VERBAL AND NON-VERBAL PARENTAL TEACHING STRATEGIES:
ETHNOTHEORIES AND EFFICACIES

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI‘I AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

IN

PSYCHOLOGY

MAY 2014

By

Ashley M. Morris

Thesis Committee:

Brandy Frazier, Co-chairperson
Ashley Maynard, Co-chairperson
Catherine Sophian

Keywords: parental beliefs, parental teaching strategies, children’s learning
Abstract

This project investigates the interplay between parent beliefs about children’s learning, verbal and non-verbal teaching strategies, and children’s learning outcomes. Study 1 found differences in parent beliefs about how children learn across cultural contexts, learning domains, and SES. Study 2 was an experimental manipulation, which asked parents to teach 4-year-olds a sorting rule using either verbal or non-verbal methods (each parent did both conditions). Parent beliefs about development and children’s learning outcomes were also measured. Parents who more strongly endorsed the idea that children learn from those around them used more direct teaching strategies; this relationship was strengthened when parental beliefs in the efficacy of verbal teaching strategies (over non-verbal strategies) were also examined. Interestingly, parents who believed children learned best by constructing their own knowledge had children who performed better on the outcome measure; however, this relationship was mediated by parents’ use of controlling teaching strategies. Results underscore the importance of examining the nuances of cultural context, parent beliefs, learning domains, teaching strategies, and children’s outcomes when deciding how to best teach children.
**Table of Contents**

Abstract ......................................................................................................................... i

Literature Review........................................................................................................... 1

- An Overview of Parental Ethnotheories................................................................. 2
- Parental Ethnotheories of Learning......................................................................... 3
- Cultural Setting for the Current Project................................................................. 5
- Verbal and Non-verbal Teaching Strategies Across Domains............................... 8
- Efficacy of Verbal and Non-verbal Teaching Strategies......................................... 10
- The Relative Efficacy of Parental Teaching Strategies Across Cultural Contexts... 16
- The Current Project ................................................................................................. 19

Study 1: Parental Ethnotheories of Learning in Hawai`i ........................................... 21

- Participants ............................................................................................................. 21
- Method ................................................................................................................... 22
- Results .................................................................................................................. 24
- Discussion ............................................................................................................. 31

Study 2: Verbal and Non-verbal Parental Teaching Beliefs and Strategies................ 37

- Participants ............................................................................................................. 38
- Method ................................................................................................................... 40
- Data Analysis & Coding ....................................................................................... 42
- Results .................................................................................................................. 46
- Discussion ............................................................................................................. 53

General Discussion .................................................................................................... 63

Appendix 1: Parental Ethnotheory Survey ................................................................. 68

Appendix 2: Parent Belief about Development Questionnaire ................................. 73
Appendix 3: Post-task Survey
Appendix 4: Verbal and Non-verbal Coding Schemes
Appendix 5: Clusters from Principal Components Analyses
Appendix 6: Additional Results
References
List of Tables

Table 1: How do children learn?.................................................................86
Table 2: Whom do children learn the most from?......................................87
Table 3: How should children seek information across scenarios?...............88
Table 4: Verbal and non-verbal teaching lengths........................................89
Table 5: Cohen’s kappas for reliability of parental teaching behaviors..........90
Table 6: Correlations between verbal and non-verbal teaching methods........91
Table 7: Correlations among verbal and non-verbal teaching strategies.........92
Table 8: Paired-sample t-tests between verbal and non-verbal teaching strategies.........93
Table 9: Correlations between parental beliefs and teaching strategies..........94
Table 10: Correlations between parental teaching strategies and children’s learning...........95
Literature Review

Children learn many things between the ages of two and six years old. Having mastered the basics of language during their second year, the next few years are spent refining language skills. Preschool-aged children develop friendships with peers, increasingly complex play skills, and more refined motor skills. They also master many important cognitive tasks, becoming more competent in complex cognitive functions such as learning and remembering rules for sorting objects.

How do children acquire these new skills? Vygotsky (1978) suggested that experts (e.g., parents, teachers, older siblings) in the child’s environment scaffold the development of these skills through the zone of proximal development: a theorized gap in the child’s skills, where she can complete a task with help that she will soon be able to accomplish alone. As the child gains experience and can perform the new skill without help, the zone of proximal development shifts, and a new skill is scaffolded. Across many fields of study including anthropology, sociology, and developmental psychology, previous research has focused on the parent-child relationship as the most readily available expert-novice relationship in young children’s lives. Previous research has shown that parents are quite skilled at adjusting their teaching methods to their child’s level of competence. For example, Moreno (2000) found that mothers used different types of questions at the end of a teaching session than at the beginning, suggesting that mothers were adapting their type of question to the child’s competence in the task. In an everyday task (shared book reading), Neumann and Neumann (2009) found that parents use several scaffolding behaviors (e.g., questions during reading, referencing print) to foster preschoolers’ literacy skills.

Parents scaffold their children’s learning in a number of different ways. Previous research has shown that children learn through a number of different verbal and non-verbal
methods employed by their parents (Brophy, 1970; Laosa, 1980; Larkina, Guler, Kleinknecht, & Bauer, 2008; Moreno, 2000; Olmstead & Jester, 1972; Phinney & Feshbach, 1980; Roberts & Barnes, 1992). Related research in the field of psychological anthropology has also documented that parents’ relative frequencies of using various verbal and non-verbal strategies differ across cultures (Lancy, 2008; Levin, 1992; Morton, 1996; Ochs & Schiefflin, 1994; Odden & Rochat, 2004; Paradise & Rogoff, 2009). The linking of developmental psychology and anthropological theories of development has suggested that parental teaching strategies should be examined in relation to their functions within certain cultural systems (Harkness & Super, 1996; Keller, 2007; Rogoff, 2003). The current project will add to the present literature by investigating connections between parental ethnotheories of learning and verbal and non-verbal parental teaching strategies in Hawai‘i and on the Mainland.

An Overview of Parental Ethnotheories

Why do parents differ in their teaching methods across cultures? Several researchers, including developmental psychologists and anthropologists who study childhood in a cultural context, have theorized that parents may hold different beliefs about the “best ways” to raise children based on their definition of what it means to be a successful adult within their culture or society (Harkness & Super, 1996; Keller, 2007; LeVine et al., 1994; Rogoff, 2003; Whiting & Whiting, 1979). For example, parents in cultures that emphasize the interdependence of their members co-sleep with their infants more than parents in cultures that emphasize independence, who place their infants in a separate crib, usually in a completely different room (Keller, 2007; Rogoff, 2003). In the domain of language development, Seymour (1999) found that parents in an Indian culture taught young children kinship names (e.g., sister, cousin, grandfather) before object names, reflecting a cultural emphasis on familial relationships. This is in contrast to early
language learning in the United States where children learn object names before kinship names (Nelson, 1973). These different ideas about the “best ways” to raise children are encompassed in the term “parental ethnotheories.”

**Parental Ethnotheories of Learning**

Parental ethnotheories differ across domains (including the two examples in the previous section) as well as cultures. This project specifically focuses on parental ethnotheories within the domain of children’s learning. Parents across the world hold different beliefs regarding the processes through which children acquire knowledge about the world around them. For example, Tanzanian mothers see their children as recipients of knowledge whereas American mothers see their children as taking an active role in acquiring knowledge about the world (McGillicuddy-De Lisi & Subramanian, 1996). Similarly, in a small community in Tahiti, Levy (1996) described a mother, who said, “I just let them watch. When they are ready, they will do the work,” which suggests a parental ethnotheory of learning based on children learning primarily through observation. There is also cultural variation in parental beliefs about whom children should learn from. For example, mothers in a large city in Nepal encouraged their children to learn from siblings (Levy, 1996) whereas American mothers valued didactic teaching interactions between parents and children (McGillicuddy-De Lisi & Subramanian, 1996).

In addition to cross-cultural work comparing parents in vastly different parts of the world, there is evidence that parents who are geographically close to each other may also hold different ethnotheories about how children acquire knowledge. For example, Martin and Johnson (1992) compared parental beliefs about children’s learning in a rural community in Wisconsin and found that parents held different ideas about the ways in which their preschool-aged children were learning new skills and knowledge. Their survey, the Beliefs about Development
Questionnaire, asked parents to choose from one of three options regarding how they think a child learns in a variety of scenarios (e.g., “How do children come to understand the differences between plants and animals?”). One option corresponds to a maturational view of knowledge acquisition that children learn spontaneously based on natural and/or genetic processes (e.g., “The distinction is obvious to children at a certain age”). Another option corresponds to a cognitive-developmental view of knowledge acquisition that children learn by integrating their existing knowledge with information they receive from the environment (e.g., “They formulate the concept by observing and thinking about living things”). The third option corresponds to a learning view of knowledge acquisition that changes in children’s knowledge occur as a result of teaching within her/his social and physical environments (e.g., “They are taught the important characteristics of each group”). Martin and Johnson (1992) were interested in correlating parental beliefs about knowledge acquisition with children’s actual abilities and found that education level was not a predictor of maternal beliefs about learning. Mothers who more strongly endorsed the cognitive-developmental view of knowledge acquisition were also more accurate in describing their children’s actual abilities (as measured by congruence with teacher ratings of children’s abilities).

In addition to beliefs about the overall processes of how children acquire knowledge (Levy, 1996; Martin & Johnson, 1992; McGillicuddy-De Lisi & Subramanian, 1996), parental ethnotheories of learning also address specific learning and teaching behaviors that are most effective for young children. Of particular interest in the current project are parents’ endorsements of and uses of various types of parental teaching and scaffolding behavior (e.g., letting children observe on their own, directly instructing children, asking questions). Some parental ethnotheories of learning emphasize verbal teaching and scaffolding strategies such as
question-asking while others endorse non-verbal ways for young children to acquire knowledge such as observation (Brooker, 2003; Greenfield, Keller, Fuligni, & Maynard, 2003; Greenfield, Trumbull, Keller, Rothstein-Fisch, Suzuki, & Quiroz, 2006; Kagitcibasi, 1996). Greenfield and colleagues (2003; 2006) describe two different pathways of development in an effort to explain why parents differ in their use of verbal and non-verbal teaching methods. The *individualistic* pathway favors verbal communication and teaching children to express themselves whereas the *collectivistic/sociocentric* pathway favors non-verbal communication and teaching children to comprehend and respect authority (Greenfield et al., 2003; Greenfield et al., 2006).

**Cultural setting for the current project: Parental ethnotheories of learning in Hawaii and other Pacific Island cultures as compared to Mainland America**

Hawai`i is an ideal place to conduct research into parental ethnotheories of learning because it is the most culturally diverse state in the country. According to the 2010 U.S. Census, 24.7% of Hawai`i’s residents are White (in contrast to 72.4% in the country as a whole), 38.6% are Asian (in contrast to 4.8%), 10% are Native Hawaiian/Pacific Islander (in contrast to 0.2%), and 23.6% of residents report more than one race (in contrast to 2.9%). Whereas the United States is generally thought of as an individualistic society (therefore emphasizing verbal communication), Hawai`i is interesting because its population includes a much higher percentage of people who are first-generation immigrants from traditionally collectivistic/sociocentric societies in Asia and other Pacific Islands (which emphasize more non-verbal communication) as well as people who may have been born in Hawai`i but have grown up within a more collectivistic cultural setting.

Imitate,” representing a parental ethnotheory that emphasizes non-verbal learning (Boggs, 1985; Gaile, 1974; Pukui, 1983; Pukui, Haertig, & Lee, 1972). Gallimore, Boggs, and Jordan (1974) found that these traditionally non-verbal parental ethnotheories of learning had an effect on preschool children’s information-seeking. In an experiment with an impossible puzzle, Native Hawaiian preschoolers used less verbal and more non-verbal help-seeking strategies when attempting to solve the puzzle than Caucasian preschoolers in another part of the state. For example, the Native Hawaiian preschoolers were more likely to work non-verbally on the puzzle by themselves whereas the Caucasian preschoolers were more likely to ask verbally for help. In interviews with parents of preschoolers, Levin (1992) also found that Native Hawaiian parents endorsed traditional non-verbal teaching methods (e.g., observation and imitation) when children were learning how to perform household chores.

Parental ethnotheories of non-verbal teaching have also been found on other Pacific Islands. Similar to Levin’s (1992) findings that Hawaiian children are encouraged to learn household chores through non-verbal methods, Morton (1996) describes young children in Tonga as learning how to do household chores, how to bathe, and how to use tools through strict observation of adults. In Samoa, boys learn traditional methods of fishing by observing and practicing on their own without direct instruction (Odden & Rochat, 2004). In New Zealand, Nicol (1985) observed interactions between both Pakeha (New Zealanders of European descent) and Samoan (living in New Zealand) parents and their preschoolers; she found that Samoan parents and children used more non-verbal interaction strategies (e.g., touch, gesture, eye contact) while Pakeha parents and children used more verbalizations.

In contrast to parental ethnotheories of learning in the Pacific Islands that emphasize non-verbal teaching strategies, studies of parent-child interaction and teaching behaviors in the
Mainland United States have revealed a parental ethnotheory of learning that seems to emphasize verbal teaching strategies. For example, Callanan and Oakes (1992) and Chounaird (2007) found that preschool-aged children frequently use verbal question-asking as a method of seeking information from their parents. Subsequent research has shown that not only do preschool-aged children ask a lot of questions, but also they are able to discriminate between answers that provide explanations and answers that merely provide verbal input without offering explanatory information (Frazier, Gelman, & Wellman, 2009). In addition to question-asking, research has also looked at the types of verbal praise that parents provide within the context of parent-child teaching interactions. For example, Cimpian, Arce, Markman, and Dweck (2007) show that using context-specific verbal praise with four-year-olds increases their motivation to perform a drawing task.

Whereas broad cultural differences may exist between verbal and non-verbal parental teaching strategies, most parents probably naturally use a combination of both verbal and non-verbal strategies. In all studies that coded for verbal and non-verbal teaching behaviors, no parent exclusively used only one or the other, but some parents used one more often than the other (Laosa, 1980; Larkina et al., 2008; Moreno, 2000; Phinney & Feshbach, 1980). Not only might parents use different levels of verbal and non-verbal teaching strategies across cultures, but there is also evidence that parents’ ethnotheories, and use of verbal and non-verbal teaching strategies may differ across domains and that parental beliefs about how children learn (as well as beliefs about the efficacy of verbal versus non-verbal learning) may influence which verbal and non-verbal teaching strategies parents use.
Verbal and non-verbal teaching strategies across domains

In addition to parents emphasizing certain methods of learning as a result of their culturally instantiated ethnotheories, there is also evidence that parents within a culture may think differently about the best ways to learn across different domains. As previously described, parents in the Pacific Islands have traditionally endorsed non-verbal teaching methods for young children such as observation, imitation, and listening when learning how to do chores, how to bathe, and how to fish (Boggs, 1985; Gallimore et al., 1974; Morton, 1996; Odden & Rochat, 2004; Pukui, 1983). However, parents in the Pacific Islands often endorse verbal direct teaching when children are learning rules and social etiquette (Boggs, 1985; Gallimore et al., 1974; Morton, 1996). Although this contrast in teaching strategies may at first seem contradictory, one way to explain this difference would be to consider parents’ perceptions of the relative importance of teaching skills within these two sets of domains. Given that Pacific Island communities tend to fit more into Greenfield and colleagues’ (2003; 2006) collectivistic/sociocentric pathway of development, in which social knowledge may be seen as the most important skill for children to learn and respect for authority highly valued, perhaps rules and social etiquette are verbally taught to young children because they may not pick up on the importance of this domain of learning through strictly non-verbal observation.

Alternatively, the introduction of formal schools may have shifted parental ethnotheories away from traditional expectations about learning. Levin (1992) found that, while Native Hawaiian parents endorsed non-verbal learning of household chores, they reported engaging in verbal teaching when preparing their preschool children for kindergarten. The introduction of formal schooling into other cultures has also altered parental ethnotheories such that parental ethnotheories that traditionally relied on non-verbal learning systems shift towards verbal,
didactic teaching models when preparing children for school (Maynard, 2004; McGillicuddy-De Lisi & Subramanian, 1996; Rogoff, 2003).

Given that formal schooling has historically shifted traditional parental ethnotheories of non-verbal observational learning towards more verbal didactic teaching, researchers might expect parents to use more verbal teaching methods in tasks that are school-relevant (e.g., learning the alphabet, learning a sorting rule for pictures) and more non-verbal teaching methods in everyday-relevant tasks (e.g., learning how to perform household chores, learning how to tie shoes). Indeed, Levin (1992) found this pattern in her parental interviews with Native Hawaiian parents. However, other researchers have found a different pattern of verbal versus non-verbal parental teaching strategies across different domains of learning. For example, Moreno (2000) found that Mexican-American mothers used more verbal teaching strategies (e.g., labeling, commands, directives, questions, praise) when teaching their four-year-old children how to tie their shoes (which Moreno labeled “an everyday task”) than when teaching them a picture-sorting task (which Moreno labeled “a school-like task”). In the picture-sorting task, Mexican-American mothers used more non-verbal teaching strategies (e.g., modeling, demonstration, physical correction, visual cues). These results are puzzling especially because Mexican-American parents tend to come from a collectivistic/sociocentric cultural background (Greenfield et al., 2003; 2006), and therefore researchers might expect them to use predominantly verbal teaching in the school-like task and predominantly non-verbal teaching in the everyday task. There are two possible explanations for these counterintuitive results. The first possibility is that the Mexican-American mothers in Moreno’s (2000) study did not hold traditionally collectivistic/sociocentric ethnotheories of children’s learning; parental ethnotheories were not measured in this study. A second possibility is that the tasks (picture sorting and learning to tie
shoes) may not have elicited the same teaching behaviors as tasks that other researchers have
examined. For example, Levin (1992) found differences in parental reports of their children’s
learning in chores and learning the alphabet. Perhaps parents did not see Moreno’s (2000) picture
sorting task as a particularly school-like task, despite his classification; this would explain why
they used predominantly non-verbal teaching methods instead of the verbal teaching methods
one would expect based on previous literature. It is also possible that the Mexican-American
parents did not view learning how to tie shoes as analogous to other “everyday” learning tasks
that previous research has shown are taught through predominantly non-verbal methods such as
performing household chores (Levin, 1992; Morton, 1996) or using tools (Morton, 1996).
Therefore, it is clear that parental ethnotheories of learning influence different types of verbal
and non-verbal parental teaching strategies.

