Children's Thinking Styles, Play, and Academic Performance

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Based on the study of seventy-four middle school children of mostly Filipino and part Hawaiian heritages, this article explores the relationships of children's thinking styles, play preferences, and school performance. Using the Group Embedded Figures Test, the Articulation of the Body Scale, and written responses to three questions, the authors found significant relationships between children's field-independent or field-dependent thinking styles and play preferences; play preferences and academic performance; thinking styles and academic performance; and thinking styles and cultural setting. They also discovered that children's preferences for sports related, both positively and negatively, to their scores on state-mandated tests for language and math; that children who preferred unstructured play activities tended to achieve academic success; and that cultural values were correlated to thinking style. The authors argue that their study has applied value for educators because it relates children's play preferences to other aspects of their life experiences, which can help school policy makers decide the extracurricular activities and the types of play they should encourage. **Key words**: academic performance; field dependent; field independent; middle-school children; play; thinking styles

Current literature connecting children's thinking styles to play and academic performance seems sparse compared to the literature about other topics in play research. (Saracho 1989a, 1989b, 1991, 1992, 1994, 1998). The most recent studies appeared at the end of the twentieth century despite a renewed interest in and some more current research on thinking styles (Zhang and Sternberg 2006, 2009; Zhang, Sternberg, and Rayner 2012). Previous studies about the relationship of children's thinking styles to play and academic performance often relied heavily on European and American samples. These studies also focused on younger children and gave little attention to later formative periods. In this article, we explore these relationships in a non-Western cultural setting and with middle-school children.

American Journal of Play, volume 5, number 2 © The Strong
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What Are Thinking Styles?

Researchers define thinking styles as the mental frameworks that enable individuals to process information and solve problems in specific contexts (Saracho 1998; Zhang and Sternberg 2006, 2009). These styles operate much as culture does in guiding individuals' thoughts and perceptions. Researchers have identified field-dependence-independence (FDI) as a measurable component of thinking style, which consists of an antithetical pair of constructs—field dependence (FD) and field independence (FI) (Witkin 1949; Witkin et al. 1962). Individuals inclined to FD or FI process information differently, solve problems differently, and, in general, simply behave differently, even in similar situations.

Several researchers (Liu and Chepyator-Thomson 2008; Saracho and Spodek 1981; Zhang and Sternberg 2009) provide a thorough comparison of how FD and FI individuals typically process situational information differently (see figure 1). As a group, field-dependent individuals gravitate towards social situations and enjoy interacting with others. They use facial cues when processing a situation. They are sensitive to others. They prefer to stand close to others when interacting with them. They rely on authority to make decisions, and they make use of the surrounding perceptual field when processing a situation.

In contrast, as a group, field-independent individuals do not prefer social contact, and other people consider them socially distant. Field-independent individuals tend to divide a visual field into separate elements rather than perceive it as a whole. They also set their own standards for thinking and behaving. They are active and goal oriented. They possess excellent logical and analytical reasoning skills. And they also include more anatomical and cosmetic details when they draw the human the body than do FD individuals.

Thinking Styles and Play

The European and American notion that play is linked to developmental outcomes—including cognitive growth—frames many studies about play and thinking styles. For example, Saracho (1995a, 1995b) looked at the relationship of thinking styles, age, and play in preschool-aged children. She found differences in the quantity of play: FI children were more likely to engage in play than FD children. In a series of related studies, she concluded that FI children exhibited

Field Dependent	Field Independent
Seek out social interactions	Prefer to work alone rather than in groups
Seek social interactions	Shy away from social interactions
Use surroundings to process a scene	Use figure/ground processing
Respond to others' needs	Perceived as socially distant
Prefer physical contact and closeness	Prefer greater social distances
	Technical analysis
Rely on authority figures	Rely on own decisionmaking processes
React emotionally	Employ logical-analytical reasoning

Note: Extracted from Liu and Chepyator-Thomson (2008), Saracho and Spodek (1981), and Zhang and Sternberg (2009).

Figure 1. Interests, qualities, and traits associated with Field Dependence and Independence

more variety in their play than FD children and the FI style correlates positively with age (Saracho 1996a, 1996b).

