SPECIFIC LANGUAGE PRACTICES IN STORYTELLING AND THEIR

RELATION TO CONCEPTS OF NATURE

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Specific Language Practices in Storytelling and Their
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DEDICATION

This thesis is dedicated to Laura Bailey and my grandparents, Mac and Audrey Elliott.
ABSTRACT OF THE THESIS

Specific Language Practices in Storytelling and Their Relation to Concepts of Nature
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Previous research has shown that there is cultural variation in psychological closeness to nature, which is the extent to which individuals see themselves as a ‘part of’ or ‘apart from’ nature. Research has also shown that variation in the likelihood to tell stories about personal experiences in nature can predict psychological closeness to nature among Menominee Native American and European American adults. What is it about storytelling that matters for psychological closeness to nature? Based on predictions derived from construal level theory, it was expected that the level of specificity characteristic of personal storytelling would serve as a context for other language practices that are concrete and specific, including the use of greater specificity in labels used for species (e.g., oak tree vs. tree), referencing of individuals rather than kinds (e.g., this tree vs. trees), and descriptive adjectives (e.g., large oak tree with green leaves). It was predicted that the presence of these language practices would moderate the relationship between storytelling and psychological closeness to nature. In Study 1, data from previously conducted interviews with adults were used to study the differences between storytelling and expository discourse. The results showed that the only specific language practice to vary across these discursive contexts was the use of taxonomic labels, such that using either generic or specific labels was more likely in the expository context. Study 2 involved a more direct investigation into the causal link between storytelling and psychological closeness to nature among undergraduates and children, aged 5-11. The results showed that both children and adults were more likely to reference individuals than kinds in storytelling discourse, and both were more likely to reference kinds than individuals in expository discourse. However, these specific language practices were unrelated to psychological closeness to nature (as measured by a human-nature categorization task), and predictions regarding the use of other language practices were not supported. A significant interaction between age and prompt type revealed that whereas children and adults were equally as likely to group humans with nature in the expository condition, children were more likely than adults to group humans with nature in the storytelling condition. Implications for cultural learning across development are discussed.
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CHAPTER 1

INTRODUCTION

Our intuitive knowledge about the biological world, termed “folkbiology,” is influenced by our experience with the natural world and can vary as a function of cognitive maturity, culture, and language (Atran, Medin, & Ross, 2005; Gelman, 2003; Medin & Atran, 2004). Previous research has shown that there is cultural variation in psychological closeness to nature, which is the extent to which individuals see themselves as a ‘part of’ or ‘apart from’ nature (Bang, Atran, & Medin, 2007; Bang, Townsend, Unsworth, & Medin, 2005). Previous research has also shown that variation in the likelihood to tell stories about personal experiences in nature can predict psychological closeness to nature among Menominee Native American and European American adults (Unsworth, 2008). But what is it about storytelling that matters? One possibility is that these stories increase psychological closeness to nature simply by creating associations between self and nature. However, storytelling may also increase psychological closeness to nature in a less direct way, and may serve as a broader discursive context that gives rise to other, more specific language practices that help to increase psychological closeness to nature.

Previous research has shown that different contexts do give rise to different language practices, including the use of labels that vary in specificity (e.g. rocking chair vs. furniture; Gelman, Chesnick, & Waxman, 2005; Waxman & Gelman, 1986) and that there are several specific language practices that account for variation in psychological closeness to nature (Unsworth & Horton, 2009; Unsworth & Novi, 2009). There is some preliminary evidence regarding specific language practices that occur more frequently in storytelling (e.g. gesture that mimics the actions of non-human species; Unsworth, 2008) compared to non-storytelling discourse. Storytelling is a description of a series of single events that are related either thematically, temporally, spatially, or causally (Gee, 1996). In contrast, expository discourse aims to simply inform, instruct, or describe and it may be case that it is less likely than storytelling to utilize particular language practices. However, Unsworth did not systematically compare the frequency of these practices across discursive contexts. The
current research aims to do that and to explore developmental differences in the relationship between storytelling discourse, more specific language practices, and concepts of nature.

**VARIATIONS IN PSYCHOLOGICAL CLOSENESS TO NATURE**

*Psychological closeness* refers to something that is perceived as being temporally, spatially, or socially close, and likely to occur (Liberman & Trope, 2008; Trope & Liberman, 2003). Bang et al. (2007) found that the extent to which people see themselves as ‘a part of’ nature or ‘apart from” nature can vary across cultures. For example, when asked to talk about the 5 most important things that they would want their child or grandchild to learn about the biological world, Menominee Native American parents gave more examples of ways in which they personally used particular plants and animals (e.g. “I/we use milkweed for soup”), compared to rural European American parents. European American parents, in contrast, referred to nature more abstractly, including references to distant utility (e.g. “Wood is used for construction”) and abstract liking (e.g. “It is important to enjoy nature;” Bang et al., 2007). Although participants lived in similar rural areas and shared similar activities (i.e. hunting and fishing), there are significant differences in the ways in which they reasoned about the natural world and expressed psychological proximity to nature.

Anggoro, Waxman, and Medin (2008) have shown that differences in language and naming practices are related to variation in the likelihood to think of humans as related to the rest of nature. Specifically, Anggoro et al. showed that Indonesian and English speakers use the label “animal” differently. English and Indonesian speaking children (aged 6 and 9) were presented with a photograph of a human and were asked, “Could you call this an animal?” Indonesian-speaking children were less likely than English-speaking children to use the label “animal” to refer to humans. A second study was performed which demonstrated a link between categorization and naming practices. English and Indonesian-speaking children (aged 6-9) were presented with a set of cards which depicted various living and non-living things. They were asked to place the kinds of things that belong together in piles. Indonesian-speaking children were less likely than English-speaking children to categorize humans with non-human animals. These studies show that children’s concepts of humans and the rest of nature are congruent with the naming practices of their linguistic community. These results
suggest that language practices, such as naming, may serve as a conceptual foundation or prompt to form specific animal categories that either include or exclude humans.

**STORYTELLING AND PSYCHOLOGICAL CLOSENESS TO NATURE**

Other research has shown that more general discourse practices, such as storytelling, are also related to psychological closeness to nature. Unsworth (2008) analyzed the naturally occurring discourse in community organized hunter education classes taking part in Menominee Native American and nearby rural European American communities. She found that Menominee adult instructors were not only more likely to spontaneously tell stories of personal experience in nature as a part of their lecture, but they used significantly more references to and specific descriptions of non-human animals in their stories. European Americans were mostly telling stories about other hunters or firearm safety. In a subsequent study conducted by Unsworth, adult participants were presented with pairs of pictures of plants or animals and were asked, “How might these two go together?” The results showed that telling a story of personal experience in nature accounted for a significant proportion of the variance in human relations to nature that were considered psychologically close (e.g. reference to personal utility of nature). While personal experience stories were related to expressions of increased psychological closeness to nature, they were unrelated to human-nature relations that were considered psychologically distant (e.g. distant utility).

Interestingly, analyses also revealed that during non-storytelling discourse, Menominee adults were more likely than rural European Americans to engage in perspective-taking gesture of non-human species, indicating increased psychological closeness. For example, one Menominee adult simulated an eagle flying by moving her arms up and down as if they were wings. However, cultural differences in these gesture practices were not significant during the telling of personal experience stories, as both Menominee and rural European American were likely to use these gestures while telling stories. These results suggest that there may be something special about storytelling that evokes these specific gesture practices.