**Efficacy of verbal and non-verbal teaching strategies**

Whereas there has been substantial research examining parents’ use of verbal versus non-
verbal teaching strategies (as reviewed above), the question of the relative effectiveness of these
different strategies (Is one type of teaching better than another? Do different parental teaching
strategies lead to different learning outcomes?) remains open. Historically, researchers have
often adopted a “deficit model” implying that non-verbal teaching and learning strategies are
inferior to the upper/middle-class Western/Euro-American emphasis on verbal learning and
teaching. In actuality, many studies have measured different levels of parental verbal and non-
verbal teaching strategies between cultural groups or socioeconomic groups, but have not
reported an outcome measure (Brophy, 1970; Laosa, 1980; Olmstead & Jester, 1972; Phinney &
Feshbach, 1980). Below, I review a few studies that have included outcome measures in an effort
to directly measure the efficacy of various verbal and non-verbal parental teaching strategies.
Given that most parents probably use both verbal and non-verbal strategies, the following sections are organized by overall teaching strategy. Within each teaching strategy section, the efficacies of both verbal and non-verbal iterations of the teaching strategy are discussed.

**Demonstration and modeling.** Rogoff (2003) and Lancy (2008) suggest that, around the world, demonstration and modeling are more common parental teaching strategies than direct verbal instruction. In demonstration and modeling, parents perform a task to specifically show the child how to do something. This showing is not necessarily an exclusively non-verbal strategy; modeling and demonstration may be accompanied by verbal narration as well. When Mexican-American mothers were asked to teach their four-year-old children two different tasks in the previously discussed study, Moreno (2000) found that higher levels of modeling and demonstration (i.e., when mother performed an aspect of the task for the purpose of providing a demonstration for the child to observe) were negatively correlated with children’s performance in the everyday task (learning to tie shoes) but were not correlated with children’s learning of the school-like task (learning a sorting rule for pictures). However, Moreno’s outcome measure of how much children had learned in the everyday task was largely non-verbal (e.g., “Show me how to tie your shoes”) whereas the outcome measure in the school-like task was largely verbal (e.g., “Tell me why these pictures go with these pictures”). Because Moreno (2000) coded only non-verbal modeling and demonstration, it follows that his results would only show that a non-verbal teaching strategy (modeling and/or demonstration) was correlated with performance on the non-verbal outcome measure (everyday task) and did not show any correlation with performance on the verbal outcome measure (school-like task). However, it is puzzling that, when parents used higher rates of non-verbal modeling and demonstration, their child’s performance on the non-verbal outcome task was worse than in children whose parents had used lower levels of non-
verbal modeling and demonstration. Perhaps there is a mediating variable (e.g., another teaching strategy) that explains why frequent use of non-verbal modeling and demonstration does not directly improve performance on a non-verbal task. It is also puzzling that a parent’s use of non-verbal modeling and demonstration was not correlated with their child’s performance on a verbal outcome task. This lack of correlation casts doubt on the traditional “deficit model” that non-verbal teaching strategies have a detrimental effect on children’s performance on verbal tasks. Because of this puzzling correlation between non-verbal modeling and demonstration and non-verbal task performance (and lack of correlation with verbal task performance), it will be important for future studies to include both verbal and non-verbal performance measures within the same task.

In contrast to Moreno’s (2000) results, Larkina and colleagues (2008) found that, in a picture memory task, three-year-old children’s performance on a verbal recall measure (e.g., how many pictures they recalled) was positively correlated with both non-verbal and verbal demonstration by their mothers during the teaching session. In the task, mothers were given a stack of cards with pictures and instructed to teach their child to remember as many of the twelve pictures as possible. The pictures could be sorted into three categories (e.g., clothing, fruits, and places), with four pictures in each category. When mothers modeled sorting the pictures into categories either verbally (by labeling them) or non-verbally (by physically separating them into piles), children were able to recall more pictures in the recall task compared to children whose mothers did not verbally or non-verbally demonstrate categorization of the pictures (Larkina et al., 2008). Whereas Moreno (2000) only coded non-verbal parental demonstration and modeling behaviors, Larkina and colleagues (2008) added to the literature by coding both verbal and non-verbal parental demonstration and modeling behaviors. In contrast to Moreno (2000), who found
that non-verbal demonstration and modeling parental teaching strategies were not correlated with a child’s performance on a verbal performance task, Larkina and colleagues (2008) found that both non-verbal and verbal demonstration and modeling strategies were positively correlated with a child’s performance on a verbal task. However, because Larkina and colleagues (2008) only included a verbal outcome task, the correlation between demonstration/modeling and children’s non-verbal performance is unclear. There are still many open questions about the correlation between parental usage of verbal and non-verbal demonstration and modeling teaching behaviors and children’s performance on verbal and non-verbal outcome tasks.

**Praise and correction.** When parents are teaching their child a new task, they may use verbal or non-verbal praise (e.g., “That’s right!” or smiling and nodding) as well as corrections (e.g., “Nope, try it again” or shaking their head) to communicate whether the child is performing well or not. Research suggests there may be differences in how often parents employ these strategies around the world. Greenfield and colleagues (2006) propose that parents may use different levels of praise and correction as a result of their parental ethnotheory: individualistic pathways of learning value praise whereas collectivistic/sociocentric pathways of learning favor criticism and corrections. These values make sense given that parents in individualistic cultures may be promoting children’s individual achievement whereas parents in collectivistic/sociocentric cultures may be discouraging children’s mistakes in an effort to support the community’s achievements. This characterization fits with what has been historically observed within Pacific Island cultures, where parents have employed more criticism and very little praise in teaching and learning situations (Boggs et al., 1974; Morton, 1996; Pukui et al., 1972). However, the efficacy of various amounts of praise and correction within parent-child teaching situations has not been extensively studied.
Moreno (2000), described earlier, also examined the efficacy of parents’ use of praise and corrections when teaching four-year-old children how to tie their shoes and sort pictures. He found that Mexican-American mothers’ use of corrections in a teaching task was negatively associated with children’s post-test performance on both an everyday task and a school-like task. However, higher levels of maternal praise during the teaching session were correlated with higher post-test scores across both domains (Moreno, 2000). These results suggest that the use of praise was an effective teaching strategy and the use of corrections was an ineffective teaching strategy within these tasks (learning how to tie shoes and sorting pictures).

**Asking and answering questions.** Another strategy that parents could use to teach children both verbally and non-verbally is asking questions, prompting children’s answers to those questions, and encouraging children to ask questions themselves. Asking children questions to “test” their knowledge potentially primes children for school environments where they will need to be ready to answer their teachers’ questions (Yamauchi, 2005). Therefore, we may expect to see parents using this teaching strategy more frequently when teaching their children school-like tasks. Often, in addition to parents asking their children questions, children also ask their parents questions in an effort to acquire knowledge (Callanan & Oakes, 1992; Chounaird, 2007). By answering their children’s questions, parents may encourage children to seek future information by asking further questions (Frazier et al., 2009).

In parental ethnotheories where performance within formal schooling is highly valued, parents may see asking questions as a way to prepare children for school. However, parental ethnotheories in several cultures do not value question-asking, perhaps because other skills (e.g., traditional methods of fishing or weaving) are valued more than academic performance in school. For example, Levin (1992) found that Native Hawaiian parents of preschoolers believed
children asking questions was rude because it was a breach of the generational separation between parents and children. This Native Hawaiian parental belief may reflect a larger cultural ideal where respect for hierarchy between generations is more highly valued than children’s academic performance (Pukui et al., 1972). When children do not have their questions answered, or are discouraged from asking them, they learn to seek information in other ways, such as through observation or testing ideas on their own or with peers (Boggs, 1985).

Despite the wide cultural variation in asking and answering preschool children’s questions, many studies have shown that children who have more experience with questions at home are better prepared for school, even in cultures where parental ethnotheories do not encourage question asking. For example, Martini and Mistry (1993) observed Native Hawaiian preschool-aged children’s everyday interactions at home and found that, among the children who were well-prepared for kindergarten (as defined by performance on school readiness assessments), parents responded to child-initiated questions 77% of the time. Among the children who were less-prepared for kindergarten, parents only responded to child-initiated questions 34% of the time. Gaile (1974) found that Hawaiian children who responded more verbosely to a researcher’s questions (suggesting that they had practice with answering questions at home) were also more likely to ask questions of their kindergarten teacher, were more likely to answer their teacher’s questions, and, as a result, were more likely to be ranked as attentive by their teachers.

Many studies have shown positive effects of parents’ use of questions as a teaching strategy for preschoolers, especially in preparing them for school. However, Moreno (2000) failed to replicate this finding. In his previously discussed study, Mexican-American mothers’ use of questions was not related to their four-year-olds’ performance on the picture sorting task.
and was negatively related to children’s performance on the shoe-tying task. These correlations are puzzling for two reasons. First, given that previous research has shown a positive correlation between maternal question-asking and children’s performance at school, it is puzzling that Moreno (2000) found no correlation between maternal question-asking and children’s performance on his school-like task. Second, given that previous research has shown positive correlations between maternal question-asking and children’s performance, it is puzzling that Moreno (2000) found a negative correlation between question-asking and children’s performance on his everyday task. The discrepancy between the research showing that parents’ use of question-asking is beneficial for children and Moreno’s (2000) findings that maternal questions were unrelated to school-like task performance and negatively related to everyday task performance suggests that question-asking may be differentially beneficial across cultural contexts as well as across different types of tasks. The relationship between parental question-asking and children’s performance in different cultural contexts as well as across different types of tasks warrants further research.

The relative efficacy of different parental teaching strategies across cultural contexts

Recently, two experimental studies have suggested that parental teaching strategies may have differential efficacy across cultural contexts (Kermani & Brenner, 2000; Wang, Bernas, & Eberhard, 2005). For example, Kermani and Brenner (2000) found that Iranian immigrant and Anglo-American mothers used different levels of verbal explanation (Anglo-American mothers used more) and verbal and non-verbal correction (Iranian immigrant mothers used more) in a task that asked mothers to help teach their 5-year-old children to construct a pattern from blocks. Despite the differences in teaching strategies, there were no significant differences between their children’s independent performance in a similar follow-up task, suggesting that the different
levels of verbal and non-verbal teaching strategies were effective for each group (Kermani & Brenner, 2000). These results are in line with previous work that suggests children are “trained” to learn in certain ways (as a result of their parents’ ethnotheories of learning) and perform best when teaching behaviors match the “training” they have received at home (Harkness & Super, 1996).

Similarly, Wang and colleagues (2005) measured various verbal and non-verbal interaction strategies of Chinese, white suburban American, Native American, and Hutterite (communally living American Anabaptists) mothers with their four-and-a-half year old children while playing with a standard set of toys shown in previous studies to elicit children’s requests for assistance and parents’ teaching behaviors. The researchers also measured children’s cognitive competence with four tasks. In the first task, they were asked to construct plastic pieces reproducing a pattern in a picture. In the second task, they were asked to anticipate the next piece that would fit in a pattern. The third task required children to demonstrate their conservation knowledge (e.g., recognizing that there were still the same number of buttons after rearranging them). In the fourth task, children were asked to categorize blocks based on different properties (e.g., color, shape). These tasks were not a direct measurement of the efficacy of maternal teaching strategies because children did not complete these tasks with their mothers before the researchers measured their performance. Nevertheless, the results show important cross-cultural differences between mothers’ interaction behaviors with their children.

American mothers frequently proposed verbal alternatives and asked open-ended questions in the interaction task. Chinese mothers often verbally requested information from their children and non-verbally demonstrated how to play with the toys. Hutterite mothers frequently offered immediate guidance, verbally provided specific information, and verbally and
non-verbally used a lot of correction. Native American mothers often provided verbal contextual information and often relinquished learning responsibility to their children. However, these differences in verbal and non-verbal teaching methods did not predict children’s representational scores on cognitive tasks, suggesting that different levels of verbal and non-verbal learning can yield equally positive outcomes in terms of children’s cognitive performance (Wang et al., 2005).

However, these two studies were limited in their outcome measures. Kermani and Brenner’s (2000) study used only a non-verbal follow-up task that asked the children to construct a design similar to the one they had worked on with their mother. Wang and colleagues’ (2005) outcome task was a measure of overall cognitive representational skills and was not a direct measure of the efficacy of different parental teaching strategies. Further research is needed to investigate the efficacy of various verbal and non-verbal parental teaching strategies.

**The Current Project**

The current project involves two studies: one aimed at measuring the ethnotheories of learning held by parents of a variety of ethnic and cultural backgrounds living in Hawai‘i, and a second study that will measure the relationship between parental ethnotheories, parental teaching strategies, and children’s outcomes. The current project will add to the extensive literature on parental ethnotheories of learning and parental teaching behaviors in a variety of ways. First, in Study 1, I will measure the ethnotheories of learning currently held by a sample of parents living in Hawai‘i, using a questionnaire asking about parents’ ideas about the best ways for children to learn. As Hawaii has a very culturally diverse population, it is likely that there will be a wide range of parental ethnotheories of learning represented by parents living in this context. Previous studies have described parental ethnotheories in Hawai‘i, but have not been updated for close to
twenty years (Levin, 1992; Roberts & Barnes, 1992; D’Amato & Inn, 1993). In addition, by including parents on other Hawaiian islands (Moloka‘i and Maui), this study will address a limitation of previous research, which has, for the most part, been done exclusively on O‘ahu.

Study 2 will include a parental ethnotheory, an active parental teaching task, and a post-test. Parents will complete a parental ethnotheory measure to assess their beliefs about the efficacy of various verbal and non-verbal learning and teaching strategies. Parents and their 4-year-old children will participate in two teaching tasks where parents must teach their child a sorting rule for pictures of animals and food. In one task, parents will only be able to use verbal teaching strategies; in the other task, they will only be able to use non-verbal teaching strategies. Finally, children will participate in a post-test to determine the relative efficacy of various teaching strategies. Study 2 will add to the existing literature in three ways: by linking parental ethnotheories directly to parental teaching behaviors, by measuring the efficacy of these teaching behaviors through both verbal and non-verbal outcome measures, and by attempting to separate the effects of verbal and non-verbal teaching strategies. Most studies of parental ethnotheories of learning have either focused on the beliefs or behaviors of parents; Study 2 will measure both in an effort to investigate directly how parental beliefs about learning and teaching influence parental teaching strategies. In addition, previous studies have measured the efficacy of various parental teaching strategies, but their outcome measures have been limited by evaluating children predominantly verbally or non-verbally; Study 2 will measure the efficacy of parental teaching strategies by administering a post-test to children that has both verbal and non-verbal measurements of learning. By doing so, I aim to identify certain parental teaching strategies that are most effective for verbal or non-verbal learning. Finally, Study 2 aims to isolate the effects of verbal and non-verbal parental teaching strategies by including two comparable tasks and asking
parents to teach one verbally and one non-verbally. By experimentally manipulating whether parents use verbal or non-verbal teaching strategies, I will be able to look for possible verbal and non-verbal learning effects of one teaching strategy compared to the other. I also anticipate that it will be difficult for parents to use only verbal or non-verbal teaching strategies, especially for parents who endorse one more than the other in their parental ethnotheories. For example, parents who more strongly endorse verbal teaching strategies will most likely have a difficult time in the non-verbal teaching task and may accidentally say something to their child. By asking parents to use one method or the other in this experimental manipulation, I will be able to gain a clearer picture of which types of teaching parents are most comfortable with; previous studies have allowed parents to use whichever strategies they deem most effective and therefore have not been able to investigate the ways parents teach when they are limited to verbal or non-verbal strategies. Additionally, I will also include a parental ethnotheory questionnaire that measures parents’ beliefs in the efficacy of various verbal and non-verbal teaching strategies. By including this measure, I hope to link parental ethnotheories of learning to the efficacy of their verbal and non-verbal teaching strategies.
Study 1: Parental Ethnotheories of Learning in Hawai‘i

Study 1 investigated parental ethnotheories of preschool-aged children’s learning in Hawai‘i. About half of the sample parents (56%) grew up in the Pacific Islands where parental ethnotheories have traditionally emphasized learning through observation and participation (Boggs, 1985; Gallimore et al., 1974; Levin, 1992; Odden & Rochat, 2004; Pukui et al., 1972; Rogoff, 2003). However, twenty years ago, Levin (1992) suggested that, in Hawai‘i, traditional ethnotheories of learning through observation might be shifting more towards the Western model of direct teaching and asking questions for some domains of learning. She noted that parental ethnotheories regarding how children should learn school-related skills (e.g., learning the alphabet) emphasized direct teaching whereas skills around the home (e.g., learning how to do chores) were still thought to be best learned through more traditional models of learning such as observation (Levin, 1992). I hypothesized that parents who had grown up in the Pacific Islands would endorse learning through observation more strongly than parents who had grown up outside of the Pacific Islands, who would endorse children learning through asking questions more strongly. I also hypothesized that parents, regardless of where they grew up, would think differently about the best ways for children to learn across different domains. Specifically, I predicted that parents would endorse observation as the best means for learning about social conventions such as taking off shoes at home (but not at the store) and would endorse direct teaching as the best means for learning about school-like content such as learning about why some toys float while others do not.

Participants

Fifty-one parents (39 mothers, 11 fathers, 1 aunt) were recruited via five preschools located on O`ahu (n=25), Moloka`i (n=8), and Maui (n=22). Each parent had at least one child
between the ages of 2- and 6-years-old (total= 70 children, 32 girls). Thirty-two parents had 1 preschool-aged child, 16 had 2 preschool-aged children, 2 had 3 preschool-aged children, and 1 parent did not answer the question about her children’s ages. Twenty-two parents identified with more than one ethnicity. In total, 18 parents identified as Native Hawaiian, 15 as another Pacific Islander, 22 as Asian, 23 as Caucasian, 3 as Hispanic, and 10 as other (including African, European, and Middle Eastern). About half of the parents (56%, n=28) grew up in the Pacific Islands, including Hawai`i (n=19). About one-quarter (26%, n=13) grew up on the Mainland United States, and 18% (n=9) of parents grew up elsewhere, such as Asia, Africa, and Europe. One parent did not report where she had grown up, and was excluded from the analyses looking at where parents had grown up.