Other related studies have explored the relationship between FDI and children's engagement in different types of play. These include research by Steele (1981), which posited a relationship between play (pretend play and playfulness) and thinking styles in kindergarten-aged children, and by Saracho who conducted her work over two decades (e.g., 1989a, 198b, 1991, 1992, 1994). These studies addressed the differences in the quantity, quality, and types of play in which FD and FI children engage. General findings suggest that FI children play more and in more diversified ways than FD children. In addition, neither FD nor FI kindergartners much display the ability to communicate ideas even though both FD and FI children frequently play cooperatively.

The relationship between FDI and playful activities also holds for older children and their engagement in more structured activities. In older children, FDI has been linked to children's physical activity and their participation in sports. For example, Liu and Chepyator-Thomson (2008) found, in their work

with middle-school children, that FI children engaged in significantly more physically vigorous play, participated more often in formally organized sports, and acquired novel motor skills more readily than FD children. They suggest these findings have applied value: field-dependent children might benefit from intervention programs featuring increased physical activity and activities that develop skills in motor learning.

In a related study, Liu (2003) looked at the relationship between thinking styles and formal play activities such as sports. In her study with university student-athletes, Lui found that children's thinking styles correlated with the types of sports in which they participated. Field-independent students preferred closed-skill sports, such as track and field, that take place in relatively unchanged and stable environments. Field-dependent students preferred open-skill sports, such as ball games, in which game action changes frequently and players must adjust their actions rapidly. Lui also suggests that the categories—and, consequently, the findings of her studies—should be approached with caution because of the fuzzy boundary between sports classified as open skill (with novel actions and changeable settings) and those classified as closed skill (with repeated movements and stable settings).

The FDI continuum also illuminates the study of the relationship between children's intellectual styles and academic prowess. For example, Guidsande and her colleagues (2007) found that field-dependent children did not perform as well as field-independent children in any academic subject. The researchers concluded that FI children had more difficulties paying attention to their studies than did field-dependent children and children categorized as more intermediate on a FDI scale. Guidsande and her coauthors discuss the importance of understanding the connection between thinking styles and attention and its relevance in helping children achieve academic success. Based on their findings, they offer strategies for helping children excel in school.

Studies of non-Western children have reached similar conclusions. For example, Cakan (2003) noted that high achievers tend to adopt field-independent styles. Kuhnen's (2001) cross-cultural comparison of children's ability to locate hidden or embedded figures supports these conclusions. In addition, these studies draw attention to the relationship between cultural setting and thinking styles. They confirm that field-dependent styles tend to be associated with non-Western, group-oriented, collectivist cultures whereas individualistic, Western cultural groups tend to adopt field-independent thinking styles (see also Zhang 2002).

We framed our study using the literature about play (Saracho 1996a, 1996b) and thinking styles (Witkin et al. 1962; Zhang and Sternberg 2006, 2009). We accepted the notion that thinking styles are mental constructs that guide the way individuals process their surroundings to solve a problem. We also accepted that the differences between FD and FI children do not make one superior to the other. FD children tend to solve problems with a sensitivity to others that leads them to acquire good social skills, and they rely on such factors as their setting to do so. In contrast, FI children have the ability to separate elements of a problem to solve it (Saracho 1998), and they are affected by a variety of factors linked to their life experiences such as age, cultural values, and academic achievement. The following research questions informed this study.

1. What is the relationship between middle-school children's thinking styles and play activities? This question expands on Saracho's (1995a, 1995b, 1998) works with play and thinking styles in young children.
2. Is there a relationship between thinking styles and play and academic performance? Research suggests, for example, that FI individuals tend to achieve more in academic settings (Cakan 2003; Guisande et al. 2007; Kuhnen et al. 2001; Luk 1998).
3. Is cultural setting related to the children's thinking styles and, consequently, play choice? Research suggests that individualism is associated with FI but collectivist ideals, such as sensitivity to group needs, are associated with FD (Zhang 2002; Zhang and Sternberg 2006). Existing literature supports a relationship between non-Western ethnic heritages and field dependence, but Europeans and Americans are associated with field independence (Cakan 2003; Kuhnen et al. 2001).

In past studies, FDI thinking styles correlate with only one variable. Here we explore the relationships of FDI to play, academic performance, and cultural setting. To our knowledge, no other study has attempted to do so. Based on existing literature, we hypothesize that the majority of children will be classified as FD because they are members of a community that socializes its children to internalize collectivist values. We assume children classified as FI will do better academically than FD children. Finally, we think FD children will probably

prefer group play activities such as sports and socializing while the FI children will prefer probably more autonomous play activities.

