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Rhythmic-Movement Facilitation of Learning in Working-Class Afro-American Children

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ABSTRACT. In this study, we examined whether the cognitive performance of working-class Afro-American children could be enhanced based upon a presumed knowledge of the Black cultural experience. Children (6 and 9 years old) learned to match each of 12 pairs of pictures via a rhythmic movement-coordinated procedure accompanied by a musical beat or through a rote recitation procedure. It was expected and found that subsequent retention of the picture matches was superior in the rhythmic movement condition. Moreover, for the younger children, the effect was stronger for those who came from homes providing high stimulation and who had high levels of movement expressiveness.

CONTEXTUAL FACTORS that facilitate the cognitive performance of children typically identified as educationally at risk have been the focus of attention in recent years (Howard & Scott, 1981; Tharp et al., 1984). Much effort has concentrated on Afro-American children, and several researchers have posited that performance enhancement should be predicated upon the adaptive or cultural orientation of Afro-American people (Gordon, 1983; Holliday, 1984; Longstreet, 1978).

Boykin and his associates (Boykin, 1979; 1982; Boykin, Davis, & DeBritto, 1987; Tuck, 1985) proposed that the particularly high sensate stim-

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ulation levels consistently present in extant Afro-American homes (Wachs, Uzgiris, & Hunt, 1971; Young, 1970) predispose the children to be especially receptive to relatively high levels along the intensity and variability dimensions of stimulation. Accordingly, they argued that the performance of Afro-American children can be positively enhanced when increased sensate stimulation is afforded in a task situation. Subsequent research has supported these claims (Boykin, 1979; 1982; Boykin, Davis, & DeBritto, 1987; Tuck, 1985). In these studies, four types of problem-solving tasks were presented to children in two distinct presentation formats. In one format, the tasks were presented in a blocked sequential pattern in which all tasks of one type were presented before those of another. In the second format, the tasks were presented in a random order without regard to task type. The blocked sequential pattern presented the children with less format variability, whereas the random-order presentation provided greater format variability and thus, greater sensate stimulation.

It was consistently found that Black working-class children's performance was markedly higher with the greater format variability. This has generally not held for White middle-class children nor for Black middle-class children. White working-class children also performed better in the more varied condition, but the performance difference was not as pronounced as for Black working-class children.

In addition, Black working-class children reported living in homes affording higher stimulation levels than do White children or Black middle-class children. Moreover, although a connection between high home stimulation and performance enhancement was demonstrated for Black working-class children in two of the three studies, such a connection has yet to be demonstrated for any other ethnic group-class combination.

Although the results of this set of investigations are noteworthy, it seemed crucial to broaden the range of contextual conditions for which facilitating effects can be demonstrated, for instance, constructing a task-context manipulation that provided qualitatively distinct patterning and in which the putatively facilitating condition still preserved the high sensate stimulation connotation of the previous research.

Boykin (1983) posited that the relatively high level of sensate stimulation afforded in Afro-American homes emanates from the residue of a rhythmic-music-movement expressive orientation cultivated in such homes. Such a movement orientation has been identified with Afro-Americans by several other researchers as well (Gordon, 1983; Hale, 1982; Morgan, 1980). Guttentag (1972) found that Black working-class preschoolers displayed larger, more varied, and more rhythmic movement repertoires than did their working- and middle-class White counterparts. It seems quite reasonable that embodied in the qualitative patterning of a rhythmic-music-movement expressive mosaic is the affordance of high sensate stimulation. As such, the

cultivation of such a movement orientation could conceivably also lead to an affinity for high sensate stimulation per se.

Boykin (1983) referred to the propensity to be especially receptive to a given level of sensate stimulation as indicative of a person's level of psychological verve. A relatively high level of psychological verve was posited by Boykin to be one manifestation of Black cultural ethos, along with a rhythmic-music-movement expressive orientation. Therefore, the context used in the present study was constructed to capitalize on two ingredients of Black culture: verve and movement.

The present study was an attempt to extend the previous work in other ways as well. We employed an extended and modified home stimulation affordance measure; we obtained this information not only from children but also from their parents. Moreover, we sought to determine the movement expressiveness among the children and then related that level of expressiveness to performance in low and high movement-verve contexts, as well as to the level of home stimulation affordance.

