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ABSTRACT

This study used the Learning Potential Test to demonstrate the independence of learning potential from the characteristics of the family environment. The subjects were 36 white children age 46 to 75 months from low and middle socioeconomic level families. Demographic information was obtained by a questionnaire and the home environment quality was evaluated with a revised version of the HOME Inventory (HOME-R). The Learning Potential Test was given individually to children and yielded six scores: spontaneous performance (success without assistance), assisted performance (success with help), transfer performance (performance after assistance, the learning potential score), inefficiency score (part of the assisted performance which did not bring the child to succeed in the transfer task), global performance (score with and without assistance), and gain quotient (proportion of global performance obtained by transfer performance). The Raven's Progressive Colored Matrices were given individually to 21 of the children. Results indicated that the spontaneous performance score correlated with the total HOME-R score and the Raven's scores, suggesting that spontaneous performance is comparable to conventional IQ scores. The transfer performance correlated with only one HOME-R subscale, suggesting that learning potential is independent of the family environment. For families receiving lower HOME-R total scores, the transfer performance was higher than the spontaneous performance, while in the families with higher HOME-R total scores, the transfer performance was lower than the spontaneous performance, suggesting that families with lower home environment quality are more likely to benefit from assistance than families with higher home environment quality. (Contains 49 references.) (KDFB)

Learning potential: Independent from the quality of the family environment

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The goal of the learning potential (LP) test (Ionescu & Jourdan-Ionescu, 1992) is to measure the capacity to learn in a context where assistance is provided. This measure is expected to be culture-free, not affected by socio-economic status (SES), nor by previously acquired information, biases that are still confounding the majority of conventional IQ tests. This study aims to demonstrate the independence of LP from characteristics of the family environment. The LP test was administered to 36 five-year-old children. Quality of family environment was evaluated using an adaptation of the HOME inventory (Caldwell and Bradley, 1978), the HOME-R (Palacio-Quintin, Jourdan-Ionescu & Lavoie, 1989) and socio-demographic information (e.g. family income, parent's years of schooling). Results show the independence of the LP measure from the quality of the family environment.

Introduction

Children of lower socioeconomic status (SES) families do less well than their peers of middle and higher SES families on intelligence or cognitive ability tests. Low SES and its correlates, unemployment, low income, single parenthood, parental low educational level, have been shown to be associated with low IQ scores in young children (Duncan *et al.*, 1994; McLoyd, 1990; Sameroff *et al.*, 1987). But SES by itself cannot be held as a unique source of influence on child development (Ramey & McPhee, 1986; Wilson, 1985). Several studies have shown the importance of more proximal variables on child intellectual development, especially the quality of the home environment: provision of adequate and various stimulation, maternal warmth and implication with the child (Bradley *et al.*, 1987; Yeates *et al.*, 1983; Bee *et al.* 1982). Luster & Dubow (1992) and Bradley *et al.* (1993) report significant correlation between preschoolers' IQ scores and the quality of the home environment after controlling for maternal intelligence scores. Using the HOME inventory (Caldwell & Bradley, 1978), Johnson *et al.* (1993) came to the same

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conclusion after controlling for SES, but their results also suggest that the relationship between the quality of the home environment and the intellectual development of the child may depend on the type of intelligence test used.

Measurement of intelligence in low SES populations is subject to controversy. Cultural bias (Hamers & Resing, 1993; Helms, 1992; Herbert & Wilson, 1977), the effects of labeling the child from IQ scores (Paour *et al.* 1995; Ionescu & Jourdan-Ionescu, 1983; 1994) and the static character of IQ measurement in the context of an ongoing development in childhood (Schweinhart & Weikart, 1991) have been pointed out in debates. Ensuing these critics, new instruments, aiming to a more dynamic evaluation of learning capacities, have been devised (Paour *et al.*, 1995). Among these instruments, learning potential (LP) tests revealed to be of great interest and several types have been developed (Lidz, 1990; Fernandez-Ballesteros, 1989; Mercer, 1979; Ionescu & Jourdan-Ionescu, 1994; Ionescu *et al.* , 1974, 1990; Feuerstein, 1967; Budoff, 1967; Budoff & Friedman, 1964; Budoff & Corman, 1974; Budoff & Hamilton, 1976). The LP concept refers to one's ability to learn from experience, after receiving assistance in a task, and to transfer this learning to performance (Büchel & Paour, 1990; Budoff & Corman, 1974). Adopting the vygotskian perspective on the proximal zone of development (Vygotsky, 1978), LP tests address the comparison of "current" and "potential" performances. As shown in Figure I, the potential performance may be obtained in bringing adequate assistance to the child when he is unable to achieve success in performing a given task (Egorova, 1971; Ivanova, 1967).