Method

Participants

The seventy-four participants in our study—forty-five boys and twenty-nine girls—were middle-school children enrolled in a Hawaiian public school for grades K-12. Twenty-nine of them—seventeen boys and twelve girls were sixth graders. Twenty more—ten boys and ten girls—attended seventh grade. The remaining twenty-five—eighteen boys and seven girls—were in eighth grade. The ages of the participants ranged from ten to fifteen years (with a mean age of 12.55 years). The ethnic heritages of the majority of children were Filipino and part Hawaiian. Figure 2 documents the participants by grade and gender.

Grade	Boys	Girls
Before GEFT scoring		
6th	17	12
7th	10	10
8th	18	7

	FD		FI	
After GEFT scoring	Boys	Girls	Boys	Girls
6th	8	4	5	4
7th	3	5	3	1
8th	6	3	4	1

Figure 2. Participants by gender and school grade

We treated all participants as advised by the American Psychological Association's (2002) ethical codes of conduct (see also Flewitt 2005), and an institutional review board granted approval for the project. In addition, we obtained consent from parents or guardians and consent from each child.

Setting

The children came from an isolated island community consisting of Filipino and part-Hawaiian residents. Many of them could trace their ancestry several generations to the first wave of Filiino and Asian immigrants who arrived in Hawaii to work on the island's ranch and pineapple plantation. The community taught its children to value family, respect their elders, recognize the needs of others, and prefer face-to-face social interactions. The children are group oriented, and they value educational achievement (Holmes 2011). The school system takes great pride in its 100 percent graduation rate, which is a group effort because the school and community work together to help their children succeed in school. In essence, these children have a large network of supporters extending from intimate family circles to the larger community including neighbors and school personnel.

Tests and Materials

The Group Embedded Figures Test (GEFT), a group test completed by individuals, involves a nonverbal, written perceptual task that requires each participant to find a single, very common geometric shape hidden within a more complex image (Oltman et al. 1971; Cakan 2003). The test instrument resembles Where's Waldo? a popular children' game, in which children look for obscured items hidden in a larger picture. In the GEFT, children must locate and trace the hidden figure. The GEFT assesses a particular aspect of perceptual functioning—the ability to tease apart a visual field into separate pieces of experience (Witkin et al. 1971). This ability can be applied to one's thinking or perceptual style. The GEFT assesses one particular type of thinking style, which we have already discussed: field-dependence-independence (FDI).

The test instrument consists of a booklet containing twenty-five individual problems organized in three sections. The first is a practice session. Participants complete the test within a designated time. For an adult, the entire test should take approximately twenty minutes but, as is customary with younger participants (Cakan 2003), we gave our children extra time to complete each section. We converted raw scores obtained from the children's correct responses into norms.

We administered the GEFT test by combining sections 2 and 3. The totals from this completed section represented the number of correct embedded figures the child completed. The maximum score for each section was nine, which yielded a perfect score of eighteen. We followed well-established scoring procedures (Witkin et al. 1971): we divided the children's scores into quartiles. We placed children with the lowest scores at the top in quartile 1 and classified them as field dependent. Quartiles 2 and 3 represented children who cumulatively produced the middle 50 percent of all scores. Quartile 4 contained the children with the highest scores. We classified these children as field independent. We then eliminated from our analyses children's scores in quartile 2 and 3 because these possessed both field-dependent and field-independent qualities. The resulting subsamples included twenty-nine field-dependent and eighteen field-independent children.

We also administered the Articulation of the Body Scale (ABC). The ABC involves a drawing task similar to the Goodenough Harris Draw a Person Task (Harris 1963) that asks children to draw a full-figured man and a woman. We chose it precisely because it works with children, as Saracho (1991) shows. Scoring criteria included shape, form, and additions to the body, and we assessed them using a rating of 1 to 5, in which 1 represented the most sophisticated drawing and 5 represented the least sophisticated (Witkin et al. 1962). Using pencils, children drew each figure on a separate sheet of paper (8.5 x 11 inch). Sample drawings of a man appear as figures 3 and 4.

In scoring the drawings, we followed procedures established by Saracho (1991), averaging the scores for the two figures and correlating these values with the GEFT scores. When children completed both the GEFT and the ABC, we found a high degree of correlation with the Embedded Figures Test (EFT). Thompson, Pitts, and Gipe (1983) found this correlation holds for older children as well. Additional research suggests it is also reliable and valid as a measure even when the EFT cannot be administered (Guisande et al. 2007; Witkin et al.1971).