But why might storytelling matter? One possibility is that psychological closeness may be reflected in storytelling practices. Alternatively, the act of storytelling may have a causal influence on psychological closeness. That is, storytelling and psychological closeness
may interact in such a way as to “mutually reinforce” one another. While, for example, talking about nature in an expository context may indicate general knowledge, telling a story about nature may activate different cognitive structures that result in greater psychological closeness to nature. Analysis of causality may show that engaging in storytelling, as opposed to an expository context, leads to increased psychological closeness to nature and that language practices reflecting greater specificity may increase psychological closeness in a linear, additive way. However, this increase in psychological closeness may only be apparent if the underlying cognitive structure of nature is already in place. Possible directions of influence will be examined in the present research in order to better understand the influence of language and particular language practices on thought. Before discussing this directionality in greater detail, I will first provide review of evidence for a connection between other specific language practices and psychological closeness to nature.

**Specific Language Practices and Increased Psychological Closeness**

As mentioned in the previous section, Unsworth (2008) found cultural differences in the likelihood to engage in perspective-taking gesture of non-human species. Previous research has shown that that when instructed to take the perspective of other individuals, participants not only view those individuals as more similar to themselves but they ascribe more self-descriptive traits to those individuals (Davis, Conklin, Smith, & Luce, 1996; Galinsky & Ku, 2004; Galinsky & Moskowitz, 2000). In other words, taking the perspective of another is related to increased psychological closeness to that individual. When the target group consists of plants and non-human animals, this could be interpreted as increased psychological closeness to nature.

In a laboratory setting, it appears that perspective-taking gestures have a causal influence on perspective taking. Unsworth and Novi (2009) told participants stories featuring animal protagonists and asked participants to either observe the experimenter as she used gesture that demonstrated the actions of the animal, or to also engage in these gesture practices (i.e. to mimic the experimenter). Then the participant was asked to choose between two photographs: one illustrating the scene depicted in the story from the perspective of the animal and another illustrating the scene from an observer perspective. They found that only in the mimicry condition were the participants likely to choose the photograph with a view
from the vantage point of the animal protagonist. This study demonstrates that variation in specific language practices, such as perspective-taking gesture, can causally influence psychological closeness to non-human animals and nature, and that the causal effect is not restricted to a particular cultural group.

Unsworth and Horton (2009) have also found that telling a personal experience story about nature that included more concrete descriptions can have a causal influence on psychological closeness to nature. In this study, undergraduates were presented with storytelling text that varied in level of descriptive specificity along three dimensions, including description detail (e.g., adjectives such as cold, wet, or large), generic or specific category labels for entities (e.g., water vs. river; tree vs. oak tree), and level of description used for mental states (e.g., higher-order goals versus moment-to-moment experiences). To measure psychological closeness, participants were asked to rank on a scale of 1 to 7 how well each word (e.g. came vs. went) fit in the sentence (e.g., “The man ______ toward the otter”). For example, if the man CAME toward the otter, the participant would be demonstrating perspective taking of the otter instead of the man. Unsworth and Horton found that concrete descriptors of high specificity lead to greater perspective taking of both human and non-human protagonists.

If specificity matters for increased perspective-taking, what other language practices exist that also reflect higher descriptive specificity? Gelman has done extensive research on one specific language practice that may be more likely to occur in storytelling: the use of ‘kinds’ versus ‘individuals’ (Gelman et al., 2005; Hollander, Gelman & Star, 2002). When talking about something in broad terms, individuals might be more likely to reference ‘kinds’ (e.g., trees, generally speaking). As these descriptions are of higher-level construal, an individual may feel more psychologically distant to that particular category. In contrast, referencing ‘individual’ categories (e.g., this tree; these trees) indicates lower-level construal and may be related to increased psychological closeness to nature.

Using generic or specific taxonomic labels is another language practice that might be related to perceived psychological distance to nature (Coley, Medin, & Atran, 1997; Rosch, Mervis, Gray, Johnson & Boyes-Braem, 1976). A generic label is in reference to broad taxonomic categories (e.g. kingdom of “animals” or “plants”) while a more specific label is in reference to a further differentiated taxonomic category (e.g. species of “cocker spaniels”
or “dogwood trees”). Unsworth and Horton’s (2009) results, described above, suggest that labels associated with different taxonomic levels might be related to variation in psychological closeness to nature.

**STORYTELLING AS A CONTEXT**

Although a connection between storytelling and psychological closeness to nature exists, it is still unclear why storytelling might matter. Although Unsworth and Horton (2009) show that descriptive specificity plays a role, it has yet to be determined whether specific language practices reflecting this kind of specificity are more likely to arise naturally in storytelling discourse compared to other forms of discourse. Descriptive specificity and its connection to psychological closeness will be framed here in terms of Construal Level Theory (CLT; Bar-Anan, Liberman, & Trope, 2006; Liberman & Trope, 2008). Any idea or object can be represented at different levels of construal. Statements of higher-level construal are more abstract, less specific, and represent the general idea of the available information. Descriptions of lower-level construal are more specific, concrete, and give more subordinate details of the object/event/idea. For example, children could be “having fun” (high level construal) or “practicing basketball” (lower-level construal). Both may be true, but give different information as to what is central to the event and what is secondary. CLT can serve as a basis for thinking about storytelling as a context that gives rise to more specific language practices because storytelling typically involves descriptions of multiple specific events, and a variety of specific language practices may arise during these descriptions. In addition, CLT links greater specificity in descriptions of events or activities with greater psychological closeness to those events or activities.

Previous research has shown that having less direct experience with something is associated with using descriptions of higher-level construal (Förster, Liberman, & Shapira, 2009; Liberman & Trope, 2008; Trope & Liberman, 2003). Experiences are described more abstractly and with less specific detail. Additionally, psychological closeness increases if descriptions of lower-level construal are used. In research by Liberman and Trope (2008), participants were presented with words from four categories: higher or lower level construal (e.g. a higher-level construal category such as “drinks” versus a lower-level construal category such as “Coke”) and words indicating a socially small or large psychological
distance (e.g. socially distant words such as “theirs” and “stranger” versus socially proximal words such as “our” or “friend”). For distance congruent trials, large psychological distances were paired with descriptions of higher-level construal and small psychological distances were paired with descriptions of lower-level construal. For incongruent trials, large psychological distances were paired with descriptions of lower-level construal and small psychological distances were paired with descriptions of higher-level construal. Participants were asked to press a key on a keyboard when they identified particular permutations of pairings across the four categories. Participants responded more quickly to congruent pairings than to incongruent pairings, which indicates cognitive compatibility between concrete, specific descriptions and increased psychological closeness, or feeling ‘a part of’ a particular group. These findings are extremely relevant to the previously cited research by Gelman and to the current proposal that specificity in taxonomic categories may be an indicator of increased psychological closeness to nature.

In another series of experiments, participants were shown a landscape photograph with either an arrow pointing to a distant or proximal point on the landscape (Bar-Anan, Liberman, Trope, & Algom, 2007). Each arrow contained a word which expressed psychological proximity (e.g. tomorrow, us) or psychological distance (e.g. someday, them). Participants were asked to respond by pressing one of two keys as quickly and accurately as they could. In one version of the task, participants had to indicate whether the arrow indicated a distant or proximal location while in the second version, participants had to identify the word printed within the arrow. In both versions, participants responded faster to ‘distance congruent’ arrows in which a proximal arrow contained a psychologically close word and a distal arrow contained a psychologically distant word. These responses to ‘distance congruent’ arrows indicates a cognitive compatibility between concepts. If Construal Level Theory is relevant for thinking about language practices and psychological closeness, then perhaps CLT also helps us think about personal storytelling as a discursive context that supports specificity in language practices and increased psychological closeness to nature.

