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Cognitive differences In United States preschool children and Mexico preschool children

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COGNITIVE DIFFERENCES IN UNITED STATES PRESCHOOL CHILDREN AND MEXICO PRESCHOOL CHILDREN

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COGNITIVE DIFFERENCES IN UNITED STATES PRESCHOOL CHILDREN AND MEXICO PRESCHOOL CHILDREN

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ABSTRACT

Considerable cross-cultural work on adults and older children suggests that collectivist and individualist cultures are associated with different modes of cognitive processing involving holistic and analytic thinking styles. The current study examined cultural differences in holistic-analytic thinking styles in an understudied population—preschoolers—in the United States, a representative country for individualism, and in Mexico, a representative country for collectivism. Eighty-three preschoolers (United States: $n = 41$; Mexico $n = 42$) with an age range from 3 years to 6 years 1 month participated in this study. Two measures of cognitive style were given to each participant: the triad task and a modified version of the Preschool Embedded Figures Task (Coates, 1972). Results revealed no significant differences between Mexican and United States preschoolers in either the triad or the embedded figures task except in how quickly preschoolers identified the embedded figures, with Mexican preschoolers' performance exceeding American preschoolers' performance. An age effect was evident in preschooler performance in both tasks in both countries: older preschoolers were more

likely to show thematic organization and field-independent thought than younger preschoolers. Results are discussed in terms of the need to re-evaluate monolithic concepts of both collectivism-individualism and cognitive style.

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The assumption of universality of cognitive processes in humans predominated in mainstream psychology until the late 20th century, an assumption that is traceable to the writings of philosophers such as Locke and Hume in the 18th and 19th centuries (Nisbett, Peng, Choi, & Norenzayan, 2001). Over the past 40 years, however, cross-cultural psychologists have collected increasing evidence to seriously question the universality assumption. Although cross-cultural studies of difference in cognition are still in their infancy (Gutchess, Yoon, Luo, Feinberg, Hedden, Jing, Nisbett, & Park, 2006), psychologists have found significant evidence of culture effects on cognition.

Much of this cross-cultural work has examined broad proposals of difference across cultures in collectivism and individualism. Principles of collectivism involve privileging group over individual goals, whereas those of individualism involve privileging individual over group goals (Davis, 1995). Members of individualistic cultures tend to value independence and autonomy, emphasize uniqueness, and show low sensitivity to social cues. In contrast, members of collectivistic cultures tend to value interdependence and group harmony, emphasize conformity, and show high sensitivity to social cues (Nisbett, Peng, Choi, & Norenzayan, 2001). Triandis (1989, 1995) proposed that 70% of the world's population hails from collectivist-oriented cultures, including populations in Africa, Asia, Latin America, and Native America.

The characteristic cognitive styles by which people perceive both the world and themselves also seem to vary along collectivist-individualist cultural lines. Considerable cross-cultural research suggests that collectivist and individualist cultures are associated with different modes of cognitive processing (Ji, Peng, & Nisbett, 2000; Kitayama, 2000; Markus & Kitayama, 1991; Miyamoto & Kitayama, 2002; Nisbett , 2003; Nisbett, Peng,

Choi, & Norenzayan, 2001; Witkin & Berry, 1975, Masuda & Nisbett, 2001). This research has primarily looked at cultural differences in holistic-analytic thinking, a dimension of cognitive style—"the characteristic, self-consistence ways of functioning a person shows in the cognitive sphere" (Witkin, 1965, p. 28) –originally designed to characterize individual differences in cognition but later adopted by cross-cultural psychologists to study differences across nations.

Holistic and Analytic Styles of Thought

Holistic thinking involves the categorization of objects on the basis of their thematic relations, the attribution of causality to context, and the tendency to be more tuned to contextual information, whereas analytic thinking involves the categorization of objects taxonomically, the ascription of causality to focal actors or objects, and the tendency to be more tuned to a focal object and less sensitive to context. Nisbett, Peng, Choi, and Norenzayan (2001) elaborate:

> We define holistic thought as involving an orientation to the context or the field as a whole, including attention to relationships between a focal object and the field, and a preference for explaining and predicting events on the basis of such relationship…We define analytic thought as involving detachment of the object from its context, a tendency to focus on attributes of the object to assign it to categories, and a preference for using rules about the categories to explain and predict the object's behavior (p. 293).