Education level also varied among the participants. Seven parents (14.3%) listed a high school diploma as their highest education level, 18 (35.3%) listed an associate’s degree or some college, 12 (23.5%) listed a bachelor’s degree, and 12 (23.5%) parents in the sample had a completed a graduate degree. Two parents did not report their education level. Income also varied with 17 parents (33.3%) reporting annual household income below $25,000, 12 (23.5%) reporting household income between $25,000 and $75,000, and 19 (37.3%) reporting annual household incomes of greater than $75,000. Three parents did not report their annual income.

Method

Parents were asked to complete a survey. Those who returned a survey and signed consent form were compensated with a $5 gift card to either Jamba Juice (a national smoothie chain restaurant) or PoMahina Designs (a local clothing company on Moloka`i). The survey consisted of 3 parts, plus a section on demographic information (see Appendix 1).
In Part 1, parents were asked to construct 2 ranked lists. First, they were asked to rank how children learned the best. They were given the following choices: observation, talking, asking direct questions, listening, imitation, thinking, direct teaching, and hands-on experience. There were also extra lines and space for the parents to write additional ways they believe children learn. Second, they were asked to rank whom children learn the most from. They were given the following choices: parents, siblings, teachers, other adults, and peers. Again, there were also extra lines and spaces for the parents’ thoughts on additional sources from whom children learn.

In Part 2, parents were presented with 24 statements about preschool children’s information-seeking behavior and were asked to indicate their agreement with each statement using a 6-point Likert scale. For example, “It is important to explain the reasons behind rules to preschool children,” “It is important to me that I make time to play with my preschool child,” and “I encourage my preschool child to ask me questions” (for a full list of questions, see Appendix 1). The statements were presented in four randomized orders across participants.

In Part 3, parents were presented with 6 short hypothetical scenarios involving a preschool-aged child wondering about something. These scenarios included situations such as why we remove our shoes at home, why some toys float, why grass might turn yellow and brown, why we eat vegetables before dessert, why we need to be quiet in the library, and why an adult may be crying in a public place. Parents were asked to choose one of 5 methods representing the best way for the child to seek answers to what they were wondering about. Options included observing or experimenting on their own, asking parents a question, asking another authority figure a question, asking an older sibling, having a parent explain without the child needing to ask, or none of the above. Scenarios were counter-balanced in their order of
presentation. Parents were also given the option of writing in other ways that they thought would be the best way for a child to seek out answers in each scenario.

Results

**Part 1.** In Part 1 of the survey, parents constructed ranked lists of how children learned best, as well as whom children learned the most from.

*How do children learn best?* In Table 1, parents’ rankings are analyzed using three different approaches. In the first, I give frequency counts of parents listing each method of learning as one of their top 3 choices. In the second, I give frequency counts of parents listing each method of learning as their top choice for how children learn best. In the third, I rank the methods of learning according to their means. Because this is ordinal data, the means do not hold any special meaning except as a way to rank the learning methods; the relative closeness of the means should not be interpreted to imply the degree of closeness among the ranked methods. See Table 1 for results.

As shown in Table 1, observation, hands-on experience, and imitation are consistently the highest ranked methods of learning. Because previous research has indicated parents differ in their beliefs about the best way for children to learn based on where they grew up, SES, or parental education level, I ran Mann-Whitney Tests (a non-parametric test for differences among ranking data in two groups) and Kuskal-Wallis Tests (a non-parametric test for differences among ranking data in more than two groups) for those 3 variables to investigate whether parents differed significantly in their ranking of these various methods of learning. Parents who grew up in the Pacific Islands ranked “listening” significantly higher than parents who had grown up elsewhere \((p<.01)\) which supports previous literature showing that Pacific Island parents emphasize more non-verbal learning and teaching methods. However, parents who had grown up
in the Pacific Islands also ranked “talking” significantly higher than parents who had grown up elsewhere \((p<.05)\). In order to address these somewhat contradictory findings, I ran another Mann-Whitney Test between parents who self-identified as Native Hawaiian and those who did not. There were no significant differences at the .05 level for any of the teaching methods; however, there were interesting trends in how parents ranked “talking” and “direct teaching.” While Native Hawaiian parents tended to rank “talking” higher than others \((p=.07)\), they also tended to rank “direct teaching” lower than other parents did \((p=.06)\). As seen in Appendix 1, the survey defined “talking” as “the child engages in conversations with others” and “direct teaching” as “an adult, sibling, or peer explicitly teach the child.”

A Kruskal-Wallis Test was performed to check for differences in rankings among parents depending on their level of education (the parent who completed the survey was coded as completing one of the following: high school, some college, college, or graduate degree). Four interesting patterns emerged. The higher the level of parental education, the lower they ranked “talking” as a way for children to learn \((p<.05)\) and the higher they ranked “hands-on experience” \((p<.05)\). Parents who had completed high school or some college ranked “imitation” significantly lower than parents who had completed college or graduate school \((p<.05)\). Interestingly, parents who had completed college (but not graduate school) ranked “thinking” higher than the other three groups of parents \((p<.01)\), including those who had completed graduate school.

Finally, I analyzed the parental rankings based on their reported household annual income. Those in the highest income bracket (annual household income greater than $75,000) ranked “talking” lower \((p<.05)\), “listening” lower \((p<.05)\), “hands-on experience” higher \((p<.01)\),
and “imitation” higher ($p<.05$) than those with lower incomes (annual household income below $75,000).

**Whom do children learn the most from?** There was less variability in parents’ responses to this question than in their responses to the first question, with 80% of parents overall listing “parents” as the people whom children learn the most from. As in Table 1, the means in Table 2 do not hold any meaning beyond indicating the relative order in which parents ranked others as people to learn from. As seen in Table 2, “parents” ranked highest, with “siblings” and “teachers” rounding out the top 3.

I ran a Mann-Whitney Test to see if there were differences depending on where parents had grown up. None of the comparisons were significant, but the ranking of “peers” approached significance with parents who had grown up in the Pacific Islands ranking “peers” lower than parents who had grown up elsewhere ($p=.06$).

**Part 2.** Using Principal Components Analysis, I identified 5 clusters of responses from the 24 Likert scale statement ($\chi^2=201.18; p<.05$). Principal Components Analysis identifies clusters of items that vary in similar ways across participants. The clusters are detailed below, along with the loadings for each statement. A higher loading value indicates a higher degree of correlation between that question and the cluster.

*Cluster 1: Child-Initiated Teaching*

1. Preschool children ask questions because they are interested in the world around them (0.82).
2. I encourage my preschool child to ask me questions (0.59).
3. If my preschool child has a question, I hope s/he would ask me (0.68).

*Cluster 2: Adult-Directed Teaching*

1. Parents should initiate conversations with their preschool children often (0.78).
2. Preschool children are a product of their environment (0.56).

3. I initiate conversations with my preschool child often (0.72).

4. Preschool children should be encouraged to ask questions (0.60).

5. There are some things that parents do not need to explain to their preschool children (0.53).

Cluster 3: Children and adults in separate spheres

1. Preschool children should be seen and not heard (0.65).

2. Preschool children should never interrupt an adult conversation (0.59).

3. Preschool children should be expected to follow the rules without an explanation (0.72).

4. Reverse scored: Parents and preschool children should play together often (-0.61).

Cluster 4: Individualistic developmental pathway

1. It is important to explain the reasons behind rules to preschool children (0.69).

2. It is important to me that I make time to play with my preschool child (0.52).

3. Children should actively participate in family and cultural traditions to learn them (0.77).

Cluster 5: Collectivistic/Sociocentric developmental pathway

1. Preschool children ask too many questions (0.47).

2. Reverse scored: It is important to me that my preschool child be able to play by him/herself (-0.76).

3. Preschool children ask questions because they are trying to get someone’s attention (0.59).

4. Reverse scored: Parents should follow their preschool child’s lead in conversations (-0.51).

Parents’ answers within the clusters were summed to give each parent a sub-score in each of the clusters. These sub-scores were then used as dependent variables in univariate general linear models to investigate whether demographic variables (e.g., where a parent grew up, income level, education level) were significant predictors of cluster sub-scores.
A few interesting patterns emerged. Income level was a significant predictor of parents’ Cluster 3 scores, which described adults and children as belonging to separate spheres ($F=3.47, p<.05$). Post-hoc Tukey HSD tests revealed a trend towards parents in the lowest income level (below $25,000/year) having higher sub-scores in this cluster than parents in the middle income level ($25,001-$75,000/year, $p=.08$) as well as parents in the highest income level (over $75,001/year, p=.07$). Income level was a significant predictor of parents’ Cluster 5 scores, which described collectivistic/sociocentric-type parental ethnotheories ($F=8.76, p<.01$). Post-hoc Tukey HSD tests revealed significant differences with parents in the highest income having lower sub-scores in this cluster than parents in the lowest income level ($p<.001$) as well as parents in the middle income level ($p<.05$).

Education level was also a significant predictor of parents’ Cluster 5 scores ($F=4.88, p<.01$). However, post-hoc Tukey HSD tests revealed a puzzling pattern: parents with the lowest level of education (only high school) did not significantly differ from any of the other education levels. However, parents with the second lowest levels of education (some college) differed significantly from parents in the highest education level (graduate school, $p<.01$) and parents in the second highest education level (college degree, $p<.05$). Parents in the higher education levels had lower sub-scores in Cluster 5 than parents who had only attended some college but did not have significantly different sub-scores than parents who had only completed high school.

Whether a parent had grown up in the Pacific Islands or not was not a significant predictor of their sub-score in any of the clusters.

**Part 3.** Part 3 consisted of 6 scenarios where a preschool child was wondering about something (e.g., why some toys float, why they need to be quiet at the library). Participants were asked to choose from 5 choices as to the best way for the child in the scenario to seek the
information they were wondering about. Although the instructions for Part 3 asked parents to choose the best way for children in each scenario to seek out information, several parents chose 2 or more ways that children should learn. The scenario where a child was wondering why the grass was yellow when they returned home from vacation had the largest percentage (28.5%) of parents choosing more than one way for that child to seek out information. The scenario where a child was wondering why they had to eat vegetables had the lowest percentage (20.0%) of parents choosing more than one answer. The other 4 scenarios fell within this range: 22.0% for an adult crying in public, 24.5% for being quiet in the library, and 25.5% for both taking shoes off at home and wondering why some toys float.

In order to address this issue of multiple answers without throwing out roughly one quarter of the data for each scenario, I weighted the choices according to a standardized system. For example, if a parent chose both observation and asking a parent for one scenario, I assigned 0.5 to each of those choices. There was no indication on the form as to which might be a parent’s first choice as opposed to their second choice, and I feel confident in this weighting system because many parents who chose more than one answer wrote notes beside the question saying, “These are all equally good ways to learn.” Therefore, each option for each scenario was separated and assigned a value for each parent between 0 (the parent had not chosen it) to 1 (the parent had indicated only that answer). For example, if a parent chose three answers, each choice was assigned 0.33, if they chose 4 answers, each choice was assigned 0.25. If they chose all 5 answers, they were assigned to a new category: all of the above.

First, I was interested in whether parents as a whole thought differently about the best way for children to seek out information across different domains. I added the weighted scores for each answer. As seen in Table 3, parents differed across scenarios in terms of which learning
methods they endorsed. Overall, parents chose “ask parents” as the most appropriate way for children to seek out information in 3 scenarios: a child wondering why the grass was yellow after a week away, why we take off shoes at home, and why an unknown adult would be crying in the airport. Parents chose “parents should explain before child asks” in 2 scenarios: why we eat vegetables before dessert and why we should be quiet at the library. Overall, parents only endorsed “observation” as the best way for children to seek out information within the scenario where a child is wondering why some toys float and others do not.

Second, I hypothesized that parents would endorse different methods of learning across different domains depending on whether they had grown up in the Pacific Islands or not, specifically that Pacific Islander parents would endorse more information-seeking through observation compared to parents who grew up elsewhere. Based on previous research, I also wanted to investigate whether household income or parental education level were significant predictors of parents choosing a particular method for a child to seek information. In order to address these questions, I ran general linear regression models to predict each method of learning in each scenario. Results are organized by method of learning.

**Observation.** I was specifically interested in parents’ endorsement of children learning through observation across the different scenarios. Parental education level was not a significant predictor of parents’ endorsement of “observation” as a child learning strategy across any of the scenarios. However, whether a parent had grown up in the Pacific Islands or not was a significant predictor of their endorsement of “observation” in 2 scenarios: the one where a child is wondering why he needs to be quiet in the library ($F=7.03, p<.05$) and the one where a child is wondering why some of her toys float in the water while others do not ($F=6.37, p<.05$). Interestingly, the results were in opposite directions: parents who grew up in the Pacific Islands
were less likely to endorse observation when a child was wondering about a rule (staying quiet in the library) and more likely to endorse observation when a child was wondering about science knowledge (why some toys float while others do not) compared to parents who did not grow up in the Pacific Islands.

**Asking a parent.** The next child learning strategy that I examined in this section of the survey was the child asking their parent a question to seek out information. The only scenario that had a significant predictor was the scenario where a child was wondering why the grass had turned brown after her family had been away on vacation. For this scenario, income level was a significant predictor of whether parents endorsed the child asking her parents ($F=3.91, p<.05$) with a general trend of those with annual incomes less than $25,000 endorsing asking a parent a question more than those with annual incomes more than $75,000 (68.75% versus 15.79%).

**Other methods of seeking out information.** There were no significant predictors for the information-seeking methods of asking a teacher, asking an older sibling, or the parent explaining without the child needing to ask. There were also no significant predictors for parents who chose “none of the above.” Although “all of the above” was not an option, several parents indicated it across a variety of the scenarios. Income was a significant predictor of parents choosing “all of the above” in the scenario about being quiet in the library ($F=6.05, p<.01$) and a child seeing someone crying at the airport ($F=3.63, p<.05$). In both scenarios, the only parents to indicate “all of the above” were those whose household annual incomes were above $75,000.

**Discussion**

Parents of preschool-aged children in Hawai`i hold diverse ethnotheories about the best ways for children to seek out information, both in general and across a variety of domains. Overall, parents ranked learning through observation, hands-on experience, and imitation as the
best ways for children to learn. However, there were some interesting differences in the ways parents ranked other methods of learning based on where they had grown up, their annual household income, and parent education level.

Parental ethnotheories of learning are often affected by where parents grew up themselves. In this study, I was particularly interested in parents who had grown up in the Pacific Islands where parental ethnotheories have historically emphasized learning through observation (Boggs, 1985; Levin, 1992; Odden & Rochat, 2004; Pukui et al., 1972). Parents who grew up in the Pacific Islands ranked both “listening” and “talking” higher than parents who grew up elsewhere. In the survey, I defined “listening” as “the child listens to what others have to say” and “talking” as “the child engages in conversation with others.” The higher endorsement of “listening” among Pacific Islander parents compared to parents who had not grown up in the Pacific Islands seems to fit with the Pacific Island ethnotheory in the literature that parents value non-verbal learning strategies such as observation. However, the higher endorsement of “talking” among parents who had grown up in the Pacific Islands compared to parents who had not seems to be at odds with previous literature; perhaps this result signifies a shift towards a new Pacific Island parental ethnotheory that includes engaging in conversations with young children as a valuable method of teaching.

Although parents endorsed observation, hands-on experience, and imitation as the best ways for children to learn in their ranked lists, their responses to the specific scenarios across a variety of learning domains are not entirely consistent with their initial rankings. Parents ranked observation as the best way for children to learn, but their answers to the scenarios indicate that they highly value children learning through asking questions as well as through observation. One possible explanation for this discrepancy is that, when they were constructing their ranked
lists, parents could have been thinking about learning domains or situations that were different from the learning domains and situations presented in the scenarios.

The data from the scenarios suggest that parents think about learning differently across different domains, as shown by their endorsements of different methods of information-seeking across the scenarios. For example, parents overall endorsed explanation without their child asking as the best way for children to learn rules such as why we have to be quiet at the library. It is also interesting to examine the data and see differences in some domains between parents who were raised in the Pacific Islands (where parental ethnotheories have historically emphasized learning through observation) and those who did not. In my sample, whether a parent had grown up in the Pacific Islands was a significant predictor of their endorsement of the child observing on her own in the science scenario of wondering why some toys float while others do not. This result could have interesting implications for school readiness levels; perhaps children whose parents think they should learn about science through observation are at a disadvantage when they are expected to ask questions in school (Gallimore et al., 1974; Yamauchi, 2005). Further research could investigate parental beliefs about the best way for children to seek out information across other school-like domains such as math, reading, and writing. Children from Pacific Island backgrounds tend to have lower academic achievement than their non-Pacific Islander peers (Office of Hawaiian Affairs, 2006); one of the explanations for this lower school achievement may be found in investigating the differences between the ways children are encouraged to learn at home and at school.

In his review of anthropological studies of early learning, Lancy (2008) found that many cultures historically did not endorse direct teaching, except in the social etiquette domain. In Study 1, whether a parent had grown up in the Pacific Islands or not was a significant predictor
of whether they endorsed observation as a means for seeking information in the scenario in which a child was wondering why they needed to be quiet at the library. Unlike the previously discussed science scenario, where Pacific Island parents endorsed observation more than parents who had grown up elsewhere, in the library scenario, parents who had grown up in the Pacific Islands endorsed observation less than parents who had grown up elsewhere. Historically in Pacific Island communities, social etiquette and rules were thought to need direct teaching (Morton, 1996; Pukui, Haertig, & Lee, 1974; Ritchie & Ritchie, 1983). Based on the results of Part 3, it seems that this emphasis on direct teaching of rules and etiquette within Pacific Island communities may still exist. Further research is needed to investigate differences in parental ethnotheories of learning within this domain: are there some rules for which parents endorse children learning through observation and some rules where they would endorse asking a parent?