The information drawn from such tests might be helpful in determining the kind of assistance a child needs to achieve a better performance, as shown in studies of LP with blind (Newland, 1990) or deaf children (Haywood & Wingenfeld, 1992), mentally deficients (Friedle, 1986; Budoff, 1967; Budoff & Friedman, 1964; Budoff & Hamilton, 1976; Ionescu *et al.* , 1974,1990; Jourdan-Ionescu & Ionescu, 1992), children with learning problems (Ruijssenaars & Hamers, 1989) or brain injured subjects (Neistadt, 1994).

Using a version of a LP test, derived from Kohs-Goldstein cube task (Galifret-Granjon & Santucci, 1958), Ionescu *et al.* (1986-87, 1986) report that LP is not influenced by gender or age, nor by cultural or socio-economic characteristics. Given the fact that LP is theoretically independent of acquired knowledge and previous

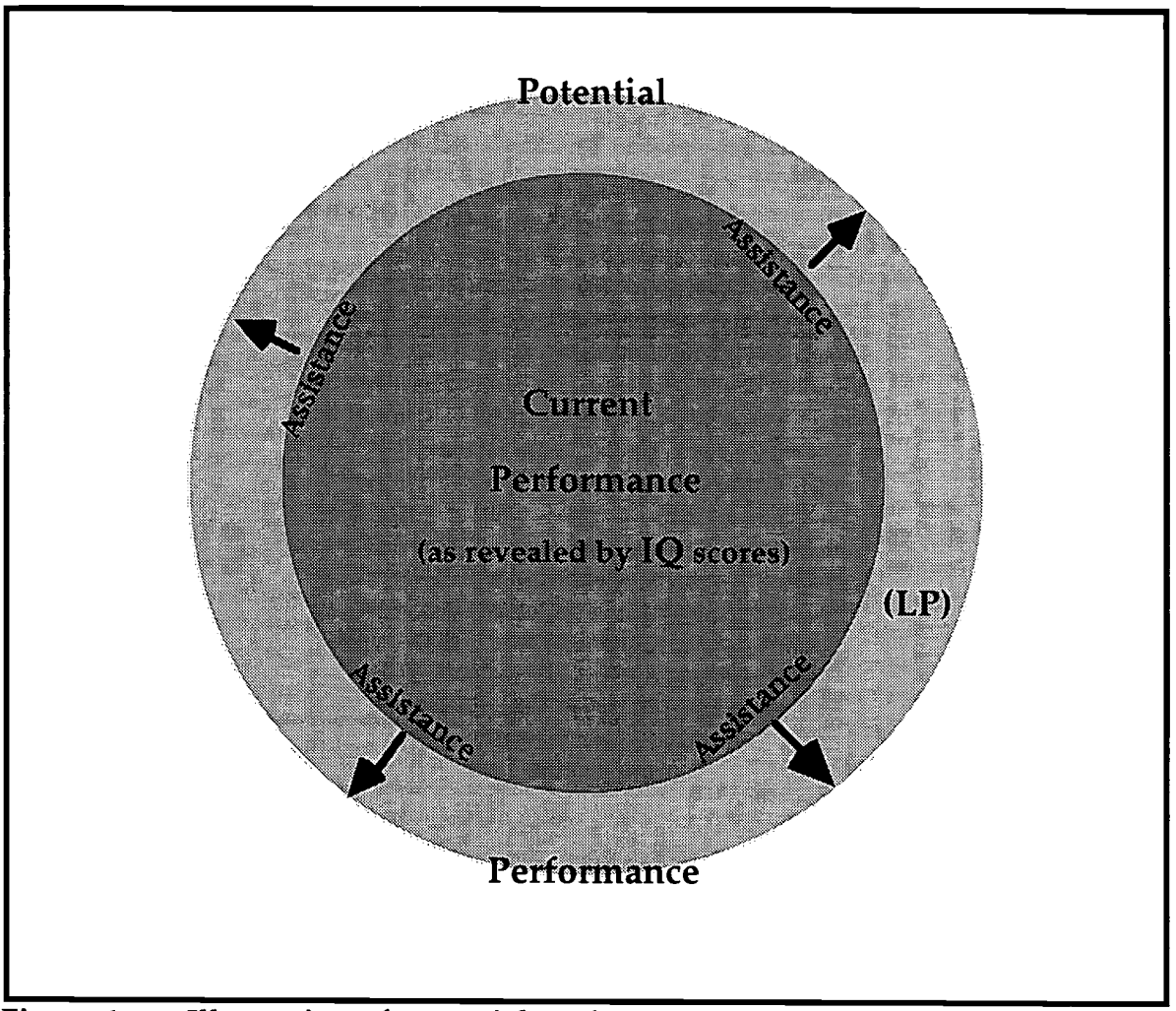

Figure 1- Illustration of potential performance as measured by a learning potential test

learning, we hypothesize in the present study, that LP is not significantly influenced by the quality of the home environment. If so, the use of such a test could bring valuable information to school practitioners about the actual learning capacities of children from disadvantaged families.

Method

Subjects were 36 preschoolers (25 boys and 11 girls), 46 to 75 months old (m=61.7) from low and middle SES families. All subjects were White and came from families who volunteered after recruitment in a kindergarten of a small urban area. Demographic information is shown in Table 1.

Table 1- Sample Demographic Information

		m	σ	Range
Child's age (months)		61.7	(7.4)	46 - 75
Mother's age (years)		32.7	(5.2)	24 - 47
Father's age (years)		35.2	(5.2)	24 - 48
Maternal education (years)		13.4	(2.5)	8 - 18
		N		
Gender	boys	25		
	girls	11		
Parenthood	single	16		
	biparental	20		
Annual Family Income		($CAN)		
less than 15 000$		13		
15 through 30 000$		10		
30 through 45 000$		9		
45 through 55 000$		4		

Instruments

Demographic information was gathered using a questionnaire on the history of the child, *Questionnaire sur l'histoire de l'enfant* (Jourdan-Ionescu, 1995). A revised version of the HOME Inventory (Caldwell & Bradley, 1978), the HOME-R (Palacio-Quintin, Jourdan-Ionescu & Lavoie, 1989) was used to evaluate the quality of the home environment. This 32 items criteria-based scale yields a Total Scale score and 6 subscale scores: Provision for toys, games and reading materials; Speech