Work investigating holistic-analytic cognitive style differences between collectivist and individualist cultures over the past few decades has linked individualistic cultures (e.g.,

the United States) to a greater tendency toward analytic thought and collectivist cultures (e.g., Africa, Asia, Latin America, and Native America) to a greater tendency toward holistic thought (Nisbett, Peng, Choi, & Norenzayan, 2001; Witkin & Berry, 1975).

Researchers have designed a variety of measurements to test holistic-analytic thinking styles. Measures of causal inference, such as casual attribution and inclusion tasks, are designed to examine the extent to which individuals assign behavior to dispositional or situational factors and, more generally, how individuals causally relate different types of information to events (Choi, Dalal, Kim-Pireto, & Park, 2003; Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006,). Categorization tasks (e.g., the triad task) are designed to assess the extent to which individuals are more likely to pair items on a thematic or taxonomic basis. When individuals are asked, for example, which of two alternative objects (a picture of grass or a picture of a pig) a target object (a picture of a cow) is better associated with, are they more likely to choose a thematic association (grass paired with cow since cows eat grass) or a taxonomic association (pig paired with cow since both are animals)?

Finally, measures of field dependence-independence are designed to assess the extent to which individuals when processing information rely more on figural, that is foregrounded items (internal frames), or on environment or situational fields (external frames), e.g. the background in which a figure is embedded (Goldstein & Blackman, 1978). Field-dependent individuals tend to view both background and foregrounded items as a whole, continuous field, whereas field-independent individuals more readily perceive foregrounded items as discrete from the background field. Specific tests of field dependence-independence include the Rod and Frame Test (RFT), also called the

Framed-Line Test (FLT), The Tilting Room Tilting Chair Test (TRTC), and the Embedded Figures Test (EFT). Both the RFT and TRTC tests manipulate the tilt of both a foregrounded figure and the background in which it is embedded; in the case of the RFT, a rod and its surrounding frame are tilted relative to one another, whereas in the case of the TRTC, the participant sitting in a chair and the room which she/he occupies are tilted relative to one another. Each task requires participants to move either a rod or their own chair to the position they perceive to be upright. For the EFT, participants are asked to locate various, simple figures within different complex designs; those individuals more field independent in their thinking should detect more embedded figures at a faster pace relative to those individuals more field dependent in their thinking, who should detect fewer embedded figures and do so more slowly (Glicksohn & Kinberg, 2009).

Cross-cultural Difference in Adult and Child Holistic-Analytic Cognitive Styles

Tendencies toward situational attributions in causal inference tasks, thematic associations in categorization tasks, and field dependent thought all characterize a holistic cognitive style. Tendencies toward dispositional attributions in causal inference tasks, taxonomic associations in categorization tasks, and field independent thought all characterize an analytic cognitive style. Research comparing adults from traditionally collectivist cultures—such as East Asian, Eastern and Central European countries—with adults from traditionally individualist cultures—such as the United States and Western Europe—has demonstrated clear cultural differences in holistic and analytic thought across these various tasks, with greater tendencies toward holistic thought in collectivist cultures and greater tendencies towards analytic thought in individualist cultures (Choi,

Dalal, Kim-Pireto, & Park, 2003; Ji, Peng & Nisbett, 2000; Ji, Zhang & Nisbett, 2004; Kitayama, Duffy, Kawamura, & Larsen, 2003; Kühnen, Hannover, Roeder, Shah, Schubert, Upmeyer, & Zakaria, 2001; Kitayama & Ishii, 2002; Masuda and Nisbett, 2001; Masuda 2003; Varnum, Grossmann, Katunar, Nisbett, & Kitayama, 2008).

Some research points to the role of language in these cross cultural differences in cognitive style. For example, Ji, Zhang and Nisbett (2004) reported that bilingual Chinese university students from the Mainland and from Taiwan were more holistic in their thinking when tested in Chinese than when tested in English. Kashima and Kashima (1998, 2003) have further shown that cultures with pronoun drop languages, such as Chinese, Japanese, Slavic, and most romance languages, are more collectivist compared to cultures with non-pronoun drop languages, such as English and German, which tend to be more individualistic.