Other studies have found parent education level to be a significant predictor of parental teaching behavior (Greenfield et al., 2003; Maynard, 2004) with parents with higher levels of education emphasizing more school-like teaching behaviors such as direct teaching and asking questions. However, in this study there were only two differences in terms of education. The first was in the ranked list portion of the survey (part one): parents with higher levels of education tended to rank “hands-on experience” and “imitation” higher and “talking” lower than parents with lower levels of education. Further investigation is needed to interpret the reasons behind why parents with higher levels of education ranked these methods of learning higher than parents with lower levels of education. The second difference found in terms of parental education level was in participants’ sub-scores on Cluster 5 (Collectivistic/Sociocentric Principles) of Part 2 of the survey. Parents with some college had higher sub-scores than parents who had finished college and/or graduate school. However, parents who had only completed high school did not
differ from either group. This finding is puzzling because it suggests a non-linear relationship between parental education level and their endorsement of collectivistic/sociocentric principles; further investigation is clearly needed. Only 7 parents in the study had only completed high school. There were no differences in their children’s ages or genders compared to parents in other education levels. Of the 6 mothers and 1 father within this group, 3 had other relatives living in the house with higher levels of education, which may have influenced their beliefs about the ways children learn. The 6 mothers identified as Pacific Islanders (4 Native Hawaiian, 1 Samoan, and 1 from Palau) while the father identified as Vietnamese. The parents had grown up in a variety of places (1 each from Guam, Vietnam, American Samoa, Oʻahu, Molokaʻi, Maui, as well as 1 parent who had grown up on both Oʻahu and Molokaʻi). There appear to be no systematic differences between this group of parents and the other education levels to explain the lack of difference in their Cluster 5 scores.

In deficit models, parents of lower socioeconomic statuses are often assumed to have less effective ways of teaching their children than parents of middle and high socioeconomic statuses (e.g., non-verbal methods, more corrections and negative statements). For example, Phinney and Feshbach (1980) found that working-class mothers used more non-verbal behavior compared to middle-class mothers who asked more questions and used less negative statements. Similarly, Olmstead and Jester (1972) found that middle-class mothers used a greater variety of verbal teaching behaviors, including open-ended questions and praise when compared to working-class mothers. Although both of these studies implied that the verbal teaching behaviors were more effective, neither study included an outcome measure of children’s learning to directly test their theories. In Part 2, income level was a significant predictor of parents’ sub-scores on two clusters: Cluster 3 (Children and adults occupy separate spheres) and Cluster 5.
(Collectivistic/sociocentric principles). In Cluster 3, parents in the lowest income group (<$25,000/year) were more likely than the middle or highest income groups to agree with the ideas that children and adults occupy separate spheres. In Cluster 5, parents in the highest income group (>-$75,000/year) were less likely to agree with the ideas that seemed to describe a collectivistic/sociocentric pathway of development. These results are consistent with previous research showing that lower-income parents more often adopt “less effective” teaching strategies, which also align with collectivistic/sociocentric parental ethnotheories of learning and teaching. However, Kermani and Brenner (2000) and Wang and colleagues (2005) have shown that different parental teaching strategies may be differentially effective across cultural contexts. Further research is needed to determine whether certain learning and teaching strategies are more or less effective in Hawai‘i and elsewhere.

Given the discrepancies between parents’ rankings of teaching strategies and their choices of the best ways for children to seek out information in various scenarios, the next logical step is to investigate actual parental teaching behavior to get a fuller picture of how parents are teaching their children. Very few studies have examined the connection between parental ethnotheories about various verbal and non-verbal learning methods and the actual teaching strategies they employ with their preschool-aged children. In Study 2, I investigate parental beliefs of various verbal and non-verbal teaching strategies and their relationships to teaching behavior within a specific learning domain: categorization learning.
Study 2: Verbal and Non-verbal Parental Teaching Beliefs and Strategies

Many previous studies have examined parental teaching behaviors by giving parents and their preschool-aged children a standardized task, observing the teaching interactions, and coding the behavior. For example, Roberts and Barnes (1992) observed parents teaching their children (mean age= 4 years, 5 months) how to construct a 3-dimensional block shape from a 2-dimensional picture. Pellegrini, Brody, and Sigel (1985) observed parents teaching their children (ages 3 years, 6 months to 5 years, 8 months) how to construct various shapes of origami. Phinney and Fishbach (1980) observed parents and children (ages 2 years, 6 months to 3 years, 6 months) in several tasks including one where parents had to teach their child how to play a simple color matching game. Laosa (1980) observed parents teaching their children (age 5 years) to construct a Tinkertoy model from a picture.

In addition to teaching children how to construct an object from a picture or how to play a simple game, several studies have observed verbal and non-verbal parental teaching behaviors within the context of a parent teaching their child a simple sorting rule for pictures or objects. For example, one widely used sorting task has asked parents to teach their preschool-aged children a rule for sorting blocks that are different heights and have different markings (Hess & Shipman, 1965; Brophy, 1970; Olmstead & Jester, 1972; Davis & Lange, 1973; Johnson & Breckenridge, 1981). Other studies have observed parents teaching their preschool-aged children a sorting rule for a collection of pictures. For example Perez-Granados and Callanan (1997) had parents teach their children sorting rules for photographs cut from magazines. Larkina and colleagues (2008) observed parents helping their children to remember pictures on cards by sorting them into groups.

A limitation of all of these studies is that the researchers did not include a parental
ethnotheory measure; therefore, we cannot draw conclusions about the connections between parental beliefs about learning and parental teaching behaviors in these standardized tasks. Also, most of these studies did not include an outcome measure to evaluate what children had learned from the interaction (Perez-Granados & Callanan, 1997 and Larkina et al., 2008 are exceptions). Therefore, we cannot draw conclusions about the efficacy of different parental teaching strategies in these tasks. A final limitation of these studies is that they simply asked parents to teach their children; while the researchers often coded both verbal and non-verbal teaching behaviors, there was no attempt to isolate the effects of one type of teaching over another. Study 2 attempts to address all of these limitations.

The limitations described above will be addressed in a number of ways. First, this study will include a parental ethnotheory measure so that parental teaching behaviors can be examined in relationship to parental beliefs about learning. Second, this study will include an outcome measure (with both verbal and non-verbal components) to address the question of the efficacy of various teaching strategies. Finally, this study will attempt to isolate the effects of verbal versus non-verbal teaching strategies by asking parents to teach their child two tasks, one using only verbal methods, and one using only non-verbal methods.

**Participants**

Thirty-six mother-child dyads (19 girls) participated in the study. Mean child age was 53 months (range 46-59 months). I focused on 4-year-old children because previous research has shown that children’s ability to learn categorization rules greatly improves between the ages of 3- and 5-years-old (Blaye & Bonthoux, 2001) and that 3- and 5-year-olds who interacted with their mothers learned a sorting rule better than a control group who only received corrective feedback from researchers (Freund, 1990). Therefore, by focusing on 4-year-olds, I observed
children in the midst of their categorization skills development who would not be able to learn the sorting rule entirely by themselves.

Mean maternal age was 36 years (range 21-48 years). Thirty-five mothers had completed an undergraduate or graduate degree. In terms of ethnicity, 32 mothers identified as Caucasian (6 of these also identified as another ethnicity in addition to Caucasian). Of the 4 mothers who did not identify as Caucasian, 3 identified as Filipino and 1 as African-American. Twenty-six mothers reported annual household incomes greater than $100,000. Twenty-six mothers had grown up in the Mainland United States, 6 mothers had grown up on Oʻahu, 1 mother had grown up on a neighbor island, and 3 mothers had grown up outside of the United States (one each from Germany, Canada, and the Philippines).

As a group, children had higher-than-average verbal abilities. Children were assessed using the Peabody Picture Vocabulary Test, 4th Edition (PPVT-4) and the Expressive Vocabulary Test, 2nd Edition (EVT-2). Children’s standard scores (where 100 is average), percentiles (where 50 is average), and age equivalencies were calculated on both assessments. Overall, the mean standard score for the PPVT-4 was 118.3 (range 91-150), the mean percentile was 80 (range 21-99.9), and the mean age equivalency was 71 months (range 46-110). The mean standard score for the EVT-2 was 119.6 (range 84-140), the mean percentile was 83 (range 14-99.6), and the mean age equivalency was 70 months (range 44-96).

Eighteen dyads were currently living on Oʻahu (in suburban areas near Honolulu, HI) and 18 dyads were currently living on the East Coast of the United States (in suburban areas near Pittsburgh, PA, Boston, MA, and Washington, DC). Twenty-one dyads completed the teaching tasks at home and 15 dyads completed the tasks in a school or laboratory setting.
Method

**Sorting task.** There were 2 sorting tasks. The first involved 4 (5x7 inch) pictures of novel animals. There were also 16 (3x5 inch) pictures of novel food. The sorting rule was that one animal likes red food with stems, one animal likes yellow food with stems, one animal likes red food with no stems, and one animal likes yellow food with no stems. Each novel animal liked exactly 4 of the pictured foods. The second categorization task was similar, but involved 4 (5x7 inch) pictures of novel foods and 16 (3x5 inch) pictures of novel animals. The sorting rule was that one type of food is liked by orange animals with tails, one food is liked by purple animals with tails, one food is liked by orange animals without tails, and one food is liked by purple animals without tails.

The researcher introduced the parents and children to the task by laying out the four larger cards while saying, “Here are some funny kinds of animals” or “Here are some funny kinds of foods.” The researcher then demonstrated the sorting rule by sorting one set of small cards, saying “This kind of animal likes this kind of food” whenever she placed one down. The parent and child were both told (in the nonverbal condition) “Okay, now Mommy is going to teach you which animals like which foods, but it’s a silly game where she can’t use her voice to tell you and she can only use her hands or body.” In the verbal condition, they were told “Okay, now Mommy is going to teach you which animals like which foods, but it’s a silly game where she can’t use her hands or body and she can only use her voice.” In the verbal condition, parents were offered a laminated picture of 2 hand outlines to help them limit the use of their hands in teaching. The researcher checked that the parent understood the sorting rule and task (usually spelling out descriptions like “t-a-i-l and c-o-l-o-r” so that the child did not receive any additional information). When it was clear that the parent understood the task, the researcher
handed a stack of 12 smaller cards to the child (exactly 3 cards in the stack could be sorted to each larger card using the rule). Parents and children participated in both the verbal and non-verbal conditions, with the type of condition (verbal and non-verbal) and the type of task (sorting foods with animals, or animals with foods) being counterbalanced in their order of presentation across participants.

**Post-test with children.** After each teaching session with their parent, children participated in a post-test with the researcher. They were shown the same 4 novel items and asked, first, to sort the same exemplar small pictures as the researcher demonstrated in the teaching task. If they sorted one of the first 4 wrong, the researcher corrected them by saying, “Oh, this one actually goes here.” Then, one at a time, the researcher handed the child one of 12 small cards (4 they had sorted with their parent, 8 they had not). For each small card, children were asked to place it where it belonged and then asked, “Why does it go there?” Children could earn a maximum of 4 points for each small card: 1 point for correctly sorting according to color, 1 point for correctly sorting according to feature (tail or stem), 1 point for correctly explaining according to color, and 1 point for correctly explaining according to feature.

**Parental ethnotheory measures.** Before the teaching task, parents completed Martin and Johnson’s (1992) Beliefs about Development Questionnaire (see Appendix 2). This questionnaire consists of 30 questions asking parents to choose from 3 reasons that might explain why children develop certain skills. Each of the 3 reasons corresponds to a developmental perspective: *maturational* (children naturally learn new things as they mature), *cognitive*-
developmental (children learn new things by thinking about them and developing their own theories of how the world works), or *learning* (children learn new things through being taught by others around them). After the teaching task, parents completed a survey specifically asking
about their experience teaching verbally and non-verbally within the experiment as well as additional example of teaching scenarios and whether they thought it would be more effective to teach in these specific scenarios using verbal or non-verbal methods (see Appendix 3).

**Children’s verbal assessments.** After the verbal and non-verbal teaching tasks, children completed the Peabody Picture Vocabulary Test, 4th Edition (PPVT-4) and the Expressive Vocabulary Test, 2nd Edition (EVT-2) with the researcher.

**Data Analysis**

**Coding the parent-child teaching task.** In preparation for coding, digital video recordings of the teaching tasks were imported into iMovie. Timing of the task began when the researcher handed the child the stack of cards and ended when the dyad indicated they were done with the task. In between those events, the video was broken up into 10-second increments (ranges shown in Table 4). Segments were labeled and a distinctive bell sound was added in between the segments. Coding was completed from these videos. The researcher and 2 trained research assistants coded the teaching behaviors directly from the video (coding whether each code was present or absent in each 10-second segment). We followed standard reliability measures; we discussed and practiced with several examples, refined the coding scheme based on discussion, and then coded a random 20% of the videos. We calculated Cohen’s kappas for each code individually (range 0.67-0.88; see Table 5 for more detail). After achieving reliability, the principal investigator coded the remaining videos. To control for different lengths of teaching time, parental teaching behaviors were analyzed as percentages, which were calculated by dividing the number of segments in which the behavior was present by the total number of teaching segments in that condition.
**Verbal and non-verbal.** Overall, parents were very skilled at using either verbal or non-verbal teaching strategies and rarely used a strategy they were not supposed to (e.g., a verbal strategy in the non-verbal condition or vice versa). Therefore, I only analyzed parents’ use of verbal teaching methods in the verbal condition and non-verbal teaching methods in the non-verbal condition. The codes described below each had a verbal and non-verbal version. A complete copy of the coding schemes may be found in Appendix 4.

**Commands.** A teaching behavior was coded as a command if the parent was directing the child to complete an action without an explanation. An example of a verbal command would be, “Put that card in this pile closest to Mommy.” An example of a non-verbal command would be the parent pointing at a card in the child’s hand and then pointing at the correct pile. These examples would be commands because they do not include the parent asking for the child’s input in sorting nor do they explain why a card should be sorted to a certain pile.

**Modeling.** A teaching behavior was coded as modeling if the parent demonstrated correctly sorting the picture and/or explained why the card belonged in a certain pile. An example of verbal modeling would be, “That card belongs in this pile because it’s yellow and has a stem.” An example of non-verbal modeling would be the parent taking the card and placing it in the correct pile; this action could also be accompanied by the parent tracing the tail of the animal on the sorted card with the exemplar animal to illustrate that they matched and thus, belonged in the same pile. These examples would be modeling because they include the parent illustrating the sorting rule for the child by demonstrating it themselves and/or by explaining the sorting criteria.

**Praise and/or confirmations.** A teaching behavior was coded as a praise and/or confirmation if the parent indicated that the child had sorted or labeled a card correctly. An
example of verbal praise and/or confirmation would be, “You’re right. That card goes in that pile!” An example of non-verbal praise and/or confirmation would be the parent nodding their head or giving a thumbs up. These examples would be praise and/or confirmations because the parent is telling the child that s/he has done something correctly in relation to the sorting task.

**Negations and/or corrections.** A teaching behavior was coded as a negation and/or correction if the parent indicated that the child had sorted or labeled a card incorrectly and/or immediately corrected the child’s mistake. Examples of verbal negations and/or corrections would be, “No, that card doesn’t belong in that pile” or “What do you mean? Of course that animal has a tail.” Examples of non-verbal negations and/or corrections would be a parent shaking their head and/or picking up an incorrectly sorted card and moving it to the correct pile. These examples would be negations and/or corrections because they discredit the child’s contribution to the sorting activity.

**Questions.** A teaching behavior was coded as a question if the parent asked for the child’s input in sorting the cards or “tested” the child by asking about the color or feature of the card. If the parent was asking the child to label the card (e.g., “What color is this one?” or “Does this one have a tail?”), the behavior was coded as both a question and a label. Similarly, if the parent was asking the child to compare the card to another card (e.g., “What’s the same about these two cards?”), the behavior was coded as both a question and a comparison. An example of a verbal question would be, “Where does this one go?” and an example of a non-verbal question would be the parent pointing at a card and shrugging their shoulders. These examples would be questions because they ask the child to provide some sort of information as a response to the parent’s inquiry.
**Labels.** A teaching behavior was coded as a label if it drew attention to a part of the card (e.g., color, feature, or shape) without comparing it to another card. In the original coding scheme, the codes for labeling color, feature, and shape were coded separately. However, these parental teaching behaviors did not have significant relationships with any child outcomes and therefore, the codes were collapsed into one “label” code. As mentioned above, a behavior could be coded as both a label and a question if the parent was asking the child to label a card. An example of a *verbal* label would be the parent saying, “Look, this animal is red and it has a tail.” An example of a *non-verbal* label would be the parent tracing the shape of the animal to ask the child what the shape was. Because of their difficulty, *non-verbal* labels were relatively rare across the teaching tasks.

**Comparisons.** A teaching behavior was coded as a comparison if it specifically compared 2 or more cards, either generally or along a certain aspect (e.g., color, shape, feature). In the original coding scheme, the codes for comparing generally, as well as along color, feature, and shape were coded separately. However, these parental teaching behaviors did not have significant relationships with any child outcomes and therefore, the codes were collapsed into one “comparison” code. As mentioned above, a behavior could be coded as both a question and a comparison if it asked the child to compare 2 or more cards to arrive at an answer. An example of a *verbal* comparison would be the parent saying, “Look, these two animals are both red but these two animals are both yellow.” An example of a *non-verbal* comparison would be the parent placing an animal with a tail next to an animal without a tail and shaking her head to indicate they do not match, then placing the animal with a tail next to another animal with a tail and nodding her head to indicate their match. These examples would be comparisons because they specifically direct the child to compare 2 or more cards.
**Coding the child’s post-test.** All post-tests were video-recorded; coding was completed from these videos by the principal investigator and one trained research assistant. In the post-test, the principal investigator first handed the child (one by one) the exemplar cards and asked them to place them where they thought they belonged. If the child made a sorting mistake, the researcher corrected them saying, “Oh, you know what? That one actually belongs over here.” Children could earn a maximum of 1 point for each exemplar card based on whether they sorted it correctly without help from the researcher. After the exemplar cards were in place, the researcher handed the child other cards (one at a time) and asked them to place them where they thought they belonged. After placing them, the researcher asked the child for an explanation by saying, “Why does that one go there?” The child could earn a maximum of 4 points for each card: 1 point for sorting correctly according to color, 1 point for sorting correctly according to feature (tail or stem), 1 point for explaining correctly according to color, and 1 point for explaining correctly according to feature. The researcher also took photographs of the child’s sorting for double-checking the later coding. The principal investigator and research assistant coded 20% of the post-tests for reliability (Cohen’s kappa range= 0.83-1.00). After achieving reliability, the principal investigator coded the remainder of the post-tests.