stimulation; Expression of affection and warmth; Stimulation for academic activities; Encouragement to social maturity; Opportunities for variety in stimulation. These 2 instruments were completed at the families' homes by trained examiners. The Raven's Progressive Colored Matrices (Raven, 1965; 1977) were administered individually to children in the kindergarten. Raven's Matrices scores

are available only for 21 children who were over 5 years old at the time of evaluation.

Learning potential was assessed using the PAV92 form, developed by Ionescu and Jourdan-Ionescu (1992). The test is composed of 20 items where the child is asked to reproduce a colored model with blocks. Items are ranked according to their difficulty level which was determined, as proposed by Royer (1977) and Royer and Weitzel (1977), from the following variables: the perceptual cohesiveness of pattern (PC or number of adjacent same-colored edges), the total set size uncertainty (TSSU), and the subset size uncertainty (SSSU). These two last variables refer to the set to which belongs a given model. Royer's results show that these three characteristics, inherent to any given model, determine the time for its solution. Thus the PAV92 allows a better control of the model's difficulty level and provides criteria to measure the amount of assistance given. If the child is not able to reproduce a model, 4 types of assistance are provided until success is achieved: 1) enlargement of the model; 2) enlargement of the model and lines delimiting the edges of the blocks on the picture, 3) #2 assistance and verbal explanations, 4) presentation of the model reproduced with blocks out of the child's sight. If the child succeeds following one of the types of assistance, the initial model is brought back to be completed by the child.

The test yields 6 different scores. The spontaneous performance (SP) means success without any assistance. The assisted performance (AP) is success needing assistance. The transfer performance (TP) represents the performance achieved after the assistance was provided, which is assumed to be the learning potential score. The inefficiency score (IS) is the part of AP which didn't bring the child to succeed in the transfer task. The global performance (GP) is the score obtained with and without assistance. The gain quotient (GQ) expresses the proportion of GP obtained by TP. A "profile" of each child evaluated can be drawn from these results.

