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ASPECTS OF CHILDREN'S LEARNING BEHAVIOR IN DIFFERENT INSTRUCTIONAL SETTINGS

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Abstract

Children from two primary grade classrooms were observed in three different instructional settings: large group-teacher-directed; large and small group-teacher-directed with some independent activity; and child choice activities. Aspects of the children's cognitive functioning, materials use, language behavior, peer interaction, and task involvement were recorded. Three questions were investigated: (1) Do children in the same lesson behave alike?; (2) Do children change their behavior from one lesson type to another?; and (3) What effects do lesson types have on the five aspects of children's behavior listed in the sentence above? The results revealed a homogeneity of behavior among children within lesson types and a shift in behavioral modality from one lesson type to another. These results are consonant with Barker's (1968) critique of human ecology and Stodolsky's (1988) study of the influence of subject matter. Children's learning behaviors were congruent with lesson type, too. Larger group, more teacher directed lessons resulted in a more passive-responsive behavioral profile. Lessons with increased child choice were related to higher levels of cognitive functioning, increased language production and cooperative behavior, and more generative use of materials; an interactive-generative behavioral profile.

Introduction

The ecological critique of human behavior by Barker (1968) led to three generalizations: (1) human behavior changes from setting to setting to meet the conditions of each setting, (2) the behavior of persons in any setting is more alike than different, and (3) a person's behavior tends to be consistent over time in the same or similar setting. Barker's analysis of person-environment interaction provided for behavioral variance in any setting, the expression of personal need, and the possibility for change in setting purpose as the consequence of person-environment interaction. Nonetheless, the essence of his critique is often stated in terms of the coercion of human behavior by setting (Bruner, 1965).

According to Barker's theory, behavioral coercion occurs as a consequence of the

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interaction of features of a behavior setting. Three which have particular importance are standing patterns of behavior (SPB), milieu, and the consonance of SPBs and the milieu. SPBs are the behaviors commonly expected of all participants in any setting. It is a setting specific, extra-individual phenomenon such that one can refer to block area behavior and circle-time behavior with some assurance of being understood. The milieu or physical structure of a behavior setting refers to an activity or setting bounded in time and/or space. Consonance is what Barker refers to as the essential fittingness of SPBs and the milieu; the anticipated behaviors of any setting are congruent with its physical and temporal structure. Under such circumstances the "standing patterns of behavior remain essntially the same although individuals come and go" (Schoggen, 1978, p. 37). A classroom typically meets the conditions of a behavior setting. Activities and areas within the classroom, such as the block corner and arts area of a kindergarten, can also have the characteristics of behavior settings.

This theory suggests that the ecological environment is more powerful than the psychological state of being of persons in affecting molar, or ongoing, behavior (Bronfenbrenner, 1979). It is, as Barker has suggested (1968), as though the outside environment of the person is typically more powerful than the inside environment; one's motivation, will, intention, and need may be compromised by the behavioral demands of a setting.

Barker's theory raises a number of questions regarding the nature of the integrated personality so much a part of western psychological belief, in particular the concept of stability; the degree to which one can predict a person's behavior over time and across settings. In classrooms the concept of stability has been made manifest in work related to cognitive and learning styles (Dunn & Dunn, 1978; Kogan, 1983; Gregorc, 1985; Sternberg, 1990). In brief, it is often asserted that children have a dominant learning or cognitive style which they use in most if not all classroom exercises. Furthermore, it is asserted that knowledge of style ought to be used by teachers in designing learning activities so as to enhance learning.

However, it is entirely possible by extending Barker's theory to suggest that children may modify their molar behavior to accommodate to the demands of alternative learning environments. And, if this is observed, one might suggest that children have multiple cognitive and/or learning styles which they draw upon as required by the events or the structure of varied learning activities.