In previous work, children's performance changed little across a set of tasks. We attempted to discern if facilitating effects could be demonstrated within a learning paradigm, in which children's performance could be expected to improve. Finally, because research to date has focused on schoolchildren from the third to the sixth grade (8 to 12 years old), we decided to investigate 6-year-olds as well as 9-year-olds to extend the age range investigated as well as to chart whatever developmental trends may obtain with the new task and context operationalizations.

Method

Subjects

The sample consisted of 80 working-class Afro-American children from a large northeastern urban community. Forty of the children were between 5 and 6 years old, and the other 40 were between 8 and 9 years old. The younger age group contained 22 females and 18 males, whereas the older group comprised 20 males and 20 females. All the children were recruited from a local community center and participated in the study on a voluntary basis.

Instruments

Two questionnaires were used: the Home Stimulation Affordance questionnaire (HSA) and the Child Activity questionnaire (CA). The HSA is a seven-item inventory designed to assess the occurrence of high stimulation afford-

ance factors in the home and is a revised version of the inventory used by Boykin (1982). In this study, additional questions were added to account for other sources of household stimulation. More specifically, the original questionnaire had three questions that sought to assess the amount of time the television, radio, and other music was playing in the home. The present questionnaire retained the television question, combined the radio and music questions, and added three additional sources of stimulation, such as the frequency of dancing and clapping in the home. These five questions were responded to on a 5-point Likert-type scale ranging from *almost never* to *almost always*. In addition, the present questionnaire includes two questions that when taken together measure the household population density (i.e., the ratio of the number of rooms to the number of occupants). The obtained ratio is then multiplied by 5, yielding a score equal in weight to the other items on the inventory. An individual's composite HSA score was the result of the density score plus the sum of the rated values on the five remaining items.

The CA is a seven-item inventory designed to measure the perceived motoric activity level of the child. Four of the items measure the frequency with which the child is involved in motorically active behaviors. An example is: "Do you like to play active games (running and jumping)?". The items were derived by reviewing the literature on behaviors said to be culturally salient to Afro-American children (Hale, 1982; Morgan, 1980). The other three items measure the degree to which the child displays behaviors that have come to be associated with hyperkinesis (e.g., tapping, banging, and fidgeting; see Schleifer et al., 1975). We included these items because it could be argued that such behaviors are not negative signs of hyperkinesis but an affirmation of a culturally significant movement expressive orientation (Boykin, 1983; Gordon, 1982). Responses to this inventory were also recorded on a 5-point Likert-type scale ranging from *almost never* to *almost always*. An individual's overall CA score was the result of the summation of the values for each of the seven items.

The HSA and CA questionnaires were completed by parents and children. Although the HSA questionnaire was the same for parents (PHSA) and children (CHSA), the parent's version of the CA (PCA) had to be modified to reflect the parent's perception of the child's activity level.

Test-retest coefficients were previously computed for the HSA and CA questionnaires based on data obtained from 25 children and 25 parents comparable to those who participated in this study. The analyses yielded significant coefficients for both parents' (r = .76) and children's (r = .79) responses on the HSA, as well as for parents' (r = .69) and children's (r = .64) responses on the CA.

The questionnaires were administered individually to each child after he or she had completed the learning tasks. The parents' questionnaires were sent home with the children, who returned the completed questionnaires to

the experimenter. There was a 97.5% return rate for the parents' questionnaires.

Procedure

The children were asked to learn a set of 12 picture pairs. The stimulus items were pictures of 12 different commonly known animals and 12 different commonly known food items. On an a priori basis, a particular animal was paired with a particular food, for example, a lamb and an apple, and a giraffe and a pear. The animal–food pairs remained invariant throughout the study. The dependent measure was the number of these pairs subsequently recalled. Each pair was presented together on a poster during the study's learning phase.