Results

Design and Procedure

For this project, we used a mixed-methods approach. We combined quantitative standardized tasks with qualitative, open-ended questions in a written format. In addition, we correlated objective measures of student performance with the standardized tasks and question responses.

Figure 3 by a seventh-grade girl

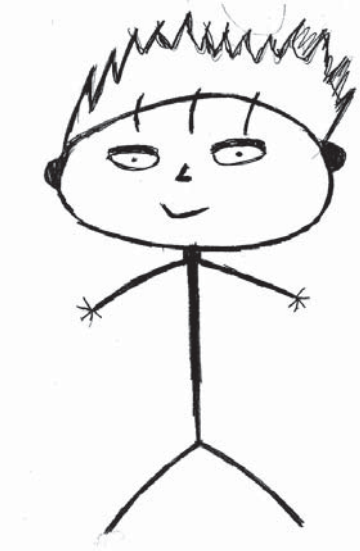

Figure 4 by a seventh-grade boy

In spring 2011, the children completed the GEFT (Witkin et al. 1971) and the ABC (Witkin et al. 1962) and responded to three open-ended questions. One of us, Sharon Liden, compiled a list of all children from whom we had received consent and who were thus eligible to participate. These children gathered in one of their usual classrooms to complete the GEFT and ABC during periods that did not interfere with classwork. Two of us, Robyn Holmes and Liden, met with the children, Holmes for the first time. We explained the nature of the task to the children, asked if there were any questions, and required the children to assent to complete the task.

We then distributed the test booklets and allowed the children to practice with the sample figures in the first section of the GEFT. As they practiced, we walked around the room checking to make sure each child understood the directions and how to solve the figure problem. Once we were sure that all children had a working knowledge of the task, we reiterated the instructions and began the actual test. The GEFT is a timed, nonverbal, written speed test so we used a stopwatch to monitor the time periods of the three sections. After the children completed the GEFT, we gave them a few minutes to relax.

Next, we asked the children to draw two full figures, one of a man and one of a woman. We asked the children to place their names on the drawings as well as an "M" or "W" so that the drawings could be distinguished if any ambiguities arose. We asked them not to draw caricatures but rather full human figures. We gave them ample time to complete each drawing (approximately fifteen minutes for each figure). When they had completed the drawings, we gave them a few minutes to relax. We spoke informally with the children during the break, then we asked them to write their responses to the following questions on the back of their last drawing.

1. What are your favorite things to do? (We had originally asked "What are your favorite things to play?" but we abandoned that phrasing because they narrowly construed play as formal school sports and almost always responded: "I play on the volleyball team." When we rephrased the question substituting "favorite things" for "play," we found they responded with play activities that included sports, electronic games, socializing, social media, and other types of play. On rarer occasions, some children interpreted the new question literally and listed their play activities. Because all the children supplied more than one activity, we

coded their first two responses operating under the presumption that they provided these to us in order of importance. This is the only question we coded for this project.)

2. Name four of your friends.
3. What do you want to be when you get older and grow up?

Results

In this section of the article, we discuss the correlations of the children's thinking styles (as measured by the GEFT and ABC scale) to play activities and academic performance. We report results here in terms of group frequencies.

The raw material in figure 5 represents the frequencies for children's first play choices and state-mandated language test scores. A Pearson r correlation for play choice by language norms revealed a strong positive correlation, r =. 62, p <.01 (see figure 6). Children who reported playing sports produced language scores well below state norms. Sports accounted for 100 percent of language