**Results**

When analyzing the video recordings, one mother did not understand the sorting rule and instructed her child in an incorrect sorting rule (even after being corrected by the researcher twice). As a result, this parent-child dyad was dropped from analyses involving parental teaching behaviors. Additionally, there were some children who were able to transfer the rule from the first condition to the second without needing their parent’s help with the second condition. There were 2 children who did not need any non-verbal teaching from their parents and 3 who did not
need any verbal teaching. The data were initially examined with these participants included and were subsequently examined with these participants excluded. I have noted the relationships between variables when these participants were not included.

Overall, children performed better on post-tests after their parents taught them using verbal strategies versus non-verbal strategies ($t=3.69$, $p=.001$). This result was not surprising since this was a school-like task and previous research has shown that school-like tasks are more effectively taught using verbal methods, regardless of parental beliefs, child verbal abilities, or order of condition (see Appendix 6 for more information). Therefore, these results will focus on more nuanced connections amongst parental beliefs about children’s learning, verbal and non-verbal parental teaching strategies, and children’s learning of a novel sorting rule. The results focus on whether parental teaching strategies differed across verbal and non-verbal conditions and how parental beliefs and teaching strategies contributed to children’s learning.

**Do parents use different teaching strategies across verbal and non-verbal conditions?** This study adds to the literature by experimentally manipulating whether mothers used verbal or non-verbal teaching strategies across conditions. These analyses were performed with the 6 participants excluded because mothers were not able to fully demonstrate which teaching strategies they would use in a given condition if their child did not need to be taught the sorting rule. I was particularly interested in whether mothers would believe in the efficacy of certain teaching behaviors in both verbal and non-verbal forms or whether some teaching strategies would be more heavily used in one condition or the other. Therefore, one important relationship to consider was whether, in a within-subjects design, mothers used similar amounts of each teaching strategy across verbal and non-verbal conditions.
To address this question, I ran paired-sample t-tests for each teaching behavior across verbal and non-verbal conditions, comparing parents to themselves (details in Table 8). Interestingly, mothers used all teaching strategies significantly differently across both conditions, suggesting that mothers believed in the efficacy of certain teaching behaviors differently across conditions. In the verbal condition, mothers used more commands ($t=3.70, p<.01$), modeling ($t=4.63, p<.001$), praise and confirmation ($t=2.75, p<.01$), questions ($t=11.86, p<.001$), and labels ($t=4.62, p<.001$) than in the non-verbal condition. However, in the non-verbal condition, mothers used more negation and correction ($t=-3.01, p<.01$) and comparison ($t=-2.88, p<.01$) than in the verbal condition.

While mothers used significantly different amounts of every teaching strategy across conditions, I also wanted to consider whether there were correlations across verbal and non-verbal conditions for various teaching behaviors (e.g., verbal and non-verbal commands) which would suggest that some parents believed in the relative efficacy of some teaching strategies in both verbal and non-verbal forms. Correlation coefficients were computed for all combinations of verbal and non-verbal teaching strategies (details in Table 6). The most interesting correlations were seen between verbal and non-verbal forms of the same teaching strategies. There were significant positive correlations between verbal and non-verbal commands ($r=0.40, p<.05$), verbal and non-verbal modeling ($r=0.47, p<.01$), verbal and non-verbal praise/confirmations ($r=0.41, p<.05$), and verbal and non-verbal questions ($r=0.47, p<.01$). There were no significant correlations between verbal and non-verbal negations/corrections, verbal and non-verbal labels, or verbal and non-verbal comparisons.

Because there were also significant correlations amongst different teaching strategies, I ran a Principal Components Analysis to determine whether there were clusters of parent teaching
behaviors that tended to occur together. I ran Principal Components Analyses with just verbal teaching, just non-verbal, and verbal and non-verbal teaching strategies together. Three verbal, 3 non-verbal, and 6 combined clusters emerged from my analyses (see Appendix 5 for details). In the following sections, I describe how particular clusters were related to parental beliefs and children’s outcomes.

**How do parental beliefs and teaching strategies contribute to children’s learning?**

Previous studies have measured either beliefs or teaching strategies, and have often failed to include an outcome measure. This study adds to the literature by measuring parental beliefs about how children learn as well as the efficacy of verbal versus non-verbal teaching, specific teaching strategies that parents use, and children’s learning outcomes. Below, I discuss how 4 teaching strategies are related to parental beliefs and children’s learning outcomes.

**Direct teaching.** There were 2 clusters of parental teaching strategies that were classified as direct teaching. The first was an overall direct teaching cluster, which included verbal and non-verbal modeling, verbal labeling, and non-verbal comparison. The second was a verbal direct teaching cluster, which included verbal modeling, questions, and labeling. Parents with stronger beliefs in children learning through being taught (the learning sub-score on the PBDQ) used more overall direct teaching ($r=0.38$, $p<.05$) as well as verbal direct teaching ($r=0.47$, $p<.01$). Additionally, parents with strong beliefs in the efficacy of verbal learning over non-verbal learning also used more overall direct teaching ($r=0.59$, $p=.001$) as well as verbal direct teaching ($r=-.56$, $p=.001$). However, these direct teaching clusters were not correlated with any child outcome measures ($ps>.22$).

Because I was interested in the interplay between parental beliefs about learning and their beliefs about the efficacy of verbal teaching, I constructed linear regression models where
parental beliefs predicted teaching behaviors. Stronger parental beliefs about learning through being taught coupled with stronger beliefs in verbal (versus non-verbal) teaching predicted more verbal direct teaching as well as overall direct teaching. Together, the learning sub-score on the PBDQ ($\beta=0.42$, $p<.05$) and the ratio between beliefs in verbal versus non-verbal teaching ($\beta=0.57$, $p=.001$) predicted mothers’ use of the verbal direct teaching strategies ($F=13.33$, $p<.001$, $R^2=0.49$) better than the models containing either variable by itself. Similarly, the learning sub-score ($\beta=0.32$, $p<.05$) and the verbal teaching ratio ($\beta=.57$, $p=.001$), together, predicted mothers’ use of overall (both verbal and non-verbal) direct teaching strategies ($F=10.69$, $p<.001$, $R^2=0.45$). These variables remained significant predictors even when other factors were added to the model (e.g., child gender, location, child verbal ability) which suggests that stronger beliefs in children learning through being taught, combined with stronger beliefs in the efficacy of verbal (as opposed to non-verbal) teaching lead mothers to use more verbal direct teaching as well as more direct teaching in general.

**Controlling Teaching.** A third cluster of parental teaching strategies was classified as controlling teaching because the teaching strategies (verbal and non-verbal command and verbal and non-verbal negation/corrections) did not encourage children’s autonomy (Deci & Ryan, 1985). Parental beliefs about learning through children constructing their own knowledge (the cognitive-developmental sub-score on the PBDQ) caused parents to use fewer overall controlling teaching behaviors ($F=4.69$, $p<.05$, $\beta=-0.38$, $R^2=0.14$).

Controlling teaching strategies were detrimental to children’s learning. Parents who used more controlling teaching had children who performed worse on the outcome measures across both verbal and non-verbal conditions ($r=-0.47$, $p<.01$). Controlling strategies were particularly detrimental to children’s performance in the verbal condition ($r=-0.45$, $p<.01$). In addition to
directly negatively impacting children’s learning within this task, controlling teaching techniques also acted as a mediator between cognitive-developmental beliefs and children’s learning outcomes. In general, stronger beliefs in children learning through constructing their own knowledge were associated with better child outcomes ($r=0.38$, $p<.05$). However, parents’ use of controlling techniques mediated this positive effect. These results suggest that it is important to look at both parental beliefs and teaching behaviors when predicted how children will learn.

Whereas cognitive-developmental beliefs were positively correlated with children’s learning outcomes, maturational beliefs about learning were negatively correlated with children’s learning outcomes in the verbal condition ($r=-0.36$, $p<.05$). Adding controlling teaching strategies to the model where maturational beliefs led to lower outcomes strengthened the relationship. Therefore, when parents held beliefs about children learning just by getting older, and also used more controlling teaching techniques, children performed worse in the outcome measures.

**Question-asking.** Mothers did not use much non-verbal question-asking, so these analyses focus on parents’ use of verbal questions (e.g., “Does this one have a tail?”). Interestingly, parental beliefs in children learning through being taught (learning sub-score) as well as learning through constructing their own knowledge (cognitive-developmental sub-score) were both related to parents’ use of verbal questioning, but in opposite directions. Mothers’ stronger beliefs in learning through being taught were associated with greater use of verbal questions ($r=0.39$, $p<.05$) whereas their stronger beliefs in learning through children constructing their own knowledge were associated with fewer verbal questions ($r=-0.41$, $p<.05$). These relationships were not mediated by children’s verbal abilities (PPVT-4 and EVT-2 scores).
These results suggest that parents’ beliefs about how children learn influence their use of questions when teaching their children.

Verbal questions were detrimental to children’s overall (verbal and non-verbal conditions) learning in this task ($r=-0.39$, $p<.05$). Within the verbal condition only, verbal questions were marginally detrimental to overall score ($r=-0.34$, $p<.10$) and explanations ($r=-0.33$, $p<.10$). Non-verbal questions were too rare to analyze their effects on children’s learning in the non-verbal condition.

**Modeling.** Parents used both verbal and non-verbal modeling, with different effects on children’s learning. Verbal modeling was beneficial for children’s overall score in the verbal condition ($r=0.36$, $p<.05$); this effect was significant for children’s explanation scores ($r=0.42$, $p<.05$) but not for their sorting scores. These results suggest that verbal modeling was particularly beneficial for the verbal outcome (explanation) within the verbal condition but not the non-verbal outcome. However, non-verbal modeling was marginally detrimental to the non-verbal outcome (sorting) within the non-verbal condition ($r=-0.31$, $p<.10$) but not the verbal outcome.

These results suggest that verbal modeling was beneficial for verbal learning, whereas non-verbal modeling was detrimental for non-verbal learning. However, interestingly, stronger parental beliefs in verbal versus non-verbal teaching predicted greater use of both verbal ($r=0.51$, $p<.01$) and non-verbal modeling ($r=0.44$, $p=.01$). These results suggest that parents who had higher beliefs in the efficacy of verbal teaching overall used more verbal and non-verbal modeling, but that only the verbal modeling was beneficial within this school-like task.

**Other predictors of differences in parent teaching strategies.** Given the differences found in Study 1 concerning parental beliefs of parents who had grown up in Asia and the
Pacific Islands versus elsewhere, an important comparison to analyze was between parents in Hawai`i and parents on the mainland United States. Parents in Hawai`i took significantly longer to teach in the verbal condition ($t(20.18)=2.10, p<.05$), used more verbal commands ($t(33)=4.68, p<.001$), used more non-verbal negations/corrections ($t(24.90)=2.12, p<.05$), and used marginally more verbal negations/corrections ($t(33)=1.83, p=.08$). See Appendix 6 for more information.

**Discussion**

Whereas Study 1 investigated parental beliefs about children’s learning across several different domains, Study 2 honed in on one particular learning domain: sorting novel pictures. The teaching task was similar to several other studies, which have examined parents teaching their preschoolers how to sort blocks or pictures (Brophy, 1970; Davis & Lange, 1973; Larkina et al., 2008; Moreno, 2000). Previous studies have found differences in teaching strategies across maternal education level (Laosa, 1978), socio-economic status (Brophy, 1970; Phinney & Feshbach, 1980), and cultural groups (Kermani & Brenner, 2000; Wang et al., 2005). These differences in teaching strategies (especially verbal versus non-verbal strategies) have been theorized to be the result of different parental beliefs about the best ways for children to learn (Greenfield et al., 2003; Keller, 2007; Rogoff, 2003) but Study 2 adds to the literature by measuring parental beliefs as well as parental teaching strategies in an effort to link the two. Study 2 also addresses the question of which teaching strategies were most effective for children’s learning within this domain of picture sorting. A few previous studies have attempted to measure effectiveness of teaching strategies, but have been limited in that they only used either verbal or non-verbal outcome measures; Study 2 addresses this limitation by including both a non-verbal (sorting) and verbal (explanation) measure of children’s learning.
Which teaching strategies were most effective? Overall, children’s scores across verbal and non-verbal conditions were positively correlated, indicating that some parents were more effective than others. As a group, children performed better when their parents used verbal teaching techniques versus non-verbal strategies, regardless of order. This is not a particularly surprising finding, given that the sorting game was a school-like task and previous research has described formal schooling as a place where verbal teaching methods are employed and encouraged (Greenfield et al., 2003; Maynard, 2004; Rogoff, 2003). Therefore, it fits that children performed better when their parents used verbal strategies in this particular task but this finding may not extend to other domains (e.g., informal learning such as chores).

How do verbal and non-verbal parental beliefs and teaching strategies contribute to children’s learning? Whereas previous research has examined parents’ use of verbal and non-verbal teaching strategies, no study has specifically asked parents to use either verbal or non-verbal methods. By employing a within-subjects design in Study 2, I was able to compare parents across verbal and non-verbal teaching conditions. Interestingly, parents used different amounts of verbal and non-verbal forms of teaching strategies across the two conditions. Overall, parents used more commands, modeling, praise/confirmation, questions, and labels in the verbal condition and more negations/corrections and comparisons in the non-verbal condition. However, there were also significant correlations across the verbal and non-verbal conditions for commands, modeling, praise/confirmation, and questions indicating that parents who used more of the verbal forms of these teaching strategies also used more of the non-verbal forms. It is interesting to note that there are only positive correlations among teaching strategies that were most common in the verbal condition. Perhaps most parents saw this sorting task as a primarily verbal task and therefore used the non-verbal forms of verbal teaching strategies they believed to
be effective. Correlations across the conditions suggest that parents believe in the overall efficacy of certain types of teaching behaviors; differences between the conditions suggest that parents may believe some teaching behaviors are more effective in verbal or non-verbal forms. Cluster analyses showed that certain combinations of teaching behaviors cluster together. Below, I discuss how each significant teaching strategy was related to parental beliefs and children’s learning outcomes.

**Direct teaching.** Parents with stronger beliefs about children learning through being taught (the learning sub-score on the PBDQ) used more direct verbal teaching strategies (verbal questions, labels, and modeling), suggesting that parents who believe children learn from others will make more of an effort to use direct teaching strategies. Moreover, when parents had stronger beliefs in children learning through being taught as well as stronger beliefs in verbal (as opposed to non-verbal) teaching strategies across many domains, they were more likely to use these direct verbal teaching strategies. Relatedly, when both verbal and non-verbal teaching strategies were entered into a cluster analysis, an overall direct teaching cluster emerged, containing verbal and non-verbal modeling, verbal labeling, and non-verbal comparison. This collection of overall direct teaching strategies was, again, predicted by stronger parental beliefs in children acquiring knowledge through teaching as well as stronger beliefs in the efficacy of verbal teaching strategies.

These results fit well with previous literature, especially that of Rogoff (2003) and Greenfield and colleagues (2003; 2006). For example, Greenfield and colleagues (2006) describe parents in more individualistic cultures as valuing verbal communication styles over non-verbal communication styles, as well as valuing questioning as the most important type of socializing communication (as opposed to directives in collectivistic/sociocentric cultures). Elsewhere,
Greenfield and colleagues (2003) describe how higher levels of formal education lead to these more individualistic teaching strategies (e.g., verbal questions). Rogoff (2003) describes direct teaching as more prevalent in middle-class families, suggesting that parents in this demographic believe more strongly in teaching that is tailored to the child. Together, these theories suggest that parents who strongly believe that children learn through teaching that is tailored to them will use more verbal communication strategies (particularly questions). Study 2 supports these theories with empirical evidence that parents who more strongly believe that children learn through being taught will use more direct teaching (especially verbal) strategies within this task. Additionally, accounting for parents’ stronger beliefs in learning through verbal methods along with beliefs about children learning through teaching builds a stronger model to predict parents’ use of direct teaching methods. It is important to mention that one reason Study 2 may have supported these findings so well is that the majority of the participants were middle- to upper-middle-class with high levels of formal education.

Study 2’s results illustrated the connections between parental beliefs about children learning through being taught, the perceived efficacy of verbal teaching over non-verbal teaching, and parents’ use of verbal and non-verbal direct teaching strategies in a way that fits with the current literature. However, the results failed to show a connection between these beliefs, teaching strategies, and children’s learning outcomes. One interpretation of this finding is that it casts doubt on the traditional deficit model where verbal direct teaching prepares children for school-like tasks more effectively than other teaching strategies. If this were the case, the children in this study who received lower levels of direct verbal teaching should have performed worse than the children whose mothers used higher levels of direct verbal teaching. However, in this study, mothers who used fewer direct verbal teaching methods seemed to have
children who performed just as well as those whose mothers used greater amounts of direct verbal teaching.

**Controlling teaching strategies.** Self-Determination Theory defines controlling teaching behaviors as being at the lowest end of a continuum of autonomy-supportive teaching techniques (Grolnick, Gurland, DeCourcey, & Jacob, 2002). Whereas autonomy-supportive behaviors affirm the child’s volition, controlling behaviors pressure the child to behave in a certain way (Deci & Ryan, 1987; Grolnick & Apostoleris, 2002; Grolnick & Pomerantz, 2009; Joussemet, Landry, & Koestner, 2008). Joussemet and colleagues (2008) assert that parents will use fewer controlling strategies when they believe that children play a more active role in their own development. The results from Study 2 support this assertion by demonstrating that parents who have stronger beliefs in children as “little scientists” who create their own theories will use fewer controlling teaching strategies in a task.