Results

The analysis of the relationships between the quality of the home environment and the results of the LP test are shown in Table 2. The spontaneous performance score correlates with total scale HOME-R score ($r=.313$, $p<.05$). In fact, this score may be

comparable to conventional IQ scores, as illustrated by the correlation between SP and the Raven's score (r=.747, p<.001; see Table III). The transfer performance, which again is considered to express LP is significantly related to only one of the HOME-R subscales. The negative correlation between TP and Stimulation for academic activities (r=-.288; p<.05) has to be interpreted in the context of the LP test used here: TP is calculated when the child has to correct a wrong answer on a trial, after assistance was provided. This negative relationship suggests that the less Stimulation for academic activities is provided in the child's milieu, the more he is likely to benefit from appropriate assistance. The same interpretation may be given for the negative correlations observed between the gain quotient and all of the HOME-R subscales.

Table 2- Pearson's correlations between LP test and HOME-R scores

		Spontaneous Perf.	Assisted Perf.	**Transfer Perf.**	Inefficiency Score	Global Perf.	Gain Quotient
	m	34.72	19.86	**7.5**	212.36	42.22	42.76
	(σ)	(28.0)	(13.0)	**(5.7)**	(115.9)	(28.2)	(25.9)
Provision for toys & reading materials	28.8 (6.2)	.297*	.179	**.137**	**-.**336*	.323*	-.201
Speech stimulation	15.55 (3.0)	.325*	-.056	**-.025**	**-.**304*	.318*	-.404**
Affection & warmth	25.72 (4.6)	.339*	.045	**-.237**	**-.**298*	.290*	-.455**
Stimulation for academic activ.	12.00 (3.4)	.131	-.026	**-.288***	**-.**101	.073	-.262
Encouragement to social maturity	11.36 (2.6)	.180	-.036	**.091**	**-.**187	.198	-.204
Opportunuties for variety	19.30 (2.5)	-.170	.149	**-.025**	.123	-.174	-.086
HOME-R total score	**112.78 (15.6)**	**.313***	**.086**	**-.071**	**-.315***	**.297***	**-.398****