There have been several studies of the behavior of young children in child care and education settings which, in one way or another, support the accuracy of Barker's theory. Smith and Connolly (1980) completed studies of the effects of physical space, the amount and kind of materials, and adult roles on the behavior of nursery school children and found that as environmental conditions changed, so too did the behavior of the participants. Weinstein (1977) found that the learning appropriate behavior of second graders was influenced by making changes in the physical arrangements of the classroom. Garner (1990) cites a study by Hall and colleagues (1987) which found strong setting effects for children's use of language which was decriptive of levels of cognitive functioning.

Gump (1967) and Day (1983) argued that classrooms are dynamic environments

comprised of a series of temporally and spatially related behavior settings, each with a set of purposes and expectations potentially quite different from all others. They suggested that children will of necessity change their behavior as they move from one setting to another, from reading to science, and from block play to the art corner, as a consequence of their perception of the demands of each setting.

A study by Oxford, Morrison, and Mckinney (1979) supports this assertion. They described the action structure of lessons and other learning activities in kindergarten with particular attention to children's task involvement. They found that such factors as the size of the instructional group, children's influence on their action in any lesson, and instructional format, all contributed to the proportion of time students spent on task.

Stodolsky (1988), building upon Barker's theory, studied the context and behavior of fifth grade students in mathematics and social studies lessons. She documented variety in the daily experiences of children related to subject matter ; social studies was not the same experience for children as mathematics even when taught by the same teacher. Furthermore, Stodolsky found that the variance in children's behavior was greater in social studies than mathematics. She attributed this variance to a mix of the values shared by teachers and children regarding the comparative importance of mathematics and social studies in the order of school things, and an instructional format which seemed to reflect this value hierarchy resulting in modification in the mode of interacting in learning task from one discipline to the other. In each subject, the students, by and large, sought to understand and meet the conditions of each lesson, to seek engagement, and to remain curious and attentive albeit in different ways.

This study builds upon Gump's and Day's elaborations of the Barker critique in ways similar to that of Stodolsky. The purpose is to describe and contrast aspects of young children's cognitive, linguistic, social, materials use, and task engagement behavior in instructional settings varied by group size, instructional format, and degree of child autonomy. Observations and video tapes were made of three children in each of two early childhood classrooms over a two month period of time.

Research Questions

Young children do change their behavior as they move from context to context. However, there is not a large body of data describing the substantial character of these changes nor of the contextual conditions under which these changes occur (Garner, 1990). Like Stodolsky, this study explicated the cognitive, linguistic, materials use, child to child engagement, and task involvement behavior of the children and related these behaviors to contextual factors of instructional format, source of pacing for the activity, and the organizational structure of the lesson (Stodolsky, 1988).

The following questions were addressed :

1. Do children in the same or similar lesson structure behave alike ?
2. Do children change their patterns of behavior as they move from one lesson type to another ?
3. What effects do lesson types have on the behavior of children in regard

to aspects of:

3.1 cognitive functioning;
3.2 materials use;
3.3 language behavior;
3.4 peer interaction; and
3.5 task involvement?

Questions 1 and 2 are designed to test the homogeneity of response among children within lessons and variation between lessons. Substantial variation within lesson types and little change in behavior across types would support the conventional belief in behavioral stability and the power of the internal environment. Such results would not support the Barker thesis. Assuming affirmative answers to both questions 1 and 2, answers to question 3 will offer a descriptive behavioral profile of the children by lesson type, the more interesting data from this study. Such a profile will illustrate the substantial changes in behavior children make as they move from lesson to lesson.

Method

Subjects

Six children, three from each of two classrooms in a non-graded school, comprised the sample for this study. (One child from the original sample of four from each classroom had to be dropped from each classroom because of absence.) The ages of the children in one classroom were 5-7 years, in the other 7-9 years. The children were selected by the teacher in each classroom primarily because they represented typical learners. Two boys and one girl were selected from the younger group; one boy and two girls were chosen from the older group. English was the first language for all children.