Controlling teaching strategies were detrimental to children’s learning outcomes, particularly in the verbal condition. Several studies have found that controlling teaching behaviors (as defined by Self-Determination Theory) from parents and/or teachers predict negative outcomes for children across a variety of measures including intrinsic motivation, engagement in an activity, conceptual understanding, and task performance (for a review, see Reeve, 2009). In the current study, controlling teaching behaviors acted as a mediator between parental beliefs in children acquiring knowledge through forming their own theories (cognitive-developmental sub-score on the PBDQ) and their learning outcomes. Overall, parents who had higher cognitive-developmental beliefs used fewer controlling teaching behaviors and had better child learning outcomes. However, when they did use controlling teaching techniques, the relationship between cognitive-developmental beliefs and children’s learning was mediated.
These results suggest that it is important for future research to examine the interaction between parental beliefs about development as well as their usage of various teaching behaviors.

Why would parents who believed in autonomy-supportive teaching practices use controlling teaching in this task? Previous research suggests that parent goals in a task are a reliable predictor of how controlling they will be. Several experimental studies have manipulated parental goals (e.g., performance versus enjoyment) and have found that, when given more performance-oriented goals, parents will adopt more controlling interaction styles and, subsequently, children will have lower performance outcomes (Cleveland, Reese, & Grolnick, 2007; Grolnick et al., 2002). It is possible that, in the current study, some parents with high beliefs in cognitive-developmental learning (who would have otherwise used less controlling behavior) interpreted the task instructions (“Please teach your child the sorting rule”) as performance-oriented or interpreted the situation of teaching their child a school-like task with a video camera recording them as a high-pressure situation. These interpretations of the task could have led mothers to be more controlling, thus mediating the positive relationship between their cognitive-developmental beliefs and their children’s learning outcomes.

Questions. Interestingly, parents with stronger beliefs in children learning through being taught used more questions, whereas parents with stronger beliefs in children constructing their own knowledge used fewer questions. These differences harken to comparisons that have been made between Piaget’s theory of children as little scientists and Vygotsky’s theory of learning from others in the zone of proximal development (for example, Tudge & Winterhoff, 1993) and suggest that parental beliefs that line up more with one theory of how children acquire knowledge cause parents to adjust their teaching strategies toward or away from using verbal questions.
Whereas previous studies have described parental question-asking as an effective tool to prepare children for school (Yamauchi, 2005), my results showed a negative effect of parent questions on children’s learning within this task. It is important to note that non-verbal questions were relatively rare and thus, this discussion focuses on the effects of verbal questions. In the current study, parents who asked more verbal questions during the teaching task, had children who performed worse, overall, on the learning outcome within the verbal condition. It is especially interesting to note that verbal questions affected children’s overall score and their explanation score (verbal outcome) but did not affect their sorting score (non-verbal outcome). This result suggests that verbal questions were particularly detrimental to children’s verbal outcomes.

This negative result, while surprising, is not unheard of within this body of literature. In his study of Mexican-American mothers’ teaching within both an everyday task (tying shoes) and a school-like task (picture sorting), Moreno (2000) found that verbal question-asking was detrimental to children’s performance in the everyday task, and unrelated to their performance in the school-like task. Because Moreno’s outcome measure was non-verbal in the everyday task, but verbal in the school-like task, his results showed that verbal questions had a negative effect on non-verbal outcomes and no effect on verbal outcomes. However, his study design leaves open the question of whether verbal questions were detrimental to non-verbal outcomes, everyday tasks or both. In the current study, by measuring both verbal (explanations) and non-verbal (sorting) outcomes within one task, my results show that verbal question-asking is particularly detrimental to the verbal outcome (explanation) but is unrelated to the non-verbal outcome (sorting) within the same task. Given the theoretical positive relationships between parental question-asking and children’s school readiness (Rogoff, 2003; Yamauchi, 2005) and
these results that parental question-asking was detrimental to children’s learning, further research is clearly needed.

One area of future research would be to examine whether different types of questions may be beneficial to different aspects of children’s learning. For example, Cleveland and Reese (2005) found that parents’ autonomy-supportive questions (e.g., “What do you think about that?”) enhanced children’s engagement in a follow-up task whereas structurally-supportive questions (e.g., “What happened after that?”) enhanced children’s accuracy. However, they were investigating parental questions within the domain of parent-child reminiscing conversations. Further research is needed to explore different types of questions that parents use in teaching tasks.

Another area for further exploration would be to examine children’s responses to parents’ questions as well as children’s self-initiated questions. The current study was limited in that it only coded parental questions. However, previous research has shown that preschool-aged children ask questions to seek out information about the world around them (Callanan & Oakes, 1992; Chounaird, 2007; Frazier et al., 2009), but that there is also cultural variation in how and when children ask questions (Boggs, 1985; Gaile, 1974; Levin, 1992; Martini & Mistry, 1993; Pukui et al., 1972). Perhaps parents who have stronger beliefs in children learning through being taught will use more parent-directed questions, whereas parents who have stronger beliefs in children learning through constructing their own theories will encourage more child-directed questions. My results suggest that this may have been the case: parents with higher learning beliefs asked more verbal questions whereas parents with higher cognitive-developmental beliefs asked fewer verbal questions. Therefore, future studies should code both parent- and child-initiated questions to obtain a richer picture of how children are learning.
**Modeling.** Whereas questions and controlling teaching strategies were detrimental to children’s learning, the relationship between parental modeling and children’s learning was more complicated. Verbal modeling was beneficial for children’s verbal outcome (explanations) whereas non-verbal modeling was marginally detrimental to children’s non-verbal outcome (sorting). These results suggest that, within this task, modeling may be differentially beneficial depending on whether it is used as a verbal or non-verbal strategy as well as whether learning is measured verbally or non-verbally. While these results may appear contradictory, they fit within the broader literature on parent teaching strategies with preschool-aged children. For example, Moreno (2000) found that non-verbal modeling was detrimental to a non-verbal learning outcome. Larkina and colleagues (2008) found that verbal and non-verbal modeling were beneficial to a verbal learning outcome.

Research on child development around the world shows that both verbal and non-verbal modeling are common ways to teach (Greenfield et al., 2003; Lancy, 2008; Maynard, 2004; Paradise & Rogoff, 2009; Rogoff, 2003). Therefore, this is an area ripe for future research. It is possible that verbal and non-verbal modeling are differentially beneficial across different learning domains. For example, in the current study, as well as the research by Moreno (2000) and Larkina and colleagues (2008), the task is largely school-like. Formal schooling has been associated with a shift from non-verbal teaching to verbal teaching (Levin, 1992; Maynard, 2004), which may account for verbal modeling being beneficial in this school-like task. However, in other domains such as science learning, rules, or chores, verbal modeling may not be as beneficial.

In sum, Study 2 illuminated several interesting relationships between parental beliefs, verbal and non-verbal teaching strategies, and children’s learning outcomes. However, because it
was limited in that it only examined these variables within a single task, I will use the General Discussion to relate Study 1 and 2 to each other, emphasizing the importance of investigating parental beliefs, teaching strategies, and children’s learning not only across cultural contexts but also across learning domains.
General Discussion

Traditionally, deficit models have assumed that non-verbal teaching strategies are less effective than verbal ones; because cultural minority parents often use more non-verbal teaching strategies than majority parents, deficit models have attempted to explain the lower academic achievement of cultural minority children. However, cultural developmental psychology has documented several types of verbal and non-verbal learning (e.g., observation, asking questions, modeling) across a variety of learning domains (e.g., rules, chores, preparation for school). Additionally, cultural developmental psychologists have theorized that parents use different teaching strategies because of their beliefs about the best ways for children learn, which may be affected by some combination of their own upbringings, the cultural context in which they are raising their children, and their goals for their child’s future (Greenfield et al., 2003; Harkness & Super, 1996; Levin, 1992; LeVine et al., 1994; Rogoff, 2003; Whiting & Whiting, 1979).

The current project attempted to bring together these several lines of inquiry by addressing the question of how diverse parental beliefs influence the verbal and non-verbal teaching strategies they use and, subsequently, the effects on children’s learning outcomes. Study 1 demonstrated that parents hold diverse beliefs about the best ways for children to learn across a variety of learning domains. Study 2 focused on one particular learning domain (sorting pictures) and demonstrated that parental beliefs about how children learn, as well as the efficacy of verbal versus non-verbal teaching, affect how they teach their children. Additionally, Study 2 challenged the deficit model by illustrating that it is important to take into account not only what teaching strategies parents are using but also how we are measuring children’s outcomes.
Child-initiated learning versus parent-initiated learning

In Study 1, parent responses clustered into child-initiated and parent-initiated teaching. Despite having a diverse sample of parents (education level, income, ethnicity, where parent grew up), no demographic variable was a significant predictor of parents’ beliefs in who should initiate learning and teaching. This lack of correlation was surprising given previous literature that showed differences in parental beliefs across cultures (Lancy, 2008; Levy, 1996) and socioeconomic groups (Davis-Keane, 2005; Roberts & Barnes, 1993). Study 2 helped to shed light on this puzzling result by illustrating that parents within a less diverse sample (largely Caucasian, highly educated, and high income levels) also showed variation in their beliefs about child-initiated learning versus adult-initiated learning as shown in their sub-scores of the items on the Parental Beliefs about Development Questionnaire relating to children acquiring knowledge through cognitive-development (child-initiated) versus learning (adult-initiated).

While the current project did not find parental beliefs about child-initiated versus adult-initiated learning to be predicted by demographic factors, results did show that these beliefs had an effect on parental teaching strategies as well as children’s learning outcomes. Parents who had stronger beliefs in adult-initiated teaching used more direct teaching strategies, especially verbal questions whereas parents who had stronger beliefs in child-initiated teaching used fewer verbal questions. Results showed that this second group of parents also used fewer controlling teaching techniques (commands and negations). Because Self-Determination Theory literature places controlling teaching at one end of a spectrum of autonomy support (Deci & Ryan, 1985; Deci & Ryan, 1987; Grolnick & Ryan, 1989), we can infer that parents with stronger beliefs in child-initiated teaching used more autonomy-supportive teaching strategies that valued the child’s volition.
Parental beliefs in child-initiated learning predicted better child learning outcomes in Study 2. However, this relationship was mediated by parents’ use of controlling teaching techniques. Additionally, overall, parents who used more controlling teaching techniques (regardless of their beliefs about how children learn) had children with lower learning outcomes. These results suggest that autonomy-supportive teaching strategies may be especially valuable in teaching tasks similar to Study 2. However, future research should address the role of autonomy-supportive teaching in other domains of learning such as rules (where it may be necessary for parents to be more controlling to keep children safe, for example).

There is currently a debate in the field as to whether autonomy-supportive parenting is beneficial across different cultural contexts (Barber, Stolz, & Olsen, 2005; Chirkov, Ryan, Kim, & Kaplan, 2003; Wang & Fivush, 2005). Results from Study 1 suggest that parents think differently about children’s learning across domains. Together, these results suggest that future research should not only focus on autonomy-supportive and controlling parenting across cultural contexts but also across learning domains. For example, in the Pacific Islands, social etiquette has traditionally been endorsed as extremely important for children to learn (Lancy, 2008; Morton, 1996; Nicol, 1985; Pukui et al., 1972). Study 1 supported these findings by showing that parents who had grown up in the Pacific Islands endorsed parent-directed teaching of rules more than parents who had grown up elsewhere. Because there is high pressure for children to conform to social rules within this cultural context (Greenfield et al., 2003), parents may use higher levels of controlling teaching than they would in other domains (Grolnick & Apostoleris, 2002). Future research should examine parental goals for children across domains and how those goals affect their teaching strategies.
The efficacy of verbal versus non-verbal teaching across domains and parent beliefs

In Study 1, parents endorsed various methods of verbal and non-verbal teaching across different domains. In Study 2, children had higher learning outcomes when their parents used verbal teaching methods. Importantly, verbal teaching methods more strongly affected verbal outcome measures whereas non-verbal teaching methods more strongly affected non-verbal outcome measures. These findings suggest that researchers and educators should be wary about measuring children’s learning in exclusively verbal form, especially when they may be more familiar with non-verbal teaching strategies.

Interestingly, parents' stronger beliefs in verbal over non-verbal teaching (across a variety of domains) predicted their use of both verbal and non-verbal modeling in Study 2’s school-like sorting task. However, verbal modeling was associated with better child learning outcomes whereas non-verbal modeling was associated with worse child learning outcomes. These results are an interesting complement to Kermani and Brenner (2000) and Wang and colleagues (2005) who suggested that different types of verbal and non-verbal teaching may be differentially effective across cultural contexts. In this project, Study 1 suggested that parents varied in how they thought about children’s learning across different teaching domains while Study 2 suggested that even parents within a relatively homogenous cultural context have varied beliefs about the best ways to teach children and that these beliefs influence teaching behaviors within a specific teaching task. Further research is needed to more fully examine the relationships between cultural context, domains of learning, and parental teaching beliefs and strategies.

Whereas previous models (e.g., Greenfield et al., 2003) have suggested that parents favor verbal or non-verbal learning, the relationship between parental beliefs about the efficacy of various teaching strategies may be more nuanced across different learning domains and different
cultural contexts. For example, in Study 1, parents who had grown up in the Pacific Islands reported favoring verbal teaching methods (explanation) in the domain of rule learning but non-verbal teaching methods (letting the child explore) in the domain of science learning.

Together, Studies 1 and 2 suggest that parents may hold overall beliefs about the efficacy of verbal versus non-verbal teaching methods (and that these may be influenced by the greater cultural context, as in Greenfield et al., 2003) but that their reliance on individual methods may vary widely across learning domains and different contexts. Therefore, future research should examine different verbal and non-verbal parental teaching strategies across different learning domains. Importantly, this project highlighted the complicated relationships between parental beliefs about how children learn, teaching strategies they use, and children’s subsequent learning outcomes.
Appendix 1: Parental Ethnotheory Survey

Part One

1. We know that preschool-aged children learn a lot about the world from many different people. Whom do you think preschool-aged children learn the most from? Please rank the following groups of people in terms of how much preschool-aged children learn about the world from them. If there is a tie between two groups for a spot, please make that note beside the ranking.

Groups to rank: Parents, Siblings, Peers, Teachers, Other Family Members (grandparents, aunts, uncles), Other Adults (friends’ parents, community members). There are extra lines in case there are other people from whom you believe children learn that are not mentioned above.

Preschool-aged children learn the most about the world from:

1. ____________________________________

(Rank the others in order of how much children learn from them, with the final space being the group the children learn the least from)

2. ____________________________________
3. ____________________________________
4. ____________________________________
5. ____________________________________
6. ____________________________________
7. ____________________________________
8. ____________________________________

If you have any additional thoughts about whom children learn from, please include them below:

2. There are many methods that preschool-aged children use to gather information about the world. How do you think preschool-aged children learn best about the world? Please rank the following methods of learning in terms of how effective they are at teaching preschool-aged children about the world around them. If there is a tie between two methods for a spot, please make that note beside the ranking.

Methods to rank: Observation (the child watches others), Talking (the child engages in conversation with others), Children asking direct questions (the child asks questions about
what s/he is wondering), **Listening** (the child listens to what others have to say), **Direct teaching** (an adult, sibling, or peer explicitly teach the child), **Hands-on experience** (the child experiments with what s/he’s wondering about), **Imitation** (children do what they see other people doing), **Thinking things through** (the child ponders what s/he’s wondering about until s/he comes up with an answer). There are extra lines in case there are other methods that you believe children learn from that are not mentioned above.

Preschool-aged children learn about the world best through:

1. ____________________________________________

(Rank the other methods in order of how well preschool-aged children learn through them, with the final space being the group the children learn the least effectively from)

2. ____________________________________________

3. ____________________________________________

4. ____________________________________________

5. ____________________________________________

6. ____________________________________________

7. ____________________________________________

8. ____________________________________________

9. ____________________________________________

10. ____________________________________________

If you have any additional thoughts about how children learn, please include them below:

**Part Two**

Below each statement is a scale. Please circle the number that corresponds with how much you agree with the statement(1=Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4=Somewhat Agree, 5=Agree, 6= Strongly Agree). If you feel you wish to further explain any of your answers, please write beside the question or on the back of the page.

1. It is important to explain the reasons behind rules to preschool children.

   1  2  3  4  5  6
2. Parents should initiate conversations with their preschool children often.
   1   2   3   4   5   6

3. Preschool children ask too many questions.
   1   2   3   4   5   6

4. It is important to me that I make time to play with my preschool child.
   1   2   3   4   5   6

5. Children should actively participate in family and cultural traditions to learn them.
   1   2   3   4   5   6

6. Some children are born with more curiosity about the world around them than others.
   1   2   3   4   5   6

7. Preschool children should be seen and not heard.
   1   2   3   4   5   6

8. Preschool children ask questions because they are interested in the world around them.
   1   2   3   4   5   6

   1   2   3   4   5   6

10. Preschool children are a product of their environment.
    1   2   3   4   5   6

11. It is important to me that my preschool child be able to play by him/herself.
    1   2   3   4   5   6

12. I initiate conversations with my preschool child often.
    1   2   3   4   5   6

13. Preschool children should be encouraged to ask questions.
    1   2   3   4   5   6

14. Preschool children should be expected to follow the rules without an explanation.
    1   2   3   4   5   6

15. Parents and preschool children should play together often.
    1   2   3   4   5   6

16. Preschool children ask questions because they are trying to get someone’s attention.
    1   2   3   4   5   6

17. Preschool children should always have an adult close by.
    1   2   3   4   5   6

18. I encourage my preschool child to ask me questions.
    1   2   3   4   5   6

19. It is important to me that my preschool child play and get along with his/her siblings.
    1   2   3   4   5   6

20. There are some things that parents do not need to explain to their preschool children.
    1   2   3   4   5   6

21. Children should watch and observe family and cultural traditions to learn them.
    1   2   3   4   5   6

22. Parents should follow their preschool child’s lead in conversations.
    1   2   3   4   5   6

23. It is important to me that my preschool child play and get along with his/her peers.
    1   2   3   4   5   6

24. If my preschool child has a question, I hope s/he would ask me.
    1   2   3   4   5   6
Part Three

Below are scenarios involving preschool-aged children wondering about the world. Please choose the answer you feel is the best way for the child to handle the situation. In the lines below the situation, please explain why you feel that is the best way for the scenario to be handled, and what you feel should happen next.

