level information as an efficient and parsimonious way of registering and storing information in memory because it does not include numerous low-level details (Ariely and Carmon 2000). Due to this efficiency, people may have developed a tendency to extract the gist as they gain closure. This would allow individuals to put a learning experience behind them and attend to other issues, while still keeping a summarized or essential version of it in memory.

Prior work in Gestalt psychology provides additional insight and support of the notion that closure yields summarized representations of events. Perceptually, closure is a

mental process of sealing gaps and making connections between detached parts to recognize a complete gestalt, or meaningful shapes or patterns. This automatic mode of perception, also known as the "law of closure" (Wertheimer 1938, 1958), is a process of visual summarization or simplification because it entails extracting an overall coherent pattern from discrete units of visual information and encoding it at a higher level. Germane to the present work, Gestalt completion tasks involving visual closure have been used in prior literature to prime and measure higher-level processing of information (McCrea, Wieber, and Myers 2012; Smith and Trope 2006; Trope, Liberman, and Wakslak 2007; Wakslak et al. 2006). Similar to the process of visual closure on objects, I argue that psychological closure on experiences also encourages generating and extracting summary or gist-level information, making the experiences seem more cohesive as whole units.

Psychological distance created by closure may also contribute to summarization of learned material. Psychological distance is defined as a "subjective experience that something is close or far away" (Trope and Liberman 2010, 1) and more psychologically distant targets are represented at higher levels in a more simplified, cohesive, and decontextualized manner (for review, see Trope and Liberman 2010). Closure may bring about psychological distance by creating a mental barrier that blocks information flow from the past. As noted above, closure has been conceptually associated with a sense of "pastness" (Beike et al. 2007). This notion is also supported by the first essay of this dissertation – although not statistically powerful, in many studies there is a direct positive effect of closure on psychological distance that is not explained by changes in emotional intensity.

Further, Martin (1986) demonstrates that participants are more likely to use primed concepts in subsequent judgment tasks when the priming tasks had been interrupted (thus, open) compared to when the priming tasks were completed (thus, closed). This suggests

that open past experiences permeate into the present, while closed ones are mentally separated from the present. Hence, the increased psychological distance from a closed learning experience may lead the experience to be summarized at a gist-level.

Taken together, the present research proposes and demonstrates that psychological closure involves mentally wrapping up and creating summary representations of learning experiences. Higher, gist-level cues from the experience are extracted and made available as a result. For example, a customer visiting a cheese store may open a brochure to read about various facts about cheese in different eras and continents. With a feeling of closure, this customer would walk away from the learning experience remembering she just learned about "the history of cheese," a gist-level, summarized representation of the learned material. Providing indirect support of this idea, prior research shows people often generate a "lesson" from closed (vs. open) life experiences suggesting there could be a process of abstraction involved (Beike et al. 2004). Lack of closure, by contrast, is unlikely to activate a summarization process; so gist-level cues are unlikely to be extracted and less readily available. The learned content is less likely to be coherent or tightly tied together under a broad umbrella, and will seem like a compilation of separate facts (e.g., "Ancient cheeses were sour and salty" and "Blue cheese used to be aged in caves").

The next section discusses the role of summary representation and higher, gist-level cues in individuals' subjective knowledge estimates.

SUMMARY REPRESENTATION AND SUBJECTIVE KNOWLEDGE

Prior research highlights the importance of understanding consumers' estimates of their own knowledge as it relates to consumer decision-making. Consumers' subjective knowledge has been shown to influence susceptibility to others' recommendations (Brucks 1985), behavioral application of knowledge (Phillips 1993; Traill, Chambers, and Butler

2012), motivation to learn new information (Radecki and Jaccard 1995; Wood and Lynch 2002), speed of making decisions (Park and Lessig 1981), and degree of selective information search (Moorman et al. 2004).

Unfortunately, what consumers think they know may not always be parallel to what they actually know (Alba and Hutchinson 2000; Carlson et al. 2009). A miscalibration between a consumer's objective and subjective knowledge may occur when immediately accessible or salient information is a poor representation of objective knowledge (Alter, Oppenheimer, and Zemla 2010; Benjamin and Bjork 1996; Benjamin, Bjork, and Schwartz 1998; Koriat 1993, 1995). As a result, consumers may feel more or less knowledgeable than they actually are. When consumers err this way, they may fail to seek out necessary information or assistance, choose inappropriate products for their objectives, and use products unsafely. In short, their decision quality may be undermined (Radecki and Jaccard 1995).

Relevant to the present research are findings that demonstrate higher-level cues often misguide individuals' knowledge estimates. People tend to rely on higher-level cues to gauge how much they know or learned; yet these cues often poorly represent the amount and accuracy of concrete information available in memory. For example, the fuzzy-trace theory of memory provides a model for the interface between memory and judgment. It suggests that people form both verbatim and gist-level (or fuzzy) representations of events, and in general, they tend to rely on gist-level representations when available (Brainerd and Reyna 2002; Reyna and Brainerd 1995). The studies show that higher, more gist-dominant (vs. concrete, verbatim-dominant) cues increase false memories. For example, after learning a list of words that have a consistent theme (e.g., nurse, hospital, patient), individuals often report having seen words that were not presented (e.g., doctor), but fit the extracted theme (e.g., medical-related). In other words, gist-level traces highlight general

themes from learned information, and from these general themes, people make inferences and fill in details about what specifically was learned.

Another example of higher-level cues misguiding subjective knowledge can be found in the literature of illusion of explanatory depth (IOED; Alter et al. 2010). IOED refers to a common tendency for people to overestimate their ability to explain concrete concepts or mechanisms because they rely on higher-level cues to gauge their knowledge. For instance, many people do not know that a zipper works by using a sliding wedge to properly position and successively bring together each hooked tooth into the hollow of the previous tooth. Yet, people feel they know how a zipper works because they have a good understanding of zippers at the gist-level; most know what one looks like, its functionality, and how to use one.

With closure, individuals may mentally wrap up the learning experience, by extracting and generating an overall gist, and putting individual pieces of the learning experience together into a more cohesive and meaningful unit; and because of individuals' tendency to naturally attend to higher-level cues when they are available (Alter et al. 2010; Brainerd and Reyna 2002; Navon 1977), psychological closure should heighten people's subjective knowledge. In contrast, those who do not have closure are less likely experience heightened subjective knowledge because they do not have higher-level cues readily available upon subjective knowledge assessment.

PREDICTIONS AND STUDIES OVERVIEW

Seven experiments in the context of product learning demonstrate the effect of closure and the underlying summary representation mechanism. I apply multiple methods of manipulating high or low closure on learning experiences across various product categories. I also examine the mechanism by moderating the effect with attention focus

(higher- or lower-level focus) using several approaches. Studies 1a and 1b demonstrate the main effect of psychological closure on subjective knowledge and show that high (vs. low) psychological closure makes gist-level information more readily available. Study 2 replicates the effect of psychological closure on subjective knowledge while simultaneously testing whether this effect is mediated by summary representation. Subsequent studies further examine the mechanism by demonstrating the moderating role of attention focus. Specifically, I demonstrate that directing participants' attention to lower-level information of the learning material causes those in the high (vs. low) closure condition to reduce their initially inflated perceptions of subjective knowledge (study 3). I further demonstrate this effect by directing people's attention to lower- versus higher-level information using a mindset prime (study 4) and a temporal distance manipulation (study 5). I also replicate the effect of closure using an embodiment paradigm while mimicking its effect through a direct manipulation of mental summarization to shed further light to the underlying mechanism (study 6).

Chapter 9: Studies 1A & 1B

The purpose of these studies was to demonstrate the basic effects of psychological closure on summary representation of learned material and subjective knowledge. Study 1a shows the basic effect of closure on subjective knowledge. Then, study 1b shows the effect of closure on summary representation. Subsequent studies further examine these effects.

STUDY 1A

Method

Fifty-six participants (33 females) from Amazon Mechanical Turk who were located in the U.S. and had a 95% prior HIT acceptance rate participated in this survey in exchange for monetary payment (I applied the same selective criteria to other studies using Amazon participants in the present research). Participants were first asked to carefully read a three-page online booklet about cheese (Appendix A). This booklet had a professional-looking cover page followed by short paragraphs about the history, production, categorization, and consumption of cheese. All pages of the booklet were presented on a single web browser so participants could scroll up and down to move freely between pages. Participants read the booklet for five minutes and were then randomly assigned to either the high-closure or low-closure condition. In this study, the closure manipulation was directly adapted from prior work in order to ensure my findings are comparable (Beike et al. 2007; Beike and Crone 2008; Beike et al. 2004). Specifically, participants responded to the following (low-closure condition in parentheses):

> Sometimes people say that they *have (don't have)* "closure" on an experience; that the experience is like *"a closed book" ("unfinished business")* to them. They say

this when the experience feels *complete (incomplete)*, and they *feel (don't feel)* ready to move on from it. Please briefly describe why the learning experience you just had – reading the informational booklet about cheese – could be considered *CLOSED (NOT CLOSED)* for you. Even if you don't agree that the learning experience is *closed (not closed)*, it is important to us to know what kinds of things people come up with.

On the next page, participants responded to the single-item subjective knowledge question "I feel like I learned a lot about cheese from the Cheese Booklet" on a 9-point Likert-type scale (1 = Not at all; 9 = Very much).

Results

The predicted main effect indicated that high (vs. low) closure led people to feel more knowledgeable as a result of reading the Cheese Booklet (M = 7.00 vs. M = 5.45; $t(54) = 2.86$, $p < .01$).

STUDY 1B

This study was designed to observe the way participants encode the learning experience in memory to examine closely the cognitive process activated through closure. Thus, after the learning experience and closure manipulation, I allowed participants to freely describe what they learned. Based on my theory, psychological closure should make the gist of the learning experience more readily available, and since these higher (vs. lower) level cues are more spontaneously attended to, they should be one of the first things that come to mind when remembering the experience.

Method

One hundred and thirty-two participants (76 females) from Amazon Mechanical Turk participated in this survey in exchange for monetary payment. From the main questionnaire window, an online Smart TV Features Manual was launched into its own window on the screen when participants pressed a button. The manual was a compilation of 26 smart TV features with desciptions, and was divided in such a way that 5 or 6 items appeard on each page (Appendix B). Participants read one page at a time and were not allowed to go back to previous pages.

Each page had a large heading on top that reminded participants how many pages they read so far, and the total number of pages in the manual (e.g., "Page 3 of 6"). On the last page, instead of seeing page 6, all participants were informed that their time was up for reading, that the last page of the manual would not be shown, and that they were to return to the main window to complete a questionnaire about the pages they were able to finish reading. This was to demonstrate the effect of closure on incomplete tasks.

I manipulated psychological closure using an embodiment paradigm adapted from Gu et al. (2013) and Li et al. (2010) to fit an online learning context. Specifically, participants either closed the manual's pop-up window (high-closure condition) or left it open in the background (low-closure condition) before returning to the main survey. As a cover story, I told participants this was "to ensure proper data registration between the two electronically linked survey windows."

After returning to the main questionnaire window, participants reported whether or not they have actually closed or opened the web browser as they were instructed. Then they continued to the next page to write an essay about what they learned. Specifically, they were instructed "Describe what you learned in the Smart TV Features Manual." Participants freely responded without any length or time restrictions. Two independent

coders blind of participants' assigned treatment conditions coded these responses on whether the first statement was summary-oriented or feature-oriented. Summary-oriented statements included mentions about main takeaways or overall impressions (ex. "I learned that smart TVs have many features" or "A smart TV is like a smart phone"). Feature-oriented statements mentioned specific details (ex. "I learned that I can type with my voice" or "The dual split screen is what really got my attention").

To examine further my prediction that psychological closure leads to a more summarized representation of learned material, I also asked three questions concerning the level of cohesiveness of the overall learning experience. On 7-point scales, participants indicated how much they agreed with the following statements: "Thinking back on the learning experience, the manual seemed cohesive; Thinking back on the learning experience, it seems like the information in the manual was scattered (reverse-coded); Thinking back on the learning experience, it seems like the content of the manual was integrative" (1 = strongly disagree, 7 = strongly agree).

Results

Three participants in the high closure condition left their web browsers open, and two participants in the low closure condition closed their web browsers, and thus, were excluded from the analyses. Including these participants did not alter the pattern of results. The agreement rate between two coders was high (91.3%), and disagreements were settled through discussion. As predicted, participants in the high-closure condition were more likely to mention a summary-oriented statement first in their description of the learning experience (80.65%) compared to those in the low-closure condition (60.0%; $\chi^2(1, N = 127) = 6.45, p = .01$).

The three perceived cohesiveness questions measuring the extent to which the overall learning experience was represented in a summary form loaded together highly ($\alpha = .74$), and hence, were averaged into a single measure. Further supporting the influence of closure on summarization, those in the high-closure condition perceived the Smart TV Features Manual more cohesively ($M = 5.15$) than low-closure ($M = 4.72$; $t(125) = 2.08$, $p < .05$).

Discussion

Studies 1a and 1b demonstrate the basic effect of closure on subjective knowledge and cognitive representation. Study 1a shows that closure leads to greater subjective knowledge after a learning experience. Study 1b shows that closure leads to greater summarization of learned material. The following studies further explore these effects, illustrating the robustness of the proposed relationship while putting greater focus on testing the underlying mechanism.