* p≤.05 **p≤.01

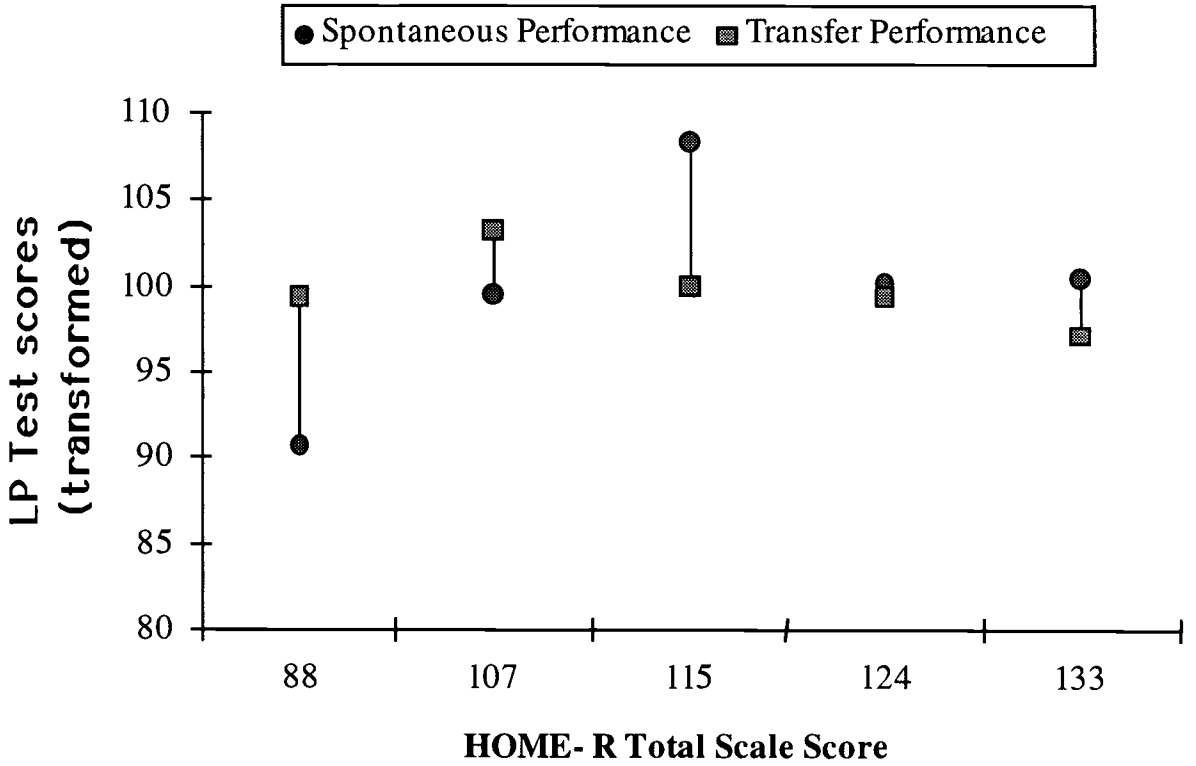

Figure 2- Relationship between Spontaneous Performance and Transfer Performance scores across different levels of the quality of the home environment.

Figure 2 illustrates the relationship between SP and TP scores across different levels of the scores obtained to the HOME-R. The sample has been equally divided in five sub-groups and the HOME-R scores reported in this figure represent the mid-point of each of these sub-groups. SP and TP scores were transformed in z scores to achieve this comparison. We observed that, in the lower levels of the HOME-R scale, TP scores are higher than SP scores and, conversely, in the middle and highest level of the HOME-R scale, TP are lower than SP scores. These results illustrate that children from families showing a lower quality of the home environment are more likely to benefit from assistance.

Table 3 shows correlation coefficients between results to LP test and other variables related to the child's environment which are reported to be in relation with IQ scores. As expected, we find a positive correlation between SP and the socio-economic index variable ($r=.330$; $p<.05$) and a non-significant correlation between TP

Table 3- Pearson's correlations between LP test scores, family environment variables and Raven's Progressive Matrices

	m (σ)	Spontaneous Perf.	Assisted Perf.	**Transfer Perf.**	Inefficiency Score	Global Perf.	Gain Quotient
Socio-economic Index	8.17 (2.5)	.330*	-.146	**-.278**	-.239	.272	-.466**
Maternal school grade	13.4 (2.5)	.223	.019	**-.288***	-.165	.163	-.352*
Child's rank in family	1.8 (1.3)	.259	-.018	**.058**	-.246	.269	-.091
Raven's matrices percentile (n=21)	66.19 (25.7)	.747***	-.256	**-.219**	-.706***	.727***	-.296

* p≤.05 **p≤.01 ***p≤.001

and the same index (r=-.278). Note that this index is a composite score taking into account the family income, the occupational status of the family and school grading of parents. The minimum score is 4 and the maximum is 12. Finally, we observe significant negative correlations between mothers' completed school grade and both TP (r=-.288; p<.05) and GQ (r=-.352; p<.05).

Conclusion

The results of this study show a positive correlation between the spontaneous performance (SP) (close to a conventional intelligence evaluation score) and the total score on the HOME-R. As expected, SP is also positively related to the socio-economic index variable, maternal education and the children's Raven scores. This confirms the results of several authors such as Luster & Dubow (1992) and Bradley *et al.* (1993).

However, the transfer performance (TP), the learning potential measure, is not significantly related to the HOME-R total score nor with the SES index. Only two significant negative correlations concerning the TP are observed and these are with Stimulation for academic activities and the mothers' educational level. This indicates that in general, the learning potential (LP) is not significantly influenced by stimulation received in the family environment. But our results also indicate that the less the child receives stimulation oriented toward academic success in his milieu, the more susceptible he is to benefit from assistance when performance is expected.

Therefore, the results show that the children who are not stimulated in the family environment can benefit from appropriate assistance to improve their initial performance. These results are optimistic for children who live in a disadvantaged environment and are at risk for school failure. Henceforth, they would be able to increase their initial performance, and notably their school performance, as long as appropriate assistance is put in place.

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XIVth Biennial Meetings of the International Society for the Study of Behavioural Development (Quebec City, Quebec, August 12-16, 1996).

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August 16, 1996

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Sincerely,

Karen E. Smith

Karen E. Smith
Acquisitions Coordinator