1. Tyler knows that it is the rule to take his shoes off before going inside at home. He wonders why he doesn’t have to take his shoes off other places, like the grocery store.
   a) Tyler should watch where adults take off their shoes and where they don’t so that he can learn the rules for different places
   b) Tyler should ask a parent why they take off shoes at home but not all other places.
   c) Tyler should ask his teacher why he takes off shoes at home but not all other places.
   d) Tyler should ask his older sister why they take off shoes at home but not all other places.
   e) His parent should know that he is wondering about this (without him needing to ask) and explain it to him.
   f) None of these. Please describe what you think should happen:
      Why? What will happen next?

2. Abby wonders why some of her toys float in water and some sink.
   a) Abby should ask her parent why some toys float and some sink.
   b) Abby’s parent should see that she’s confused (without her asking a question) and explain it to her.
   c) Abby should ask her older sister why some toys float and some sink.
   d) Abby should test out different toys while she is in the bathtub, pool, and ocean so that she can figure out why some toys float and some sink.
   e) Abby should ask her teacher why some toys float and some sink.
   f) None of these. Please describe what you think should happen:
      Why? What will happen next?

3. Hannah is at the dinner table with her family. Her parent puts vegetables on her plate and says it is important to eat them. Hannah would rather eat candy and wonders why she has to eat vegetables.
   a) Hannah’s parent should explain why it is important to eat healthy foods without Hannah needing to ask.
   b) Hannah should ask her teacher why it is important to eat vegetables.
   c) Hannah should ask her older brother why it’s important to eat vegetables.
   d) Hannah should see that everyone else at the table is eating vegetables so she should too.
   e) Hannah should ask her parents why it is important to eat her vegetables.
   f) None of the above. Please describe what you think should happen:
      Why? What will happen next?
4. Jack, his parent, his two best friends from school, and his older brother are at the library one afternoon. The librarian tells the children that it is very important that they be quiet inside the library. Jack is really excited to be with his friends and wonders why they can’t talk and sing like they do at school.
   a) Jack should ask his older brother why they have to be quiet at the library.
   b) Jack should ask the librarian why they have to be quiet at the library.
   c) Jack should see that everyone else is being quiet, so he and his friends should too.
   d) The librarian or the parent should explain why the children need to be quiet at the library before Jack or his friends ask.
   e) Jack should ask his parent why he has to be quiet at the library.
   f) None of these. Please describe what you think should happen:

   Why? What will happen next?

5. Charlie is at the airport with his parents and older sister, getting ready to board a flight. He sees an adult sitting a few rows over who is crying. Charlie wonders why this adult is crying.
   a) Charlie should ask his teacher why this person is crying.
   b) Charlie’s parents should see that he is wondering about the adult crying and explain it to him without him asking.
   c) Charlie should ask his older sister why the adult is crying.
   d) Charlie should watch the adult for a long time to see if he can figure out why they are crying.
   e) Charlie should ask his parents why the adult is crying.
   f) None of these. Please describe what you think should happen:

   Why? What will happen next?

6. Avary, her parents, and her brother return from vacation to find their grass is yellow and the plants are drooping. Avary wonders why the grass is yellow since she remembers it being green before they left for vacation.
   a) Avary should ask her older brother why the plants are yellow and droopy.
   b) Avary’s parents should explain why the plants are yellow and droopy without her asking.
   c) Avary should ask her teacher why the plants are yellow and droopy.
   d) Avary should closely inspect the plants to see if she can figure out why they are yellow and droopy.
   e) Avary should ask her parents why the plants are yellow and droopy.
   f) None of these. Please describe what you think should happen:

   Why? What will happen next?
Appendix 2:

Parental Beliefs about Development Questionnaire (Martin & Johnson, 1992)

Directions: The purpose of this questionnaire is to determine your beliefs about the development of young children. We are interested in your opinions. There are no right or wrong answers. Assume that all questions refer to preschool children who are 4-5 years old. Read each item and decide which answers you think are most important. Number your choices as follows:

1 = best answer  
2 = second best answer.

1. What makes two preschool children friends?
   _____ They are encouraged to spend time together.  
   _____ They are about the same age and same size.  
   _____ They think about things in similar ways.

2. Where do children’s misconceptions about the world come from?
   _____ Television and other children present confusing information.  
   _____ Misconceptions are a natural part of childhood.  
   _____ Children interpret their observations incorrectly.

3. Why do children’s misconceptions about the world eventually change?
   _____ As they get older, they outgrow immature ideas.  
   _____ Adults or older children present the correct information.  
   _____ Their curiosity motivates them to test their ideas.

4. How do children come to understand the parent’s viewpoint?
   _____ They figure out how the parent thinks from everyday experiences with the parent.  
   _____ Parents must explain their viewpoint to children.  
   _____ When they reach a certain stage, they are able to understand the parent’s viewpoint.

5. How do children come to know why some things float and other sink?
   _____ Parents or teachers must explain the concept to them.  
   _____ They discover the concept by experimenting with objects.  
   _____ They know why things float when they reach a certain stage.

6. What good does playing with others serve for young children?
   _____ They have an opportunity to test and develop their ideas.  
   _____ Playmates teach each other new ideas and behaviors.  
   _____ During play, children demonstrate the skills that are appropriate for their age.

7. What makes children act independently?
   _____ They reach a stage when they can do things alone.  
   _____ Parents praise them for doing things on their own.  
   _____ They have a desire to experiment with new ideas and actions.

8. When do children usually follow rules?
   _____ When they want the approval of others or they fear punishment.  
   _____ When the rules are appropriate for their age level.  
   _____ When children understand the reasons for the rules.

9. How do young children make decisions?
   _____ They make decision by weighing all the alternatives.  
   _____ They rely on adults to help them decide.
They decide on the bases of what a children their age usually knows.

10. How do young children become able to plan things ahead of time?
   - When children are ready, they are able to plan.
   - They discover through daily experiences that planning is important.
   - Parents emphasize the importance of planning ahead.

11. How do young children come to realize that other children may feel different than they do?
   - Teachers and parents teach children to recognize different feelings.
   - Their curiosity leads them to think about the feelings of others.
   - Some children seem to naturally understand that others have different feelings.

12. What makes a child come to realize that some things are alive and others are not?
   - Adults describe and label the important characteristics for them.
   - At a certain age, they know the distinction naturally.
   - The child discovers the concept by observing and thinking about different things.

13. How do young children become able to resolve conflicts with their playmates?
   - Some children are naturally more agreeable or cooperative than others.
   - They discover that cooperation reduces playtime conflicts.
   - They are encouraged by parents to get along.

14. How do young children come to understand the differences between plants and animals?
   - The distinction is obvious to children at a certain age.
   - They formulate the concept by observing and thinking about living things.
   - They are taught the important characteristics of each group.

15. How do young children become able to find their way home from school on their own?
   - They are given direction by others and the practice the skill with supervision.
   - Children’s sense of direction improves as they grow older.
   - Children’s abilities to observe and reason strongly influence this skill.

16. How do children know that a candy bar broken into pieces is still the same amount of candy?
   - While playing with objects, children think about the relationship of parts and wholes.
   - Adults keep reminding them that the amounts are equal.
   - Children begin to know this when they reach a certain age.

17. How do children come to realize that parents cannot control the times of TV programs?
   - Parents must explain this to children a number of times before it sinks in.
   - They figure this out by observing parents’ limitations.
   - As they get older, they outgrow such confusion.

18. How do children come to know that TV commercials are different from regular shows?
   - This understanding comes naturally as children develop.
   - Repeated exposure and explanation from others helps them learn the difference.
   - They gradually formulate the concept as they observe the difference.

19. Why are children able to make up imaginative stories?
   - Make believe is a natural part of childhood.
   - Teachers and parents encourage and foster the child’s imagination.
   - As children play with others and think about objects, their imagination develops.

20. How do children become able to read a clock?
   - They must develop the concept of time and know their numbers.
   - They reach a stage when they are ready to learn.
   - They are taught by parents or teachers.
21. How do young children come to understand that cartoon characters are not real?
   _____ Parents tell them that these stories are make-believe.
   _____ At some point, the difference is obvious to children.
   _____ Their everyday experiences help them realize that cartoon characters cannot be
   real.

22. Why do children begin to take care of their toys and other belongings?
   _____ Parents continually remind them that this is important.
   _____ They realize that they will have toys longer if they take care of them.
   _____ Some children seem to have a natural tendency to be neat and orderly.

23. How do children come to know when to follow rules and when to be independent?
   _____ If children know why the rules exist, they will know when to follow them.
   _____ The natural balance between rules and independent action emerges spontaneously.
   _____ Adults explain when rules must be followed.

24. How do children overcome irrational fears?
   _____ They rely on adults to calm their fears.
   _____ Most children outgrow the stage when they are susceptible to such fears.
   _____ Thinking processes lead to the discovery that the fears are unfounded.

25. What makes young children be cautious in dangerous situations?
   _____ They naturally fear danger.
   _____ They are taught to recognize danger.
   _____ They observe danger signals and regulate themselves.

26. How do children get the desire to do their best?
   _____ Some children seem to be born with a desire to succeed.
   _____ They imitate adults who work hard.
   _____ Their curiosity motivates them to keep testing their ideas.

27. When are children best able to deal with sad feelings?
   _____ When they are comforted by adults.
   _____ When they understand what has caused the sadness.
   _____ When they are mature enough to cope with the sad situation.

28. How do children form opinions?
   _____ Opinions develop naturally as children grow older.
   _____ Children’s insights into everyday experiences are the basis of their opinions.
   _____ They take on the opinions of their parents and peers.

29. How do children become able to solve everyday problems?
   _____ Parents demonstrate the solutions for them.
   _____ They relate past experiences to new situations.
   _____ The necessary problem solving skills emerge spontaneously as children mature.

30. How do children come to realize the consequences of their actions?
   _____ Children gradually become more aware of how things happen as they grow older.
   _____ They think about possible outcomes of their actions.
   _____ Adults praise their good behavior or ignore their bad behavior.
Appendix 3: Parental Post-task Survey

Thank you for completing our study! We are interested in your thoughts about being asked to teach things verbally versus non-verbally. Please complete the following questions.

1. Which type of teaching were you most effective in? Please circle one: Verbal  Non-verbal
2. What was easiest about the verbal teaching task?
3. What was most difficult about the verbal teaching task?
4. What was easiest about the non-verbal teaching task?
5. What was most difficult about the non-verbal teaching task?

Now we would like you to pretend you are teaching your children tasks other than sorting rules for pictures. Next to each task, please circle whether you think it would be more effective to teach your child verbally or non-verbally.

1. How to tie their shoes: verbal  non-verbal
2. How to cook a family recipe: verbal  non-verbal
3. How to take turns at the playground: verbal  non-verbal
4. How to read a simple book: verbal  non-verbal
5. How to recognize letters of the alphabet: verbal  non-verbal
6. Rules about which flowers are okay to pick: verbal  non-verbal
7. How to put away their toys: verbal  non-verbal
8. How to write their name: verbal  non-verbal
9. The idea that it is important to water plants everyday: verbal  non-verbal
10. Facts about an animal they’ve never seen before: verbal  non-verbal
11. The importance of looking for cars before they cross the street: verbal  non-verbal
Appendix 4: Verbal and Non-verbal coding schemes

VERBAL CODING SCHEME

- **Command**
  - Parent directs child to do something
    - Ex: “Put that card in this pile closest to Daddy.”
  - If it is just moving the game along (i.e., “Let’s look at it together) do not code.

- **Modeling**
  - Parent models the sorting rule
    - Ex: “That goes there because it’s red and has a stem.”
  - If modeling occurs AFTER a child’s sorting mistake, do not code as “Modeling” code as “Correction”

- **Praise/Confirmation**
  - Parent confirms that child has sorted or labeled something correctly and/or praises them for it
    - Ex: “Yep! That's where that goes. Good job!”
    - Ex: “You’re right, it does have a tail.”

- **Negation/Correction**
  - Parent indicates that child has sorted or labeled something incorrectly.
    - Ex: “Nope that’s not where that goes.” (after sort)
    - Ex: “No, he doesn’t have a tail!” (after label)
  - AND/OR immediately following a child’s sorting mistake, parent offers a correction for the specific card sorted incorrectly
  - Correction only occurs AFTER a child’s sorting mistake (if there was no mistake, it’s probably modeling)
    - Ex: “That goes in the other pile because it has a stem”

- **Question**
  - Parent asks child a question or seeks information from the child
    - Ex: “Where do you think that goes?”
  - If question asks the child to compare the card to any of the other cards, code as question AND comparison
    - Ex: “What’s the same about these two cards?”
  - If question asks the child to label something on the card, code as Question AND label
    - Ex: “Does that fruit have a stem or no stem?”

- **Label**
  - Parent explicitly labels color, feature or shape of animal/fruit
    - Ex: “This one is red”
    - Ex: “That banana-shaped one has a stem”
  - Labels may be part of modeling (code as both)
  - Can be asked in the form of a question (code as both question AND label)
    - Ex: “What color is this one?”

- **Comparison**
  - Parent compares two or more cards and makes specific reference to color, feature, or shape.
    - Ex: “This one is red and that one by Mommy is red”
o Can also be a general comparison without reference to a specific attribute.
  ▪ Ex: “That one looks different than that one”
o May be asked in the form of a question (code as both comparison AND question)
  ▪ Ex: “Which one does this one go with?”

NON-VERBAL CODING SCHEME

  · Command
    o Parent commands child to sort a card to a certain place (can be pointing with
      finger or other body part)
      ▪ Ex: Parent points to card and then to correct sorting pile
  · Modeling
    o WHILE PARENT HAS CHILD’S ATTENTION, parent sorts the card into the
      correct pile
    o May be combined with label and/or direct comparison (code all)
      ▪ Ex: parent places card in correct pile after comparing colors
  · Praise/Confirmation
    o Parent confirms that child has sorted correctly (or labeled something correctly)
      and/or praises them for it
      ▪ Ex: parent nods yes after child sorts correctly
      ▪ Ex: parent gives child thumbs up after child sorts correctly
  · Negation/Correction
    o Parent indicates the child has not sorted or labeled correctly (may be followed by
      correction)
    o AND/OR Parent correctly sorts the card the child sorted incorrectly after a sorting
      mistake
      ▪ Ex: Parent shakes head after child sorts incorrectly
      ▪ Ex: after child sorts incorrectly, parent moves card to correct pile
    o Do not code if it’s just a behavioral correction (e.g., child is being silly and parent
      shakes head)
    o Do not code if parent just takes card off pile without another indication that child
      has sorted incorrectly.
  · Question
    o Parent shrugs shoulders or otherwise indicates they are asking a question or
      seeking information from the child.
    o Note: if parent seems to be comparing one card to other(s), code as question AND
      comparison
      ▪ Ex: parent shrugs shoulders while gesturing to all cards
    o Note: if parent seems to be asking child to label something about the card, code as
      question AND label
      ▪ Ex: parent shrugs shoulders after tracing the tail of an animal
  · Label
    o Parent draws attention to color, feature (stem/tail), or shape of card without
      directly comparing it to another card.
      ▪ Ex: Parent points to child’s red shirt, then to the red fruit.
      ▪ Ex: Parent traces shape.
- Ex: Parent points to tail
  - Can be asked in form of a question (code as both)
    - Ex: Parent traces tail of an animal (without comparing it to another) and then shrugs shoulders

- **Comparison**
  - Parent indicates two or more cards
    - Ex: Parent holds up two cards.
  - Can specifically reference color, feature, or shape. – or just be a general comparison w/o a specific reference
    - Ex: Parent points to 2 cards that are both red.
    - Ex: Parent points to 2 cards that both have stems.
    - Ex: Parent points to 2 cards that are both shaped like cats.
  - May be in form of a question (code as both)
    - Ex: Parent takes a card and places it next to piles but does not put it down; is waiting for child’s answer to where it belongs
Appendix 5: Clusters from principal components analysis

1. Verbal teaching strategies only

Cluster 1 (Explicit verbal teaching): verbal modeling, verbal questioning, verbal labeling

Cluster 2 (Verbally controlling teaching): verbal commands, verbal negation/correction

Cluster 3 (Verbally autonomy-supportive teaching): verbal praise/confirmation, verbal comparisons

2. Non-verbal teaching strategies only

Cluster 1 (Explicit non-verbal teaching and evaluation): non-verbal commands, non-verbal modeling, non-verbal negation/correction

Cluster 2 (Non-verbal confirmatory teaching): non-verbal praise/confirmation, non-verbal comparisons (reverse-scored)

Cluster 3 (Non-verbal one-way teaching): non-verbal labeling, non-verbal questions (reverse-scored)

3. Verbal and non-verbal teaching strategies together

Cluster 1 (Controlling teaching): verbal commands, non-verbal commands, verbal negation/correction, non-verbal negation/correction

Cluster 2 (Explicit teaching): verbal modeling, non-verbal modeling, verbal label, non-verbal comparisons

Cluster 3: verbal praise, verbal label, non-verbal label

Cluster 4: non-verbal praise, non-verbal questions

Cluster 5: verbal questions

Cluster 6: verbal comparison (reverse-coded)
Appendix 6: Additional results

Relationships amongst teaching strategies

In addition to the correlations between verbal and non-verbal forms of the same teaching strategies, there were also interesting correlations amongst different verbal and non-verbal teaching strategies (see Table 7). In the verbal condition, commands and negations were significantly positively correlated \((r=0.54, p<.01)\) as were modeling and labeling \((r=0.43, p<.05)\). Verbal modeling and verbal comparisons were negatively correlated \((r=-0.39, p<.05)\). In the non-verbal condition, commands and negations were also significantly positively correlated \((r=0.45, p<.05)\) and commands and modeling trended towards a positive correlation \((r=0.32, p<.10)\). There was a significant negative correlation between non-verbal praise and comparisons \((r=-0.48, p<.01)\) and a trend towards negative correlations between praise and modeling \((r=-0.34, p<.10)\), command and comparison \((r=-0.31, p<.10)\), and labeling and questions \((r=-0.32, p<.10)\).