The data for the study are presented by classroom; children aged 5-7 years are referred to as the "younger" group, children 7-9 years as the "older" group. The reasons for separating the data by class are straight forward. First, there were presumed developmental and learning differences resulting from both age and experience in school. Second, though both classrooms fit the description for a non-graded school, the physical structure and the character of the classrooms were different. Third, as will become apparent in the presentation of the lesson type data, the subject matter for the same type lessons across the classrooms was different in ways which made the aggegation of data problematic.

Lesson Types

The children in each classroom were observed in three types of lessons which varied by instructional format, the source of pacing for the lessons, and structure of the instructional group. The lessons were defined as: (1) *Teacher Directed/Large Group* - teacher directed, total class for the entire lesson; (2) *Teacher and Child Directed/Large and Small Groups* -predominantly teacher directed with a maximum of 25% child directed activity, where the teacher presented the content or procedures of the lesson to the whole class or most of the children after which there were work groups of 2 to 5

children; and (3) *Child Directed*-child directed activity with group size a function of the children's choice of activity. Data describing the instructional format, lesson pacing, and organization of the children are presented in Tables 1 through 6.

In the classroom with younger children Type 1 lessons (Teacher Directed/Large Group) were morning meeting and language arts where the teacher led the entire class in opening exercises, introduced the letter of the day, asked questions of substance about earlier letter lessons, and focused discussion on selected topics. A didactic teaching mode predominated.

Type 1 lessons for the older children consisted of the entire class gathered about the teacher during which time individual children would read excerpts of stories they had written and receive questions and comments from the teacher and the other children. These lessons were a regular part of the writing and reading curriculum.

TABLE 1

Instructional Format by Lesson Type: Younger Children

	Type 1[1] (Language Arts)	Type 2 (Math)	Type 3 (Choice)
INSTRUCTIONAL FORMAT			
Indep. Seatwork	.3%[2]	22.6%	
Discussion	99.7	65.2	
Instructions		9.6	
Transition		2.6	
Choice			100%

[1] Type 1=Total Class, Teacher Directed; Type 2=Large & Small Group, Teacher Directed & Independent Activity; Type 3=Child Choice of Activity.

[2] The percentage of time observed for each factor within each lesson type.

TABLE 2

Lesson Pacing by Lesson Type: Younger Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
SOURCE OF PACING			
Teacher	100%	77.4%	9.2%
Child		22.6	47.9
Child to Child			42.9

TABLE 3

Organization of the Children by Lesson Type: Younger Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
ORGANIZATION			
Total Class (instruction)	100%	33.3%	8.9%
> 5, < Total Class		57.3	
3-5 Parallel			13.2
2-3 Parallel		9.7	10.3
3-5 Cooperative			39.7
2-3 Cooperative		12.8	3.4
Isolate Activity			24.6

TABLE 4

Instructional Format by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
INSTRUCTIONAL FORMAT			
Indep. Seatwork		18.0%	
Recitation	15.7%	71.5	
Discussion	40.8	3.1	
Student Reports	36.8	.5	
Instructions	6.8	1.9	
Tutorial		4.9	
Choice			100%

TABLE 5

Lesson Pacing by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
SOURCE OF PACING			
Teacher	56.9%	79.9%	16.4%
Child	43.1	18.4	20.4
Child to Child			26.7
Mechanical			36.5

TABLE 6

Organization of the Children by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
ORGANIZATION			
Total Class (instruction)	100%	33.3%	
Total Class (seatwork)		25.2	
> 5, < Total Class			11.6%
3-5 Parallel			7.5
2-3 Parallel		41.4	15.7
3-5 Cooperative			18.0
2-3 Cooperative			36.6
Isolate Activity			10.6

Type 2 lessons (Teacher and Child Directed/Large and Small Gqoup) for the younger children were instruction in mathematics. There were three format variations in these lessons: (1) teacher instruction about time using a model of a clock face; (2) work in dyads in which the children would quiz one another about telling time using a clock face; and (3) children completing individual worksheets on telling time.