The children participated in groups of two or three. All of the children were tested in a room at a large community center by a Black female experimenter. They learned the 12 picture pairs under one of two experimental conditions. In one condition, the children, sitting in chairs, were instructed to repeat each pair after it was orally presented by the experimenter. For example, the experimenter would say "bear–cake,' and the children would repeat "bear–cake." This sequence was repeated three times for each of the 12 pairs while the experimenter held up the corresponding poster. After all 12 picture pairs had been rehearsed, the children were then instructed to recite each pair while the experimenter held up the appropriate poster.

In the second condition, the children were told to stand around the experimenter while they listened to a rhythmic percussive tune. Then they were told that the experimenter would call out either a pair of words or only one word, while displaying the corresponding poster. If the experimenter called out a pair of words, the children were to respond by calling back the pair; if the experimenter called out only one word in the pair, then they were to respond by calling back the appropriate word to complete the pair. The following sequence was then enacted. The experimenter would call, for example, "bear–cake," and the children would respond, "bear–cake." The experimenter would then call out, "bear," and the children would respond, "cake," followed by the experimenter calling "cake" and the children responding "bear." The call and response sequence was ended by the experimenter calling "bear–cake" and the children responding "bear–cake." This procedure was completed for all 12 pairs. After that, the experimenter held up each poster while the children recited each pair once. Thus, the number of rehearsals in each condition was held constant: The children named each animal and food item four times and the experimenter orally presented each pair three times.

In the second condition, movement and hand clapping were encouraged but not forced. The experimenter noted, however, that in most instances the children fell right into the pattern of the presentation very easily and that not much encouragement was needed to initiate movement and hand clapping.

Moreover, the movement and hand clapping were inevitably rhythmically coordinated with the beat of the musical accompaniment.

The recitation and rhythmic-movement conditions were designed to differ in the amount of movement and sensate stimulation afforded. As such, we will refer to them as the low-movement/verve (LMV) and high-movement/verve (HMV) conditions, respectively.

Once the learning phase was completed, the children performed a matching card task to test retention of the animal–food pairs. The task consisted of matching the picture pairs using cards containing the same pictures that had appeared on the posters. The cards with the animals were laid out on the floor in a predetermined sequence, and the children were given a stack of randomly arranged cards with the pictures of the foods. The children were given 7 min to match each food picture with the corresponding animal picture. A second experimenter, unfamiliar with the hypotheses under test and blind to the condition a given set of children was in, recorded all the matched pairs. Retention was measured by the number of correctly matched pairs, although all matched pairs were recorded. Retention scores could range from 0 to 12.

The testing procedure was identical for both learning conditions. Once the matching card task was completed and after a 5-min interval, the entire procedure was repeated. Children were alerted in the beginning, prior to the first learning session, that there would be two trials and that the matching card task would follow each rehearsal session. Each rehearsal session lasted approximately 7 min.

Results

A four-way analysis of variance ANOVA was computed to assess the effects of age, gender, condition, and trials on task performance. The main effect for age was significant, $F(1, 72) = 65.57$, $p < .001$, with the mean performance score for 9-year-olds ($M = 6.01$) higher than that of 6-year-olds ($M = 3.01$). Condition yielded a significant effect, $F(1, 72) = 32.65$, $p < .001$, showing that children in the HMV condition had a higher mean performance score ($M = 5.65$) than children in the LMV condition ($M = 3.95$). There was also a significant effect for trials, $F(1, 72) = 628.39$, $p < .001$, with the mean performance score on Trial 2 ($M = 6.73$) higher than the mean score for Trial 1 ($M = 2.88$).

Significant two-way interactions were obtained for all the variables, excluding interactions with gender. The interaction between age and condition, $F(1, 72) = 3.87$, $p < .05$, showed that condition had a greater effect on 9-year-olds than it did on 6-year-olds. The mean scores by condition for 6-year-olds were 3.05 for the LMV group and 4.09 for the HMV group. The 9-year-olds' mean scores were 4.87 and 7.15 for the LMV and HMV groups, respectively. The interaction between age and trials was also significant, $F(1,$

72) = 15.70, $p < .001$, with 9-year-olds scoring higher than 6-year-olds on both trials, but markedly more on Trial 2. The mean scores for Trials 1 and 2, respectively, were 1.95 and 5.18 for 6-year-olds and 3.78 and 8.24 for 9-year-olds. The interaction between condition and trials was marginally significant, $F(1, 72) = 3.76$, $p < .06$. Children in the HMV condition scored higher than did children in the LMV condition on both trials, with the difference being greater on Trial 2. The mean scores for the LMV condition were 2.18 and 5.74 for Trial 1 and Trial 2, respectively. The scores for the HVM condition were 3.55 and 7.68 for Trials 1 and 2, respectively.