Relationships between parent beliefs and teaching strategies

When all participants were included, higher learning beliefs on the PBDQ (children learn new things through being taught by others around them) correlated with marginally more verbal negations and corrections \((r=0.28, p<.10)\) and significantly fewer verbal comparisons \((r=-0.33, p<.05)\). When participants who did not need teaching were excluded, other significant correlations emerged. The correlation between learning beliefs and verbal negations and corrections became significantly positive \((r=0.35, p<.05)\) and the correlation with verbal comparisons was no longer significant. However, two new significantly positive correlations emerged between learning beliefs and, independently, verbal questions \((r=0.39, p<.05)\) and verbal labels \((r=0.39, p<.05)\). It is particularly interesting to note that learning
beliefs were only significantly correlated with verbal teaching methods and not with any non-verbal teaching methods.

*Maturational* beliefs (children naturally learn new things as they mature) did not correlate with any parental teaching strategies except verbal and non-verbal comparisons. When all participants were included, higher *maturational* beliefs were correlated with marginally more verbal comparisons ($r=0.32, p<.10$) and significantly less non-verbal comparisons ($r=-0.55, p=.01$). When participants who did not need teaching were excluded, these correlations were strengthened so that there was a positive correlation with verbal comparison ($r=0.37, p<.05$) and a negative correlation with non-verbal comparison ($r=-0.51, p<.05$). When all participants were included, parental *maturational* beliefs were a significant predictor of parental use of non-verbal comparisons ($F=14.28, p<.001, \beta=-0.55, R^2=0.30$); this relationship remained significant when the participants who did not require non-verbal teaching were removed ($F=11.09, p<.05, \beta=-0.51, R^2=0.26$). These regression models did not significantly improve when children’s verbal abilities were added in as additional predictors; therefore, there seems to be a direct negative relationship between parents’ maturational beliefs and their use of non-verbal comparisons. *Maturational* beliefs were a marginal predictor of parental use of verbal comparisons ($F=3.68, p=.06, \beta=0.32, R^2=0.10$) when all participants were included but became a significant predictor when participants who did not need verbal teaching were removed ($F=4.69, p<.05, \beta=0.37, R^2=0.14$). These results suggest that parents who expressed higher belief in children learning through natural maturation use fewer verbal comparisons.
Cognitive-developmental beliefs (children learn new things by thinking about them and
developing their own theories) were correlated with both verbal and non-verbal teaching
strategies. When all participants were included, higher cognitive-developmental beliefs were
correlated with marginally fewer non-verbal commands ($r=-0.30, p<.10$) and fewer verbal
negations/corrections ($r=-0.33, p<.05$). When participants who did not need teaching were
excluded, these correlations were strengthened and a new negative correlation emerged.
Cognitive-developmental beliefs were significantly negatively correlated with non-verbal
commands ($r=-0.35, p<.05$), verbal negation/correction ($r=-0.42, p<.05$), and verbal
questions ($r=-0.41, p<.05$).

Before Higher ratios between verbal and non-verbal choices in teaching scenarios
indicated stronger beliefs in verbal teaching methods. When all participants were included,
stronger beliefs in verbal teaching (higher ratios) were significantly correlated with both
verbal modeling ($r=0.51, p<.01$) and non-verbal modeling ($r=0.44, p<.01$), as well as verbal
labeling ($r=0.38, p<.05$). Higher ratios were also marginally correlated with verbal questions
($r=0.29, p=.10$). When participants who did not need teaching were excluded, these
correlations were, for the most part, strengthened. The ratio between verbal and non-verbal
teaching was still highly correlated with verbal modeling ($r=0.54, p<.01$), non-verbal
modeling ($r=0.42, p<.05$), and verbal labeling ($r=0.44, p<.01$). However the marginal
correlation with verbal questions was no longer significant. These results suggest that parents
with stronger beliefs in verbal teaching versus non-verbal teaching used more modeling in
both conditions, as well as more labeling in the verbal condition.
Relationships amongst learning outcome measures

Before examining the relationships between parental teaching strategies and children’s learning outcomes, I looked at correlations between the verbal and non-verbal outcome measures. The verbal and non-verbal total outcome scores were significantly positively correlated ($r=0.41$, $p<.05$), indicating that children who performed well in one condition also performed well in the other. Verbal sorting and verbal explanation totals were significantly correlated ($r=0.49$, $p<.01$). Similarly, non-verbal sorting and non-verbal explanation totals were also significantly correlated ($r=0.37$, $p<.05$). These correlations suggest that children who performed better on the non-verbal outcome measure (sorting) also performed better on the verbal outcome measure (explanation). Interestingly, verbal sorting score was significantly correlated with non-verbal sorting score ($r=0.53$, $p<.001$) but not with non-verbal explanation. Verbal explanation score was significantly correlated with non-verbal explanation score ($r=0.35$, $p<.05$) but not with non-verbal sorting score. These correlations suggest that explanations and sorting are two different skills.

Additional effects of demographics

There were not many significant relationships between other demographic variables and parental beliefs, teaching strategies, and child learning outcomes. Parent education level was not related to the length of time parents spent on the verbal teaching task, but it was significantly negatively correlated with non-verbal teaching length ($r=-0.34$, $p<.05$), indicating that parents with lower education levels spent longer on non-verbal teaching. Parent education level was also significantly related to children’s outcomes in the verbal condition ($r=0.41$, $p<.05$) as well as the non-verbal condition ($r=0.37$, $p<.05$), suggesting that higher levels of parental education were correlated with better learning outcomes. However, it should be noted that all parents in this
study had relatively high levels of education; all but one mother had completed a bachelor’s degree. Therefore, higher education referred to mothers with graduate degrees while lower education referred to mothers with only an undergraduate degree.

Verbal and non-verbal conditions were counterbalanced across participants to combat order effects. Because counterbalancing is random, there were no systematic differences in parental beliefs or demographics as a product of whether they did the verbal or non-verbal teaching condition first. However, there were some effects on parental teaching strategies and children’s outcomes that are worth mentioning. Mother-child dyads who did the non-verbal task first spent significantly longer on the task ($t(19.01)=-2.73, p<.05$) and used more non-verbal questions ($t(33)=-2.94, p<.01$) than dyads who did the verbal task first. Verbal teaching length was not significantly different between the groups ($p>.80$); there were also no other differences in any other teaching strategies (all $ps>.19$).
Table 1: How do children learn best?

<table>
<thead>
<tr>
<th>Frequency count of parents ranking each method of learning as one of their top 3 choices</th>
<th>Frequency count of parents ranking each method of learning as their #1 choice</th>
<th>Overall Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Observation ((n=42))</td>
<td>1. Observation ((n=24))</td>
<td>1. Observation ((\text{mean}=1.94))</td>
</tr>
<tr>
<td>2. Hands-on experience ((n=25))</td>
<td>2. Hands-on experience ((n=12))</td>
<td>2. Hands-on experience ((\text{mean}=3.38))</td>
</tr>
<tr>
<td>1. Imitation ((n=23))</td>
<td>3. Imitation ((n=6))</td>
<td>3. Imitation ((\text{mean}=3.93))</td>
</tr>
<tr>
<td>4 (tie). Asking direct questions ((n=16))</td>
<td>4. Talking ((n=4))</td>
<td>4. Asking direct questions ((\text{mean}=4.16))</td>
</tr>
<tr>
<td>4 (tie). Listening ((n=16))</td>
<td>5. Direct Teaching ((n=2))</td>
<td>1. Direct teaching ((\text{mean}=4.29))</td>
</tr>
<tr>
<td>5. Direct teaching ((n=15))</td>
<td>6 (tie). Listening ((n=1))</td>
<td>6. Listening ((\text{mean}=4.36))</td>
</tr>
<tr>
<td>6. Talking ((n=11))</td>
<td>6 (tie). Asking direct questions ((n=1))</td>
<td>7. Talking ((\text{mean}=4.57))</td>
</tr>
<tr>
<td>7. Thinking ((n=1))</td>
<td>7. Thinking ((n=0))</td>
<td>8. Thinking ((\text{mean}=6.53))</td>
</tr>
</tbody>
</table>
Table 2: Whom do children learn the most from?

<table>
<thead>
<tr>
<th>Overall means</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parents (mean=1.25)</td>
<td></td>
</tr>
<tr>
<td>2. Siblings (mean= 2.86)</td>
<td></td>
</tr>
<tr>
<td>3. Teachers (mean= 2.98)</td>
<td></td>
</tr>
<tr>
<td>4. Other family (mean= 3.55)</td>
<td></td>
</tr>
<tr>
<td>5. Peers (mean= 3.82)</td>
<td></td>
</tr>
<tr>
<td>6. Other adults (mean=4.50)</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: How should children seek information across scenarios?

<table>
<thead>
<tr>
<th>Why grass is yellow after a week away</th>
<th>Why some toys float and others do not</th>
<th>Why we eat vegetables before dessert</th>
<th>Why we take shoes off at home</th>
<th>Why we have to be quiet at the library</th>
<th>Why adult is crying at the airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Parents explain without child asking</td>
<td>3. Parents explain without child asking</td>
<td>3. All of the above</td>
<td>3. Parents explain without child asking</td>
<td>3(tie). Observe on own</td>
<td>3. All of the above</td>
</tr>
<tr>
<td>4. All of the above</td>
<td>4. All of the above</td>
<td>4. Observe on own</td>
<td>4(tie). All of the above</td>
<td>4(tie). All of the above</td>
<td>4. None of the above.</td>
</tr>
<tr>
<td>5. None of the above</td>
<td>5. None of the above</td>
<td>5. None of the above</td>
<td>4(tie). None of the above</td>
<td>4. Ask parents</td>
<td>4. None of the above.</td>
</tr>
</tbody>
</table>
Table 4: Verbal and non-verbal teaching lengths

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal teaching (number of segments)</td>
<td>7.00</td>
<td>100.00</td>
<td>20.47</td>
<td>26.94</td>
</tr>
<tr>
<td>Non-verbal teaching (number of segments)</td>
<td>6.00</td>
<td>118.00</td>
<td>22.41</td>
<td>23.25</td>
</tr>
<tr>
<td>Ratio of Verbal to non-verbal teaching (number of segments)</td>
<td>0.23</td>
<td>13.86</td>
<td>2.22</td>
<td>1.78</td>
</tr>
</tbody>
</table>
Table 5: Cohen’s kappas for reliability coding of parental teaching behavior

<table>
<thead>
<tr>
<th>Code</th>
<th>Cohen’s kappa for Verbal code</th>
<th>Cohen’s kappa for Non-verbal code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>0.77</td>
<td>0.79</td>
</tr>
<tr>
<td>Modeling</td>
<td>0.74</td>
<td>0.70</td>
</tr>
<tr>
<td>Praise/Confirmation</td>
<td>0.88</td>
<td>0.82</td>
</tr>
<tr>
<td>Negation/Correction</td>
<td>0.78</td>
<td>0.71</td>
</tr>
<tr>
<td>Question</td>
<td>0.82</td>
<td>0.73</td>
</tr>
<tr>
<td>Label</td>
<td>0.76</td>
<td>0.67</td>
</tr>
<tr>
<td>Comparison</td>
<td>0.68</td>
<td>0.75</td>
</tr>
</tbody>
</table>
Table 6: Correlations between verbal and non-verbal teaching methods

<table>
<thead>
<tr>
<th></th>
<th>Verbal command</th>
<th>Verbal modeling</th>
<th>Verbal praise</th>
<th>Verbal negation and correction</th>
<th>Verbal question</th>
<th>Verbal label</th>
<th>Verbal comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-verbal command</td>
<td><strong>0.40</strong></td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.54***</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-verbal modeling</td>
<td>n.s.</td>
<td><strong>0.47</strong>*</td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.45**</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Non-verbal praise</td>
<td>n.s.</td>
<td>n.s.</td>
<td><strong>0.41</strong></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-verbal negation and correction</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td><strong>0.47</strong>*</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-verbal question</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td><strong>0.47</strong>*</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Non-verbal label</td>
<td>-0.42**</td>
<td>n.s.</td>
<td>n.s.</td>
<td>-0.39**</td>
<td>n.s.</td>
<td><strong>n.s.</strong></td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-verbal comparison</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>-0.33*</td>
<td>n.s.</td>
<td>n.s.</td>
<td><strong>n.s.</strong></td>
</tr>
</tbody>
</table>

*p<.10   **p<.05   ***p<.01   ****p<.001

Note: These correlations analyses were done without six participants (one where parent did not understand sorting rule, two where children transferred the rule from verbal teaching and did not need non-verbal teaching, and three where children transferred the rule from non-verbal teaching and did not need verbal teaching).
Table 7: Correlations among verbal and non-verbal teaching strategies

<table>
<thead>
<tr>
<th></th>
<th>Command</th>
<th>Model</th>
<th>Praise</th>
<th>Negation</th>
<th>Question</th>
<th>Label</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
<td>0.54***</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Modeling</td>
<td>0.32*</td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.43**</td>
<td>-0.39**</td>
<td></td>
</tr>
<tr>
<td>Praise</td>
<td>n.s.</td>
<td>-0.34*</td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Negation</td>
<td>0.45**</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Label</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>-0.32*</td>
<td></td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>-0.31*</td>
<td>n.s.</td>
<td>-0.48***</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

*p<.10   **p<.05   ***p<.01   ****p<.001

Note: Correlations above the diagonal line are among verbal teaching behaviors (excluding mothers who did not use any verbal behaviors because their child did not need them). Correlations below the diagonal line are among non-verbal teaching behaviors (excluding mothers who did not use any non-verbal behaviors because their child did not need them).
Table 8: Paired-sample t-tests between verbal and non-verbal teaching strategies

<table>
<thead>
<tr>
<th>Teaching strategy</th>
<th>Means</th>
<th>t-value of paired differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commands</td>
<td>Verbal= 16.26</td>
<td>t=3.70***</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 7.83</td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td>Verbal= 14.74</td>
<td>t=4.62****</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 5.60</td>
<td></td>
</tr>
<tr>
<td>Praise &amp; Confirmation</td>
<td>Verbal= 40.77</td>
<td>t=2.75***</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 31.00</td>
<td></td>
</tr>
<tr>
<td>Negation &amp; Correction</td>
<td>Verbal= 3.83</td>
<td>t= -3.01***</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 8.94</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Verbal= 46.06</td>
<td>t= 11.86****</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 12.97</td>
<td></td>
</tr>
<tr>
<td>Label</td>
<td>Verbal= 41.86</td>
<td>t=4.62****</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 19.94</td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>Verbal= 16.43</td>
<td>t= -2.88***</td>
</tr>
<tr>
<td></td>
<td>Non-verbal= 25.11</td>
<td></td>
</tr>
</tbody>
</table>

*p<.10  **p<.05  ***p<.01  ****p<.001

Note: These correlations analyses were done without six participants (one where parent did not understand sorting rule, two where children transferred the rule from verbal teaching and did not need non-verbal teaching, and three where children transferred the rule from non-verbal teaching and did not need verbal teaching).
Table 9: Correlations between parental beliefs and teaching strategies

<table>
<thead>
<tr>
<th></th>
<th>PBDQ-L</th>
<th>PBDQ- M</th>
<th>PBDQ-CD</th>
<th>Ratio verbal:non-verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal command</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-Verbal command</td>
<td>n.s.</td>
<td>n.s.</td>
<td>-0.30*</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(-0.35**)</td>
<td></td>
</tr>
<tr>
<td>Verbal model</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.51***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.54***)</td>
</tr>
<tr>
<td>Non-Verbal model</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.44***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.42**)</td>
</tr>
<tr>
<td>Verbal praise</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-Verbal praise</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Verbal neg/correct</td>
<td>0.28*</td>
<td>n.s.</td>
<td>-0.33**</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>(0.35**)</td>
<td></td>
<td>(-0.42**)</td>
<td></td>
</tr>
<tr>
<td>Non-Verbal neg/correct</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Verbal question</td>
<td>n.s. (0.39**)</td>
<td>n.s.</td>
<td>n.s. (-0.41**)</td>
<td>0.29* (n.s.)</td>
</tr>
<tr>
<td>Non-Verbal question</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Verbal label</td>
<td>n.s. (0.39**)</td>
<td>n.s.</td>
<td>n.s.</td>
<td>0.38**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.44***)</td>
</tr>
<tr>
<td>Non-Verbal label</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Verbal comparison</td>
<td>-0.33**</td>
<td>0.32*</td>
<td>(0.37**)</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n.s.</td>
</tr>
<tr>
<td>Non-Verbal comparison</td>
<td>n.s.</td>
<td>-0.55***</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.51**)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<.10  ** p<.05  *** p<.01  **** p<.001

Note: Number in parentheses is the correlation without some participants. In verbal teaching, three participants are excluded because the child did not need any verbal teaching. In non-verbal teaching, two participants are excluded because the child did not need any non-verbal teaching.
Table 10: Correlations between parental teaching strategies and children’s learning outcomes

<table>
<thead>
<tr>
<th></th>
<th>TOTAL SCORE (V+NV)</th>
<th>Overall V score</th>
<th>V Sort</th>
<th>V Explanation</th>
<th>Overall NV score</th>
<th>NV Sort</th>
<th>NV Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>V command</td>
<td>-0.63****</td>
<td>-0.48***</td>
<td>-0.45***</td>
<td>-0.42**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV command</td>
<td>-0.32*</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>V model</td>
<td>0.35**</td>
<td>0.36**</td>
<td>n.s.</td>
<td>0.42**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV model</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>-0.31*</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>V praise</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV praise</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>V negation</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV negation</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>V Question</td>
<td>-0.39**</td>
<td>-0.34*</td>
<td>n.s.</td>
<td>-0.33*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV Question</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>V Label</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV Label</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>V Comparison</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV Comparison</td>
<td>n.s.</td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

*p<.10  **p<.05  ***p<.01  ****p<.001
References


Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist, 44*(3), 159-175.


