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A COMPARISON OF THE PERFORMANCE OF MEXICAN BOYS AND GIRLS ON WITKIN'S COGNITIVE TASKS[1]

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ABSTRACT. According to Witkin, sex differences in cognitive style vary with the type of culture and the role women play in that culture. One goal of our research was to explore whether in a highly sex-role differentiated society like Mexican society, boys have a more field independent cognitive style than girls. The second goal of this study was to explore the relationship between child-rearing practices for Mexican boys and girls, their daily experiences, and their cognitive styles. The Children's Embedded Figure Test and the Draw-a-Person test along with a child-rearing and daily experience questionnaire were administered to 87 Mexican children. Mexican boys were found to be more field independent than Mexican girls, and American girls were also more field independent than Mexican girls. There was a relationship between the child-rearing methods used and field independence for boys but for girls, daily experience was more highly related to field independence.

RESUMEN. De acuerdo a Witkin la frecuencia de las diferencias atribuibles al sexo en materia de estilo "articulado" o "global", deberán variar de acuerdo al tipo de cultura y el lugar que la mujer ocupa en dicha cultura. El objectivo de este estudio es el explorar si en una sociedad sexualmente rígida como la mejicana, los niños son más "articulados" que las niñas. La segunda finalidad del estudio es la de explorar la relación entre las maneras particulares de crianza de los niños y las niñas mejicanas, sus experiencias de todos los días y sus aptitudes respectivas en materia "cognitiva." Hemos administrado el "Children's Embedded Figure Test" (CEFT) y el "Draw-a-Person test" (DAP) que miden el grado de "articulación," y cuestionarios relacionados con sus experiencias cotidianas y los métodos educativos empleados por sus padres a 87 niños mejicanos. Los resultados confirman que los niños mejicanos son más "articulados" que las niñas, y que las niñas americanas son más "articuladas" que las de Méjico. Hemos encontrado una relación entre los métodos educativos y el grado de "articulación" para los niños, mientras que para las niñas, el tipo de experiencia de todos los días tiene un rol más importante para el desarrollo de la dependencia o la independencia de campo.

Witkin's cognitive tasks have been given to a variety of populations in different cultural settings. From these studies two interesting findings have emerged. First, performance on tests of field dependence-independence is related to socialization practices. Parents who exercise strict, dominant control in rearing their children are more likely to have children who perform with more field dependence on Witkin's cognitive tasks (Dawson, 1963, 1967). Parents who encourage self-reliance and individualism and who avoid harsh punish-

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ment are more likely to have field independent children (Berry, 1966). Second, sex differences in cognitive style have emerged. Boys and men have been found to be more field independent than girls and women. These sex differences are evident over a large segment of life span, even though they do not always appear either in children below the age of eight (Crudden, 1941; Goodenough and Eagle, 1963) or in geriatric groups (Schwartz and Karp, 1966). Females have been found to be more field dependent in the United States and several Western countries, including England, Holland, France and Italy (Witkin, et al., 1962), Japan (Kato, 1965), and Sierra Leone, Africa (Dawson, 1963, 1967). The only exception to these findings is that, among Eskimos, women are not trained to be dependent, and Eskimo child-rearing techniques stress self-reliance and independence for both boys and girls.

These findings raise several questions about the role that socialization plays in cognitive development. Witkin (1967) has suggested that in most societies greater value is placed on characteristics associated with developed differentiation for boys than for girls. Even in preliterate societies, men have been found to engage in activities which stress self-reliance and achievement whereas women have the nurturant role of homemaking and child rearing. (Barry, Bacon and Child, 1957.) Witkin (1967) also raised the possibility that changes in child-rearing techniques for boys and girls may reduce or even eliminate sex differences in cognitive style. He further suggested that studies should be conducted in a series of cultures varying in the degree to which male and female roles are similar or different in order to compare the extent of sex differences in field dependence.

Since Mexican culture is one in which role differentiation according to sex is quite marked (Lewis, 1960; Madsen, 1964), Mexican boys and girls would be expected to perform differently on tests of field dependence with girls being especially field dependent. However, a study by Davila, Diaz-Guerrero and Tapia (1966) found no sex differences among 8 and 12 year old Mexican school children. The report of this study, though, does not describe socialization practices in the samples tested, and, therefore, it is not possible to determine whether the absence of sex differences is specifically attributable to the socialization practices followed.