Chapter 10: Study 2

The purpose of study 2 was threefold; to replicate the effect of closure on subjective knowledge, test for the hypothesized mediating mechanism, and show that the effect is not due to a change in actual knowledge about the topic. Specifically, I use the learning experience from study 1a, but include measures to test for perceptions of closure as a manipulation check and expand my measure of subjective knowledge to include multiple items for robustness. I also use the three item cohesiveness measure from study 1b to test whether summary representation mediates the effect of closure on subjective knowledge. In addition, I measure objective knowledge in order to show that only subjective knowledge is influenced by closure.

METHOD

Participants and design

One hundred and thirty-seven online respondents on Amazon Mechanical Turk (71 females) participated in study 2 in exchange for monetary payment. The study was a simple two-cell design with psychological closure as a between subject factor.

Procedure

Participants were given as much time as they wanted to read the Cheese Booklet used in study 1a. After reading the entire booklet, participants were randomly assigned to either a high or low closure condition. Closure was manipulated by having participants generate reasons why they might consider the learning experience as either closed or open (reason-listing task from study 1a; Beike et al. 2007; Beike and Crone 2008).

To ensure the manipulation of psychological closure was successful, I asked four questions on participants' self-reported experience of closure, also from previous research, but adapted to fit the learning context (Beike et al. 2007; Crawley 2010; Savitsky et al.

1997): “The learning experience I had feels complete to me; The learning experience I had feels like a ‘closed book’ to me; The learning experience I had feels like ‘unfinished business’ to me (reverse-coded); I feel ready to move on from the learning experience” (1 = not at all, 7 = very much).

Perceived cohesiveness was measured using the same three questions used in study 1b, followed by five questions on subjective knowledge. On 7-point Likert-type scales, participants indicated the extent to which they agreed with each of the five statements regarding their knowledge gained from the learning experience: “Overall, I learned a lot from the Cheese Booklet; Because of the learning experience, I am now knowledgeable about cheese in general; The Cheese Booklet has provided an effective learning experience; The learning experience I had will help me in the future when purchasing cheese; The learning experience I had will help me in the future when eating/consuming cheese” (1 = not at all, 7 = very much). Finally, objective knowledge was measured with an unanticipated quiz consisting of 8 true/false questions and 4 multiple-choice questions testing what had been learned from the booklet.

Results and Discussion

Manipulation check

A single factor emerged from the four psychological closure questions ($\alpha = .89$), so an averaged composite measure was created for self-reported experience of psychological closure. As intended, participants in the high-closure condition reported experiencing more closure ($M = 5.70$) compared to those in the low-closure condition ($M = 4.60$; $t(135) = 4.62$, $p < .001$).

Objective knowledge

Participants' quiz scores ranged from 1 to 12 out of a possible score of 12 correct answers, with a mean of 7.31, median of 7, and standard deviation of 1.96. There was no difference in participants' quiz scores by closure condition ($t(135) = .14$, *NS*). Controlling for participants' quiz scores did not alter the pattern of results in subsequent analyses.

Subjective knowledge and perceived cohesiveness and mediation

I averaged the responses from the five questions on subjective knowledge ($\alpha = .81$) and three questions on perceived cohesiveness ($\alpha = .69$) to create a composite measure for each construct. Replicating study 1a, participants in the high-closure condition indicated greater subjective knowledge ($M = 5.46$) compared to those in the low-closure condition ($M = 5.11$; $t(135) = 2.12$, $p < .05$). Also providing support for the proposed mechanism, and replicating study 1b, those in the high-closure condition also perceived the learning experience more cohesively ($M = 5.59$) compared to those in the low-closure condition ($M = 5.14$; $t(135) = 2.26$, $p < .05$). To test whether perceived cohesiveness mediated the effect of closure on subjective knowledge I used a bootstrap analysis (Preacher and Hayes 2008; Zhao, Lynch, and Chen 2010). Using 5,000 bootstrapping resamples, I found the total indirect effect through perceived cohesiveness had a 95% bias-correct and accelerated (BCa) confidence interval (CI) of 0.01 and .16, indicating significant mediation (i.e., CI does not include zero).

Test against normative alternative explanation

One may argue that the high and low psychological closure manipulations used in this study provided cues to participants that the learning experience of the survey was either objectively complete or incomplete. That is, being asked to write about why the learning experience is closed may be erroneously interpreted as a signal that the experimenter has

provided a complete learning experience in which there is nothing else to be learned, and being asked to write about why the experience is not closed may be interpreted as a signal that more learning on the topic will occur later in the survey. This could potentially provide a higher normative standard for the learning against which participants form their subject knowledge evaluations.

To address this explanation, I conducted separate correlational analyses within each closure condition. If my argument holds, then regardless of the manipulation task employed by this study, I should find that self-reported experience of closure is positively correlated with perceived cohesiveness and subjective knowledge. That is, even if my manipulations signaled a norm about the amount that could be learned, within each condition, I still expected that those who naturally feel less closure would report less cohesion and less subjective knowledge, and those who feel more closure would report more cohesion and higher subjective knowledge.

Indeed, all three constructs were significantly correlated with each other even when the high and low closure conditions were examined separately (table 2.1). Moreover, the mediation path of measured closure, perceived cohesiveness, and subjective knowledge remained significant even after controlling for participants' assigned closure manipulation condition (n boots = 5,000; 95% BCa CI [.025, .150]).

Discussion

This study replicates and extends studies 1a and 1b. I demonstrate that psychological closure leads to a more summarized representation of the learning experience as indicated by greater perceived cohesiveness of the learned material. Importantly, this representation mediated the positive effect of psychological closure on subjective knowledge. In addition, I show no differences in actual knowledge, and provide

evidence that the effect of closure was neither due to what was actually learned nor to an inferred norm of what the experimenter deemed the scope of the learning experience.

The following experiments shed light to the mechanism using a different approach; that is, by moderating participants' attention focus so they are more likely to rely on higher or lower level cues when judging their subjective knowledge. Psychological closure triggers the process of summarization and gist-extraction. Although people tend to rely spontaneously on these higher, gist-level cues when available, various situational factors may redirect attention to lower-level cues (Alter et al. 2010; Miller 1981). Such direction of attention should diminish the effect of closure on subjective knowledge. I demonstrate this moderating effect by presenting participants with concrete information from the learning material (study 3), putting participants in a concrete (vs. abstract) mindset (study 4), and providing a proximal (vs. distant) temporal context (study 5).

Chapter 11: Study 3

The purpose of this study was to show the moderating influence of directing attention to lower-level cues, and to examine within-participant evidence of subjective knowledge change. By directing people to consider lower-level cues when gauging their subjective knowledge, I expect to attenuate the effect of psychological closure. The within subject paradigm in this study adds a unique contribution because it also allows me to test whether the effect of closure is driven by overestimated subjective knowledge in the high-closure condition or underestimated subjective knowledge in the low-closure condition.

Based on my theory that psychological closure heightens subjective knowledge through available and accessible gist-level cues, I predicted that participants in the high-closure condition would make greater estimates of subjective knowledge than those in the low-closure condition. However, a subsequent manipulation that highlights concrete aspects of what was just learned should lead those who were in the high-closure condition to decrease their estimates of subjective knowledge, while those from the low-closure condition should not. This would be consistent with prior work in the IOED, which is also thought to come about by reliance on higher-level cues, but is attenuated by direction to lower-level cues (Alter et al. 2010). In their studies, participants were initially asked to gauge their ability to explain a particular process, and then asked again after an actual attempt at explanation. The degree of miscalibration of explanatory ability was measured by taking the difference between the two ability estimates.

Finally, for robustness, I add a new factor in this study to ensure that the effect of closure on subjective knowledge is not due to low accuracy motivation. I also expand the topic of the learning material to insect repellent chemicals.

METHOD

Participants and design

One hundred and ninety-three individuals (90 females) from both Amazon Mechanical Turk and the participant pool at a large public university completed this study. My findings were not qualified by a respondent source; hence, the two datasets were consolidated. The experiment was a 2 (closure: high vs. low) x 2 (time of subjective knowledge measurement: before vs. after concrete cue presentation) x 2 (accuracy motivation: high vs. control) mixed-participants design. The closure manipulation and accuracy motivation manipulation were between-participants factors while the time of subjective knowledge measurement was a repeated within-participants factor.

Procedure

All participants first read an online booklet about an insect repellant chemical DEET (Appendix C). This category was selected because it is a common product ingredient that requires particular knowledge in order to use safely. The four-page booklet included information about the origin, function, and safe use of the chemical insect repellant DEET. To ensure the booklet was realistic, it was modeled after an actual public health organization booklet about DEET designed to help consumers use the product safely.

Each page was presented on the screen individually and participants were allowed to spend as much time as they wanted before moving from one page to the next. On each page, the total and current page information was clearly stated on top of the screen (e.g., "Page 2 of 4"). This was done to ensure participants had information about where they were in the booklet and how much more of the booklet remained. After participants finished reading the entire booklet (i.e., having completed reading "Page 4 of 4"), they

were randomly assigned to either a high or low psychological closure condition with the same reason-listing task and manipulation check questions ($\alpha = .89$) from study 2.

To ensure my effects are robust against varying levels of accuracy motivation, I randomly assigned half of my participants to the high accuracy motivation condition. In this condition, participants were given the following instruction on top of the page where they made initial assessments of their subjective knowledge (T1): "TRY TO BE AS ACCURATE AS YOU CAN – Later in this survey, we will ask you to explain what you learned from the DEET Booklet to see how accurate you were when evaluating your learning experience in this page." In the control condition, participants were simply told to answer the subjective knowledge questions based on their own thoughts and feelings.

Participants then reported their subjective knowledge (T1), completed an easy quiz asking questions from the DEET booklet (concrete cue presentation), and reported their subjective knowledge again (T2). The subjective knowledge measures were nearly identical to study 2 with the following exceptions. First, the scale for the subjective knowledge measures was anchored from -5 (strongly disagree) to 5 (strongly agree). Second, the wording of the questions was adapted to fit the DEET product category.

Unlike in study 2, the quiz was designed not to test objective knowledge per se, but to present concrete information from the learning material so it redirects people's attention to their lower-level cues when gauging their subjective knowledge at T2. A total of 4 multiple-choice (e.g., "DEET was originally tested as a(n) _____") and 6 true/false questions (e.g., "30% DEET is safe to use on children.") were created for this purpose.

RESULTS AND DISCUSSION

Manipulation check

The psychological closure manipulation was successful. As expected, participants in the high-closure condition (M = 5.55) reported feeling more closure than those in the low-closure condition (M = 4.25; $t(191) = 6.05$, $p < .001$).

Concrete cue presentation

Participants' scores on the concrete cue quiz ranged from 3 to 10 (out of a total possible score of 10), with a mean of 7.67 (SD = 1.54) and median of 8. As intended, the quiz was fairly easy and participants' performance was not influenced by any of my treatments nor their interactions ($ps > .5$).

Subjective knowledge

The subjective knowledge questions loaded together as a single factor and showed high inter-item reliability at both T1 and T2 (α = .92 and .95, respectively). Hence, I averaged the items to create a single subjective knowledge measure for each of the time periods. This data was analyzed as a mixed three-way ANOVA with closure (high vs. low) and accuracy motivation (high vs. control) as between-participants factors and time of subjective knowledge measurement (before vs. after concrete cueing) as a within-participants factor. There was a main effect of measurement timing so that participants' subjective knowledge was higher at T1 versus T2 (M_{T1} = 2.29 vs. M_{T2} =2.13; $F(1, 189) = 6.59$, $p < .05$). Importantly, however, this effect was qualified by its interaction with closure as I predicted ($F(1, 189) = 5.40$, $p < .05$; figure 2.1). No other interactions or main effects were significant ($ps > .1$).

First, replicating previous studies, subjective knowledge prior to exposure to concrete cues (T1) was higher in the high-closure condition (M = 2.56) than in the low (M

= 2.03; $F(1, 189) = 4.85$, $p < .05$). Next, I examined differences in participants' estimates of subjective knowledge before and after taking the concrete knowledge quiz. As expected, participants in the high-closure condition significantly reduced their subjective knowledge estimates after they were presented with concrete quiz questions ($M_{T1} = 2.56$ vs. $M_{T2} = 2.25$; $F(1, 189) = 11.76$, $p = .001$). Those in the low-closure condition did not adjust their subjective knowledge estimates at T2 ($M_{T1} = 2.03$ vs. $M_{T2} = 2.01$; $F(1, 189) = .03$, *NS*). As a result of the downward adjustment in the high-closure condition, there was no difference between the two closure conditions at T2 ($F(1, 189) = .87$, *NS*).

Test against normative alternative explanation

Repeating the steps of study 2, I again examined the correlational relationship between experienced closure and subjective knowledge separately within high and low closure conditions. A consistent pattern emerged. That is, experienced psychological closure was positively correlated with subjective knowledge at both T1 and T2 within both high-closure condition (T1: $r = .54$, $p < .001$; T2: $r = .49$, $p < .001$) and low-closure condition (T1: $r = .44$, $p < .001$; T1: $r = .40$, $p < .001$).

Discussion

Study 3 adds supporting evidence using a repeated measure design. Supporting my hypotheses, and replicating studies 1a and 2, participants in the high-closure condition initially estimated greater subjective knowledge than those in the low-closure condition, and this effect was robust against high accuracy motivation. In addition, I again found that the positive relationship between experienced closure and subjective knowledge was significant even when examined separately within each closure conditions; this suggests that my effect is not dependent on the type of closure manipulation task used in this study.