A significant three-way interaction was obtained between age, condition, and trials, $F(1, 72) = 5.44$; $p < .023$. The interaction showed that the difference in performance in the HMV and LMV conditions for 9-year-olds remained essentially constant from Trial 1 to Trial 2, but for 6-year-olds the HMV/LMV performance difference was markedly greater on Trial 2 than on Trial 1. This finding is bolstered by the fact that the difference between performance scores for 6-year-olds on Trial 1 was not significant, based upon a post hoc test. A post hoc test did reveal, however, that on Trial 2 the performance scores of 6-year-olds in the HMV condition were significantly higher than those of 6-year-olds in the LMV condition. The performance difference between 9-year-olds in the HMV and LMV conditions was significant on both Trials 1 and 2, according to post hoc analyses. Figure 1 depicts the significant three-way interaction.

To discern whether home stimulation affordance related to performance scores, we divided the children into high and low HSA groups by performing a median split on the array of CHSA scores and the array of PHSA scores for each age group. Subsequently, four separate 2 × 2 × 2 ANOVAs were conducted. In each instance, condition and trials were analysed by either CHSA level (high/low) or PHSA level (high/low) for each age group separately. These results will only be discussed in reference to main effects and interactions appropriate to the home stimulation variables. The other main effects in the analyses produced the same trend of significant results found in the four-way ANOVA already discussed.

Neither ANOVA for 6-year-olds produced a significant main effect for CHSA or PHSA. Significant two-way interactions were revealed, however, between CHSA and condition, $F(1, 36) = 27.61$, $p < .001$, and PHSA and condition, $F(1, 32) = 11.13$, $p < .003$. Both showed that children whose homes were rated as high in stimulation affordance performed better in the HMV condition than in the LMV condition, whereas children whose homes were rated as low in stimulation affordance scored essentially the same in both conditions. See Table 1 for the means and standard deviations of the two significant interactions.

A significant three-way interaction was also obtained between CHSA, condition, and trials, $F(1, 36) = 8.015$, $p < .01$, and the three-way inter-

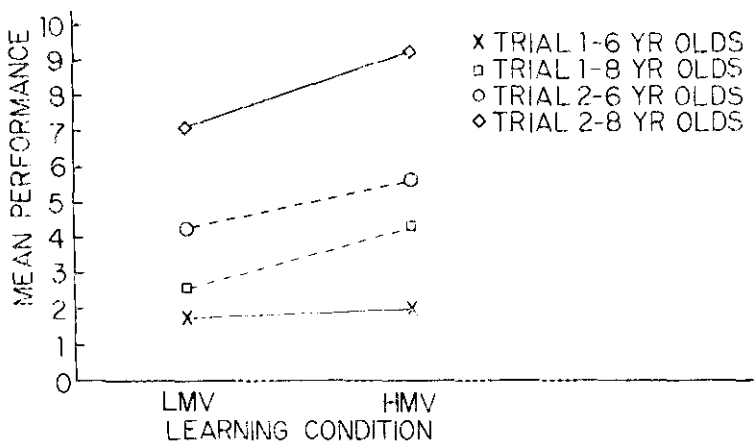

FIGURE 1. Significant three-way interaction: Age × Condition × Trial.

action between PHSA, condition, and trials approached significance, $F(1, 34) = 3.15$, $p < .085$. Figure 2 displays the significant three-way interaction; both interactions revealed essentially the same trend. There was virtually no difference in performance across conditions for children coming from homes rated as relatively low in stimulation affordance on either Trials 1 or 2. A difference in performance across conditions was found for the children coming from homes rated as relatively high in stimulation affordance on Trials 1 and 2, but the difference was more pronounced on Trial 2. Post hoc tests revealed a marginally significant performance difference across conditions on