The purpose of the present study was to investigate the following questions: (a) do Mexican boys and girls differ in their performances on cognitive tasks, and (b) do Mexican girls differ from American girls on these tasks?

The secondary aims of this study were to investigate the rela-

tionship between perceived child-rearing techniques, daily experience, sex role differentiation, birth order and family size and performance on cognitive tasks. These variables were selected for the following reasons. (a) Birth Order and Family Size: it was thought that the position a child occupies in his family and the size of his family may influence the degree of independence training he may receive, and the kind of experiences he is exposed to may in turn influence his performance on cognitive tasks. (b) Play-Work Experience: Witkin (1967) suggested socialization practices undoubtedly affect the degree of cognitive development of a child. The questionnaire used in this study investigated the kinds of daily activities of Mexican boys and girls and the degree of independence, creativity and frequency of these activities. It was reasoned that the more a child is exposed to experiences which require analysis and differentiation, the better he would perform tests which supposedly tap the development of these abilities. (c) Sex Role Differentiation: it was thought useful to see whether children of elementary school level share the ideas of role appropriateness present in the society at large as well as to see whether flexibility in boys and girls concerning these roles was related to their performance on cognitive tasks. Job appropriateness for women as judged by boys and girls was chosen as a representative example of role differentiation. Children were also asked to rate job appropriateness as perceived by their mothers to determine whether awareness of modernization of women's roles in recent times was differentially reflected in their own ratings and their mothers' ratings. These data were collected within the framework of a larger study investigating the relationship of sex role differentiation and a variety of other socialization variables.

The following hypotheses were made: (1) Mexican boys would tend to perform better on measures of cognitive ability than Mexican girls; (2) Mexican girls would tend to be more field dependent than American girls. No difference was expected for Mexican and American boys.

METHOD

Subjects. There were 88 *Ss*, 51 boys and 37 girls, for the group tests. Of this number 34 boys and 32 girls received the individual test. All children attended the fifth grade and ranged in age from 9 to 13, with a mean age of 10.8 years. All were enrolled in a school in a working-class neighborhood in Monterrey, Mexico. Following the common practice in Mexico, this school was strictly divided by sex. Girls with female teachers were in one building while boys with male and female teachers were in a separate building.

Instruments. As measures of cognitive abilities the Children's

Embedded Figures Test (CEFT) (Karp & Konstadt, 1963) and the Draw-a-Person test (DAP) were used. The subject's task on the CEFT is to find a particular simple figure within a larger complex figure. The standard instructions given in the CEFT manual were translated into Spanish by three independent translators, and the test was administered individually to each child by Spanish-speaking assistants. Responses were scored 1 or 0. The total score represents the sum of all items passed out of the total of 25 items. Higher scores indicate greater field independence.

The DAP was administered to all children in their classrooms with instructions read aloud in Spanish by their classroom teachers. The children's drawings were then scored by two independent raters according to the directions given by Witkin (1962) for rating characteristics of drawing reflecting sophistication of basic body concepts. Drawings were scored from 1, most sophisticated, to 5, most primitive. A correlation of .85 ($p<.01$) between ratings of the two DAP scorers indicated satisfactory interjudge reliability.

As a measure of the children's perception of their parents' child-rearing techniques, a questionnaire developed by Devereux, Bronfenbrenner and Suci (1962) was used, which tapped nine basic dimensions of parent behavior: (1) nurturance, (2) instrumental companionship, (3) principled discipline, (4) prescription of responsibility, (5) power, (6) physical punishment, (7) achievement pressure, (8) deprivation of privileges, and (9) expressive rejection. This questionnaire consists of questions with precoded response alternatives. For instance on item 1, "I can talk to her about everything," *S* could select one of the following alternatives: (1) always, (2) often, (3) sometimes, (4) rarely, (5) never. The questionnaire was translated into Spanish by two independent translators and rechecked by a third, one familiar with the particular idiom used in Northern Mexico.