Importantly, after being presented with concrete cues in the form of an easy quiz, participants in the high-closure condition made significant downward adjustments, suggesting the quiz made them find their initial assessment to be too high. Participants in the low-closure condition, on the contrary, maintained their subjective knowledge estimates, suggesting they found the initial judgment to be an accurate assessment of their knowledge.

This distinct adjustment pattern between the high and low closure conditions after being presented with concrete cues from the learned material provides strong evidence that heightened subjective knowledge is driven by individual's reliance on higher, gist-level cues made available by closure. When participants' attentions were guided to focus on lower-level cues through the concrete facts quiz, those in the high-closure condition made downward-adjustments to their initially inflated subjective knowledge judgments. These findings also demonstrate that the difference in subjective knowledge between the high and low closure conditions is driven by overestimation with high-closure rather than underestimation with low-closure.

Chapter 12: Study 4

The purpose of study 4 was to provide further evidence for the cognitive mechanism underlying the effect of psychological closure on subjective knowledge. I have argued and demonstrated that psychological closure facilitates the process of wrapping up or summarizing a learning experience, making higher gist-level cues from the experience readily available in memory; reliance on these cues increases subjective knowledge. Prior research found, when individuals were probed about their knowledge concerning a topic, they relied on higher, gist-level cues unless specifically prompted to seek lower-level cues (Alter et al. 2010). Based on these arguments, high (vs. low) closure should increase subjective knowledge in the absence of any external influence that directs one's focus, and also when one's focus is directed to higher (vs. lower) level cues. However, this effect of high closure should diminish when one is directed to focus on lower-level cues. For people with low closure, who presumably would not have had the opportunity to mentally wrap up the experience, directing their attention to a higher or lower level should not affect subjective knowledge, since only lower level cues would be available in their representation of the learning experience.

While study 3 used presentation of concrete information from the learning experience to direct participants' attention to lower-level cues, this study used a mindset prime. Specifically, I primed participants with a concrete or abstract mindset based on prior work showing that a concrete mindset increases focus on local features and specific details, whereas an abstract mindset increases focus on the big picture and gist when making judgments (for review, see Shapira et al. 2012). I expected that high (vs. low) closure participants would feel more knowledgeable when primed with an abstract mindset because they would access and rely on higher level cues extracted through closure. However, when

primed with a concrete mindset, I expected the effects of closure would be attenuated, as participants in both closure conditions would focus their attention on concrete cues.

METHOD

Participants and design

Two hundred and twenty undergraduate students (99 females) at a large public university participated in the study in exchange for extra course credit. The experiment was a 2 (psychological closure: high vs. low) x 2 (mindset: abstract vs. concrete) between-participants design.

Procedure

All participants first completed a learning phase that was identical to study 2 (i.e., reading the Cheese Booklet) and completed the reason-listing closure manipulation task also used in prior studies. Then, participants engaged in a mindset activation task designed to elicit either an abstract or a concrete mindset, as used in previous research (Liberman et al. 2007). For this manipulation, six common activities, including opening a new bank account, subscribing to a newspaper, and buying a computer, were presented to participants. In the abstract mindset condition, participants were asked to describe *why* someone would carry out these activities. Thinking about why someone performs activities leads to consideration of superordinate goals and higher-level meanings activating an abstract mindset; for example, one might open a bank account to save for future goals. Participants in the concrete mindset condition, on the other hand, wrote about *how* someone would carry out the activities; for example, opening a bank account involves subtasks such as gathering documents, taking the bus to the bank, waiting in line, and making a deposit. Thinking about how activities are performed leads to consideration of subordinate aspects

such as detailed behaviors, which has been shown to activate a concrete mindset (Freitas, Gollwitzer, and Trope 2004; Vallacher and Wegner 1989).

I then asked participants to rate how knowledgeable they felt as a result of the learning experience – reading the cheese booklet – by providing ratings of agreement with two statements: "I feel like I learned a lot about cheese from the cheese booklet," and "After the learning experience, I feel very knowledgeable about cheese." Participants rated their agreement with each statement on 9-point scales (1 = strongly disagree, 9 = strongly agree). Finally, participants provided a measure of objective knowledge learned from the booklet. Specifically, they took an unanticipated quiz with 20 questions covering knowledge of information that had appeared in the booklet.

RESULTS AND DISCUSSION

Subjective knowledge

The two subjective knowledge items were highly correlated (α = .82), so they were averaged to create a single composite measure. An ANOVA revealed a significant interaction between closure and construal level on subjective knowledge ($F(1, 216) = 4.67$, $p < .05$; figure 2.2). Further analyses of simple main effects supported my theory. In the abstract mindset condition, those in the high-closure condition estimated they knew more ($M = 6.35$) compared to those in the low-closure condition ($M = 5.68$; $F(1, 216) = 5.20$, $p < .05$). In the concrete mindset condition, this difference was attenuated so that there was no difference between the high versus low closure conditions ($M = 5.74$ vs. $M = 5.96$; $F(1, 216) = .59$, *NS*).

Also as predicted, for participants who were in the high-closure condition, being in an abstract mindset led to greater subjective knowledge ($M = 6.35$) than being in a concrete mindset ($M = 5.74$; $F(1, 216) = 4.17$, $p < .05$); this difference was not significant within

the low-closure condition (M = 5.68 vs. M = 5.96; $F(1, 216) = .99$, *NS*). Consistently, a planned contrast revealed participants in the high closure and abstract construal condition reported a significantly higher level of subjective knowledge (M = 6.35) compared to the remaining three groups of participants (M = 5.79; $F(1, 216) = 2.25$; $p < .05$).

Objective knowledge

Despite differences in subjective knowledge estimates dependent on closure, objective measures of knowledge did not show this pattern. Participants' scores ranged from 8 to 19 out of a possible score of 20 (each correct question counted as 1 point) with a mean of 14.66 (SD = 2.30) and a median of 15. A 2 (closure) x 2 (mindset) ANOVA showed no significant main effect of closure on quiz performance ($F(1, 216) = .03$, *NS*) nor a significant interaction ($F(1, 216) = 1.07$, *NS*). There was, however, a significant main effect of mindset. Participants who were in the concrete mindset condition (M = 14.99) scored higher than those in the abstract mindset condition, (M = 14.32; $t(218) = 2.18$, $p < .05$) which could be a result of fit between a concrete mindset and recognizing individual facts.

Discussion

This study provides further evidence that closure increases estimates of subjective knowledge through summary representation that extracts gist-level information. As expected, the positive effect of psychological closure on subjective knowledge was replicated when participants were directed to focus on higher-level cues (abstract mindset); however, this relationship was attenuated when there was greater focus on lower-level cues (concrete mindset). Also consistent with my theory, participants in the high-closure condition reported feeling more knowledgeable when they focused on higher- vs. lower-level cues; but level of focus did not affect participants with low-closure. This conceptually

replicates the distinct adjustment patterns exhibited between high and low closure conditions in study 3.

Importantly, the above findings cannot be explained by objective knowledge, as objective knowledge is not influenced by closure manipulations. The fact that concrete (vs. abstract) mindset resulted in better quiz performance also rules out the possibility that the quiz was not sensitive enough to capture any difference in objective knowledge. Moreover, statistically controlling for objective knowledge in my analyses does not weaken the effect of closure on subjective knowledge.

It is also crucial to note that the results of this study help rule out a potential alternative explanation of the effect of closure on subjective knowledge, which is that closure simply enhances feelings of completion or fulfillment. If closure increases subjective knowledge by making people feel they have reached a certain standard, I would not have found that putting people in a concrete mindset weakened the effect of closure, which is what I found in this study. Thus, my findings are consistent with the proposed mechanism of this research, which is the reliance on gist-level cues made available as a result of psychological closure and mental summarization. I return to this in the next study and again in the general discussion.

Chapter 13: Study 5

The purpose of study 5 was to conceptually replicate the findings of the previous study and to add robustness and ecological validity in several ways. First, instead of the reason-listing task used in the previous studies and prior literature (Beike et al. 2007; Beike and Crone 2008), this study uses task-framing to create high or low feelings of closure. Specifically, after completing the learning experience, participants were explicitly told either that the subjective knowledge measures were part of a new task (high-closure on learning experience at the point of estimating subjective knowledge), or that the subjective knowledge measures were a continuation of the learning experience task (low-closure on learning experience when estimating subjective knowledge). Along with study 1b, this study increases the practical relevance of the literature by examining a closure-inducing cue that is more likely to be experienced in a consumer setting and is potentially under the control of a marketer.

Second, this study activates construal level mindsets by employing a temporal context (close vs. distant future) rather than the priming task used in study 4. Temporal distance influences mindsets by activating more concrete, lower-level focus when considering the close future and more abstract, higher-level focus when considering the distant future (Liberman, Sagristano, and Trope 2002). It has been used in prior research to successfully induce abstract or concrete thinking modes (Giacomantonio, De Dreu, and Mannetti 2010; Plaks, McNichols, and Fortune 2009).

Based on my theory, and conceptually replicating studies 3 and 4, closure should increase subjective knowledge estimates when learned information is expected to be used in the distant future (i.e., when consumers are in an abstract mindset). To reiterate, this is also how people would spontaneously gauge subjective knowledge even without any

mindset prime, as demonstrated in prior studies 1a, 2, and 3. However, the effect of closure on subjective knowledge should be attenuated when learned information is expected to be used in the close future (i.e., when consumers are in a concrete mindset). In addition, among participants with high-closure, a temporally distant (vs. close) perspective would result in greater subjective knowledge, but this effect should be attenuated in the low-closure condition. Note that my prediction to find a significant effect of closure in the temporally distant (vs. close) condition makes it a conservative test for my theory, as it is less likely for people to consider that a learning experience now would be helpful in the distant future (i.e., next year).

METHOD

Participants and design

One hundred and twenty-seven undergraduate students (74 females) at a large public university participated in the study for extra course credit. The experiment was a 2 (closure: high vs. low) x 2 (psychological distance: close vs. distant) between-participants design.

Procedure

Participants first completed a learning phase followed by the closure manipulation. All participants read the same DEET booklet used in study 3. As in study 3, each page was presented on the screen individually. The total and current page information was clearly stated on top of the screen (e.g., "Page 2 of 4") to ensure participants had information about where they were in the booklet and how much more of the booklet remained.

After participants finished reading the entire booklet (i.e., having completed reading "Page 4 of 4"), psychological closure was manipulated via task-framing. Based on random assignment, I told participants they either had or had not come to the end of the

general survey activity. More specifically, participants in the high-closure condition were brought to a screen with subjective knowledge questions under an instruction that said "You have now completed the main part of today's survey. Before submitting your responses and leaving the survey station, please answer some additional questions" in order to create mental segregation from the learning experience and the effect of "moving on." Participants in the low-closure condition, on the other hand, saw a screen with subjective knowledge questions that said, "Wait! Before you go to the next part of the survey, please answer the questions below" so the subjective knowledge questions were presented as a continuation of the ongoing learning experience.

I also manipulated the temporal context for participants' evaluations of their knowledge about DEET. Participants were assigned to either a temporally distant or proximal condition so they rely on higher or lower level information, respectively. The following instruction was used (proximal condition in parentheses): "Imagine that *next year* (vs. *right now*) you are going on a trip where you might take advantage of what you just read."

After the task-framing and temporal distance manipulations, participants evaluated their subjective knowledge. The subjective knowledge questions were the same as study 3, anchored from 1 (not at all) to 7 (very much). Finally, I gave participants an unanticipated quiz to measure their objective knowledge. Because the quiz from study 3 was designed to be easy, which served the purpose of cuing concrete details, I modified it to be slightly more difficult for study 5, resulting in 4 multiple-choice questions and 9 true/false questions based on information from the DEET booklet.

RESULTS AND DISCUSSION

Subjective knowledge

A single factor emerged from these questions ($\alpha = .87$). Hence, the responses were averaged to create a single subjective knowledge measure. As expected, a 2 (closure) x 2 (temporal distance) ANOVA revealed a significant two-way interaction ($F(1, 123) = 4.00$, $p < .05$; figure 2.3). Specific comparisons further supported my theory. When evaluating for a distant future, in which participants were more likely to rely on available higher-level cues, participants in the high (vs. low) closure condition reported feeling greater subjective knowledge ($M = 5.63$ vs. $M = 4.94$; $F(1, 123) = 6.51$, $p = .01$). For the proximal future conditions, when people are likely to draw on available lower-level cues, there was no difference in subjective knowledge between the high versus low closure conditions ($M = 4.94$ vs. $M = 5.01$; $F(1, 123) = .08$, *NS*).

Also consistent with my prediction, within the high-closure condition, those evaluating for the distant future had higher subjective knowledge ($M = 5.63$) compared to those evaluating for the proximal future ($M = 4.94$; $F(1, 123) = 6.36$, $p = .01$). Temporal distance had no such impact in the low-closure conditions ($M = 4.94$ vs. $M = 5.01$; $F(1, 123) = .07$, *NS*). A planned contrast revealed that participants who were induced to feel a high sense of closure and evaluated their knowledge in a temporally distant context felt more knowledgeable ($M = 5.63$) compared to the other three groups of participants ($M = 4.97$; $t(123) = 3.04$; $p < .01$).