A story can be distinguished from other discourse by its description of a series of singular events that are related either thematically, temporally, spatially, or causally (Gee, 1996). Storytelling often involves lower-level construal of objects, activities, and events
including more information concerning how, when, why, and where they take place (Stadler & Ward, 2005; Trabasso, Secco, & van den Broek, 1984; Trabasso & Sperry, 1985). In comparison to expository discourse (i.e. discourse that aims to inform, instruct, or describe) or other types of informative discourse, perhaps storytelling serves as a discursive context for more specific language practices. Specific language practices of lower-level construal could include referencing individuals, specific taxonomic categories, and descriptive adjectives. While it may be the case that simply telling a story can predict psychological closeness to nature, perhaps these more specific language practices are likely to arise during storytelling and moderate the relationship.

In fact, previous research demonstrates that variations in other types of representational contexts have an effect on the resulting language practices. Research by Gelman and colleagues shows evidence of a link between various language expressions and the conceptual distinction between kinds and individuals. Object representation serves as a context that influences how people relate to and perceive objects (Gelman, Waxman, & Kleinberg, 2008; Ware & Gelman, 2009). In an object representation task, participants were shown either actual tangible item representations (i.e. a miniature toy piano) or a drawing of the same item. During mother-child conversations, it was demonstrated that participants who were shown the actual item were more likely to make references to individuals while those who were shown the drawing were more likely to make references to kinds. In other words, when presented with pictures, mother-child conversations tended to elicit talk about broad categories, whereas when presented with an object, there was more talk about specific examples. This research is important in that it demonstrates that specific language practices can vary across different representational contexts. In Gelman’s work, the level of naming varied as a function of whether the actual item or the drawing was shown, demonstrating context-specific language and thought.

As it appears that other types of contexts give rise to more specific language practices, I propose that storytelling is a representational context that gives rise to more specific language practices that are related to psychological closeness. One additional question explored in the present research is: Are there developmental differences in the relationship between storytelling, specific language practices such as specific labels, and psychological closeness to nature?
STORYTELLING AND DEVELOPMENTAL VARIATIONS IN THINKING AND REASONING

Much of how we think is conceptualized through the facilitation of language. At what age do children typically learn storytelling and story structure? Although children typically begin expressing language in a conversational format, by ages 3 or 4 they begin using storytelling as a means of communication (Stadler & Ward, 2005). These stories may begin as references to personal experience (Unsworth & Levin, 2009) and develop into more complex stories as a function of age.

Unsworth and Levin also found that children are influenced by culture-specific discourse practices that are highly related to specific concepts of nature. This is an interesting finding given the lack of consensus regarding the influence of culture on folkbiological thought early in life (e.g., Evans, 2001; Inagaki & Hatano, 2002; Johnson, Mervis, & Boster, 1992; Ross, Medin, Coley, & Atran, 2003). On one hand, many researchers propose that cultural context is less influential on the folkbiological thinking of younger children than of adults. For instance, Johnson et al. (1992) found that in a similarity judgment task, 10 year olds were unlikely to pair humans with non-human primates, whereas adults paired humans with non-human primates about 68% of the time. On the other hand, there is also evidence for an influence of culture on folkbiological thought in early development (Ross et al., 2003), and some research shows a greater influence in children compared to adults (Astuti, Solomon, & Carey, 2004). In the present research, if storytelling serves as a representational context for more specific language practices that influence folkbiological thought, it will be interesting to examine the extent to which children and adults are sensitive to this type of linguistic context.

There is reason to believe that storytelling contexts influence thought at even a very young age. By early childhood, children are encouraged to construct storytelling content and structure valued by that of their community (Minami, 1996; Minami & McCabe, 1991; Stein, 2004; Wakabayashi & Fernald, 2000). As mentioned above, children as young as 5 years of age appear to be sensitive to culture-specific storytelling practices used in their communities. Specifically, both Menominee Native American and European American children who were 5-7 years of age exhibited cultural differences in psychological closeness to nature, and across both groups of children, psychological closeness to nature was much more likely for
children who also described personal experiences in nature (Unsworth, Levin, & Medin, 2010). These findings map onto other results showing that Menominee adults are more likely than European American adults to tell stories about personal experiences in nature (Unsworth & Horton, 2009). Some research suggests that by age 6, children will have acquired all the culturally valued components of story construction, making ages 6-9 the optimal ages for examining developmental and cross-cultural story analysis (McCabe, 1996; Peterson & McCabe, 1983; Stein, 2004).

Qi Wang (2006) has also shown that storytelling discourse is learned early in life and that it influences early thought. She conducted a study of 189 three-year-olds and their mothers in which she examined the relationship between maternal styles for telling stories about personal experiences on children’s memory capabilities. She found that European American mothers were more elaborative during storytelling than Chinese mothers, who were more elaborative than first-generation Chinese immigrant mothers in the United States. As expected, children’s shared memory reports were positively correlated with maternal elaborations during reminiscing. European American children provided more memory information during sharing than did Chinese and Chinese immigrant children. Furthermore, it appears that even by age 3, children have enough input about the narrative structure of personal experience storytelling from their parents to have coherent, elaborate memories. This research supports the proposal that language influences early thought.

Even at a very young age, children are able to use particular language practices in a manner comparable to adults. Hollander et al., (2002) have shown that children are able to use kind and individual phrasing by age 4 or 5. Furthermore, there are developmental changes in the use and understanding of generic noun phrasing between 3 and 4 year olds. Participants were asked three types of property questions: wide scope (e.g. Are fires hot?), narrow-scope (e.g. Do girls have curly hair?), and irrelevant (e.g. Do fish have branches?). Additionally, there were 3 other wording conditions including generic (e.g. “Are fires hot?”), universally quantified (e.g. “Are all fires hot?”), or indefinite plural (e.g. “Are some fires hot?”). They found that 3-year-old participants were only sensitive to property type and not the wording conditions. The authors propose that due to the cognitive load of the task, 3-year-olds treated all properties as generic. However, 4-year-olds are as proficient at distinguishing both property and wording as were adults, demonstrating the drastic
developmental changes that occur during this single year. Both 4-year-olds and adults were most selective of properties in the “all” condition and least selective in the “some” condition (see also Gelman, Star, & Flukes, 2002). Other research has also shown that in young children, generic noun phrases are disproportionately used in plural and mass form, relative to non-generics (Gelman et al., 2008; Goldin-Meadow, Gelman, & Mylander, 2005). One aim of the current research is to determine if there are developmental changes in the use of these specific language practices during storytelling between 5 years of age and adulthood.

It is likely that within a storytelling context, there are language practices that emerge in development. However, are there particular language practices that emerge before others or do they all arise at the same time, as a “package?” As a function of Construal Level Theory, the latter possibility may be more likely, as previous research (described above) has revealed conceptual links underlying multiple expressions of psychological closeness ( Förster et al., 2009; Liberman & Trope, 2008; Trope & Liberman, 2003).
CHAPTER 2

PRESENT RESEARCH AND PREDICTIONS

I propose that storytelling discourse related to personal experiences in nature, in comparison to expository discourse about nature, serves a context for the emergence of more specific language practices that are related to increased psychological closeness to nature. In accordance with the predictions of CLT, these include the use of species-specific categories, referencing of individuals vs. kinds, and descriptive adjectives.

In Study 1, data from previously conducted interviews with adults (Unsworth, 2008) was used to study the differences between storytelling and expository discourse. During breaks in between three sets of picture-pair trials, participants in this study responded to two questions regarding their knowledge about deer. The first question was an expository prompt (e.g. “Can you please tell me everything you know about deer?”) and the second question was a personal storytelling prompt (e.g. “Can you please tell me a story about a time when you saw a deer, or came across a deer, or hunted a deer?”). It is expected that the participants would be more likely to respond with stories of personal experience in nature and that they would incorporate more of the specific language practices mentioned previously in response to the storytelling prompt than in response to the expository prompt.