A group administration procedure was employed in which the children filled out the entire questionnaire twice; first, to describe their mother, and second, to describe their father. Factor scores were obtained for each *S* on each factor or dimension by summing the raw scores for the two or three items receiving the highest loading on each factor. Thus, each *S* received 18 scores describing his mother's and father's child-rearing practices. Moreover, following Dawson (1963, 1967) and Berry (1966) *S*s were asked to rate their mothers and fathers as either: very strict, strict, or not so strict. Dawson and Berry had found such ratings by children of their parents' disciplinary strictness to be correlated with their performances on cognitive tests.

To establish whether there is a relationship between performance on cognitive tasks and various degrees of play and work experience of Mexican children, a special questionnaire was constructed. This questionnaire inquired into the child's involvement in such activities as shopping, games, cooking, housework, toy-constructing and part-time jobs. The child was asked several questions about each of these activities, and then required to check on a three-point scale whether he did them often, sometimes, or never. The lower the score received on each activity, the higher the degree of self-reliance. For example, "to construct toys alone" received a lower and, therefore, more independent rating than "repairing something with one's father." Six experience factor scores were then obtained by summing the raw scores for the items in each factor. Each *S* also received a total score which represented his total-experience independence score.

To measure awareness of role differentiation and job appropriateness according to sex, two checklists were devised. In the first checklist, boys and girls were asked to check all the jobs they deemed appropriate for a woman from a total of 33 jobs, some of which were traditional and some modern. Then, on a separate form they were asked to check the jobs their mothers would consider more appropriate for a woman. Moreover, boys and girls were asked the following two questions to determine whether their choice of a career was sex-determined: (1) what job would you like when you grow up? (2) what job would you like if you were a girl (boy) with the same interests and abilities you have now? For each *S* a Total Role Width score was obtained which consisted of all the jobs checked as appropriate by the subject for a woman. A second Total Role Width score was obtained for the jobs considered appropriate by the mothers. A third and fourth score for each *S* consisted of the ratio of traditional vs. modern jobs he had checked as appropriate for himself/herself and his/her mother. Finally, a score was computed for the differences between the number of jobs considered appropriate by *S* and by his mother.

Regarding job aspirations as related to sex, if boys or girls indicated they would choose another job if they were members of the opposite sex, they received a score of 1; if not, a score of 0.

Information about birth order and family size was also gathered. The family size score consisted of the number of people residing in the child's home. If a child was firstborn, he received a score of 1; if he was the youngest sibling, a score of 3; and if he was a middle child, a score of 2.

TABLE 1

Mean Test Scores and t-Tests for Mexican Boys and Girls

#	Variables	Mean Boys	Mean Girls	t
1	CEFT	17.91	13.72	4.90***
2	DAP	2.69	2.65	.18
	EXPERIENCE			
3	Shopping	10.80	10.57	.55
4	Games	21.88	22.89	1.65
5	Cooking	12.26	11.22	2.77***
6	Housework	19.16	14.22	7.77***
7	Play Creativity	9.63	9.51	.28
8	Part time job	1.59	2.00	2.28*
9	Total	74.90	69.70	3.56***
	Child Rearing: Father			
10	Nurturance	5.26	6.66	2.09*
11	Instrumental Compan.	3.65	4.87	2.75***
12	Principled Discipline	3.72	4.73	2.40**
13	Prescriptive Respons.	3.77	4.14	.96
14	Power	5.04	5.41	.74
15	Physical Punish.	12.67	13.16	.93
16	Achiev. Pressure	3.02	3.08	.10
17	Depriv. Privilege	7.26	8.05	1.77
18	Expressive Rejection	8.26	8.57	.90
	Child Rearing: Mother			
19	Nurturance	5.43	5.89	.84
20	Instrumental Compan.	4.08	4.70	1.41
21	Principled Discipline	4.14	5.08	1.86
22	Prescriptive Respons.	3.65	3.87	.53
23	Power	4.61	5.27	1.62
24	Physical Punish.	13.31	13.30	.04
25	Achiev. Pressure	2.84	2.91	.23
26	Depriv. Privilege	7.39	8.38	2.39**
27	Expressive Rejection	8.04	7.76	.85
28	Role Width Total	11.67	20.68	6.07***
29	Role Trad/Modern	2.46	2.48	.13
30	Mother Role	8.71	7.19	1.61
31	Mother Trad/Modern	2.15	1.84	1.81
32	Mother/child dif.	2.96	13.47	7.26***
33	Birth order	1.90	2.19	2.05*
34	Role change	.92	.73	2.49**
35	Family size	8.80	8.57	.33

*p .05
**p .02
***p .01

RESULTS

The mean scores for each variable for boys and girls are presented with the tests in Table 1.