Objective knowledge

Participants' scores on the objective knowledge quiz ranged from 4 to 12 out of the possible total of 13 with a mean of 8.83, a median of 9, and a standard deviation of 1.84.

As intended, the quiz was significantly more difficult than in study 3 (performance standardized to total 100 points; $M_{study5} = 68$ vs. $M_{study3} = 77$; $t(318) = 5.13$, $p < .001$).

Interestingly, a significant interaction emerged between closure and temporal distance for objective knowledge ($F(1, 123) = 5.17$, $p < .05$). Within the distant future condition, participants in the high (vs. low) closure condition performed worse on the quiz ($M = 8.25$ vs. $M = 9.23$; $F(1, 123) = 4.55$, $p < .05$), and within the high closure condition, participants in the temporally distant (vs. close) condition performed worse ($M = 8.25$ vs. $M = 9.21$; $F(1, 123) = 4.23$, $p < .05$). A follow-up comparison revealed that participants in the high-closure and distant-context group performed significantly worse ($M = 8.25$) compared to the rest of the groups ($M = 9.03$; $t(123) = 2.15$, $p < .05$). Note this is the exact opposite pattern of what was observed in participants' subjective knowledge estimates: participants who were most psychologically removed from the learning experience (high-closure and distant-context), presumably with more available higher-level cues and stronger higher-level focus, reported the highest levels of subjective knowledge, but paradoxically remembered the fewest details compared to those in all other groups.

Discussion

These findings further support my theory by conceptually replicating the results of study 4 while adding robustness. Using different methods to manipulate both psychological closure and construal level, I again found that the effect of high versus low closure on subjective knowledge replicates when thinking abstractly (reliance on more gist-level cues), but is diminished when thinking concretely (reliance on lower-level cues). Additionally, relying more on gist-level cues (as opposed to lower-level cues) increased subjective knowledge in the high-closure condition, but not in the low-closure condition. The closure and construal manipulations used in this study add robustness to my findings,

and increase external validity by integrating natural situational contexts into the self-assessment of knowledge.

The findings of this study also highlight the powerful nature of psychological closure, as it is likely difficult for an individual to think that any particular learning material will be useful after a year (vs. right now). Nonetheless, I found that participants with high closure felt more knowledgeable when they imagined using the acquired knowledge in a distant (vs. close) future. As in study 4, these findings are more consistent with my proposed mechanism, rather than the potential alternative mechanism that closure simply makes people feel more finished; the alternative mechanism would not predict the moderation by temporal context.

Moreover, the pattern of results cannot be explained by actual differences in objective knowledge because objective knowledge was affected in the opposite direction and controlling for objective knowledge did not change the pattern of my results. In this study, closure and abstract mindset (vs. all other treatments) resulted in less knowledge about concrete facts, but greater feeling of knowledgeableness. The effects on objective knowledge are not inconsistent with previous work. For example, studies of negative emotional experiences have found that people tend to recall fewer emotion-related details after achieving closure (Beike and Wirth-Beaumont 2005; Li et al. 2010). I provide further thoughts in the General Discussion about the role of closure in objective knowledge.

Chapter 14: Study 6

This study served two important purposes. One was to further examine the process of psychological closure and how it increases subjective knowledge. I proposed that closure increases subjective knowledge through a mental wrap up process which summarizes the learning experience at a higher, more abstract level. On the other hand, individuals who lack closure after learning are deprived of this opportunity to extract higher level information. This study highlights this process by adding a condition that directly manipulates mental summarization. More specifically, I demonstrate in this study that, even for participants who lack closure (low closure condition), I can mimic the effect of high closure on subjective knowledge by adding a recap session that presents higher-level information from the learning experience. In contrast, a recap session that presents lower-level information from the learning experience should not increase subjective knowledge among low closure participants.

The second goal of this study was to examine an important downstream consequence of subjective knowledge, namely, external information search. Consumers who feel less knowledgeable about a product are more likely to seek recommendations and search for additional information (Brucks 1985; Radecki and Jaccard 1995). Therefore, I predicted a mirroring pattern from previous studies, such that participants who had had closure or had formed a summary representation of the learning experience would be the ones who feel the lowest need to seek additional information.

METHOD

Participants and design

One hundred and thirty-six participants on Amazon Mechanical Turk completed the online survey in exchange for a small monetary reward. The experiment was a 2

(closure: high vs. low) x 3 (cue-level: abstract vs. concrete vs. no cues) between-participants design.

Procedure

Participants engaged in the same cheese-learning experience as in prior studies, i.e., reading the Cheese Booklet. They clicked a button on their screen to open a new window that was the booklet. Similar to study 1b, I told participants that the booklet consisted of total 4 pages when in fact there were only 3 pages. The page number of the booklet was clearly stated on top of the window (e.g., "Page 1 of 4"). When participants reached page 3, they were told that their time was up, and that they would not be reading the final page of the booklet. They were also told they would only be asked questions from the pages that they read.

Then, I manipulated high or low feelings of closure using the same embodiment paradigm used in study 1b. In the high closure condition, I told participants "In order for the booklet to work smoothly for other survey takers, the survey window must be closed properly." Then they proceeded to the next page where they saw a button. They clicked the button to close the booklet window and returned to the main survey window. In the low closure condition, participants were told "In order for the booklet to work smoothly for other survey takers, the survey window must NOT be closed right now… Leave this booklet window open and running in the background and simply return to the main survey." After returning to the main survey window, participants answered questions that checked whether the closure manipulation was successful. These items were the same as the ones used in prior studies (e.g., "I feel ready to move on from the learning experience").

Then, I assigned participants to one of the three conditions varying in how cues from the booklet were presented. In two of these conditions, I presented either abstract or

concrete cues in the form of a recap session. Specifically, the top of the page read "Recap: you have just learned…" In the abstract cue presentation condition, I showed participants 5 headings, each corresponding to the five different sections of the booklet (e.g., "Consumption of Cheese and Health"). In the concrete cue presentation condition, I showed participants 5 facts from booklet, taking 1 fact from each 5 sections (e.g., "Cheese takes up about 1/10 the volume of the milk it was made from"). The other condition was included as a control group. Participants in this condition did not have any "recap" session and did not see any cues from the booklet. I included this condition to replicate the basic effect of closure found in prior studies.

As a downstream consequence of subjective knowledge, I asked two questions measuring participants' need for additional information. Specifically, I asked whether they would "like to receive cheese recommendations" if they were to bring cheese to a friend's house party, and whether they would be "interested in receiving an additional informational brochure about cheese." These questions were followed by a quiz measuring objective knowledge. The quiz was mostly identical to that used in study 2, with only one exception: I removed three quiz items that overlapped with the facts presented in the concrete cue presentation condition because the answers to these quiz items would have been given away from the presented cues in this condition.

Results and Discussion

Manipulation check

The closure manipulation was successful. Participants who closed the web browser reported feeling a greater sense of closure than those who left the web browser open in the background ($M = 4.59$, $SD = 1.05$ vs. $M = 4.10$, $SD = 1.15$; $t(134) = 2.61$, $p = .01$).

Objective knowledge

Participants quiz scores ranged from 2 to 9 out of a total possible score of 9. The mean was 5.01 (SD = 1.49) and median was 5. None of the treatments nor their interaction predicted participants' quiz performance (ps > .4).

External information search

The two items were strongly correlated (r = .52, p < .0001), and were averaged to form a single measure of need for external search. An ANOVA revealed only a significant interaction between closure (high closure vs. low closure) and cue-level (abstract vs. concrete vs. no-cues), $F(1,130) = 3.14$, $p = .05$, figure 2.4. To test the proposed theory, I conducted further simple effect analyses. First, I found that the high closure manipulation (i.e. closing the web browser) significantly reduced participants' information search need when participants did not see any cues from the booklet (M_{close} = 3.75, SD_{close} = 1.69 vs. M_{open} = 5.05, SD_{open} = 1.23; $t(44) = 3.02$, $p < .005$). In other words, I conceptually replicated the basic effect of closure on subjective knowledge.

The remaining simple effects analyses examined how cue presentation moderated the effect of closure on information search. I theorized that participants who had closure, or were somehow able to wrap up the learning experience at a higher level, would experience a greater sense of knowledge. Thus, even participants in the low closure condition, if they were given abstract cues that summarized their learning, should have a heightened sense of subjective knowledge. This prediction was supported. Within the low closure condition, compared to participants who did not see any cues (M = 5.05, SD = 1.23), those who saw abstract cues as a recap of what they learned exhibited a significantly lower external search need (M = 4.14, SD = 1.30; $t(48) = 2.55$, $p = .01$). Also as predicted, these participants (low closure and abstract cues condition) reported a similar information search need as those in the high closure and no cue condition (M = 3.75, SD = 1.69; $t(38)$

= .82, p = .42), and the high closure and abstract cues condition (M = 4.55, SD = 1.77; t(41) = .87, p = .39). The fact that these three groups showed a similarly lower need for external search is consistent with the idea that people feel most knowledgeable when they have a summary representation of the event with abstract cues readily available and salient.

While the findings pertaining to the presentation of abstract cues or no-cues (control) support my theory, the pattern is not as consistent for participants exposed to concrete cues from the booklet. Supporting my theory that availability of abstract cues is needed to feel knowledgeable, within the low closure condition, there was no difference between the no-cue (M = 5.05, SD = 1.23) and concrete cues condition (M = 4.75, SD = 1.73; t(46) = .71, p = .48). Again within the low closure condition, I also predicted that participants exposed to concrete cues would feel less knowledgeable and thus seek more external information than those exposed to abstract cues. This effect was directionally consistent, but not statistically significant (M = 4.75, SD = 1.73 vs. M = 4.14, SD = 1.30; t(40) = 1.31, p = .20). Within the high closure condition, I predicted that presenting people with concrete cues from the booklet would reduce participants' reliance on abstract cues extracted via the closure process, leading to reduced subjective knowledge and increased external search. This effect was also directionally consistent but did not reach statistical significance ($M_{concrete}$ = 4.26, $SD_{concrete}$ = 1.82 vs. $M_{control}$ = 3.75, $SD_{control}$ = 1.69; t(43) = .95, p = .35). Presenting concrete cues did not increase external search when compared with presenting abstract cues ($M_{abstract}$ = 4.55, $SD_{abstract}$ = 1.77; t(46) = .55, p = .58).

Discussion

Overall, the findings of this study support the proposed theory. The control group with only the closure manipulation (no recap session) showed a consistent pattern with findings of prior studies. Participants who simply closed the booklet window and

experienced a sense of closure were less likely to request further information compared to those who left the booklet window open, presumably because they felt more knowledgeable. Importantly, providing higher-level summary information in the form of a recap session helped participants with low closure feel as knowledgeable as participants with high closure who did not have a recap session. In contrast, providing a recap session with concrete cues did not help participants with low closure feel more knowledgeable.

The somewhat inconsistent pattern found in the concrete cue presentation conditions could be explained by an overall lower-than-predicted external search need in these conditions. The abstract cues in the recap session were only headings (or titles), while the concrete cues were actual information taken from the booklet. It may be the case that participants in these conditions, because they saw 5 pieces of actual information, felt a lower need to engage in additional information search, possibly to avoid information overload. An overall lower external search need in the concrete cue conditions would explain why I did not find a statistically significant difference between the abstract and concrete cue conditions within both high and low closure conditions. On the other hand, if there were a generally higher level of external search need in the concrete cue conditions, the findings would have confirmed my predictions.

Alternatively, since the most disconfirming evidence is the low external search (or high subjective knowledge) outcome in the high closure and concrete cues condition, it is possible that the concrete-cue recap session was not a strong-enough intervention to make concrete cues triumph the salience of the abstract cues already extracted through the high closure manipulation. In study 3, I was able to draw people's attention to concrete cues and undo the positive effect of closure on subjective knowledge. However, in study 3, the concrete cues were presented through a 10-item quiz that participants had to solve, whereas in this study, participants simply read 5 facts that were given to them. The former is likely

to be a more engaging process than the latter, thus a stronger way to make concrete cues more salient than abstract cues.

Overall, this study provides further insight into the mechanism of how closure affects subjective knowledge. I replicated the positive effect of psychological closure on subjective knowledge, while also showing that low closure can lead to the same outcome as high closure when followed by an abstract summary.

Chapter 15: General Discussion

Six experiments demonstrated how psychological closure on a learning experience leads to a heightened sense of subjective knowledge through a mental summarization process. Studies 1a and 1b demonstrated the basic effect while providing evidence that closure makes gist-level summary information highly available in people's memory. Study 2 provides further evidence for this mechanism by showing that the degree of summary representation mediates the effect of closure on subjective knowledge. Studies 3-5 also examine the proposed mechanism by showing that directing people's attention to lower-level details at the point of subjective knowledge estimation attenuates the effect of closure. On the other hand, by directing participants' attention to higher, gist-level information, I continued to observe the effects of closure, as I did in studies 1a, 1b, 2, and 3 (T1) in the absence of induced higher-level focus. This is consistent with the notion that people tend to spontaneously rely on higher-level cues when they are available (Alter et al. 2010; Miller 1981; Navon 1977; Reyna and Brainerd 1995). Further, I replicated the closure effect and made participants in the low closure group feel just as confident as those in the high closure group, by presenting summary information (i.e. headlines) to them before subjective knowledge assessment (study 6). The robustness of the effect was demonstrated by employing various product categories, closure manipulations, and mindset activation methods. The effect was also robust against high accuracy motivation.