Reading instruction was the subject of Type 2 lessons in the classroom for older children. In one lesson a group of children was being instructed on alphabetical order as they learned about the use of dictionaries. Other children were completing assigned seatwork. In other lessons children were reading in small groups led by the teacher, working with another child on a reading exercise or working independently at one's

desk. In each lesson there was some large group instruction followed by small group and independent activity.

For both groups of children Child Directed (Type 3) lesson observations were made during choice time. This was a period of time each day when the children were free to choose activities. Children were observed working at computers, completing seat tasks, playing games with other children-board games and fantasy play, engaged in social talk, or completing projects related to subject matter assignments. There was substantial variance in the nature of children's engagement, as would be expected. The significant variable is the child's decision how, where, with whom, and in what way engagement was to occur.

Categories of Behavior

Five categories of behavior were observed. They were: (1) Cognitive Functioning; (2) Language Behavior; (3) Materials Use; (4) Task Involvement; and (5) Peer Interaction Behavior. The category of Cognitive Functioning refers to the nature of intellectual activity observed in each lesson ranging from lesser to greater intellectual engagement. These behaviors were initially drawn from Stodolsky (1988) and adapted for use upon completion of a pilot study to reflect the ages and developmental levels of the children.

Language behaviors were derived from observation and deduction. They were designed to represent common linguistic options available to children in typical early education lessons.

Materials Use behaviors also have an empirical and deductive base reflecting options commonly extant in classrooms for young children. Behaviors included, but were not limited to, higher order intellectual behavior, e. g., invention, idiosyncratic materials use, and combining materials from different areas to produce novel or complex effects.

Peer Interaction behavior was comprised of an array of possible person-to-person interaction modalities from independent activity to cooperation. These behaviors reflected the type of social interaction required or expected in any lesson with considerable attention given to the possibility for collaboration, an indicator of a higher order interactive modality.

Task Engagement was a three dimensional index of children's attention to the task: on task, off task, and in transition between tasks.

Taping Procedures

Video tapes of each lesson type were made in each classroom during a two month period in the spring of the school year. The teachers were aware of the types of lessons we sought to tape and suggested possibilities. Observations were made by the researchers in advance of the video taping to determine whether or not the lessons suggested by the teachers seemed to meet the criteria for the three types. Subsequently a schedule for taping was arranged with the teachers that did not require any modification in their instructional schedule. The use of a video camera was not an infrequent event for the children in each classroom. There was no evidence that the

taping substantially altered the behavior of the teachers or the children.

Each lesson was taped in its entirety. A minimum of two lessons were taped for each child in each of the three lesson types. It was often possible to record all subjects in one lesson.

Two persons managed the video taping. One was the second author who directed the taping and made notes on the lesson. The second person, who was unaware of the purpose of the taping, operated the camera.

Data Coding Procedures

Each lesson was initially viewed by the researchers to determine if it did in fact meet the lesson type criteria for which it was chosen. Two lessons were subsequently not used because the instructional format varied substantially from any of the three types established for the study.

A time sampling procedure was followed in coding both the lesson type and child behavior data using a five second interval. Data were aggregated by the total number of entries per five seconds for each of three lesson type variables and the five behavior variables. The absence of an equal number of entries for each child within and across lesson types necessitated the use of percentages in the presentation of the data.

Reliability of the Coding

Two graduate students unaware of the purpose of the study were trained to code the tapes by the second author. Video tapes not used in this study were used for training purposes. Each coder was tested for reliability against that of the trainer. The percent agreement for each lesson type variable and behavior variable was computed using the following formula: agreement divided by agreement plus disagreement multiplied by 100i.e., $(a/a+d)\times 100$. Training continued until agreement reached 90%. The tapes were coded independently by each coder.

Results

Lesson Types

Three types of lessons, differentiated by (1) instructional format, (2) source of pacing of the lesson or activity, and (3) organizational structure of the children, were selected for this study. The proportional distribution of activity for each lesson is presented in Tables 1-6; the first three tables represent lessons for the younger children and the last three tables lessons for the older children.