Boys performed significantly higher than girls ($p<.01$) on the CEFT, a result supporting our first hypothesis derivative from Witkin's theory that boys are more field independent than girls. The mean for boys was 17.91 and for girls 13.72. Confirmation of Witkin's hypotheses was also found in a comparison of performance of American girls from published data (Karp and Konstadt, 1963) with performance data of Mexican girls. The CEFT standardization sample included a group of 40 *Ss*, ranging in age from 10 to 12. Scores of these American girls had a mean of 16.72 with an SD of 5.26 whereas scores of Mexican girls in our study had a mean of 13.71 with SD of 3.96. Thus, our second hypothesis that American girls would be found to be more field independent than their Mexican counterparts was confirmed ($p<.01$). No significant difference emerged between the performances of American and Mexican boys on this task.

However, while the CEFT test supported the initial hypothesis, results of the DAP test did not. No significant difference emerged between the performances of boys and girls.

With respect to the life experience dimension, it was found that boys and girls differed significantly in their total experience independence dimension. Also, as expected, girls tended to do more cooking alone and with others and to do more housework. Boys tended to have more part-time jobs.

It was found for the child's rating of his parent's child-rearing strictness that almost all Mexican children tended to describe their parents as "not so strict." Only two boys and three girls used the other two categories of "strict" and "very strict." Therefore, this category could not be used for purposes of comparison.

Boys described their fathers as higher in nurturance ($p<.05$), companionship ($p<.01$), and principled discipline ($p<.02$) than girls. Boys also described their mothers as depriving them of privileges more than girls ($p<.02$).

Boys and girls differ significantly ($p<.01$) in how many jobs they consider appropriate for boys and girls, a result again confirming our original supposition that Mexican culture tends to have a more rigid stereotyping of roles, at least where males are concerned. By the fifth grade Mexican boys consider only a few jobs appropriate for women (mean of 11 out of 33 jobs), whereas girls are more liberal in their interpretation of what is appropriate for them (mean of 20). Girls also differ significantly from boys in their self-ratings of role

appropriateness compared with their ratings of what they thought their mothers would consider appropriate for women ($p<.01$). Sig-

TABLE 2

Product-moment Correlations Between CEFT, DAP and Other Variables for Mexican Boys and Girls

#	Variables	CEFT Boys	CEFT Girls	DAP Boys	DAP Girls
2	DAP	.42*	.43*		
3	Shopping	.20	-.16	-.01	-.23
4	Games	.18	.25	-.03	.10
5	Cooking	-.31	.00	-.19	-.06
6	Housework	.17	.38*	-.07	.28
7	Play Creativity	.13	.36*	.26	.32*
8	Part time job	.09	.05	.19	.21
9	Total	.30	.38*	.03	.17
	Child Rearing: Father				
10	Nurturance	.12	.11	.01	.00
11	Instrumental Compan.	.29	.05	.20	-.03
12	Principled Discipline	.19	-.12	-.14	-.08
13	Prescriptive Respons.	.28	-.16	-.04	.17
14	Power	-.09	-.17	-.13	.20
15	Physical Punishment	-.27	-.05	-.29*	.08
16	Achiev. Pressure	.21	-.17	.02	-.03
17	Depriv. Privilege	-.15	-.24	-.16	-.19
18	Expressive Rejection	-.05	-.09	-.19	-.08
	Child Rearing: Mother				
19	Nurturance	.17	.02	.21	-.10
20	Instrumental Comp.	.36*	-.01	.11	-.24
21	Principled Discipline	.38*	.09	.14	.15
22	Prescriptive Respons.	.05	.10	-.27*	-.03
23	Power	.27	-.15	.09	-.02
24	Physical Punishment	-.09	-.13	-.12	.01
25	Achiev. Pressure	.09	-.20	-.15	-.23
26	Depriv. Privilege	.03	-.10	.19	-.01
27	Expressive Rejection	.13	-.24	.21	-.29
28	Role Width Total	.29	.01	-.07	-.01
29	Role Trad/Modern	.12	.00	.27	-.06
30	Mother Role	.09	.00	-.02	-.17
31	Mother/Trad/Modern	-.14	.10	.11	.01
32	Mother/Child dif.	.23	.01	-.06	-.10
33	Birth order	-.05	-.01	.14	.02
34	Role Change	-.16	-.27	-.35**	-.03
35	Family size	-.25	.11	-.14	-.14