Given that the storytelling prompt in Study 1 (e.g. “Can you please tell me a story about a time when you saw a deer, or came across a deer, or hunted a deer?”) primed participants to not only talk about a singular event about deer, but to reference specific, individual deer (e.g. “a deer”), the kind vs. individual coding was excluded from analysis. Any significant differences in the likelihood to reference experience with individual deer in the storytelling context would be expected and would influence significant findings.

Study 2 is integral to the present research in order to systematically compare across expository and storytelling prompts. In Study 1, the expository prompt was always delivered before the storytelling prompt, which may have affected storytelling discourse. Study 2 involved a between-subjects design in which participants responded to only one of these prompts. In addition, a causal link between storytelling and psychological closeness to nature
was examined in Study 2, and children were included in order to examine developmental trends.

In this study, participants responded to either an expository or storytelling question and completed a categorization task. In the storytelling prompt condition (e.g. “Now we’re going to do storytelling. Can you please tell me about when you’ve seen birds?”), participants were expected to be more likely to respond with stories of personal experience and these stories should include more specific language practices of lower-level construal, indicating increased psychological closeness to nature. The categorization task is similar to that used by Anggoro et al. (2008) and consists of grouping items together according to how participants think they belong together. Increased psychological closeness to nature is indicated by placing a human character with other natural items, as opposed to with other humans or man-made artifacts. The categorization task allows for examination of the relationship between storytelling and psychological closeness to nature.

I predict that participants who answer the expository question first will not be as likely to place humans with nature in the categorization task compared to participants who answer the storytelling question first. Furthermore, the specific language practices that may be more likely to occur in storytelling may moderate this relationship. For example, specific language practices may increase psychological closeness in a linear, additive way.

The causal link demonstrating storytelling as influential on concept formation will be examined by prompting each participant with either an expository prompt or a storytelling prompt. I predict that those participants who answer the storytelling prompt will show an increased likelihood to place a human with other natural items compared to those participants who answer the expository prompt. In contrast, participants who respond to the expository prompt will not be as likely to place humans with nature because they may not be as likely to use the specific language practices that increase psychological closeness to nature. The causal link is demonstrated here in that participating in storytelling, not an expository listing of facts, leads to increased psychological closeness to nature. Additionally, this design will allow me to explore whether the relationship we see between storytelling discourse and psychological closeness to nature is a function of the learned associations between psychological closeness and particular forms of storytelling, or if discourse practices have a more direct influence.
Due to previous research, there is reason to believe that the causal relationship between language and thought can be easily manipulated in experimental research. For example, Boroditsky has addressed how language influences thought in several experiments that demonstrate differences in concepts of time among English and Mandarin Chinese speakers (2001). English speakers predominantly talk about time as if it were on a horizontal plane, while Mandarin Chinese speakers tend to describe time as if it were vertical. In several experiments, Boroditsky shows that Mandarin participants were still likely to think about time as a vertical plane, even when thinking about English sentences. Furthermore, the extent to which bilinguals were able to think about time vertically is related to how old they were when they first began to learn English. To demonstrate that these differences were due to language and not cultural variation, Boroditsky trained 70 native English speakers to talk about time using vertical rather than horizontal terms. Even after just a brief training, the English-speaking participants produced responses very similar to those of Mandarin speakers. Boroditsky shows that people use different metaphors to conceptualize time and that when these contexts are pushed around in a laboratory setting, they can have an immediate influence on thought.

There has been minimal research which demonstrates how storytelling influences cognition. However, in the previously mentioned research by Qi Wang (2006) where 189 three-year-olds and their mothers were asked to talk about two experiences where both the mother and child had participated, she found that European American mothers were more elaborative during storytelling than Chinese mothers, who were more elaborative than first-generation Chinese immigrant mothers in the United States. However, regardless of culture, the more elaborative and evaluative the mothers were, the more information the children were able to recall (although the effect was smaller for the Chinese than it was for the European Americans and Chinese immigrants).

I predict that there will be differences in the likelihood to use these specific language practices as a function of age and development. Additionally, based on research related to Construal Level Theory (Förster et al., 2009; Liberman & Trope, 2008; Trope & Liberman, 2003), I propose that many language practices emerge at the same time in development, rather than some emerging earlier than others. Language practices of similar construal level
should emerge together as they are more similar in descriptive specificity and may reflect similarities in underlying conceptual structure.

In summary, there is evidence that storytelling is related to psychological closeness to nature (Unsworth, 2008, Unsworth & Horton, 2009), that representational contexts influence thought (Gelman et al., 2008), and that there are several specific language practices that can influence psychological closeness to nature. The present research examines whether storytelling serves as another context for representing conceptual information in a way that gives rise to more specific language practices related to psychological closeness to nature.
CHAPTER 3

STUDY 1 METHODOLOGY, RESULTS, AND DISCUSSION

The methods described here include the participant demographics, materials, design, and procedures used in this study. Also included are the result and discussion sections.

PARTICIPANTS

Twenty-one Menominee adults (average age was approximately 33) and 28 European Americans adults (average age was approximately 38) were recruited to participate in the study. Menominee adults came from the Menominee reservation in rural Wisconsin and European American adults were recruited from nearby towns of Shawano, Bonduel, Pulaski, and Rhinelander. Each participant received $20.00 in exchange for their participation.

MATERIALS AND DESIGN

The open-ended species-relations interview conducted in this study involved presenting 30 pairs of pictures of plant and non-human animal species situated in their natural habitats (all of which can be found in the state of Wisconsin). The 30 picture pairs were divided into 3 sets, with 10 picture pairs in each set. Each set of 10 pairs included 5 animal-animal pairs, 2 plant-plant pairs, and 3 animal-plant pairs (animals included insects, reptiles, amphibians, birds, and mammals). The order in which the 3 sets of picture pairs were presented was counterbalanced across participants and the picture pairs within each set were shuffled before each interview. Each picture pair was presented on an 8 ½” by 11” sheet of paper, with two 4” by 4” pictures on each sheet. Two versions of stimuli were created so that the position of the pictures on the paper (i.e. top vs. bottom) could be counterbalanced across participants. Picture pairs of species were selected so that each pair afforded a variety of responses (e.g., eagle and hawk might go together because they are both birds, they both eat small rodents, they both nest in trees, they both live in this area, and they both are culturally significant animals).
All participants were audio-recorded using an Olympus VN-4100PC digital voice recorder. In addition 9 Menominee and 9 European American participants were video recorded using a Sony mini DV camcorder. The same interviewer conducted all sessions in this study.

**PROCEDURE**

At the beginning of each interview, participants were told the following:

We are conducting these interviews as part of a science education project in which we are designing science lessons that build from the knowledge, beliefs, and practices children learn within their families and communities. The purpose of these interviews is to help us learn a little more about how community members reason about plants and animals, and so in this interview we are hoping that you will respond just by telling us whatever comes to mind. There are no right or wrong answers in this interview—it’s just about what you’re thinking when you think about why certain plants and animals might go together.

Before beginning the task, participants were presented with two practice pairs and provided examples of responses. The purpose of the practice trials was to familiarize participants with the task. Participants were then shown the 30 picture pairs of plants and non-human animals, one pair at a time, and were asked to think about why or how the two might go together. Participants were told that they could say whatever came to mind, that they could say as much or as little as they pleased about each picture pair, and that they should feel free to say that they didn’t know or that the species didn’t go together.