THEORETICAL CONTRIBUTIONS

As reviewed earlier, the majority of literature on psychological closure examines emotional experiences and shows that closure reduces negative emotion (Beike et al. 2007; Li et al. 2010). Despite the focus of prior research, I believe that psychological closure is experienced or sought after in a broader spectrum of experiences including non-negative

and non-emotional domains. This is consistent with research showing that the ending, or final moment of a series of events is generally important in both retrospective evaluation and future planning (Ariely and Carmon 2000; Loewenstein and Prelec 1993). This research is the first to examine the effects of proper endings that provide a sense of closure in the context of consumer learning. Thus, I contribute to the psychological closure literature in two important ways: first by examining the effect of psychological closure in a non-emotional domain (i.e., consumer learning) and second, by discovering cognitive consequences of psychological closure, namely, summary representation and heightened subjective knowledge.

The present work also contributes to the subjective knowledge literature by revealing psychological closure as a unique determinant. Understanding how to utilize closure in order to increase or decrease consumers' sense of subjective knowledge can be applied to many marketing contexts. Marketers may want their customers to feel a high sense of closure and a sense of understanding. In this case, to increase satisfaction and perceived benefit after an educational program or material, certain procedures can be added to facilitate the closure process. Focusing attention to complete aspects, making salient the "pastness" of an experience via task-framing, or simply closing the web browser are examples used in this research.

Finally, the present research also makes theoretical contributions to the literature on goal pursuit, by providing insight to the subjective experience at the moment of goal fulfillment or failure. Fulfilling (vs. failing) learning goals would most likely lead people to feel more knowledgeable (Amir and Ariely 2008). The present research shows that, beyond actual goal fulfillment, the psychological resolution that allows people to move on can also change the way people estimate their knowledge. Even when all participants failed to complete their learning (study 1b, study 6), or completed their learning in its entirety

from beginning to end (studies 1a, and 2 through 5), a heightened sense of closure led to a more summarized representation of the learning experience and greater subjective knowledge. Consistent with these results, one could easily find daily examples of closure on a failed goal (e.g., moving on from a failed test), or attempts to further enhance feelings of closure on an already fulfilled goal (e.g., attending a graduation ceremony).

Indeed, the moderating effects of individuals' level of focus (whether it is manipulated through a mindset prime, temporal distance manipulation, or presentation of concrete cues) highlight the unique cognitive process activated by psychological closure. That is, the interaction patterns from studies 3 through 5 clearly demonstrate that the effect of closure is diminished once participants adopt a lower-level focus; this is consistent with the gist-extraction or summarization mechanism of closure rather than feelings of fulfillment.

While my studies hold actual progress constant, it is likely that completed goals are easier to move on from than incomplete ones (Zeigarnik 1927). Thus, an interesting extension of my findings would be to examine whether the goal pursuit process (e.g., the various means towards the goal) is represented in a more summarized and simplistic fashion in retrospect after the goal is fulfilled versus unfulfilled.

FUTURE RESEARCH

An interesting area for future research would be to expand the context of learning experiences beyond those in the present studies. Many consumer learning experiences are structured, such as those provided here (e.g., reading a brochure, taking a class, attending a conference). However, the concept of "life lessons" (Beike et al. 2004) highlights the possibility of unstructured or unplanned life events also becoming valuable learning experiences (e.g., learning from bad decisions).

In an everyday consumer setting, for instance, a set of experiences as simple as trying food samples at a grocery store or watching TV commercials can be considered a learning process. Would a formal act of closing the lid before leaving the food vendor create a greater feeling of evaluation certainty? Does the storyline of a TV commercial with high or low closure make people feel as if they have a good or poor understanding about the advertised product? Many of these questions are worth exploring as consumers' lives are in some way an endless experience of learning about products and brands.

Furthermore, a meta-analysis conducted by Carlson et al. (2009) found greater discrepancy between objective and subjective knowledge for non-products (e.g., medical services, health plans) compared to products. The present research only used tangible product categories as learning experiences; however, it is possible that closure has an even stronger effect after learning about services or more intangible goods. On a related note, it is also possible that psychological closure increases subjective knowledge more when the subjective knowledge is captured at a general level. This is because individuals may rely less on higher level cues when assessing subjective knowledge at a more specific, lower level (e.g., the feeling-of-knowing effects regarding concrete facts).

Finally, the effect of closure on objective knowledge also requires further research. It is unclear in which direction and to what extent closure has an effect on objective knowledge. Closure is associated with less rumination and recall of emotional details (Beike and Wirth-Beaumont 2005). These findings, however, apply to negative and emotional experiences where people might have been implicitly motivated to forget specific details that upset them. It is unclear whether the same effect will occur when there is no affect-driven motivation to forget. While the studies in the present research were not designed to specifically answer this question, they display mixed results. Among the four studies that used quizzes to test objective knowledge, closure had no effect in three (studies

2, 4, & 6), and a somewhat negative effect in one (by interacting with psychological distance; study 5). In study 5, closure impaired quiz performance when participants were primed with greater psychological distance. Although the result of a single study is insufficient to draw conclusions, it is worth mentioning the possibility that psychologically moving on from a learning experience could reduce the amount of concrete details remembered, while heightening the general feeling of knowledgeableness.

In conclusion, the present research broadens the way psychological closure is conceived in the literature to include not only negative emotional experiences, but also non-emotional experiences, such as learning. Specifically, I uncover a previously unexplored cognitive consequence of psychological closure, i.e., mental summarization and extraction of higher gist-level cues, and show this can heighten subjective knowledge. I hope to facilitate future research in this area as psychological closure may be experienced and sought after in both emotional (whether positive or negative) and non-emotional domains, and in both significant and mundane consumer events.

CONCLUSION

Consumers' everyday lives are filled with both big and small events, such as enjoying a nice meal at a restaurant, reading wine labels at a store, arguing with a service representative, or taking off for an exotic vacation. As one event unfolds after another, some consumers may easily "move on" from the previous and fully engage in what is happening in the here and now. Others may experience a harder time putting those events behind them. My dissertation examines the consequences of moving on, of getting closure. What goes on in consumers' minds when they move on from a past event, and why is this relevant to marketers?

Specifically, my two essays tackle the role of closure on consumers' cognition, emotion, and perception. My first essay shows that, by giving closure on a negative consumer event (e.g., a service or product failure), consumers' negative emotional reactions can be weakened, leading to increased psychological distance perceptions. As a result, the negative consumer event seems like it happened a longer time ago, and in a further away location. Furthermore, the negative consumer event seems less likely to happen again in the future, and problems associated with the product seem less prevalent as a result of closure.

My second essay examines the role of closure in the context of consumer learning (e.g., reading a brochure about a product) by showing how closure affects cognitive representation and subjective knowledge assessments. I find that the experience of closure on a learning experience triggers people to wrap up or summarize what they learned at a higher level. The salient higher-level cues extracted via closure then lead people to feel a heightened sense of knowledgeableness about the learned topic.

Moreover, I demonstrate various closure induction techniques across my studies in both essays. This was not only to test the robustness of my findings, but also to highlight the practical relevance of understanding the role of psychological closure in consumer behavior. While psychological closure can be naturally achieved over time, it has also been shown to be a malleable, subjective experience that can be experienced as a result of external influences. Following prior work (Beike et al. 2007; Beike and Crone 2008), I show that people can gain a sense of closure by focusing on the closed (vs. open) aspects of an experience, which is a tactic that can be applied when framing messages in advertisements and campaigns. Applying and building on prior work related to embodied cognition (Gu et al. 2013; Li et al. 2010), I successfully manipulated psychological closure by having participants enclose a service complaint letter in an envelope, and also by having them close a web browser at the end of their online learning experience. Additionally, I developed a task-framing method to enhance participants' perception that they have moved on from the previous experience.

Prior research on psychological closure has mainly focused on its emotional benefits, showing that when people move on from an experience, they tend think about the experience less frequently and with less emotional reaction. My dissertation builds on this work and expands our current knowledge about how psychological closure affects people. I move beyond showing emotional consequences to demonstrate how closure affects people's perceptions of distance and risk (essay 1) and cognitive representation and metacognitive self-assessment of knowledge (essay 2).

I believe psychological closure as a research topic has vast potential for future inquiries. For example, people will most likely vary in their ability to move on and in their degree of strategic effort they put in to find closure. This suggests that some individuals would be more susceptible than others in terms of how much they are influenced by

symbolic events and interventions designed to deliver closure (e.g., funerals, graduation ceremonies, divorce parties). However, there is not yet an appropriate scale that measures this individual difference as a chronic an enduring trait. Developing this scale would not only allow us to examine the process of closure more deeply, but it would also help us gain a better understanding about other traits and characteristics it is related or unrelated with. For example, do people with a high need or ability to achieve closure also have a high need for cognitive closure? Are these people better emotion regulators or are they less affected by sunk costs or house-money effects in their financial decisions? Having a proper measure of psychological closure would help us answer many intriguing questions that remain unanswered.

Another area of future research is to examine the role of closure as a goal or motivational drive. All studies in my dissertation either impose high or low feelings of closure to participants. However, closure may motivate people to behave in certain ways, and one possibility is that closure can determine consumption quantity. Many products and services involve multiple parts or sections that are consumed in series. For example, television programs have multiple episodes, college courses have multiple lectures, and wine-tasting sessions have multiple glasses of wine. In a lot of these cases, there are too many consumption units or episodes for a consumer to experience at once. But if a consumer starts to engage in these series of episodes, when does she stop? Gestalt psychology (Koffka 1922; Köhler 1929; Wertheimer 1912) studies organisms' tendency to perceived global patterns, shapes, and meaning before seeing separate parts, or as Lurie and Mason (2007) put it, perceptual sense-making. Therefore, it is plausible that completion points of perceived patterns may seem as a natural breaking point during a series of consumption episodes because of the associated sense of closure. This has implications for product organization and presentation (e.g., how many products are

displayed in each row). Moreover, the notion of constructed satiation, that satiation can be affected by subjective experience rather than objective consumption amount (Redden and Galak 2010), hints at the possibility that closure can enhance feelings of satiation.

These are only some general directions for future research, as the possibility of future research in this area seems abundant. I look forward to continued investigation of this topic to better understand the cognitive, emotional, perceptual, and motivational processes associated with psychological closure in various domains not limited to negative consumer experiences.

Figure 1.1: Effect of closure on temporal distance mediated by emotional intensity

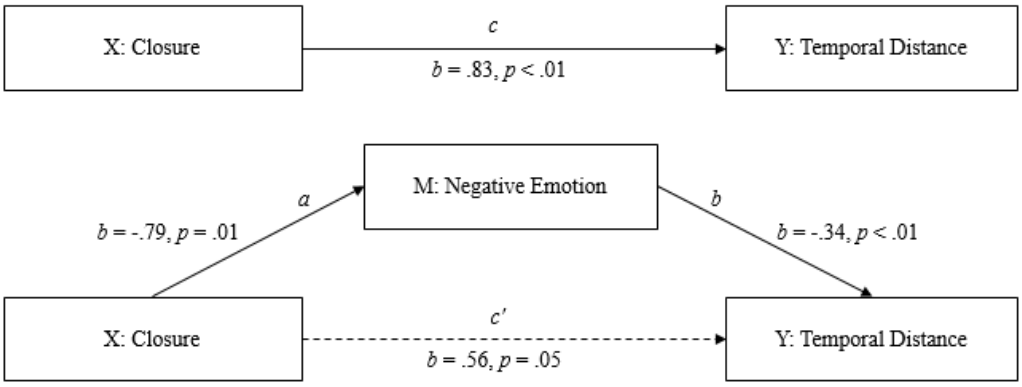


Figure 1.2: Effect of closure on probabilistic distance mediated by emotional intensity

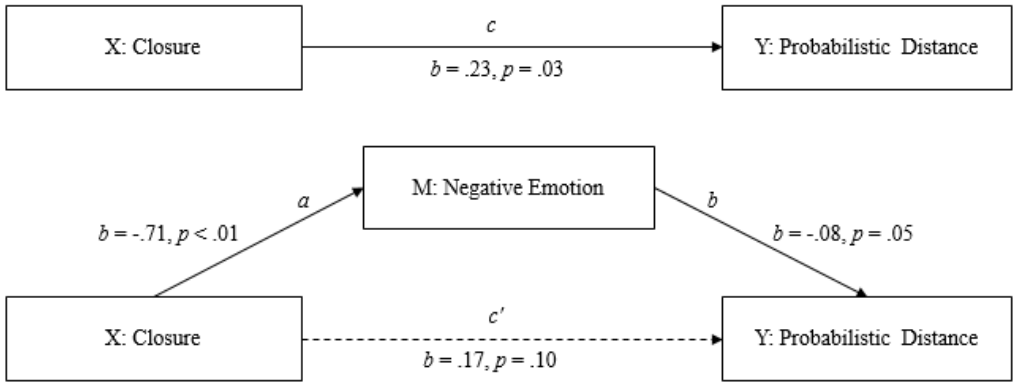


Figure 1.3: Emotionality by closure on probabilistic distance estimated at ±1 SD from average emotionality