CEFT Boys N=34 Girls N=32 DAP Boys N=51 Girls N=37

*p .05

**p .01

nificantly more boys than girls would change job choice if they were of the opposite sex; again this finding may be an indication of how rigidly Mexican boys interpret job appropriateness ($p<.02$).

Correlation coefficients between the CEFT, DAP and other variables appear in Table 2.

There were no high correlations; the highest correlations found between cognitive performance and other variables was .38 ($p<.05$). The boys' performance on the CEFT correlated significantly with their performance on the DAP (.42, $p<05$); with instrumental companionship with mother and principled discipline from the mother (.36 and .38 respectively, $p<.05$). As can be seen from Table 2, the correlations between cognitive performance on CEFT and child-rearing variables are in the general direction suggested by Witkin (i.e., negative correlation with physical punishment, positive correlation with instrumental companionship, etc.); however, they do not reach statistical significance.

The girls' performance on the CEFT correlated positively with DAP (.43, $p<.05$) and positively with amount of independence in housework, play creativity as well as the total experience dimension (.38, .36, .38, $p<.05$). However, while the experience dimension seems to be significantly correlated with performance on the cognitive tasks, there were no significant correlations between child-rearing variables and cognitive measures for girls.

For boys, performance on the DAP correlated negatively with amount of role change; i.e., the more a boy was willing to change job according to sex, the less sophisticated were his human drawings ($-.05$, $p<.01$). Degree of body differentiation was also negatively correlated with physical punishment from father ($-.29$, $p<.05$) and with prescription of responsibilities from mother ($-.27$, $p<.05$). For girls, once again parental training techniques did not correlate significantly with performance on the body differentiation task. The amount of creativity a girl exercises in playing with toys correlated significantly (.32, $p<.05$) with her ability to draw sophisticated human figures. Play creativity was the only variable that was positively and significantly correlated with performance on both cognitive tasks for girls.

Birth order and family size did not correlate significantly in any direction for either boys or girls on either the CEFT or the DAP.

For both boys and girls variables tapping various broad dimensions such as daily experience, parent child-rearing techniques and role width are correlated within each subgroup (.32 to .84). Moreover, nurturance, instrumental companionship, prescription of responsibilities and achievement pressures from father were signifi-

cantly correlated with the same variables for mother. Nurturance from mother correlated positively (.40, $p<.01$) with mother-daughter differences in job appropriateness: the more nurturant the mother is described as being, the smaller the difference between daughter and mother. Birth order correlated positively with instrumental companionship from father; for girls, the eldest daughter appeared to enjoy the company of her father more often than younger ones.

Regardless of sex, performance on cognitive tasks tended to correlate with number of games played (.21, $p<.05$), with amount of housework (.28, $p<.05$), with play creativity (.24, $p<.05$), the total experience independence dimension (.34, $p<.01$), principled discipline from mother (.24, $p<.05$), and was negatively correlated with amount of role change (.24, $p<.05$). Play creativity which is significantly related to both DAP and CEFT (.29, $p<.01$; .24, $p<.05$, respectively) is also positively related to father instrumental companionship (.25, $p<.05$) which in turn is positively correlated with total independence experience variable (.26, $p<.05$).

DISCUSSION

The results of this study tend to confirm Witkin's hypotheses that in societies where role distinction is quite marked, girls are more field dependent than boys and more field dependent than girls of other countries where sex role stress is less pronounced. Mexican girls as predicted by Witkin performed with significantly more field dependence than Mexican boys and American girls.