The 30 picture pairs were divided into three sets so that breaks occurred after each set of 10 picture pairs. During the first break (i.e. after the first set of 10 picture pairs), the participants were asked, “Can you please tell me everything you know about deer?” During the second break (i.e. after another set of 10 picture pairs), the participants were asked, “Can you please tell me a story about a time when you saw a deer, or came across a deer, or hunted a deer?” In each break, if a participant seemed slightly overwhelmed by the question (usually because the participant knew a great deal about deer and didn’t know where to begin), the interviewer would ask the participant to say some of the first things that came to mind. Once the participants indicated that they had said as much as they wanted to during each break, they were given the next set of picture pairs (face down) and were again asked to talk about how or why the species in each pair might go together. At the end of the interview, participants were asked about their age and the extent to which they hunt, fish, or berry pick.
RESULTS

In this section, the coding scheme and statistical results for specific language practices are provided.

Coding

Storytelling (after a storytelling prompt) and expository responses (after an expository response) from all Menominee and European American adults were transcribed and coded for analysis using NVIVO 8 software. The 49 transcripts (43 expository and 41 storytelling responses) were coded for specific language practices (referencing specific and generic taxonomic labels and concrete/abstract descriptive adjectives) and only discourse related to plants and non-human animal species was coded. A response was coded as a story if it involved a description of a series of singular events that are related either thematically, temporally, spatially, or causally (Gee, 1996). Breaks in these relations between events indicate a new story. Personal experience stories were coded for and were indicated by the storyteller being personally involved in the story. Storytelling discourse and non-storytelling (i.e., expository discourse) was further coded for references to species-specific categories (i.e. “white-tailed deer” or “oak tree”) and references to individuals (i.e. “this deer” or “these oak trees”). Descriptive adjectives of non-human animal species were coded (i.e. using adjectives above and beyond use of labels, e.g., “big, beautiful deer”) as either ‘concrete’ or ‘abstract.’ The distinction between the two was determined by specificity. For example, descriptions that were more concrete were considered visually perceivable (i.e. “red-eyed” or “huge”) while abstract descriptions could be considered traits or opinions (i.e. “beautiful” or “cunning”). Part of the present coding scheme used is in accordance with that used by Unsworth (2008).

To assess reliability, a second judge, who was blind to the conditions and hypothesis of the study, coded a portion of the participant responses. The agreement between the two coders was high (98.6%).
Specific Language Practices

The key analyses in Study 1 included comparisons of the proportion of expository and storytelling responses that included descriptions of non-human animals, references to kinds and individuals, and generic and specific taxonomic categories.

Although the 2-way (DESCRIPTOR: Concrete vs. Abstract) x 2 (PROMPT: Storytelling vs. Expository) interaction was not significant ($F(1, 48) = 1.30, p = .26$), there was a main effect for descriptor type ($F(1, 48) = 18.41, MSE = 2.88, p < .001$ with mean frequencies of 1.46 for concrete descriptors and .42 for abstract descriptors, when collapsing across prompt type). The main effect of prompt was not significant ($F < 1$ with mean frequencies of 1.03 for expository discourse and .85 for storytelling discourse when collapsing across descriptors).

Another 2-way ANOVA (TAXONOMY: Generic vs. Specific) x 2 (PROMPT: Storytelling vs. Expository) was not significant ($F < 1$). However, there was a significant main effect for prompt ($F(1, 48) = 4.16, MSE = .15, p < .05$ with mean frequencies of .38 for Expository and .12 for storytelling, when collapsing across taxonomy) and a significant main effect for taxonomic label ($F(1, 48) = 10.51, MSE = .30, p < .01$ with mean frequencies of .31 for Generic and .20 for Specific, when collapsing across prompt).

DISCUSSION

Across all contexts, participants were more likely to use concrete descriptors than they were to use abstract descriptors. Additionally, participants were generally more likely to use generic taxonomic labels than they were specific taxonomic labels, and were generally more likely to use taxonomic labels of any kind in the expository context than in the storytelling context. Contrary to predictions, the results showed that participants were not more likely to use concrete descriptors or specific taxonomic labels in the storytelling context compared to the expository context.

The limitations of Study 1 include the within-participant nature of the prompts (without counterbalancing the order of the prompts) as well as the language used to ask the storytelling prompt. Participants were always asked both prompts, with the expository prompt preceding the storytelling prompt, and there may be some carry-over effect of the likelihood to use particular language devices in the second, storytelling context after
producing expository discourse. In Study 2, participants will be randomly assigned to conditions in which they will respond to only one prompt type, either expository or storytelling. Furthermore, in Study 1, the storytelling prompt (e.g. “Can you please tell me a story about a time when you saw a deer, or came across a deer, or hunted a deer?”) primes the participant to respond with a singular story or event (i.e. “a story”) and to talk about one particular deer (i.e. “a deer”). Any results favoring a singular personal experience or individual phrase use after this prompt cannot be considered accurate, as the prompt may prime the participant to respond in that particular way. In Study 2, the storytelling prompt will not prime the participants to respond with one personal experience or to discuss one animal in particular (e.g. “Now we’re going to do storytelling. Can you please tell me about when you’ve seen birds?”). As the storytelling prompt will reference birds in general, any reference to an individual bird may indicate increased psychological closeness.
CHAPTER 4

STUDY 2 METHODOLOGY, RESULTS, AND DISCUSSION

The methods described here include the participant demographics, materials, design, and procedures used in this study. Also included are the result and discussion sections.

PARTICIPANTS

Fifty-eight children, aged 5-11, (25 males; range=5 years to 12 years) from a local elementary school participated in this study. Children were from a range of ethnically and economically diverse backgrounds. Additionally, 65 undergraduate students majoring in psychology at San Diego State University also participated in the study. The participating elementary school received $10 in compensation for every child who participated and undergraduate students received class credit for the psychology class in which they were enrolled (their participation was an alternative to submitting a written assignment to their instructor).

MATERIALS AND DESIGN

The structured interviews conducted in this study involved asking participants a question about an animal and having the participants complete a categorization task. All participants were audio and video-recorded using a Olympus VN-4100PC digital voice recorder and a Sony DCR-SR45 Handycam recorder. The same interviewer conducted all sessions in this study.

For the categorization task, participants were presented with pictures of items on small cards (roughly 3” X 4” in size) that could be used to make categories or groups. Pictures of items included plants, animals, and artifacts, and natural kinds. A complete record of items is listed in Appendix A.
PROCEDURE

At the beginning of each interview, participants were told the following:

We are conducting these interviews because we are interested in how people think about plants and animals. We hope that you will respond just by telling us whatever comes to mind. There are no right or wrong answers in this interview—it’s just about what you’re thinking when you think about why certain things might go together.

For the storytelling/expository prompts, no materials were presented and the participant simply responded to the question to the best of their ability. In a between-subjects design, participants were asked a single question, either storytelling (e.g. “Now we’re going to do storytelling. Can you please tell me about when you’ve seen birds?”) (storytelling prompt) or non-storytelling (e.g. “Now we’re going to just talk. Can you tell me everything you know about birds?”) (expository prompt). In both conditions, the word “birds” is a “kind” (compared to an individual reference, “this bird”) and was used to avoid any priming of individual phrase use in the storytelling condition. If the participant did not immediately respond, the interviewer repeated the question. If the participant still did not respond, the interviewer reminded them that there were no right or wrong answers, we were just interested in what they had to say, and the question was repeated one last time. Additionally, the participant was asked to say what first comes to mind.