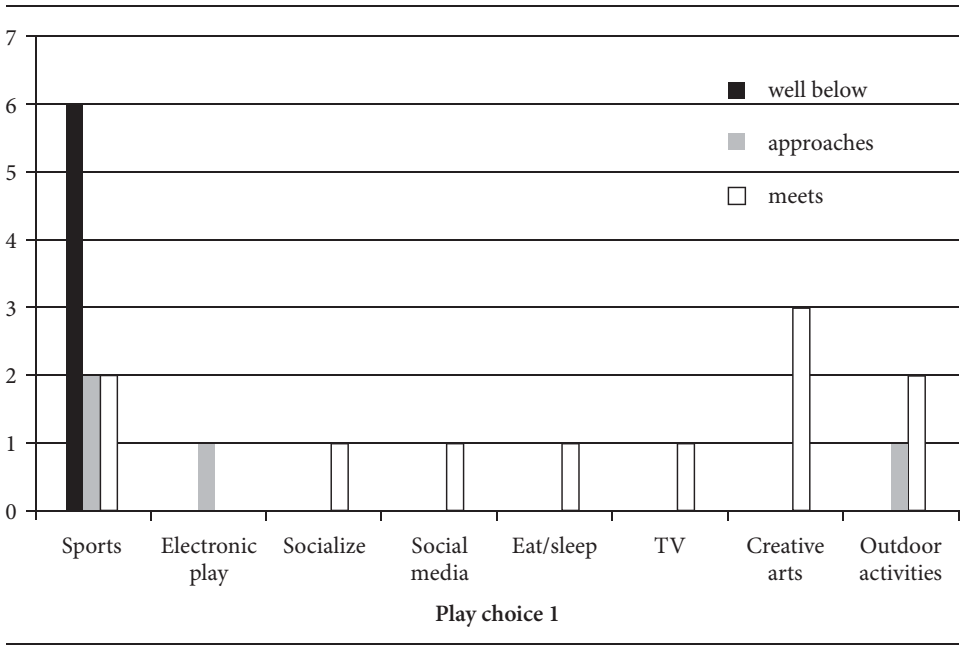

Figure 5. Frequencies for first play choice and language norms

Correlation	Significance
Play Activities	
Play choice 1 x language norms	r=.62**
Play choice 2 x math norms	r=.42*
Play choice 2 x science norms	r= -1.0**
Field dependence-independence	
FDI x play choice 2	r=.48*
FDI x math norms	r=.51**
FDI x academic GPA	r=.34*

*p <.05
** p <.01

Figure 6. Pearson *r* correlations

scores that fell below state norms and 40 percent of all responses. Less structured outdoor activities and socializing with peers led to language scores that approached or met state norms. No play-choice response was related to language scores that exceeded state norms.

Figure 7 documents frequencies for children's second play choice and state-mandated math scores. In general, children's participation in play activities correlated with their state math scores, r=.42, p <.05. Only one response, socializing with peers, related to math scores that fell below the state norm. All other play activities such as sports participation (19 percent), electronic play, and game play with and without toys seemed to connect with math scores that approached or met state norms. Creative arts, watching television, and participating in unstructured outdoor activities (playing at the beach) correlated with scores that exceeded state norms (11 percent).

Figure 8 records frequencies for the relationship between thinking styles and the second play choice. A strong significant correlation emerged, r=.48, p <.05. The majority of field-dependent thinkers (both boys and girls) participated in sports (19 percent), socialized with peers, and participated in creative