Are these cultural differences in holistic and analytic thought evident at earlier periods of development? Relatively little cross-cultural work on childhood differences in cognitive style has been conducted in recent years, so we must turn to older work in the field for this answer. A classic study by Chiu (1972) employing the triad task found a significant difference between the choices of 9- to 10-year-olds in China and the United States. Chinese children preferred to group the objects thematically, whereas the United States sample preferred to group the objects taxonomically. Studies employing the RFT comparing Spanish speaking Mexican-American school age children from Mexican-influenced traditional communities with non-traditional English speaking Mexican-American children have yielded similar results (Laosa & DeAvila, 1979, Ramirez, Castaneda, & Herold, 1974; Ramirez & Price-Williams, 1974). Within the United States,

children from more collectivist subcultures (e.g., Spanish speaking traditional Mexican-Americans) were significantly more field dependent in their thinking than children from more individualist subcultures (e.g., English speaking non-traditional Mexican-Americans). Furthermore, Mexican-American children in general are more field-dependent than Anglo-American children (Kagan & Zahn, 1975; Sanders, Scholz & Kagan, 1976). Saracho (1983, 1989) found evidence for these differences in Mexican-American children as young as 5-years-old.

However, several cross-cultural studies have found the opposite results. Rural Chinese girls with limited education (Bagley, 1995) and 9.5-year-old Navajo children (Dinges & Hollenbeck, 1978) both scored higher in field-independence relative to United States norms. In addition, Japanese-Canadian children have higher mean field-independent scores than their non-Japanese peers (Bagley, Iwawaki, & Young, 1983). These opposite results may come from the fact that most cross cultural work relies on only one kind of holistic-analytic measure for analysis. Even so, Buriel (1978), examining both EFT and FRT in school age Anglo-American and Mexican-American children, found no evidence to suggest that Mexican American children are more field-dependent than Anglo-American children, despite significant intercorrelation between both measures in both groups.

Despite a growing body of literature studying field-dependence-independence in Western preschool populations (Chynn, Garrod, Demick, DeVos, 1991; Haynes, Miller, 1987; Kloner & Britain, 1984; Steele, 1989), no cross-cultural work (to my knowledge) on cognitive style differences yet exists in children younger than 5-years-old. Given this absence of cross cultural work with preschoolers and the paradoxical findings related to

holistic-analytic cultural differences in children, it is important to further study cross cultural differences in cognitive style with a population as yet unstudied: preschoolers. The present study, therefore, is designed to address developmental gaps and to help reconcile discrepancies in the developmental literature on cross cultural differences in cognitive styles. We know very little about the developmental origins of collectivism and individualism, which requires an exploration of potential cognitive style differences in preschool children across cultures.

The Present Study

The present study examines preschoolers in the United States, a representative country for individualism, and preschoolers in Mexico, a representative country for collectivism which encourages interdependence and a focus on relationships (Morling and Lamoreasux, 2008), on the extent of cognitive style differences between the two cultures on two separate measures of cognitive style, the triad task and the embedded figure task. I predicted that preschoolers in Mexico would be more field dependent in their thinking and would organize objects more thematically than preschoolers in the United States. Specifically, I predicted 1) that Mexican preschool children would be more likely to categorize objects on the basis of their thematic relations than United States preschool children, who would be more likely to categorize objects taxonomically, in a triad task, 2) that Mexican preschool children would identify fewer embedded figures and do so more slowly than United States preschool children, who would identify more embedded figures and do so more quickly, and 3) that a high degree of correspondence would exist between scores on the triad task and the embedded figure task within both Mexican and United States population.

Method

Participants

The participants in this study included 41 preschool children (20 boys and 21 girls) from Albuquerque, New Mexico, in the United States, and 42 preschool children (21 boys and 21 girls) from Merida, Yucatan, Mexico. The mean ages of the United States and Mexican preschoolers were 4 years 4 months (1570 days, *SD* = 262 days) and 4 years 7 months (1650 days, *SD* = 287 days), respectively. One additional child was studied but could not be validly coded due to experimenter error and was therefore excluded from analysis. All of the Mexican sample consisted of native Spanish speakers, and all of the United States sample consisted of native English speakers. The full age range of participants in the study was from 3 years (1095 days) to 6 years 1 month (2220 days). Age sampling of preschoolers from the United States and Mexican daycares/preschools was designed to establish similar age ranges and age distributions for both samples. No significant difference emerged between the ages of United States and Mexican preschoolers in my sample, $F(1, 81) = 1.72$, $p = .19$. The socioeconomic status of both samples involved lower-middle to middle class families.