Younger Children's Lesson Types

Type 1 lessons (Teacher Directed, Large Group) consisted of a series of language arts lessons for the whole class which occurred at circle time. Instruction was presented in discussion format (99.7%), paced entirely by the teacher (100%).

Mathematics was the subject matter for Type 2 lessons(Large and Small group, Teacher Directed and Independent Activity). A varied instructional format was followed: 65% discussion in groups of varying sizes; independent seatwork (22.6%); and just less than 10% of the time was devoted to giving instructions. The children paced

their activity 22.6% of the time. The organization for instruction varied widely from total group (33%) to groups larger than five but less than the whole class 57% of the time. Children were observed in small group cooperative (12.8%) and parallel (9.7%) activity for a substantial amount of time.

Type 3 lessons were taped during choice time. Children were free to move about the room and busy themselves with whatever activity they chose. Over 90% of all activity was paced by the children. The organizational structure was widely variable with most activity being observed in settings with more than one child. In fact, cooperative structures were observed 43% of the time and parallel activity 23.5% of the time. Children also used choice-time to be alone (24.6%).

Older Children's Lesson Types

Type 1 lessons were organized with the whole class gathered on the floor in an open spot in the room with the teacher at the center. One by one, children would read from writing projects completed or in progress after which the teacher would lead a critique of the writing by the other children in the class. Reading and discussion of the papers accounted for 77% of all activity. The remaining time focused on recitation (15.7%) -typically the teacher asking for information designed to foster discussion and giving instructions (6.8%). The teacher and the authors shared responsibility for pacing the activity (56.9% and 43.1%, respectively).

Type 2 lessons were taped during reading instruction. As might be suspected, the teacher engaging children in recitation (71.5%) and independent seatwork (18%) accounted for most of the time. There was some discussion (3.1%) and giving of instructions (1.9%). Pacing of activities was primarily the responsibility of the teacher (79.9%) with the children being responsible mostly during seatwork time (18.4%). The more formal instruction occurred in parallel groups of up to three children (41.4%). Instructing the whole class was observed about one third of the time (33.3%) and children spent about one fourth of the time at seatwork (25.2%).

As with the younger children, Type 3 lessons were taped during choice time. Pacing was varied with children working at the computer (mechanical pacing 36.5%), child-child paced (26.7%), children directing their own activity (20.4%), and children using choice time to receive instruction from the teacher (16.4%). The organization was as varied as it was for the younger children. Cooperative groups were observed 54.6% of the time and parallel activity seen 23.2% of the time with 10.6% isolate activity.

These data make clear the differences in lesson types in both calssrooms as defined by the criteria of instructional format, source of pacing, and organizational structure. Yet, there were differences in the ways in which each type was manifest in each classroom. This reflects at least two phenomena: (1) there can be differences in the nature of the instructional format across subject matter areas, e.g., differences between the structure for reading and mathematics (see Stodolsky, 1988); and (2) differences between the classrooms in the ways in which lessons are designed by each teacher. Such variation may also reflect differences in the effects of socialization of the children to the school experience and developmental differences between the two

groups of children. Whatever the explanation, children were observed under somewhat different instructional conditions within each type of lesson.

Children's Behavior

Variance Within and Across Lesson Behavior

Tables 7 (younger children) and 8 (older children) contain the results of an analysis of variance for the behavior of children within and across lesson types. In each category of behavior for both groups of children there were instances of too few observations to allow for meaningful application of the ANOVA. The analyses in each table include only those for which there was a substantial base.

For the younger children there was only one case out of eighteen in which there was significant variation in behavior among children within lesson type (prescribed use of materials). Yet, there were 12 behaviors which achieved a level of significance equal to or greater than .10 in the across-lesson analysis.

The older children's behavior within lesson type was similar to that of the younger children; the children tended to behave similarly within lesson type. However, the shift in behavioral modality across types of lesson for the older children was not as prominent; only 9 of 20 behaviors achieved a level of significance beyond the .10 level.