The procedure took no longer than 30 minutes and all participants were tested individually in a quiet room at their school. All participants were audio and video recorded for later transcription and coding. Participants from each school (elementary and undergraduate) were randomly assigned to one of two groups: Storytelling then Categorization task and Expository then Categorization task. For the storytelling and expository interview questions, participants were asked the question and the investigator listened to the participant’s response, providing prompts for participants who were hesitant to respond. Before the categorization task, a practice trial was completed by the participant using 9 cards with solid colors. The participant was asked to group the color cards by how they belonged together and to give a name or a category to each group. This trial was important in order to assure that the participant understood the concept of grouping and naming. Next, in the picture categorization task, the investigator asked participants to group everything that “belonged together” into as many groups as they like, using all of the items
previously mentioned. Upon completion, the participants were asked to give a name or category to describe each group and the investigator recorded the groupings and their names on a separate sheet of paper (to facilitate the coding and later analysis). After completing the study, participants were thanked for their time and debriefed about the purpose of the study.

**RESULTS**

Contrary to hypotheses, the results do not fully support the claim that storytelling serves as a discursive context that gives rise to other, more specific language practices that can predict psychological closeness to nature. While one specific language practice was significantly related to telling a story (referencing individuals), most other language practices that were analyzed were, in fact, more likely to occur in an expository discourse context than in a storytelling discourse context. These results were consistent across both undergraduate participants and children.

However, there were interesting differences between children and adult participants. The nature of these differences suggests that children were more likely than adult participants to group humans with nature in the storytelling condition. In the expository condition, these differences were no longer significant. Details of all the analyses and results are provided in the following paragraphs.

**Coding**

Storytelling (after a storytelling prompt) and expository responses (after an expository response) were transcribed and coded for analysis using NVIVO 8 software. The transcripts were coded for specific language practices (referencing specific and generic taxonomic labels, kinds, individuals, and concrete or abstract descriptive adjectives) in reference to non-human animal species. A “personal experience” code was added for Study 2 due to the relative frequency of participants referencing a personal experience instead of a full story (as described by Gee, 1996). An example of a story might be, “One time I saw a bird fall out of its nest and the mommy bird couldn’t get it back in the nest. Later when I came back from school, the bird was gone.” However, a reference to a personal experience might be, “One time I saw a bird fall out of its nest.” The distinction is that a story is a description of two or
more related events. With children\textsuperscript{1}, 29 participants were asked a storytelling prompt and 15 responded (52\%) with a reference to a personal experience (i.e. not a story). For undergraduate participants, 33 participants were asked a storytelling prompt and 11 responded (33\%) with a reference to a personal experience. Additional descriptive statistics for children can be found in Table 1. Study 2 utilized the same coding scheme used in Study 1, but added a code for “personal experience” and “kind vs. individual.” A full list of these codes and their definitions can be seen in Appendix B.

Table 1. Descriptive Statistics for Children in Study 2

<table>
<thead>
<tr>
<th>Context</th>
<th>Participant Gender</th>
<th>Participant Age</th>
<th>Participants Below English Proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Females = 33</td>
<td>Mean for Females = 8.56</td>
<td>Number of Females = 5</td>
</tr>
<tr>
<td></td>
<td>Number of Males = 25</td>
<td>Mean for Males = 8.73</td>
<td>Number of Males = 5</td>
</tr>
<tr>
<td>Expository</td>
<td>Number of Females = 19</td>
<td>Mean Age for Females = 8.79</td>
<td>Number of Females = 1</td>
</tr>
<tr>
<td></td>
<td>Number of Males = 10</td>
<td>Mean for Males = 8.40</td>
<td>Number of Males = 2</td>
</tr>
<tr>
<td>Storytelling</td>
<td>Number of Females = 14</td>
<td>Mean for Females = 8.64</td>
<td>Number of Females = 4</td>
</tr>
<tr>
<td></td>
<td>Number of Males = 15</td>
<td>Mean for Males = 8.67</td>
<td>Number of Males = 3</td>
</tr>
</tbody>
</table>

For the categorization task, a response was grouped as either “human a part of nature” (i.e. natural kinds or other plants and animals) or not (i.e. human apart from nature, paired alone or with man-made artifacts). A separate grouping was performed for “bike (i.e. man-made artifact) as a part of nature. The objective in this task was to determine whether either discourse context had an effect on the ways in which humans and human-related items are categorized, and whether language practices reflecting greater specificity moderated this relationship.

To assess reliability, a second judge, who was blind to the conditions and predictions of the study, coded a portion of the participant responses. The agreement between the two coders was high (98.3\%).

\textsuperscript{1} It should be noted that there was only one language practice that was significantly different for children with below average English proficiency. For children of below basic proficiency, there was a negative correlation in the likelihood to reference individuals in either context (\(p = .04\) and accounting for 11.4\% of the variance). However, during the experiment, none of these children had any problems understanding the prompt, naming the items on the cards used during the categorization task, or following any other instructions. For this reason, these participants were not excluded from analysis.
Specific Language Practices Across Discourse Contexts

Analyses revealed a significant 3-way interaction between age (Children vs. Adults), prompt type (Expository vs. Storytelling), and descriptor type (Concrete vs. Abstract; $F(1, 119) = 7.39, MSE = 1.13, p < .01$). This interaction is illustrated in Figure 1. Follow-up tests revealed a significant 2-way interaction between age (Children vs. Adults) and descriptor type (Concrete vs. Abstract) in the expository discourse ($F(1, 59) = 9.11, MSE = 1.74, p < .01$ with a mean frequency for children of .34 for abstract descriptors and 1.28 for concrete descriptors and a mean frequency for adults of .13 for abstract descriptors and 2.50 for concrete descriptors) but not in the storytelling discourse ($F < 1$ with a mean frequency for children of .14 for abstract descriptors and .41 for concrete descriptors and a mean frequency for adults of .06 for abstract descriptors and .30 for concrete descriptors.

![Figure 1. The prompt (expository vs. storytelling) by age (children vs. adults) by descriptor (abstract vs. concrete) 3-way interaction in Study 2.](image)

In order to prevent alpha inflation at this level of analysis, a Bonferroni correction (criterion of $p < .025$) was applied. Independent t-tests were conducted to follow-up the 2-way ANOVA. The results revealed that in expository discourse, adults were significantly more likely than children to use concrete descriptors ($t(59) = 2.75, SE = .44, p < .01$ with mean frequencies of 1.28 for children and 2.50 for adults) but not abstract descriptors ($t(59) = -1.55, SE = .14, p = .14$ with mean frequencies of .34 for children and .13 for adults). In order to prevent alpha inflation at this level of the analysis a Bonferroni correction (criterion of $p < .0125$) was applied. In summary, adults were more likely than children to use concrete descriptors, but this was true only in the expository context.
The 3-way interaction between naming (Kinds vs. Individuals), age (Children vs. Adults), and prompt type (Expository vs. Storytelling) was not significant \( (F < 1) \). However, a significant 2-way interaction existed for prompt (Expository vs. Storytelling) and use of naming (Kinds vs. Individuals; \( F(1, 119) = 43.05, \text{MSE} = .28, p < .001 \)). This interaction is illustrated in Figure 2. However, there was not a significant interaction between age (Children vs. Adults) and naming (Kinds vs. Individuals; \( F < 1 \)). Follow-up t-tests for the significant interaction revealed that all participants were significantly more likely to refer to individuals in storytelling than in expository discourse \( (t(121) = 5.46, SE = .08, p < .001 \text{ with mean frequencies .03 for expository and .48 for storytelling}) \) and to refer to kinds in expository discourse than in storytelling \( (t(121) = -6.40, SE = .07, p < .001 \text{ with mean frequencies 1.00 for expository and .56 for storytelling}) \).