All of the preschoolers sampled in Mexico were identified by their parents as of Mexican descent. Of the United States sample, 31.7% of the preschoolers were identified by their parents as European American, 9.8% as Hispanic American, 7.3% as Mexican American, 2.4% as African American, 2.4% as American Indian, and 24.4% as multi-ethnic. The remainder (22%) of the preschool population could not be identified as their parents refrained from revealing their ethnic status. Of the 24.4% identified as multi-

ethnic, the overwhelming majority was identified as both European and Hispanic American.

Albuquerque, New Mexico has a population of approximately 869,000 (as of 2010) in United States. In comparison, Merida lies on the Yucatan Peninsula in Mexico, with a population of approximately 970, 000 (as of 2010), and is ranked as the 12th most populated Mexican metropolitan area. Recruitment for the study occurred at the University of New Mexico Children's Campus, in Albuquerque, New Mexico of United States as well as at two preschool programs in Merida, Yucatan, Mexico: *Rayitos de Sol* and *Bienvenidos*.

All of the three preschool programs, one in United States and two in Mexico, offer half-day/whole-day school, Monday through Friday, with a basic, educational curriculum and group activities including story time, music and art as well as a daily snack and recess time. The preschool *Rayitos de Sol* in Merida provides a three hour, half-day of program, Monday through Friday. The other preschool *Bienvenidos* in Merida provides a whole-day program instead. These three preschools were targeted to attempt to recruit children within the same age range as well as with a comparable school experience in both the United States and Mexico.

The experimenters involved in testing preschoolers in the United States were 2 males and 3 females. Both males self-identified as Hispanic Americans, and one of the female experimenters also self-identified as Hispanic American. The remaining two female experimenters self-identified as European American. All of these experimenters were native English speakers. The experimenters involved in testing preschoolers in

Mexico were 2 males, both of whom self-identified as Mexican. All of these experimenters were native Spanish speakers.

Procedure

Participants were asked to complete two measures of cognitive style: the triad task, which is a categorization test, and a modified version of the Preschool Embedded Figures Task (Coates, 1972), which is a measure of field dependence-independence. These measures were originally created in English, so to create Spanish versions of the measures, one experimenter used standard translation and back-translation methods (Brislin, 1980). Each phase included warm-up trials before the real test in order to give participants an opportunity to familiarize themselves with the rules and procedures of the tasks. All tests were conducted in the native language (Spanish or English) of the children, in a private room at their daycare center. A daycare provider was present throughout the entire testing session. The daycare provider sat in the testing room, was given a maganize to read and was instructed to refrain from eye contact with the children during the testing sessions. Two well-trained experimenters were involved in each testing session. One experimenter was in charge of administering the tests to each child, and the other experimenter recorded the child's answers on a standard recording sheet. The experimenter who administered the testing sessions was a native speaker of the children's native language. Both testing sessions were videotaped.

The triad task was the first test administered to children in both countries. In the triad task, children were presented with a total of 19 triplets (3 warm-up triplets and 16 test triplets). Each triplet consisted of three drawings of common objects, such as furniture, animals and/or clothes, with one drawing at the top and two drawings at the

bottom. For each triplet, children were asked to select which of the two lower drawings they thought was better associated with the top drawing. For example, a child was shown a top drawing of a cow and was then asked to choose which of the two lower drawings (a drawing of a chicken and a drawing of grass) was a better fit with the top drawing. Children were also asked to give reason for their choice. Each of the two lower drawings bore a different relationship to the top drawing. One of the lower drawings related thematically to the top drawing (e.g., cows eat grass), whereas the other lower drawing related taxonomically to the top drawing (e.g., cows and chickens are both animals). The side of the presentation for the thematic and taxonomic drawings was systematically varied across triads. Each child was specifically asked "the top picture goes with which picture on the bottom, this one or this one? Why?" Sixteen triplet pictures were presented in the same order across children.

The second test administered to children was the embedded figure test, which involved a set of 36 drawings of common objects embedded in different background displays. The first 12 drawings contained a target object of a circle, the second 12 contained a target object of a square, and the final 12 contained a target object of a triangle. In each group of 12, the frist two drawings were warm-up trials to familairize the children with the rules. Children were first presented with the target object (e.g., a circle) and then asked to locate the target object in subsequent drawings. For example, a child was given a circle drawing (the target object) to look at. Then he/she was shown an image of a complex figure (e.g., a drawing of a bicycle), in which the target circle was embedded. The child was then asked to point to the circle embedded in the complex figure. Whether or not the child correctly pointed to the embedded object in the complex

figure and how long it took the child to successfully identify the embedded object, if they found it, were recorded by one of the experimenters.