Nonetheless, these data allow one to assert that the children in each classroom tended to behave in a like manner within each of the three types of lessons and changed their behavior as they encountered a lesson with another structure. Hence, it seems warranted to assert that both question 1 and 2 can be answered in the affirmative: Children in the same or similar lesson structure behaved alike and they changed their pattern of interaction as they moved from one lesson type to another.

Effects of Lesson Type on Aspects of Learning Behavior

One question focused on the influence of lesson type on aspects of children's learning behavior: cognitive functioning, language behavior, materials use, peer interaction, and task involvement. This question was answered by examining the data presented in Tables 7-11. However, unlike question 2, these data were analyzed across lesson types within behavioral categories for the younger and the older children.

Cognitive Functioning

The data for cognitive functioning are presented in Table 9. In each lesson type, the older children were called upon or allowed to engage in a wider range of cognitive functioning behaviors than were the younger children. Nonetheless, there are strong similarities within lesson type for both groups of children.

In Type 1 lessons, the children spent most of their time listening, 77% younger and 63% older. The next most frequent behavior was responding to questions (youngers, 10%) and about equal amounts of oral recall and responding to questions for the older children (near 10% for each).

Listening remained a dominant behavior for the children in Type 2 lessons (23% youngers, 38% olders). However, there was considerable time spent giving responses (30% responding to questions for youngers, 21% question response & 12% oral recall

for olders). The younger children exibited some higher order cognition especially in creating and constructing products (12%).

Type 3 lessons were marked for the range of behaviors particularly higher order cognitive functioning. The children spent substantial amounts of time in creating and constructing (38% youngers), choosing among alternatives (43% olders) and a small

TABLE 7

Variance of Behavior Within and Across Lesson Types: Younger Children

		Mean Sum of Squares	Error	f[1]	Sign.
COGNITIVE FUNCTIONING					
Listen/Teacher	W[2]	181.388		.823	.502
	A	1,157.528	220.466	5.250	.076*
Observe	W	6.634		.788	.515
	A	190.021	8.419	22.569	.007*
Listen/Child.	W	33.341		.223	.809
	A	536.668	149.451	3.591	.128
Respond/Quest.	W	29.968		1.316	.364
	A	686.414	22.771	30.144	.004*
Create/Constr.	W	282.013		3.252	.145
	A	1,129.603	86.727	13.025	.018*
Non-cognitive	W	496.811		2.204	.226
	A	1,211.188	225.402	5.373	.074*
LANGUAGE					
No Speech	W	62.751		2.427	.204
	A	138.988	25.858	5.375	.074*
Social Speech	W	10.274		.350	.724
	A	60.888	29.349	2.075	.241
Response to Request	W	3.088		.944	.462
	A	19.741	3.271	6.035	.062*
Cooperative. Speech	W	29.471		1.459	.334
	A	60.831	20.201	3.011	.159
MATERIALS USE					
No Materials	W	251.008		2.489	.199
	A	1,865.321	100.864	18.493	.010*
Prescribed Use	W	285.703		6.249	.059*
	A	799.543	45.717	17.489	.011*
Inventive Use	W	28.941		.143	.871
	A	121.441	202.221	.601	.591
Idiosyncratic Use	W	279.174		1.000	.444
	A	758.084	279.174	2.715	.180
PEER INTERACTION					
Independent Activity	W	11.861		.053	.949
	A	6,351.004	222.841	28.500	.004*
Associative Activity	W	76.834		.755	.527
	A	983.174	101.794	9.658	.029*
Cooperative Activity	W	56.801		1.183	.395
	A	102.254	48.026	2.129	.235
No Evidence	W	54.703		.309	.750
	A	2,390.403	177.112	13.497	.017*

[1] Based on 2 and 4 degrees of freedom.

[2] W=within lesson variance; A=across lesson type.

* $f < .10$

but not insignificant amount of time reasoning. Higher order activity accounted for over 50% of cognitive functioning for older children during child-choice time.