TABLE 1
Means and Standard Deviations for 6-Year-Olds' HSA Ratings by Condition

	LMV		HMV	
HSA rating	*M*	*SD*	*M*	*SD*
Low				
CHSA	3.70	1.45	3.55	1.01
PHSA	3.65	1.45	3.61	.96
High				
CHSA	2.40	.74	4.60	.69
PHSA	2.45	.73	4.61	.61

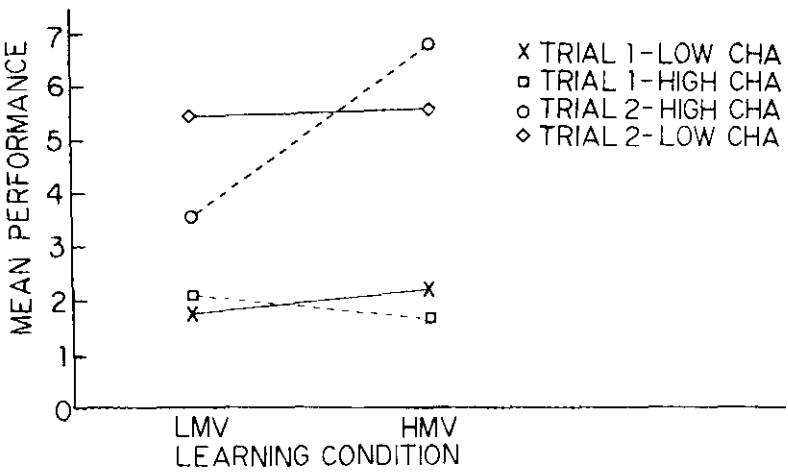

FIGURE 2. Significant three-way interaction for 6-year-olds: CHSA × Condition × Trial.

Trial 1 for children coming from homes rated as relatively high in stimulation affordance; on Trial 2 the difference was highly significant.

Although similar patterns of results were obtained for 9-year-olds, the pertinent interactions did not attain conventional levels of statistical significance. CHSA and PHSA did not relate significantly to either condition or trials.

The same type of dichotimized scores used for HSA were obtained for the CA and PCA measures as well. Again, four separate ANOVAS were performed using condition and trials with either CA level (low or high) or PCA level (low or high) for each age group. These analyses revealed no significant main effects or interaction effects involving child activity ratings (CA) for the children of either age group. A significant interaction was obtained, however, between PCA and condition for 6-year-olds, $F(1, 36) = 4.738$, $p < .05$. The interaction revealed that children whose parents rated them as relatively high in activity performed better in the HVM condition than in the LMV condition, whereas children whose parents rated them as relatively low in activity performed essentially the same in both conditions. This interaction for 9-year-olds approached significance, $F(1, 34) = 2.520$, $p < .12$, showing essentially the same type of trend. Refer to Table 2 for the means and standard deviations of the significant interaction.

The Pearson product-moment correlation coefficient was used to assess the relationship among the home stimulation ratings, child activity ratings,

TABLE 2
Means and Standard Deviations for 6-Year-Olds' CA Ratings by Condition

	LMV		HMV	
PCA level	*M*	*SD*	*M*	*SD*
Low	3.50	1.66	3.63	1.88
High	2.68	.75	4.44	.56

and performance scores. Table 3 shows the matrix of the correlations. The analyses were performed for the total sample.

The matrix shows that the parents' and the children's ratings of home stimulation correlated highly (r = .807) and that parents' and children's ratings of children's activity levels correlated significantly (r = .668). The two parent scales correlated significantly, showing that the higher parents rated home stimulation, the higher they rated their child's activity level (r = .511). There was also a moderate correlation between the two children's scales (r = .437). Trial 1 and Trial 2 performance correlated highly (r = .793) as well.