Data Reduction

For the triad task, children's choices for each of the 16 stimuli were coded as either a "1" or a "2," depending on whether the child pointed to the thematically-related object ("1") or the taxonomically-related object ("2"). These scores were then summed across all 16 stimuli for each child and averaged to yield a single score for each child ranging from 1 to 2. For the embedded figure task, the proportion of embedded figures correctly identified was computed for each child. These two scores comprised my primary variables for analysis. All proportions were arcsine transformed prior to analysis to normalize distributions.

Of the stimuli in which children correctly identified the embedded figure, a latency score was also computed for each stimulus to index how long it took for the child to correctly identify the embedded figure. These latency scores were then summed across all correctly identified figure stimuli for each child and averaged to yield a single latency score for each child.

Results

Preliminary Analyses

In preliminary analyses, I examined data both from the triad task and the embedded figures task as a function of age and sex with two univariate ANOVAs. To establish a dichotomous variable for age for analysis purposes, I performed a median split on the age variable, creating a younger group (3 years old to 4 years and 6 months old), and an older group (4 years and 7 months old, to 6 years and 1 month old). A main effect

of age emerged for both the triad task, F (1, 79) = 9.31, p =.003, and the embedded figure task, F (1, 78) = 7.88, p = .006. No main effect of sex emerged, and no age by sex interaction emerged. As a result, I collapsed the data across sex but not age for all subsequent analyses. Because an age effect exists in these data, I use age in addition to culture as an independent variable in the following analyses.

Main Analyses

For the triad task, a 2 (culture: United States, Mexico) x 2 (age: younger, older) univariate ANOVA on the mean performance of children revealed no significant interaction and only a main effect for age, F (1, 79) = 10.05, p = .002, η_p^2 = .11. Figure 1 shows that, irrespective of cultural background, older children were even more inclined to group items thematically than younger children, who themselves still showed greater tendency to group items thematically than taxonomically. Contrary to my hypothesis, preschoolers from the United States (M = 1.29, SD = .20) and preschoolers from Mexico (M = 1.30, SD = .22) showed no significant difference in performance from one another and looked virtually identical in their triad task scores, F (1, 79) = .29, p = .60.

For the embedded figure task, a 2 (culture: United States, Mexico) x 2 (age: younger, older) univaritate ANOVA on the mean correct proportional data of children again revealed only a main effect for age, F (1, 78) = 7.97, p = .006, η_p^2 = .09. Figure 2 shows that, irrespective of cultural background, older children correctly identified a higher proportion of embedded figures than younger children, who themselves still showed a greater tendency toward field independent than field dependent thought. Again, contrary to my hypothesis, preschoolers from the United States (M = .69, SD = .11) and preschoolers from Mexico (M = .66, SD = .10) showed no significant difference

in performance from one another, looking very similar in their embedded figure task scores, $F(1, 78) = 2.05, p = .16$.

Latency scores for how quickly children correctly identified embedded figures were also computed for the embedded figure task. In contrast to the preceding analyses, a 2 (culture: United States, Mexico) x 2 (age: younger, older) ANOVA on the mean latency of children's embedded figure recognition revealed only a main effect for culture, $F(1, 78) = 12.67, p = .001, \eta_p^2 = .14$. Figure 3 shows that, irrespective of age, Mexican preschoolers identified embedded figures more quickly than American preschoolers. Although these results show a culture difference in how quickly preschoolers identify embedded figures, the results are in the opposite direction of my prediction.

Finally, at the group level, children's performance on the triad task and their performance on the embedded figure task showed no systematic relationship to one another. A Pearson parametric Correlations Test revealed a very small, non-significant negative correlation ($r = -.09$).

Discussion

This study was designed to examine cross cultural differences in cognitive style between a typical individualist culture (the United States) and a typical collectivist culture (Mexico) in an unstudied population for this kind of cross cultural work: preschool age children. I used two different measures of cognitive style in this study—as opposed to many studies looking at cross cultural differences in cognitive style which only use one index of the holistic-analytic construct—in order to establish greater consistency of evidence for thinking differences across cultures. I predicted greater tendency toward holistic thinking, specifically evident in greater thematic organization

and more field dependent thought, in Mexican preschool children compared to United States preschool children, who should show greater tendency toward analytic thinking, specifically evident in greater taxonomic organization and more field independent thought. I also predicted that preschoolers' performance on the triad task should be correlated with their performance on the embedded figure task both for the Mexican and United States populations.