![Figure 2. The label (individual vs. kinds) by prompt interaction in Study 2.](image)

The 3-way interaction between taxonomy (Generic vs. Specific), age (Children vs. Adults), and prompt type (Expository vs. Storytelling) was not significant \( (F < 1) \). Additionally, the 2-way interaction between taxonomy (Generic vs. Specific) and prompt (Expository vs. Storytelling) was not significant \( (F < 1) \) and the 2-way interaction between taxonomy (Generic vs. Specific) and age (Children vs. Adults) was not significant \( (F(1, 119) = 2.21, p = .14) \).
However, there was a significant main effect for taxonomic label \( (F(1, 119) = 20.10, \ MSE = .59, p < .001 \) with a mean frequency .92 for generics and .48 for specifics, when collapsing across prompt and age. There was also a significant main effect for age \( (F(1, 119) = 5.71, \ MSE = .537, p < .05 \) with a mean frequency of .59 for children and .81 for adults when collapsing across taxonomy and prompt) and a significant main effect for prompt \( (F(1, 119) = 9.02, \ MSE = .537, p < .01 \) with a mean frequency of .84 for expository discourse and .56 for storytelling discourse, when collapsing across taxonomy and age).

**Language and Categorization**

Interesting developmental differences emerged between children and adults. A 2 (AGE: Children vs. Adults) x 2 (PROMPT: Storytelling vs. Expository) ANOVA revealed a significant interaction \( (F(1, 119) = 5.15, p < .05 \) and for storytelling, mean frequencies .52 for children and .21 for adults and mean frequencies for expository discourse are .38 for children and .47 for adults). Main effects for prompt \( (F<1 \) with mean frequencies .36 for storytelling and .42 for expository, when collapsing across age) and main effects for age \( (F<1 \) with mean frequencies .44 for children and .34 for adults, when collapsing across prompt) were not significant.

Follow-up t-tests showed that children and adults were equally as likely to group humans with nature after an expository prompt \( (t(59) = .70, \ SE = .13, p = .50 \) with mean frequencies .38 for children and .47 for adults). However, in the storytelling prompt, adults were less likely than children to group humans with nature \( (t(60) = - .2.5, \ SE = .12, p < .01 \) with mean frequencies .52 for children and .21 for adults).

Correlations were conducted to examine the relationship between the use of specific language practices and human-nature categorization. The results revealed that for children, the use of specific taxonomic categories was negatively correlated with the likelihood of placing a human with nature in the categorization task \( (p = .04 \) and accounting for 7.3% of the variance). However, for adults, there were no significant correlations between specific language practices and the likelihood to group humans with nature. All correlations between specific language practices and categorization results are represented in Table 2.
Table 2. Correlations Between Specific Language Practices and Categorization Results (Grouping Human with Nature)

<table>
<thead>
<tr>
<th>Specific Language Practice</th>
<th>Correlation and Significance: Children (N= 58)</th>
<th>Correlation and Significance: Adults (N=65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>$r = .20$</td>
<td>$r = .11$</td>
</tr>
<tr>
<td>Description</td>
<td>$p = .14$</td>
<td>$p = .39$</td>
</tr>
<tr>
<td>Concrete</td>
<td>$r = -.22$</td>
<td>$r = .08$</td>
</tr>
<tr>
<td>Description</td>
<td>$p = .10$</td>
<td>$p = .51$</td>
</tr>
<tr>
<td>Individuals</td>
<td>$r = .05$</td>
<td>$r = -.21$</td>
</tr>
<tr>
<td>Kinds</td>
<td>$p = .69$</td>
<td>$p = .09$</td>
</tr>
<tr>
<td>Generic</td>
<td>$r = -.18$</td>
<td>$r = .13$</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>$p = .18$</td>
<td>$p = .32$</td>
</tr>
<tr>
<td>Specific</td>
<td>$r = -.27$</td>
<td>$r = .04$</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>$p = .04^*$</td>
<td>$p = .73$</td>
</tr>
</tbody>
</table>

Interestingly, across both contexts, t-tests revealed that children were more likely than adults to pair bikes with nature ($t(121) = -2.62, SE = .07, p < .01$ with mean frequencies .42 for children and .21 for adults).

While there were significant differences between children and adults in several respects, it is hard to determine if there are significant differences between children aged 5-7 and children aged 8-12 due to low number of participants in the former group (N=14).

In summary, there was a significant interaction between age and prompt type: children and adults are equally as likely to group humans with nature in the expository condition. However, adults were less likely than children to group humans with nature in the storytelling context. The only significant language practice referenced in storytelling for both children and adults was individual phrasing. Additionally, for adults, there was no correlation between specific language practices and the categorization results, yet for children, there was a negative correlation between referencing specific taxonomy and placing a human with nature.
DISCUSSION

Study 2 revealed that some language practices do vary across discourse contexts and that there are developmental differences between children and adults in the likelihood to use particular language practices. Furthermore, there are developmental differences in the likelihood that participants will group humans with nature in the categorization task, indicating variation in psychological closeness to nature. The relationship between discourse practices and psychological closeness to nature is not consistent with the present predictions, but provides intriguing insight into the variation in concepts of nature between children and adults.

It was interesting that children and adults responded so similarly on the types of specific language practices used across discourse contexts. In both the expository and storytelling context, participants were equally as likely to respond with the same language practices (i.e. referencing kinds, concrete descriptors, and generic taxonomic categories more often in the expository condition and referencing individuals more often in the storytelling condition).

In accordance with Construal Level Theory (Bar-Anan et al., 2006; Liberman & Trope, 2008), it was predicted that storytelling would include more language practices that reflect greater specificity. However, it appears as though many of the specific language practices analyzed were more likely to occur in an expository context. However, if the goal was to analyze storytelling, many of the participants were not even telling a story in response to the prompt. When responding to the storytelling prompt, 52% of children and 33% of adults responded with a reference to a personal experience (i.e. not a story). It is possible that the inquiry was ineffective at prompting the participant to tell a story. Additionally, participants may not have enough experience or knowledge about birds, either generic or specific, to have much to say. It may be inaccurate to conclude that storytelling does not induce greater psychological closeness to nature, or that storytelling does not give rise to more specific language practices that are also related to psychological closeness to nature, given that a relatively high percentage of responses were not even stories.

In spite of unexpected results regarding discourse contexts, more specific language practices, and psychological closeness to nature, there were interesting developmental differences. The significant interaction between age (children vs. adults) and prompt type
(expository vs. storytelling) reveals that while children and adults are equally as likely to group humans with nature in the expository condition, children are more likely to group humans with nature in the storytelling condition than adults. Could it be that adults are learning cultural frameworks for thinking and reasoning about nature such that when personal experience is activated, they actually experience psychological distance from nature? In fact, for children, one particular language practice reflecting specificity (specific taxonomy) was negatively correlated with the likelihood of placing a human with nature in the categorization task. Perhaps children begin to learn this trend of psychological distance that is apparent in adults. This possibility will be given greater consideration in the General Discussion.

It is interesting that among children, there was a significant distinction between humans and bikes (i.e. man-made artifact) in the categorization task. Across both discourse contexts, children were more likely than adults to pair bikes with nature. As the bike is man-made, was the only other artifact in the items available to categorize, and was often grouped with the human, this could be interpreted as an extension of pairing a human with nature. This distinction is no longer apparent in adult participants, suggesting that the distance between humans or human-made artifacts becomes greater with development. This finding is quite opposite of the present predictions yet is just as intriguing. Not only are children more likely than adults to group humans with nature in the storytelling context, but across all contexts they are more likely to group bikes with nature. This suggests that not only do children see humans as more psychologically close to nature, they are also more likely than adults to consider man-made objects close to nature.