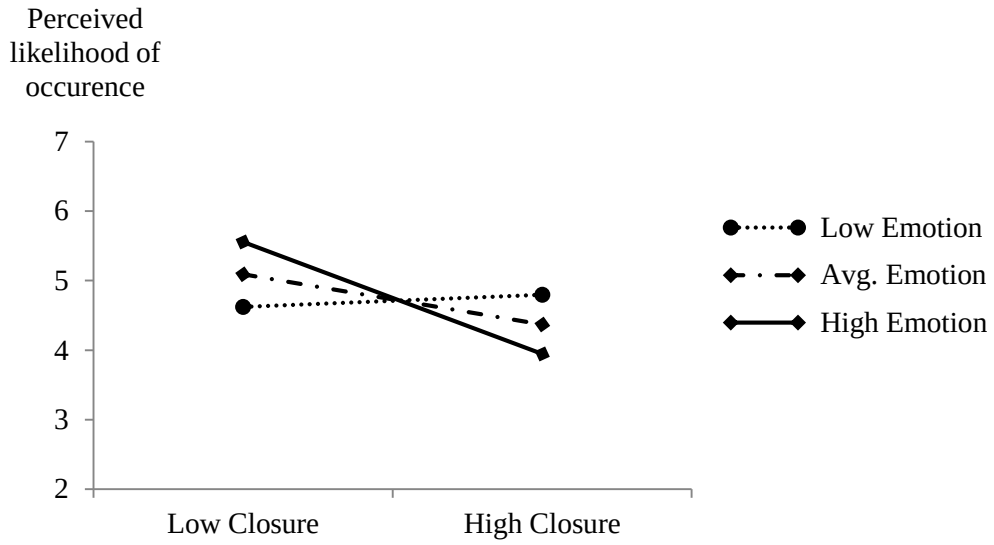


Figure 1.4a: Description emotionality by closure on perceived temporal distance

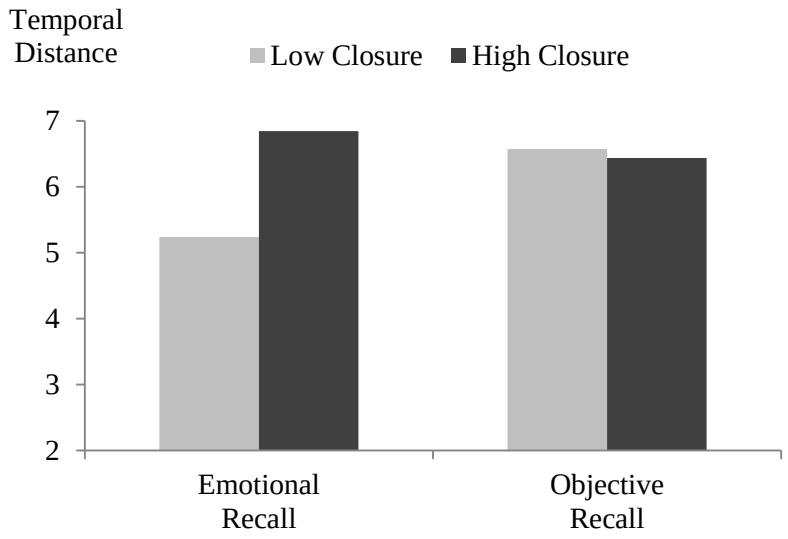


Figure 1.4b: Mediation by emotional intensity conditional on description emotionality

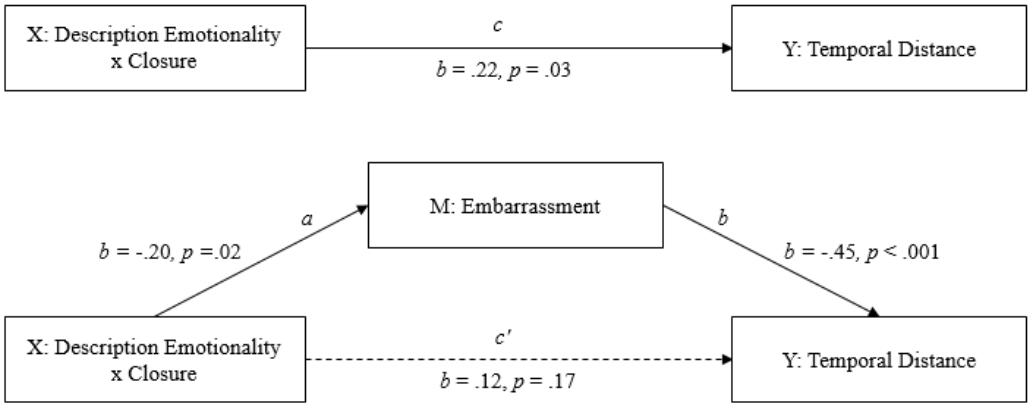


Figure 1.5a: Emotionality by closure on warranty purchase intention

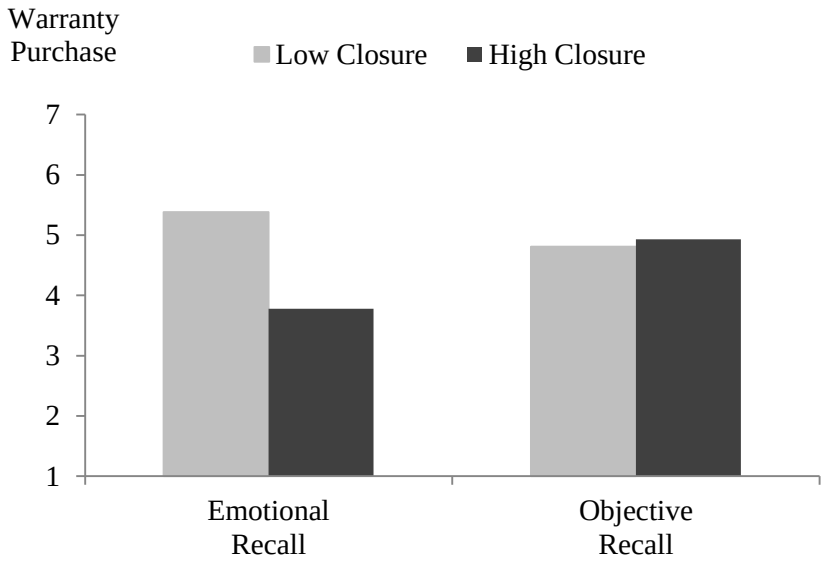


Figure 1.5b: Mediation by emotional intensity on probabilistic distance, conditional on description emotionality

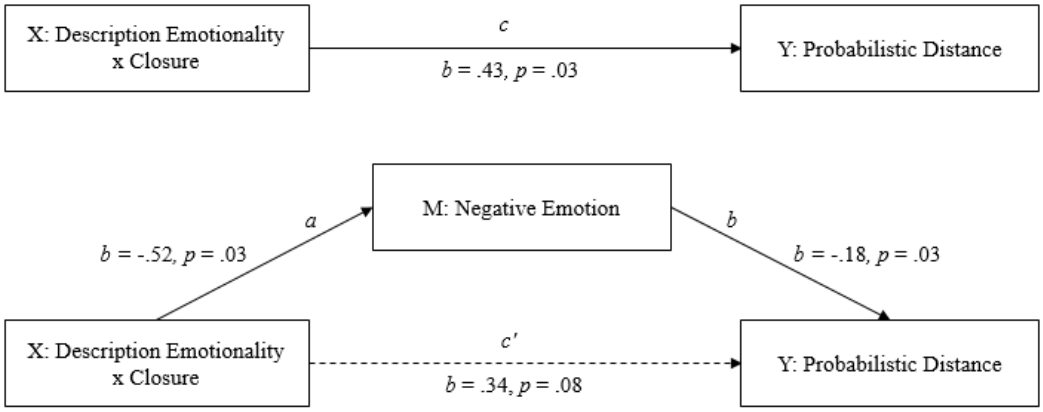


Figure 1.6a: Negative emotion associated with product depending on the extent to which participants felt they got their money's worth and participants' perceived problem inconclusiveness

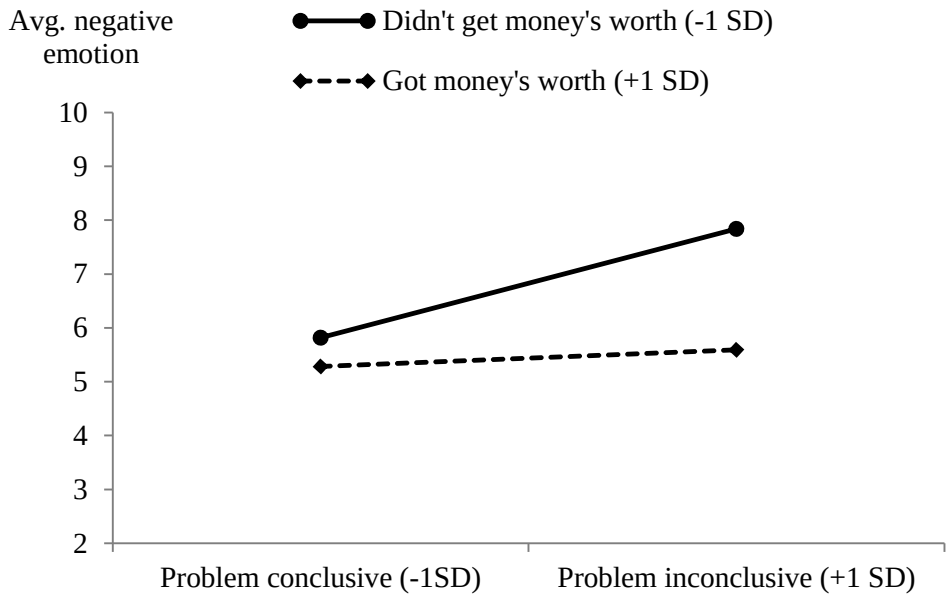


Figure 1.6b: Effect of psychological closure manipulation on probabilistic distance (predicted values) depending on getting money's worth and problem inconclusiveness

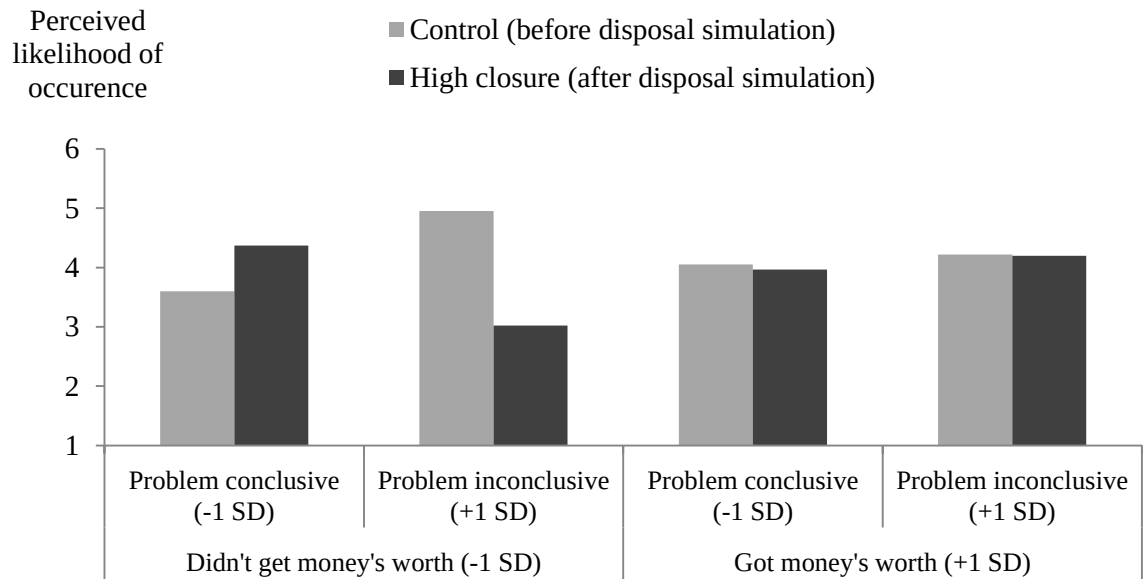


Table 2.1: Correlations (Pearson's R) between experienced closure, perceived cohesiveness, and subjective knowledge

	High-Closure Condition		Low-Closure Condition	
	Perceived Cohesiveness	Subjective Knowledge	Perceived Cohesiveness	Subjective Knowledge
Experienced Closure	.28 (p = .01)	.41 (p < .001)	.38 (p < .01)	.42 (p < .01)
Perceived Cohesiveness	–	.41 (p < .001)	–	.31 (p < .01)

Figure 2.1: Subjective knowledge by closure at before versus after concrete cue presentation