Results of this study were contrary to my hypotheses. No significant differences emerged between Mexican and United States preschoolers in either the triad or the embedded figures tasks except in how quickly preschoolers identified the embedded figures, with Mexican preschoolers finding embedded figures significantly more quickly than United States preschoolers (the direction of this effect was contrary to my prediction). Only the effect of age was evident in preschooler performance on these tasks: older preschoolers in both the United States and Mexico were even more likely to show thematic organization and field-independent thought than younger preschoolers.

How should we evaluate findings of no statistically significant differences in cognitive style between Mexican and United States preschool children? Failure to reject the null hypothesis does not allow us to draw the conclusion of acceptance of no difference. Whether or not a null result can be plausibly or reasonably considered as evidence for no difference depends on the power available in the analysis. Loftus (1996) and others (e.g., Grant, 1962) recommend looking at the magnitude of confidence intervals to determine how plausible it is that the null results from a study reflect no real difference in the populations. According to Loftus, "small confidence intervals reflect high experimental power" and under these conditions "acceptance of the null hypothesis

would be reasonable"; whereas "large confidence intervals reflect low statistical power" and under these conditions "acceptance of the null hypothesis would be unconvincing" (p. 167). With respect to preschoolers' performance on the triad task, the confidence interval for these scores, 95% CI [-.11, .08], was fairly large, reflecting low power and suggesting that differences may well exist between these Mexican and United States populations. With respect to preschoolers' performance on the embedded figure task, the confidence interval for these scores, 95% CI [-.03, .10], was again fairly large, reflecting low power and suggesting that differences may well exist between both populations. Thus, although no differences between Mexican and United States preschoolers emerged on either the triad or the embedded figure task, the actual population means for the two countries could differ to a considerable degree, given how relatively large the confidence intervals for cultural comparisons in mean performance on both tests are. However, my failure to find differences between Mexican and United States preschoolers might not be due to low power as much as it is due to the cultural effects, if they exist, being small in magnitude. Given that I found clear and statistically significant differences between ages in my sample, there was clearly enough power in the sample to reveal differences of some kinds. Thus, the failure to find culture differences may reveal more about the small magnitude of those potential differences than about the power of my sample itself.

Thus, the main results from this study are unclear. Nonetheless, there is a pattern in the data of this study that can potentially inform future research. Both Mexican and United States preschoolers showed a strong tendency to organize the objects in the triad task more thematically than taxonomically. Similarly, both Mexican and United States preschoolers showed a strong tendency to be more field independent in their thought by

locating the majority of embedded figures presented to them. And preschoolers in both cultures showed significant age-related increases in their tendencies both to organize objects thematically and to find embedded figures in complex surrounds. Basically, both Mexican and United States preschoolers showed increasing tendencies as they got older toward analytic thought in the embedded figure task and holistic thought in the triad task. Finally, Mexican preschoolers were significantly faster at identifying embedded figures than United States preschoolers, a further sign of analytic thinking in a population assumed to think more holistically. In essence, preschool children in both cultures showed primarily a holistic thinking style on one measure – the triad task—and an analytic thinking style on another measure, the embedded figure task, with Mexican preschoolers looking even more analytic in their thoughts than United States preschoolers when it comes to the latency to identify embedded figures.

The context specificity evident in both Mexican and United States preschoolers' thought suggests that they are employing different cognitive strategies depending on context. An overarching focus on a holistic and analytic cognitive styles, therefore, can misrepresent the fact that people with different cognitive styles overall may choose various thinking strategies depending upon different contextual and or situational information they receive as well as the magnitude of that information. An individual with a holistic thinking style may prefer to apply a taxonomic thinking strategy under some circumstances. For example, she/he may have a tendency to choose a thematic strategy over a taxonomic one in context A, but prefer the taxonomic strategy instead of the thematic one in context B.

Resent research points to precisely these sorts of differences within the same individual in analytic and holistic thinking strategies. For example, Jen and Lien (2010) reported that an increase in the cognitive load of a task resulted in significantly greater tendencies to make a dispositional attribution—to think analytically—for both holistic thinkers and analytic thinkers (whose cognitive style was established independently of the attribution task). In other words, both the attributions and judgments of the holistic and analytic participants in Jen and Lien's study changed in the same direction and with the same magnitude toward analytic thought under conditions of a heavier cognitive load.