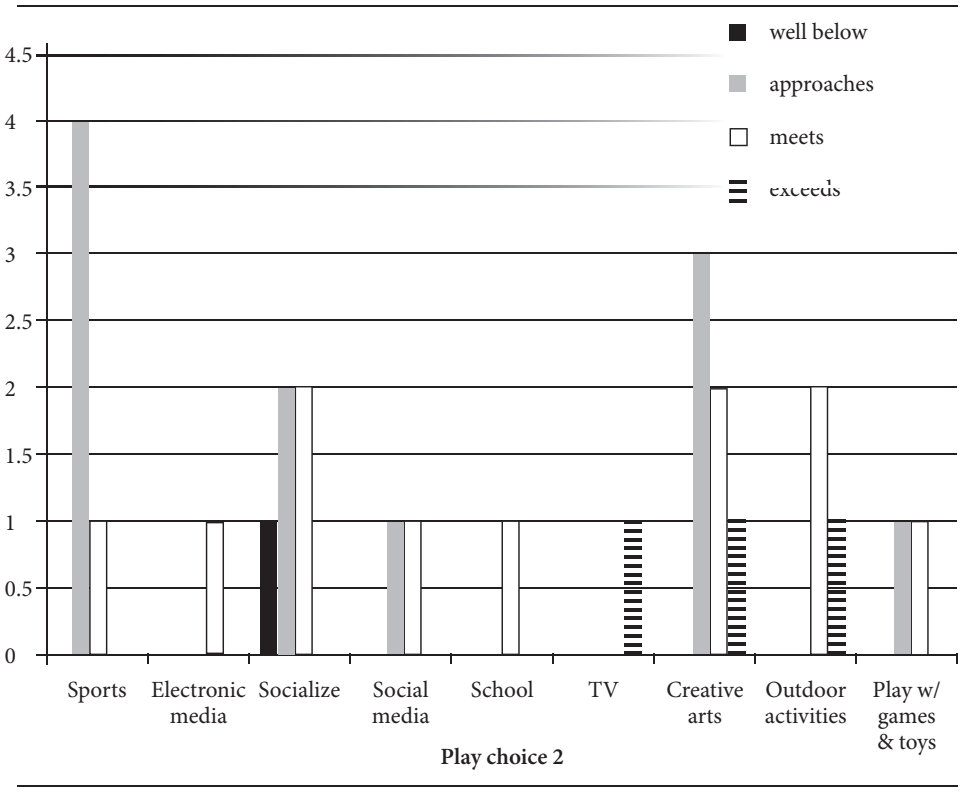

Figure 7. Frequencies for second play choice and math norms

arts such as music and dance (19 percent). The majority of field-independent thinkers also participated in creative arts (girls) and unstructured outdoor activities (boys). Play activities that appeared for both thinking styles included playing music and dancing, both individually and in groups (traditional Tahitian dances, for example), socializing with peers, and playing with games and toys.

Figure 9 lists the frequencies for thinking styles and academic grade point average (GPA). The school employs a common GPA scale in which 1 equals a D average and 4 represents an A average. Approximately 72 percent of the children classified as field dependent earned GPAs that were categorized as low or medium by school standards. Approximately 59 percent of field-independent children were categorized as having high academic GPAs whereas approximately 18 percent of field-dependent children earned high GPAs. Boys slightly outnumbered girls as field-independent thinkers in all GPA categories. The boys were roughly equivalent to girls with respect to field-dependent thinking styles.

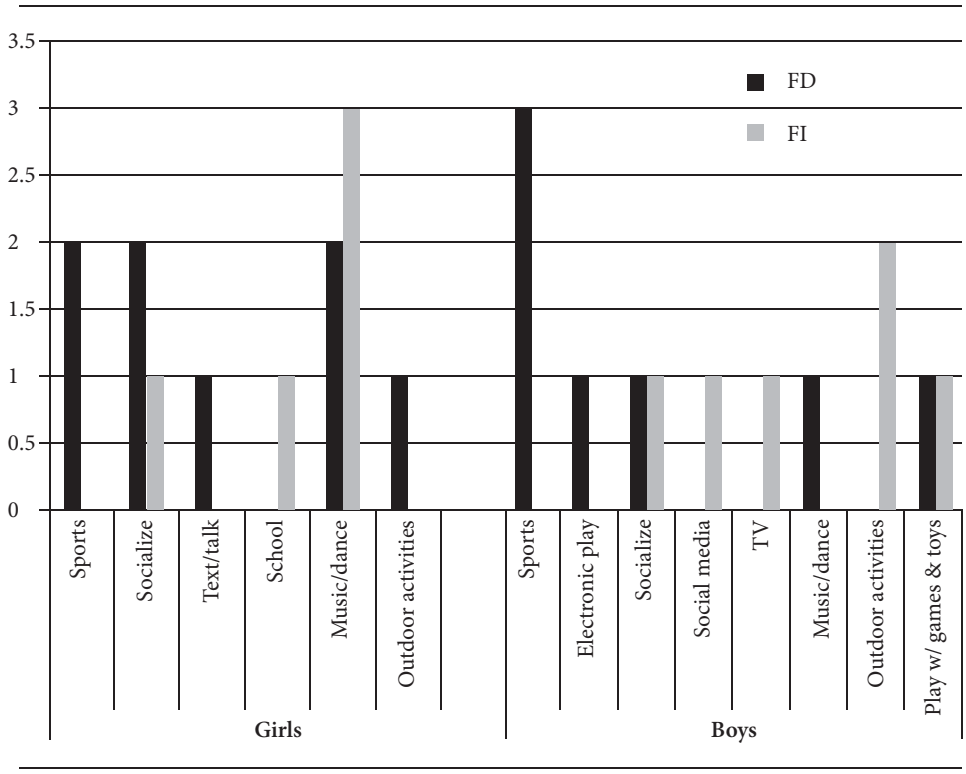

Figure 8. Frequencies for thinking style and second-play choice

Discussion

Findings about this group of middle-school children suggest some significant connections between their thinking styles and their play preferences and academic performance (as measured by GPA and state-mandated test scores). We discuss our findings in relation to our research questions.