According to Construal Level Theory (Bar-Anan et al., 2006; Liberman & Trope, 2008), specific language practices of lower level construal may influence increased psychological closeness to nature. However, analyses revealed that for children, the use of specific taxonomic categories was negatively related to grouping a human with nature in the categorization task. It is interesting that for adults, there was no significant relationship between language practices and the categorization task.
While there were significant differences between children and adults in several respects, it is hard to determine if there are significant differences between children aged 5-7 and children aged 8-12 due to low number of participants in the former group (N=14). Having increased representation in this younger population would have been valuable for more extensive developmental analysis.
CHAPTER 5

GENERAL DISCUSSION

The present research provides little support for the claim that storytelling serves as a context that gives rise to specific language practices that are related to increased psychological closeness to nature. Contrary to predictions, Study 1 demonstrates that participants were not more likely to use concrete descriptors or specific taxonomic labels in the storytelling context compared to the expository context.

The results from Study 2 showed that one language practice reflecting greater specificity, reference to individuals (vs. kinds), was related to storytelling. This is compatible with the current predictions. However, all other language practices reflecting greater specificity were unrelated to storytelling and seemed to occur more often in expository discourse, including concrete (vs. abstract) descriptors and specific (vs. generic) taxonomic categories. For instance, there was a significant 3-way interaction between prompt, age, and descriptor type, indicating that adults were more likely than children to use concrete descriptors, but this was true only in the expository context.

Interesting developmental differences were apparent in Study 2. A 2-way interaction showed that children and adults were equally as likely to group humans with nature after an expository prompt but after the storytelling context, adults were less likely than children to group humans with nature. Across both contexts, children were more likely than adults to pair bikes with nature. Contrary to predictions, for children, the use of specific taxonomic categories was negatively correlated with the likelihood of placing a human with nature in the categorization task. For adults, there were no significant correlations between specific language practices and the likelihood to group humans with nature.

The limitations of Study 1 include the within-participant design of the experiment as well as the prompt language. Since all participants were asked both an expository and then a storytelling question, there may have been some carry-over effect in the likelihood to use particular language practices in the storytelling context. Furthermore, as these data were from previously conducted interviews, implementing a categorization task was not possible. This
could have provided valuable information about the relationship between discourse practices and concepts of humans and nature. In Study 1, the language used in the storytelling prompt may have primed the participant to reference more individual animals or singular events. Therefore, any reference to individual labeling of non-human animals could have been prompted by the investigator, which necessitated removing these data from analysis.

One limitation of both Study 1 and Study 2 was the nature of the prompts; the responses given by the participants cannot be considered ‘naturally occurring discourse.’ Perhaps the discourse that truly reflects cognitive structure and concepts of nature is entirely different than the discourse produced by these prompts. In fact, a large portion of participants in Study 2 did not even respond to the storytelling prompt with a story. Many responded with short references to personal experience. Furthermore, it was apparent that many of the participants, especially the undergraduate adults, did not have stories or experiences about birds at all. Perhaps their storytelling was not reflecting personal experience with nature but ‘textbook’ general knowledge. A potential solution to these problems might include asking the participant to respond to the word “animal” in anyway they feel comfortable. Perhaps this would elicit more naturally occurring discourse about a topic with which they felt more knowledgeable.

Who are these participants? What is their background? The participants of Study 1 included adults living in rural Wisconsin who engage in numerous outdoor practices, such as hunting and fishing, which may support increased knowledge about nature (i.e. deer, in Study 1). However, both adults and children in Study 2 live in an urban environment. Developmental differences in the likelihood to group humans with nature in Study 2 suggest that responses among the adults reflect culturally learned frameworks for thinking about humans and nature. Alternatively, these differences may reflect a lack of direct experience with nature. Yet if this were the case, we might expect that the children in Study 2, who also live in urban environments, would also be unlikely to group humans with nature. Yet children were more likely than adults to group humans with nature after describing personal experiences in nature. According to the Cultural Consensus Model and research by Romney, Weller, and Batchelder (1986), cultural “truth” is represented by information that is widely shared and agreed upon. Because adults are older and more experienced, they would, presumably be more culturally competent than children. As mentioned previously, Johnson et
al. (1992) found that in a similarity judgment task, 10 year olds were unlikely to pair humans with non-human primates, whereas adults paired humans with non-human primates about 68% of the time. They argued that these developmental differences reflected cultural learning of the relationship between humans and non-human primates. The current research demonstrates that adults are less likely than children to group humans with nature (Study 2), despite living in similar environments, suggesting that developmental differences might reflect cultural learning of a mental model in which humans are apart from nature. Study 2 also demonstrates that there is a negative correlation for children between the use of specific taxonomy and the likelihood of placing a human with other natural items. Perhaps children begin to learn this cultural model of psychological distance when thinking about personal experience or concrete, specific construal. Future research could examine developmental differences across cultural context to determine the extent to which culture and environment influences concepts of nature.

Not only are children more likely than adults to group humans with nature in the storytelling context, but across all contexts, they are more likely to group bikes with nature. This suggests that not only do children see humans as more psychologically close to nature, they are also more likely than adults to consider man-made objects close to nature. Thus, children appear to be more psychologically close to nature than adults. However, is grouping humans with nature conceptually the same as seeing oneself as a part of nature? In future research, it would be interesting to investigate whether participants are actually more likely to see themselves as a part of nature when they group humans with nature. Although humans may be psychologically close to nature, these participants may not necessarily see themselves as psychologically close to nature or able to see themselves as directly interacting with the environment. The developmental differences for psychological distance to nature, both personally and for humans in general, would be an excellent direction for future research.
REFERENCES


APPENDIX A

ITEMS USED IN CATEGORIZATION TASK
Appendix A

Pictures used in categorization task

- person
- non-human mammals (coyote, panda bear)
- pets (dog)
- water animals (fish)
- birds (hummingbird)
- insects (butterfly)
- plants (flower and tree)
- natural kinds (sun, rock)
- human-made objects (bicycle)
APPENDIX B

DISCOURSE CODING SCHEME
### Appendix B

**Discourse Coding Scheme**

<table>
<thead>
<tr>
<th><strong>Code</strong></th>
<th><strong>Definition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive</td>
<td>Descriptions of lower-level construal are more specific, concrete, and give more subordinate details of the object/event/idea.</td>
</tr>
<tr>
<td>Concrete</td>
<td>An adjective that describes the qualities of entities or actions that can be detected through the senses (e.g., what an entity looks or sounds like)</td>
</tr>
<tr>
<td>Abstract</td>
<td>An adjective that could be considered a trait or opinion; less specific</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>Reference to the taxonomic category of a non-human animal</td>
</tr>
<tr>
<td>Generic</td>
<td>A less specific taxonomic category; not further differentiated from the prompt (i.e. deer or bird).</td>
</tr>
<tr>
<td>Specific</td>
<td>A more specific label that is in reference to a further differentiated taxonomic category (e.g. species of “cocker spaniels” or “dogwood trees”) and is typically lower in construal level. That is, it is described less abstractly and with more detail</td>
</tr>
<tr>
<td>Labels</td>
<td>Reference to either broad or specific groups of non-human animals</td>
</tr>
<tr>
<td>Kinds</td>
<td>Reference to broad groups, generally speaking (e.g. trees, birds)</td>
</tr>
<tr>
<td>Individuals</td>
<td>An ‘individual’ category (e.g., this tree; these trees) indicates lower-level construal and may be related to increased psychological closeness to nature</td>
</tr>
<tr>
<td>Storytelling after a storytelling prompt</td>
<td>Telling any story, defined as the description of a series of singular events linked together temporally, thematically, spatially, or causally</td>
</tr>
<tr>
<td>Expository after an expository prompt</td>
<td>Giving expository information after hearing the expository prompt. This information is not considered either a story or personal experience.</td>
</tr>
<tr>
<td>Reference to personal experience</td>
<td>A reference to an experience that does not reference multiple locations or timepoints.</td>
</tr>
</tbody>
</table>