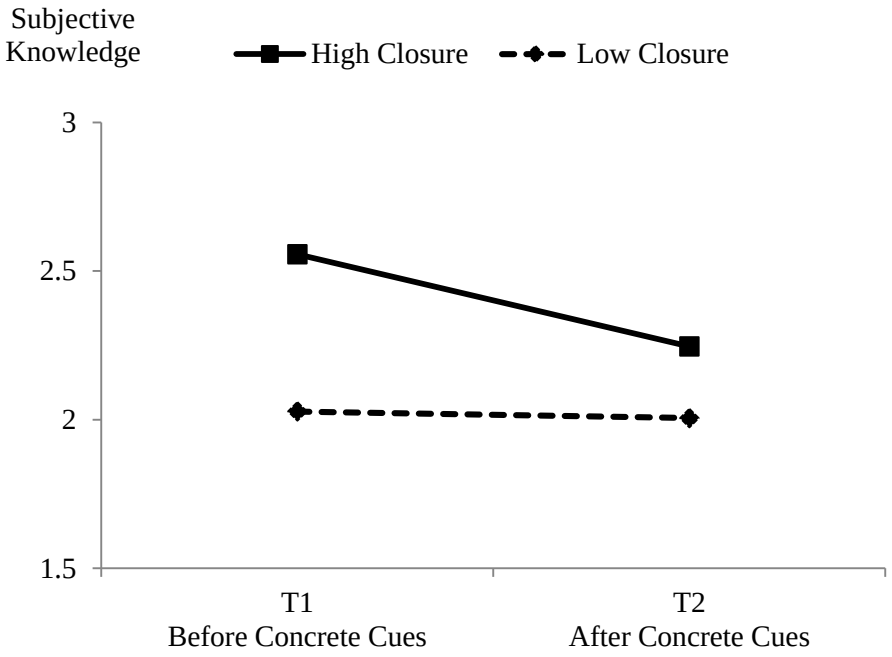


Figure 2.2: Subjective knowledge by closure and construal level

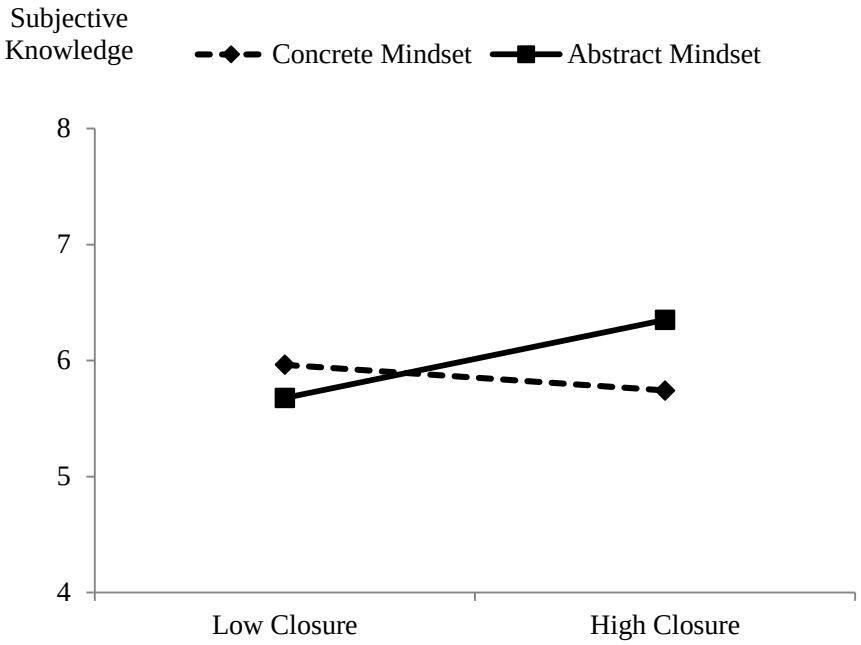


Figure 2.3 Subjective knowledge by closure and temporal distance

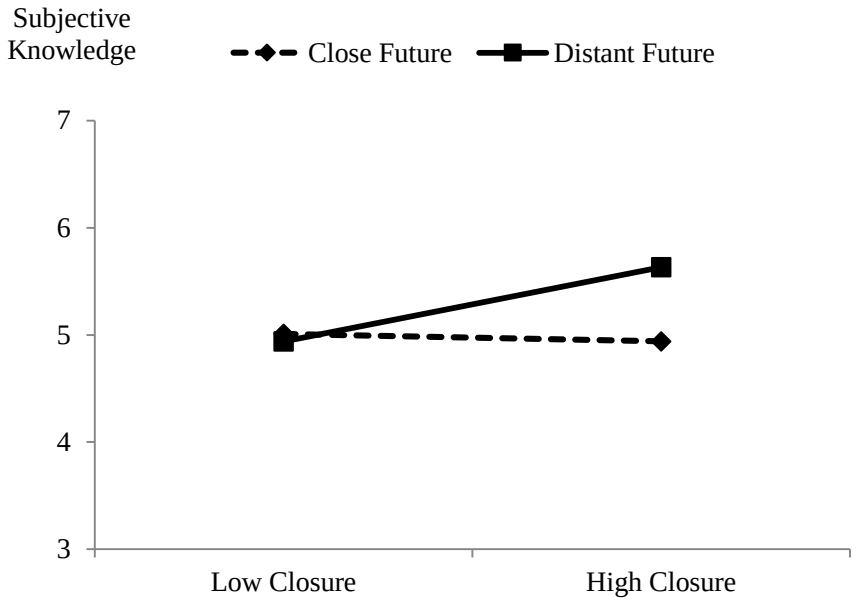
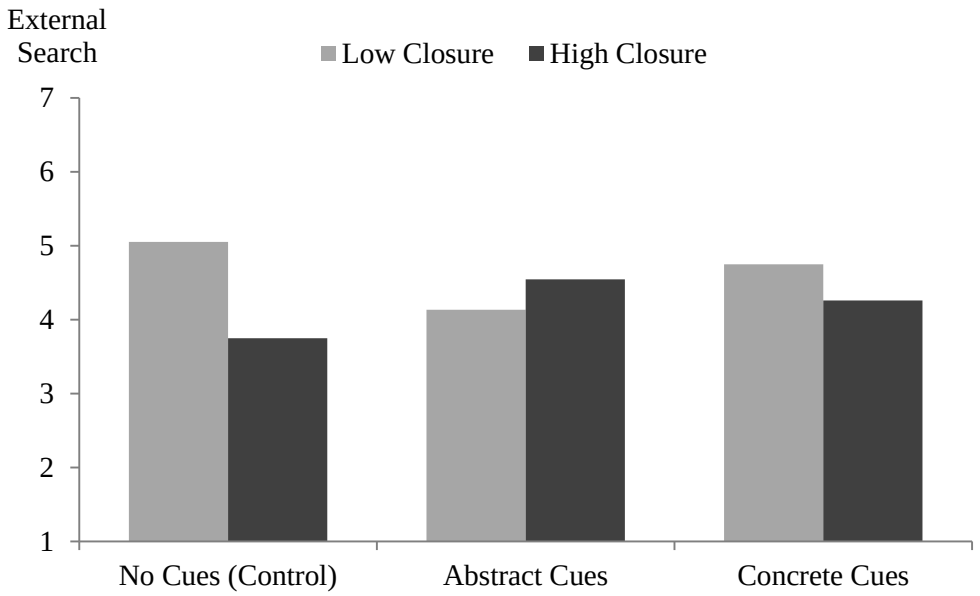
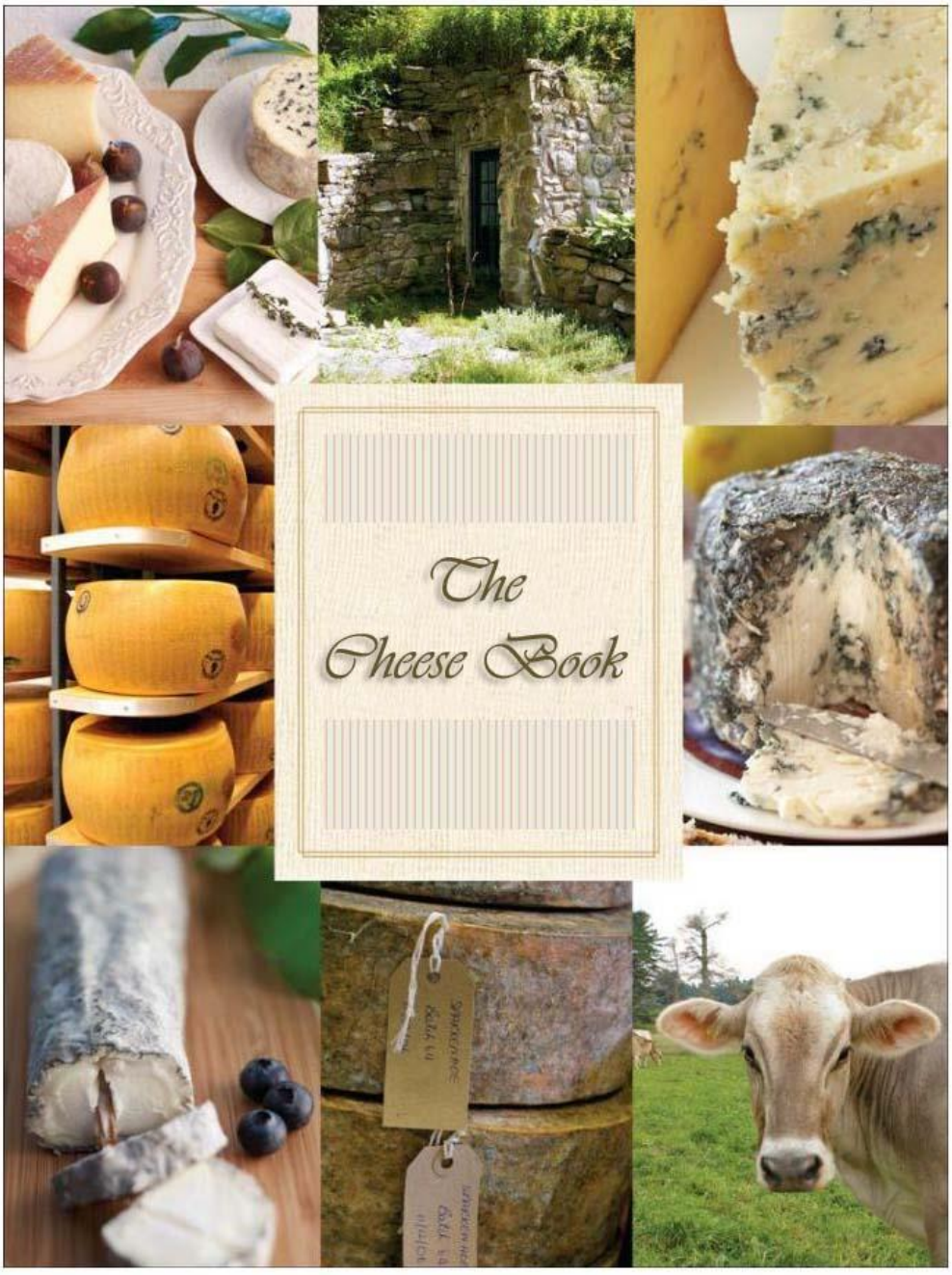


Figure 2.4 External search by closure and cue-level



Appendix A

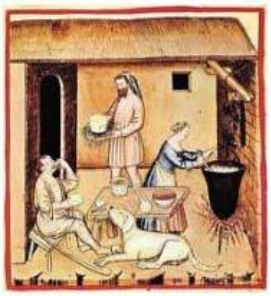


THE HISTORY BEHIND CHEESE

Where did the word 'cheese' come from? The root of the English word cheese comes from the Latin caseus, which also gives us the word casein, the milk protein that is the basis of cheese. In Old English, caseus was cīese or cēse, which became chese in Middle English, finally becoming cheese in Modern English. Caseus is also the root word for cheese in other languages, including queso in Spanish, kaas in Dutch, käse in German, and queijo in Portuguese. The earliest source is from the proto-Indo-European root *kwat-*, which means *"to ferment, become sour"*.

How was cheese first discovered? Cheese is an ancient food whose origins predate recorded history. There is no conclusive evidence indicating where cheese-making originated. Since animal skins and inflated internal organs have, since ancient times, provided storage vessels for a range of foodstuffs, it is probable that the process of cheese making was discovered accidentally by storing milk in a container made from the stomach of an animal, resulting in the milk being turned to curd by the rennet from the stomach. (*Rennet (pronounced /ˈrɛnɪt/) is usually a natural complex of enzymes produced in any mammalian stomach to digest the mother's milk, and is often used in the production of cheese.) Observation that the effect of making milk in an animal stomach gave more solid and better-textured curds, may have led to the deliberate addition of rennet.

Cheese in the early days The earliest archeological evidence of cheese-making has been found in Egyptian tomb murals, dating to about 2000 BCE. The earliest cheeses were likely to have been quite sour and salty, similar in texture to rustic cottage cheese or feta, a crumbly, flavorful Greek cheese. Cheese produced in Europe, where climates are cooler than the Middle East, required less salt for preservation. With less salt and acidity, the cheese became a suitable environment for useful microbes and molds, giving aged cheeses their respective flavors. Some cheeses have molds on the rind or throughout.



THE PROCESS OF MAKING CHEESE

Process Cheese consists of proteins and fat from milk, usually the milk of cows, buffalo, goats, or sheep. It is produced by coagulation of the milk protein casein. Typically, the milk is acidified and addition of the enzyme rennet causes coagulation. The solids are separated and pressed into final form. Their styles, textures and flavors depend on the origin of the milk (including the animal's diet), whether they have been pasteurized, the butterfat content, the bacteria and mold, the processing, and aging.

Curdling For a few cheeses, the milk is curdled by adding acids such as vinegar or lemon juice. Most cheeses are acidified to a lesser degree by bacteria, which turn milk sugars into lactic acid, then the addition of rennet completes the curdling.

Coloring Cheddar, Cheshire and Leicester cheeses have been colored with annatto seed for over 200 years. Carrot juice and marigold petals have also been used to color cheeses. Coloring may have originally been added to cheese made with winter milk from cows eating hay to match the orange hue (from vitamin A) of cheeses made with milk from cows fed on green plants.