Cross-cultural investigations of group differences in cognitive style between collectivist cultures, such as China, Japan, and Mexico, and individualist cultures, such as the United States and much of Western Europe, remain an active and influential area of research (e.g., Kitayama, Duffy, Kawamura, & Larsen, 2003; Oyserman & Lee, 2008; Varnum, Grossman, Katunar, Nisbett, & Kitayama, 2008). However, a number of challenges to the notion of a "grand divide" between cultures that value collectivism and those that value individualism have appeared in the literature over the last few years (e.g., Helwig, Yang, Tan, Liu, & Shao, 2011; Tamis-Le Monda, Way, Hughes, Yoshikawa, Kalman, & Niwa, 2008). Results from my study are consistent with these challenges. In both Mexican and the United States cultures, a mixture of traditionally identified collectivist and individualist thought may be evident, underscoring the importance of seriously considering heterogeneity within individuals and within cultures, rather than treating cultures and the individuals who comprise them as monolithic, either-or structures. For example, like the United States, Mexico is also a multi-ethnic, multi-religious state with multiple cultures. 'Assimilation' is a very sensitive word when used

to describe people in any society. Instead of continuing to advocate the concept of collectivism and individualism, perhaps we should recognize the diversity within any given culture. In the same culture, we may see strong tendencies toward individualism in one context, and strong tendencies toward collectivism in another context. And on top of this, we need to recognize intraindividual heterogeneity—the heterogeneity within an individual person—across time and context. The whole notion of cognitive style suggests that patterns of thinking and reasoning remain stable and invariant across contexts, but the fact that children in my sample showed so little consistency across two measures of a supposedly stable style of thought calls into question the applicability of such context-independent constructs, at least to the period of early childhood. Furthermore, my results suggest that researchers need to realize that although these two tests are supposed to measure categorical differences in collectivism and individualism, the two tests may, in fact, target very unique, different domains of cognition.

The current study also points to the limitations involved in using assessments created in the lab of one culture to assess behavior/thoughts in another culture. The two tests used in this study (the triad task and the embedded figure task) originated in the United States and were originally designed to tap into cognitive style differences within the culture of the United States. Applying these tests cross-culturally may not adequately capture the uniqueness of thought particular to a given culture. Instead, efforts should be underway to establish psychological assessment tools from within the framework of each culture itself, so that such assessments can be tailored to the particularities and meaning systems of that culture.

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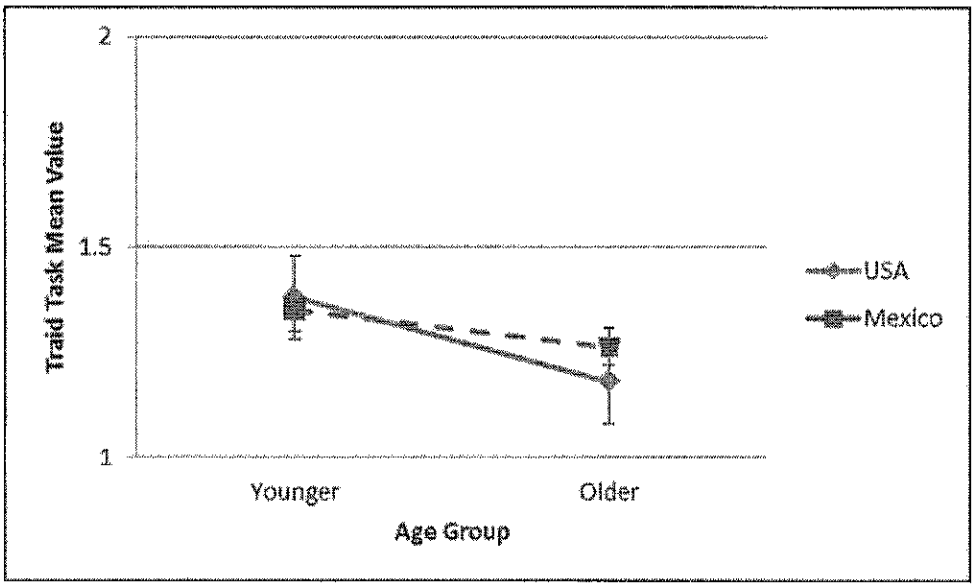

Figure 1. Age differences in triad task mean value between Mexican and United States preschoolers. Standard errors are represented in the figure by the error bars attached to each line.