First, for these children, thinking styles were linked to their play choices. This supports Saracho's (1994, 1995a, 1995b, 1996) findings with young children. For example, children who listed sports, socializing with peers, and creative activities as their play preferences also had field-dependent thinking styles. Children with field-independent styles preferred more unstructured outdoor activities (boys in particular) and creative activities (girls in particular). Some

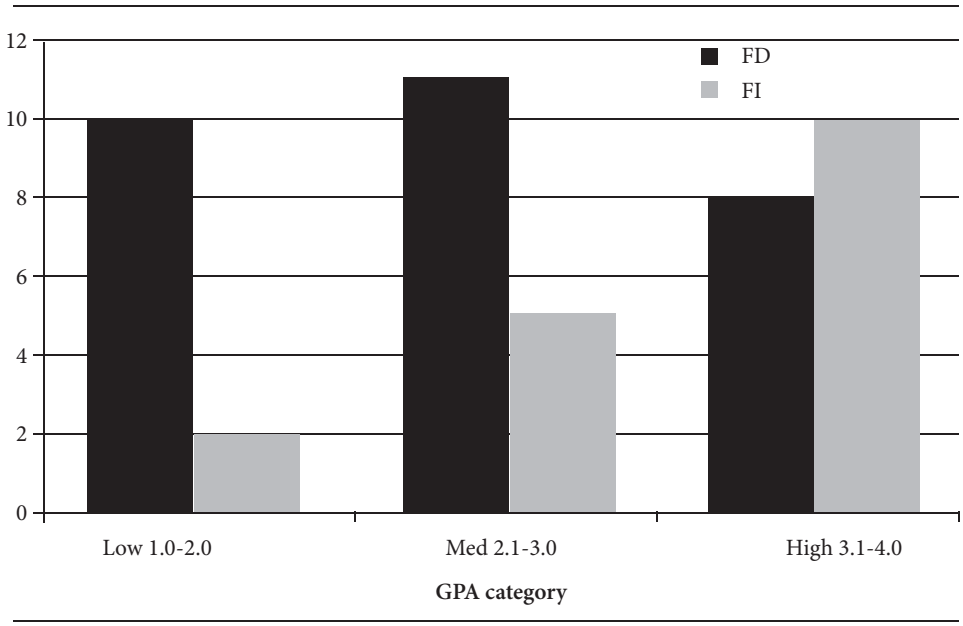

Figure 9. Frequencies for children's thinking styles and academic GPA

play activities—such as game play or play with toys—appeared as the choice of children from both thinking styles.

Second, we found a relationship between children's play choices and their academic performance as assessed by state-mandated test scores. For example, both boys and girls reported that sports was a favorite form of play for them, not surprising given that many of these children participate in school- and community-sponsored team sports. This preference also reflects the community's group-oriented, collectivist values. Parents support participation in sports because it promotes socialization with peers and it builds character. However, sports was the only category associated with language test scores that fell below state-mandated norms. Other play, such as unstructured outdoor play and socializing with peers, approached or met state expectations. No play choice was linked to language scores that exceeded state norms.

The finding that playing sports correlates with language scores below state norms may, in part, relate to the types of sports involved and to other cultural factors. The high school team sports the children play on the island include volleyball, baseball, basketball, and football. There is Pop Warner football, which is an organized league for younger children, and a community intramural basket-

ball league. It may be that participation in team sports supports and encourages community values (character building, attention to group needs, social skills) rather than enhancing language skills.

Play choice also correlates with performance on the state-mandated math tests. All play activities including sports, electronic play, and game play (with and without toys) appeared connected to math scores that approached or met state norms. Unstructured outdoor play and creative activities such as dance correlated with scores that exceeded state norms.

Sports interestingly correlate with both lower language scores and improved math scores. Individual children who preferred unstructured play activities also appeared to score higher on state-mandated test scores than children who listed other types of play. Playing sports such as baseball, volleyball, and basketball, group activities that—as we have suggested—promote social cohesion and build character also require players to have some grasp of mathematically related knowledge, statistics, physics and angles, probability, and field positions. This may partially explain the relationship between sports and higher math scores. Electronic play and rule-governed game play also requires players to have a working knowledge of probability, statistics, and spatial dimensions.

Third, we found a relationship between thinking styles and school performance as measured by GPA. Thus, our findings support other, empirical research. According to Adelina Guisande and her coauthors (2007), field-independent thinking connects to increased academic performance in all subjects. In our sample, children with a field-independent thinking style achieved higher GPAs whereas children with a field-dependent style had lower academic GPAs.