TYPES OF CHEESES AND FUN FACTS

There are over 2,000 varieties of cheeses. Factors relevant to the categorization of cheeses include: length of aging, texture, methods of making, fat content, kind of milk, country/region of origin.

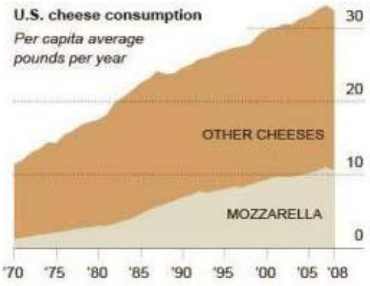
The #1 cheese recipe in America is "Macaroni and Cheese". Macaroni and Cheese is on the Top 10 list of children's' favorite foods and it's been served since the late 1700's.

Swiss cheese has a piquant, but not very sharp, taste. The most recognizable characteristic of Swiss cheese is its holes which punctuate the pale yellow exterior. These holes, also called "eyes," are caused by the expansion of gas within the cheese curd during the ripening period. Swiss cheese without eyes is known as "blind."

So-called **blue cheese** is created by injecting a cheese with *Penicillium roqueforti* or *Penicillium glaucum*, which may be further enhanced by piercing a ripening block of cheese with skewers in an atmosphere in which the mold is prevalent. The mold grows within the cheese as it ages. These cheeses have distinct blue veins, which gives them their name and, often, assertive flavors. The molds range from pale green to dark blue, and may be accompanied by white and crusty brown molds. Blue cheese is believed to have been discovered by accident. The caves in which early cheeses were aged shared the properties of being temperature and moisture controlled environments, as well as being favorable to many varieties of mold.

Limburger cheese is notorious for its strong and generally unpleasant odor. The bacteria known as *brevibacterium linens* causes this. It is also found on human skin and is partially responsible for body odor. The Chalet Cheese Cooperative, located in Monroe, Wisconsin, is the only maker of limburger cheese in North America today.

CONSUMPTION OF CHEESE AND HEALTH



Cheese consumption in the U.S. has almost tripled since 1970. Americans are especially stuck on mozzarella. It will be no surprise to pizza lovers that the single most frequently eaten cheese is Mozzarella. Cheddar was a close second and we ate 2.7 billion pounds of that.

Cheese is valued for its high content of fat, protein, calcium, and phosphorus. Nutritionally, cheese is essentially concentrated milk (it takes up about 1/10 the volume of the milk it was made from). Cheese is America's number one source of saturated fat. Whether cheese's highly saturated fat actually leads to an increased risk of heart disease is called into question when considering France and Greece, which lead the world in cheese eating, have relatively low rates of heart disease. This seeming discrepancy is called the French paradox; the higher rates of consumption of red wine in these countries are often invoked as at least a partial explanation.

Cheese is often avoided by those who are lactose intolerant, but ripened cheeses like Cheddar contain only about 5% of the lactose found in whole milk, and aged cheeses contain almost none. Nevertheless, people with severe lactose intolerance should avoid eating dairy cheese. As a natural product, the same kind of cheese may contain different amounts of lactose on different occasions, causing unexpected painful reactions.

At refrigerator temperatures, the fat in a piece of cheese is as hard as unsoftened butter, and its protein structure is stiff as well. Flavor and odor compounds are less easily liberated when cold. For improvements in flavor and texture, it is widely advised that cheeses be allowed to warm up to room temperature before eating.

CULTURAL ATTITUDES TOWARDS CHEESE

Although cheese is a vital source of nutrition in many regions of the world, and is extensively consumed in others, its use is not universal. Cheese is rarely found in East Asian dishes, as lactose intolerance is relatively common in that part of the world. Even in cultures with long cheese traditions, it is not unusual to find people who perceive cheese - especially pungent-smelling or mold-bearing varieties such as Limburger or Roquefort - as unpalatable. Food-science writer Harold McGee proposes that cheese is such an acquired taste because it is produced through a process of controlled spoilage and many of the odor and flavor molecules in an aged cheese are the same found in rotten foods.

Appendix B

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Dark-Bright Contrast Ratio: The ratio of the brightness between the brightest color (white) to that of the darkest color (black) that the system is capable of producing. For example, a 1000:1 contrast ratio means that the brightest white is 1000x brighter than the darkest black. High contrast dark-bright contrast generally makes TV pictures more vivid and clear.

Online and Offline Media Connection: If a Smart TV has this feature, the TV can seamlessly connect to other local and online media. For example, you can use your TV to search and play videos on your computer or phone storage. You can also connect to online media such as Hulu or YouTube.

Skype™ Ready: Having this feature on your smart TV means the Skype service is completely integrated into your TV. In other words, your TV is the new Skype machine. With this feature, you can have video chats in high resolution in the comfort of your living room. It's the closest thing to sitting down on the couch together.

USB port: With this feature, you can plug a USB drive into your TV and use it as an external storage. If your USB drive has pictures and music, you can play them with your TV by simply plugging the USB drive into your Smart TV.

Panel Back-Lighting Technology Type (LED or LCD): Your Smart TV will either have an LCD screen or an LED screen. LED TVs are actually a type of LCD TV. LCD TVs use standard compact fluorescent tubes to illuminate the TV picture. LED TVs, on the other hand, replace those fluorescent tubes with backlighting technology to create much brighter and clearer images.

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Thematic Picture Enhancement Mode: This feature gives you four preadjusted options of picture enhancement modes to choose from - Vivid / Standard / Cinema / Game. Whatever you are doing or watching with your TV, you can select the best picture enhance mode for it.

Built-In Camera: A smart TV with a built-in camera allows you to take pictures, record home movies, and also video chat.

Light Sensor and Automatic Brightness Adjustment: Your eyes can get tired when the screen is too bright at night, or when the screen is not bright enough during the day. A smart TV with this feature has a built-in sensor that detects how much light is in the environment. In a dark room, the TV will slightly dim its brightness. In a light room, the TV would sligthly increase its brightness. This feature is not only good for your eyes, but also for the planet because it saves energy.

Voice Typing: You can use your voice to type anything on your smart TV. For example, when surfing the web with your smart TV, simply say what you want to search instead of typing it. When using Facebook with your smart TV, go to your friends' Facebook pages by simply calling their name.

Voice Control: You can use your voice as a remote control. For example, you can turn off the TV by saying "TV Off" or turn it on by saying "TV On." You can even switch channels, adjust speaker volume, or adjust screen brightness with your voice. You can also customize what you want to say when giving orders to your TV.

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Smart Phone Remote Control: You can download a "remote control app" to your smart phone which tranforms any smart phone into a smart TV remote control. You can even control your TV from anywhere you have internet access — if you can't make it home in time for the big game, order your smart TV with your phone to record the show.

Closed Caption (Follow Show with On-Screen Text): This TV feature offers closed captioning for TV shows and movies. This allows you to keep up with shows even when on mute because a text appears on the bottom of the screen describing what is happening and what people are saying. It's also great for those with hearing impairments.

Built-In Surround Speakers: If your smart TV has this feature, you don't need separate expensive audio equipment. The surround speakers will project sounds realistically through the room so that you feel like you're right in the middle of the scene.

Screen Resolution: Even with the same screen size, there's a huge difference in image quality between high and low resolution screens. Screens with high resolution can present small images with greater precision because it has more pixels in a given screen area. Therefore, TVs with higher screen resolutions are clearer and more vivid.

2D-to-3D Viewing Technology: If your smart TV has this feature, you can watch any TV program or movie in 3D, even if they were originally recorded in 2D. You can even view your photos in 3D. When you turn on this feature, you will feel like the dynamic scenes in sports, action movies, or video games are coming alive in 3-dimensional space.

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Sound Zoom-In & Zoom-Out (3-Dimensional Sound Projection): This technology makes you hear sounds at moving 'depths' to make the TV viewing experience more realistic. Objects in your TV screen that are approaching you will sound larger and larger (sound zoom-in) while those that are moving away from you will sound smaller and smaller (sound zoom-out). These sound effects will give you an enhanced 3-dimensional experience.

Dialogue-Enhancing Clear Voice Technology: When watching TV, it is sometimes difficult to distinguish human voice from other background audios. This technology automatically amplifies and enhances the sound of human voice to help keep dialogue audible when background noise swells. It makes it easier to watch movies without having to turn up the sounds to hear the actors, which puts less stress on your ears.

Thematic Sound Enhancement Mode: This feature gives you six preadjusted options of sound enhancement modes to choose from - Standard / Music / Cinema / Sport / Game / Movie. Whatever you are doing or watching with your TV, you can select the best sound enhancement mode for it.

Built-In Wi-Fi: This features helps you to meet all your online needs because it always connected to the Internet. For example, you can surf the web, check your Facebook page, and play music or video from the web.

Energy Saving: This feature can help you save money and the planet at the same time. This feature uses technology that reduces and recaptures lost energy. An energy efficient smart TV can lower your electricity bills.

Dual Split Screen: This feature allows you to split your screen into two. You can play two different TV programs at the same time using separate headsets for audio. You can use the Internet on one half of the screen, while streaming a YouTube video on the other half. You can also play video games with a friend without being tied to sharing the same scene.

App Store: Smart TVs are linked to their own app stores where new apps are constantly developed. Just like a smart phone app store, a smart TV app store helps bring unlimited content to your TV. Play all your favorite games, watch your favorite videos, listen to your favorite music, all through the quality image and sound of your Smart TV. Apps include Hulu, Redbox, Netflix, and more.

Customizable Parental Restrictions: This feature equips your smart TV with various parental restriction options. You can give each of your children a separate account with a log-in ID and customize the setting for each account. For example, you can control what channels will be available for each account, or what times of the day the account can be accessed for TV viewing.

Motion/Gesture Remote Control: With this feature the smart TV can read your motion. This allows you to use gestures to control the TV. For example, you can wave good-bye with your hands to the TV to turn it off, or move your arms up and down to control the volume.

Motion/Gesture Gaming: This features allows you to download highly interactive games from the app store and play them by moving your body. By moving your arms, you can play games like virtual basket ball, ping pong, or baseball. You can use your legs to play virtual soccer.

Appendix C

Introduction

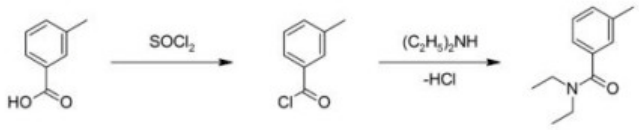
DEET is a slightly yellow oil that is liquid at room temperature. It is one of the most common active ingredients in insect repellents. It is intended to be applied to the skin or to clothing, and is primarily used to repel mosquitoes. DEET also protects against tick bites, preventing tick-borne meningoencephalitis and other tick-borne diseases such as Lyme disease.

History Behind DEET

DEET was developed by the United States Army, following its experience of jungle warfare during World War II. It was originally tested as a pesticide on farm fields, and entered military use in 1946 and civilian use in 1957.

How DEET Works

A slightly yellow liquid at room temperature, it can be prepared by converting m-toluic acid (3-methylbenzoic acid) to the corresponding acyl chloride, and allowing it to react with diethylamine:



DEET was historically believed to work by blocking insect olfactory receptors for "1-octen-3-ol", a substance that is contained in human sweat and breath. The prevailing theory was that DEET effectively "blinds" the insect's senses. However, more recent evidence shows that DEET serves as a repellent in that mosquitoes intensely dislike the smell of the chemical. A type of olfactory receptor neuron in mosquitoes that is activated by DEET as well as other known insect repellents has been identified. Some recent evidence shows that, besides having known toxic effects on the olfactory system, DEET also acts on the brain of insects, and that its toxicity is strengthened in combination with other insecticides.

DEET in Products

DEET is often sold and used in spray or lotion in concentrations up to 100%. Consumer Reports found a direct correlation between DEET concentration and hours of protection against insect bites. 100% DEET was found to offer up to 12 hours of protection while several lower concentration DEET formulations (20%-34%) offered 3-6 hours of protection.

Effects on Health

When used as directed, products containing between 10% to 30% DEET have been found by The American Academy of Pediatrics to be safe to use on children as well as adults but recommends that DEET not be used on infants less than two months old.

As a precaution, manufacturers advise that DEET products should not be used under clothing or on damaged skin, and that preparations be washed off after they are no longer needed or between applications. DEET can act as an irritant; in rare cases, it may cause skin reactions.

Effects on Materials

DEET is an effective solvent, and may dissolve some plastics, rayon, spandex, other synthetic fabrics, leather, and painted or varnished surfaces including nailpolish.

Effect on the Environment

Although few studies have been conducted to assess possible effects of DEET on the environment, DEET is a moderate chemical pesticide and may not be suitable for use in and around water sources. Though DEET is not expected to accumulate in an organism's body, it has been found to have a slight toxicity for coldwater fish such as the rainbow trout and the tilapia.

Repellent Safety

- Use only small amounts of repellent on children. Try to reduce the use of repellents by dressing children in long sleeves and long pants tucked into boots or socks if possible.
- Keep repellents out of the reach of children. Do not allow children to apply repellents to themselves.
- Do not apply repellents to the hands of young children because this may result in accidental eye contact or ingestion.
- As with chemical exposures in general, pregnant women should take care to avoid exposures to repellents when practical, as the fetus may be vulnerable.

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