DAP performance did correlate positively with the CEFT for both boys and girls, but there were no significant differences between the means for Mexican boys and girls. This lack of significant difference could be due to a number of the following factors. One could be the difficulty in scoring the DAP since the criteria offered by Witkin are liable to subjective interpretation. Another could be the fact that possibly the CEFT and the DAP measure different types of abilities; i.e., whereas performance on the CEFT requires simple perceptual and analytical ability, a good performance on the DAP requires a good perceptual awareness of sex differences and of body concept besides motor coordination and a minimum of practice and facility in representation. While boys and girls could perform differently on a task requiring them to discriminate verbally between male and female body features, it would not necessarily follow that boys and girls would differ in their ability to portray these differences. A third might be that girls were favored on the DAP tasks by their experiences and interest in clothing. (One of the factors that

contributed to girls' high scores was their attention to details in clothing.) Even if girls have a less differentiated body concept, they would compensate this difference with more precision in clothing and hairstyle details.

If the evidence for the existence of the phenomenon of sex differences in cognitive performance is contradictory, depending as it does in this study on what measure of cognitive abilities one uses as a reference, the relationship between performance on these cognitive tasks and other variables such as child-rearing techniques is even more perplexing. It should be remembered that Witkin and Berry (1967, 1966) hypothesized that stricter parents and especially stricter mothers would tend to rear more field dependent children. First of all, the results of this study indicate that for our sample of Mexican children simple categories like strict, very strict and not so strict were not discriminatory, since almost all children tended to rate both their parents as "not so strict." Moreover, the word *strict,* even if defined, has a different connotation in every culture and does not indicate much about what actual behaviors are associated with it.

The questionnaire used in the present investigation attempted to explore parents' behavior in more depth. The results show that Mexican boys tend to describe their father as more nurturant, more ready to be a companion, and using more principled discipline than girls. Mexican boys also tend to see their mothers as more depriving of privileges than girls do. However, none of these child-rearing factors correlated significantly with the boys' performance on either cognitive task. Instrumental compionship and principled discipline from mother were positively correlated with performance on the CEFT and physical punishment from father and prescription of responsibility from mother correlated negatively for the DAP. These findings tend to lend some support to Witkin's hypothesis about the influence of child-rearing style on cognitive task performance. Instrumental companionship and principled discipline are child-rearing techniques which could favor the growth of analytical thinking. They have in common the setting of limits and the offering of explanations for what is requested or done. The finding that physical punishment from father and prescription of responsibilities from mother are negatively correlated with performance on the DAP also tends to support the theory that stricter parents will have lower-scoring sons on tests of field independence. For the boys, parent child-rearing techniques seem to be correlated with performance, but Mexican girls present quite a different picture: none of the child-rearing var-

iables was significantly correlated with their performance on either of the cognitive tasks.

The picture is completely reversed if one considers the experience variables. While none of these variables correlated significantly with boys' performance, girls' performance correlated with independence in housework, play creativity and the total independence experience dimension. Play creativity correlated significantly in a positive direction for girls on both tests. Why child-rearing variables should correlate with performance for boys and not for girls while experience variables should be important for girls and not for boys is unclear. It was first thought that some of these variables may be discriminatory for boys and not for girls and vice versa; however, an analysis of variance and standard deviations for boys and girls revealed that all the variables that correlated significantly with performance on cognitive tasks were equally discriminatory.

Perhaps in attempting to investigate a phenomenon of sex differences in performance on cognitive tasks, we have encountered a second phenomenon of sex differences in correlational patterns for these cognitive tasks. Further studies should investigate the relationship between performances on cognitive tasks and child-rearing and experience variables for both boys and girls of different cultures. If in several cultures both boys' and girls' performances are found to correlate with two distinct sets of variables, namely parent child-training variables for boys and experience variables for girls, then we could draw some conclusion about the existence of the phenomenon.

On the basis of the present study we can conclude that sex differences in performance on cognitive tasks do exist in the expected direction, but that the relationship between performance on cognitive tasks and such other variables as child-rearing and task experience may be different for boys and girls.

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