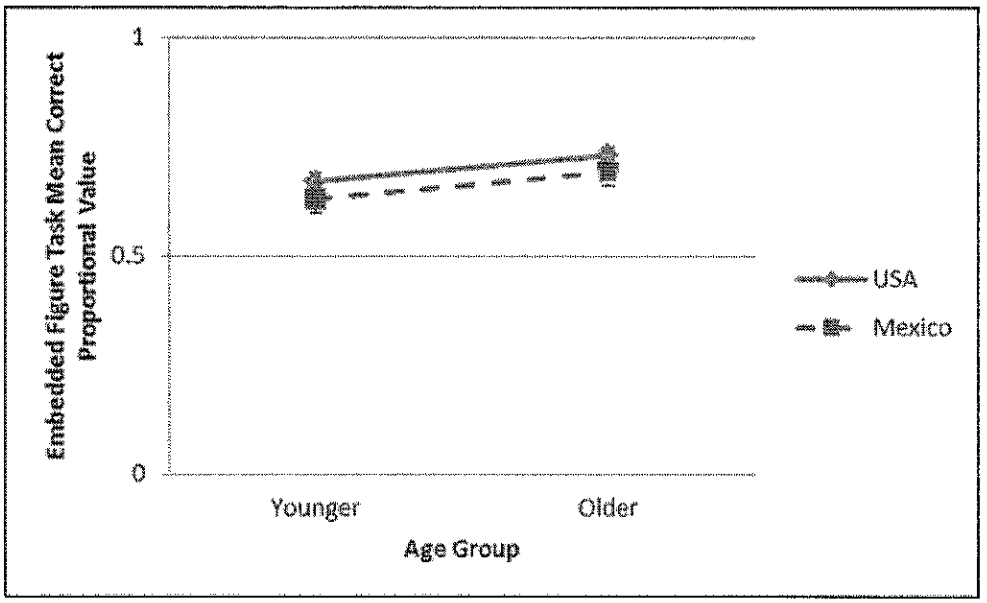

Figure 2. Age differences in embedded figure task mean value between Mexican and United States preschoolers. Standard errors are represented in the figure by the error bars attached to each line.

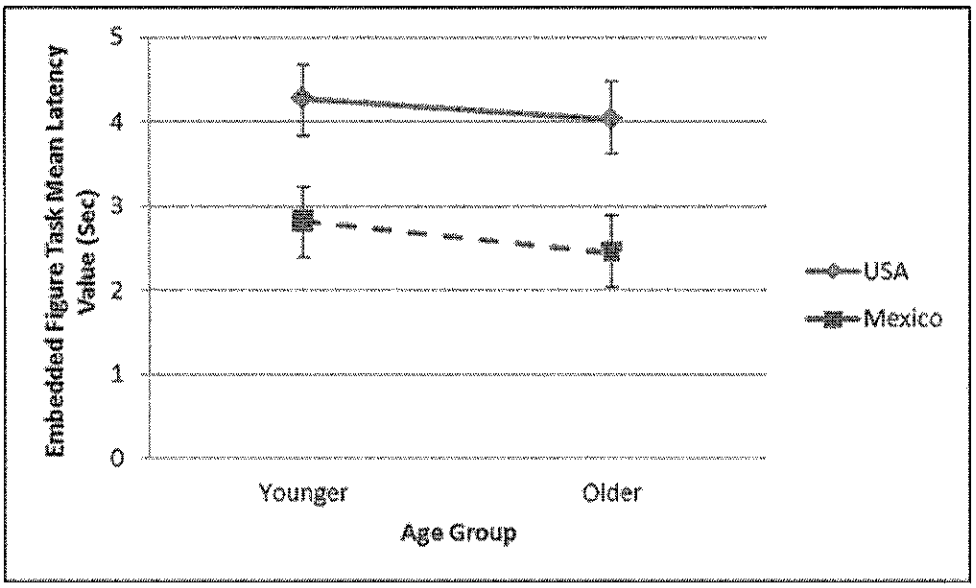

Figure 3. Age differences in embedded figure task mean latency value between Mexican and United States preschoolers. Standard errors are represented in the figure by the error bars attached to each line.