Discussion

Performance was markedly better in the HMV condition than in the LMV condition. This finding replicates and extends previous work documenting contextual inducement of performance facilitation with working-class Black children (Boykin, 1982; Tuck, 1985; Boykin, DeBritto, & Davis, 1987). Indeed, this operationalization proved to be a particularly effective facilitator of these children's performance. In addition, this finding is consistent with that

TABLE 3
Matrix of Correlations Among Measures and Performance Scores

	Trial 1	Trial 2	CHSA	PHSA	CA	PCA
Trial 1						
Trial 2	.793**					
CHSA	.054	−.144				
PHSA	.066	−.129	.807**			
CA	−.192	−.157	.437**	.426*		
PCA	−.071	−.115	.446**	.511**	.668**	

*p < .01. **p < .001.

of Guttentag and Ross (1972), who showed that motor responses are an effective vehicle for enhancing simple verbal learning in working-class Black children.

Although facilitation effects were obtained, they were moderated by two factors. Performance was enhanced more for 9-year-olds and after the second learning trial. The latter findings can be better understood when placed in the context of the three-way interaction between age, trials, and condition. Superior performance in the HMV condition emerged on the second trial for the 6-year-olds, whereas the 9-year-olds performed markedly better in the HMV condition even on Trial 1. Indication from informal observation is that some amount of initial wariness may have been present for the younger children at Trial 1. Thus, the facilitation effect was more immediate and more pronounced for older children, but younger children seemed to require more time to become acclimated to the task setting.

It appears that the child and parent ratings were functionally related to performance facilitation and in similar fashion. Yet these relationships held only for the 6-year-olds. Why no significant effects emerged for 9-year-olds is puzzling and may be due merely to sampling fluctuation. Nevertheless, we need deeper understanding of the psychological processes that arise from homes that afford high stimulation and how this may be functionally related to receptiveness to high stimulation affordance contexts. In examining the pattern of correlations among the various rating measures, we noted that all the measures were significantly and positively correlated with each other. This suggests that, in the main, the measures are assessing similar phenomena. Yet certain correlations stand as particularly noteworthy. The strong relationship between parent and child ratings of home stimulation indicates considerable confluence in opinion of the nature of the home stimulation environment and gives greater credence to the notion that the ratings do measure an actual property of the environment. The relatively high correlation between the two activity measures indicates stability in this behavioral phenomenon. Interestingly, the two parent ratings were correlated, as were the two children's ratings. This indicates that, to the parents and the children, home stimulation and children's activity are functionally linked. That is, active children are identified with active environments.

In future work, it will be crucial to see if the effects presently obtained are generalizable to other samples. The rhythmic-movement condition may be so compelling that it has universal appeal and may be universally facilitating. But a principal aim of this study was to construct a facilitating context self-consciously informed by an ethnographic understanding of the Black cultural experience. This objective has been reasonably met. Nevertheless, in examining children of varying classes, ethnic groups, and home backgrounds, we may ferret out the extent of social and cultural process involvement in the obtained effects and, in turn, what social and cultural processes

are most functionally related to the obtained patterns of performance (see McLoyd & Randolph, 1984, for an excellent discussion of race homogeneous versus race comparative research).[1] The psychological underpinnings for the improved performance under the HMV condition also need to be determined. Was it simply because of the greater familiarity of this condition? Might this condition have produced more optimal cortical activation? Were the children more task involved, persistent, and/or attentive in this condition? It is important to realize that the contexts employed were actually conglomerations of several different stimulus elements. It may prove desirable to unpack the manipulations in future research to determine more precisely the locus of the obtained context effects. In a similar vein, the cognitive demands on the children occurred in two phases—an initial rehearsal phase and the subsequent performance phase. Given that context effects can apply both at the initial encoding of information and at the subsequent retrieval (Tulving, 1983), it may be worth pursuing how and if contextual inducement can likewise be obtained at these phases separately. This would allow closer inspection of the cognitive processes most affected by, for example, the affordance of increased movement and sensate stimulation.

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[1]The homogeneous nature of the subject population employed does limit the claims that can be made about culture per se. The absence of a different ethnic group for comparison made it impossible to assess cross-cultural differences. Moreover, if White children improve to the same degree as the present sample, the performance gap between White and Black children will still be in need of explanation. Yet the present results are consistent with previous research employing heterogeneous subject populations, where Ethnic Group × Condition interactions have been obtained. This lends credence to the facilitation via culture argument advanced here.

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