Finally, we were interested in exploring the relationship of cognitive-thinking styles to children's socialization experiences and cultural values. If one applies the individual-collectivism construct formulated by Triandis (1993, 1995) to this setting, the children on the island are members of a decidedly collectivist, group-oriented community. These children are socialized to be sensitive and attentive to the needs of others and to respect their elders. Their parents emphasize group-oriented activities, and the children are prosocial and family oriented (Holmes 2011). Based on the standardized tests the children completed, the majority of them possess a field-dependent thinking style.

As Zhang and Sternberg (2006) noted, children in collectivist cultures (in which children define the self by their relationship to others) tend to have a field-dependent thinking style because it emphasizes social interaction, a reli-

ance on authority figures, and the taking of contextual cues into account when solving problems. This thinking is characteristic of the Filipino and Hawaiian ethnic groups that make up a large percentage of the community. Individualism (where individual accomplishments define the self) is associated with FI, but collectivist ideals seem more compatible with FD (Zhang 2002; Zhang and Sternberg 2006; Hegdens 1993). This correlation appeared true of the children in our group. Cultural setting clearly seems one factor that influences their cognitive-thinking styles.

One of us, Robyn Holmes, has worked with the students' community for several years, and she has personally experienced the collective ideology pervading the island. She has worked with children in classroom settings and witnessed how collectivist values shape their daily interactions. Thus, the example we now present does not surprise her, nor would it surprise many community members. Cultural values and socialization experiences guide the children's everyday behavior. A clear example emerged when we conducted the GEFT task, which, as we have described, we administered to each student in a group setting. We provided the children with standard directions and time to practice the problems of the test. What transpired during both the practice sessions and at the beginning of the actual test is a testimony to how cultural factors contribute to children's cognitive-thinking styles.

On several occasions, one child helped a classmate nearby who appeared to struggle with the task figure. In two cases, children rose from their seat to help a classmate across the table. Children offered constant encouragement and assistance throughout the practice session to other classmates and continued to do so into the beginning of the first test section. We had to interrupt the children in their helpfulness and remind them that we were delighted they were concerned about each other's successes but they each had to complete the test individually with no assistance from another person. They did so, but we noticed during the tasks that the children still attended to each other's facial cues to garner information regarding their classmates' progress. This is typical of the children in this community. Helping, sharing, and cooperating are common, daily behaviors for them; and competition is rare, especially so in some contexts.

For example, no child is ever denied a spot for an extracurricular activity or sport, even those who lack the requisite skills and abilities. All children receive encouragement to participate; they all receive the opportunity to do so; and they all benefit from a support network at home, at school, and in their community.

The support system on the island presents difficulties for some of the children when they transition to other settings away from home. Competition and the desire to be the best are mainstream American values and ideals. On the island, these ideals are entwined with collectivist values, specifically, with helping others to become successful too.

Limitations

There were some issues with this study we should address. First, the community we cover is relatively homogenous in its ethnic heritage and socioeconomic status. Thus, we caution the reader about extending these findings to broader groups or larger populations. As Oyserman, Coon, and Kemmelmeier (2002) noted, even collectivist cultures may vary widely in the degree and expression of collectivist ideology to which they subscribe. Second, for the question regarding leisure activities, we asked the children to report their three favorite activities. We are not certain they listed these in order. For example, the children spend a great deal of time engaged with social media, yet this appeared more as a second-choice activity than a first choice. Also, we phrased the question in terms of "your favorite things to do." Perhaps a better phrasing would have been "your three favorite play activities."

Future Research

There is a resurgence in research about thinking styles (Zhang and Sternberg 2009). Thinking styles relate to how individuals solve problems in constrained settings. Most researchers consider the ability to problem solve a cognitive skill critical for children's academic and social success. These styles also impact other factors, such as play preferences, cultural setting, and academic achievement. These factors, in turn, relate to children's social worlds, and they influence their life experiences and their successes as adults. Understanding how children's intellectual styles relate to their school success and playful pursuits will inform school policy makers about which extracurricular activities they should offer to develop particular academic and cognitive skills that their students may need to improve. Forthcoming studies might pursue the examination of children's thinking styles in diverse settings and in various formative periods. These studies might use different approaches to assess play preferences and help broaden our understanding of how a child's development is influenced both by things external and internal.

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