TABLE 8

Variance of Behavior Within and Across Lesson Types: Older Children

		Mean Sum of Squares	Error	f[1]	Sign.
COGNITIVE FUNCTIONING					
Listen/Teacher	W[2]	8.968		.040	.961
	A	549.121	222.953	2.463	.201
Listen/Child.	W	170.028		2.031	.246
	A	817.258	83.736	9.760	.029*
Oral Recall	W	69.493		.962	.456
	A	44.503	72.207	.616	.584
Worksheets	W	58.321		.569	.606
	A	122.888	102.486	1.199	.391
Respond/Quest.	W	37.441		.870	.486
	A	234.698	43.021	5.455	.072*
Reasoning	W	.188		.377	.708
	A	9.149	.498	18.366	.010*
Choose from Alternatives	W	159.935		1.000	.444
	A	906.030	159.935	5.665	.068*
Non-cognitive	W	232.431		2.563	.192
	A	213.221	90.698	2.351	.211
LANGUAGE					
No Speech	W	468.324		1.460	.334
	A	980.434	320.811	3.056	.156
Social Speech	W	156.143		1,072	.424
	A	121.163	145.627	.836	.499
Recitation	W	131.160		2.930	.165
	A	151.410	44.770	3.382	.138
Response to Request	W	4.563		1.186	.394
	A	51.423	3.847	13.368	.017*
Cooperative Speech	W	17.080		1.000	.444
	A	219.040	17.080	12.824	.018*
Talks to Self	W	76.454		1.282	.371
	A	116.861	59.648	1.959	.255
MATERIALS USE					
No Materials	W	568.548		23.246	.006*
	A	3,709.868	24.458	151.685	.0001*
Prescribed Use	W	774.254		37,995	.003*
	A	3,228.618	20.378	158.438	.0001*
PEER INTERACTION					
Independent Activity	W	668.243		.966	.455
	A	2,068.830	692.063	2.989	.161
Get Teacher Assistance	W	5,320		1.000	.444
	A	19.360	5.320	3.639	.126
Associative Activity	W	134.668		.654	.568
	A	1,116.348	205.908	5.422	.073*
No Evidence	W	756.503		1.378	.351
	A	1,832.443	548.907	3.338	.140

[1] Based on 2 and 4 degrees of freedom.

[2] W = within lesson variance; A = across lesson type.

* $f < .10$

TABLE 9

Cognitive Functioning by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
COGNITIVE FUNCTIONING						
Non-cognitive	10.2%[1]	14.9%	46.2%	15.6%	26.6%	20.0%
Listen-teacher	42.5	11.6	5.9	29.4	27.1	5.1
Listen-child	32.5	11.2	8.2	33.8	9.8	2.3
Observe-illust.	.4	13.9				
Oral recall				9.8	11.8	4.5
Worksheet		3.3			2.4	12.1
Respond-quest.	10.2	29.9	.1	10.6	21.4	3.9
Respond-hints	1.8	.8	.8		.2	
Questioning	.4	.2	.1			.6
Volunteer	3.1	1.4	.6			
Reasoning		1.0	.3		.2	3.3
Choice/Altern.						43.4
Create/Construct		11.9	37.9			4.9

[1] The percentage of time each behavior was observed within each lesson type.

TABLE 10

Language Behavior by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF SPEECH						
No speech	93.1%	87.9%	79.6%	75.9%	57.3%	52.3%
Social speech		5.7	8.9	3.4	15.9	11.3
Recitation	.8	.2		12.1	21.2	7.2
Response/assist.	4.9	1.3	.1	7.8	.9	.3
Cooperative	.2	3.3	9.1			14.8
Inquiring	.5	.8	1.4		.2	1.0
Inventive	.1		.3			.2
Talking to self	.3	.8		.8	4.4	12.9

TABLE 11

Peer Interaction by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF INTERACTION						
Independent	%	17.1%	24.0%	.2%	17.9%	35.6%
Seek teacher help			2.8			4.4
Give peer help					1.4	
Associative act.		35.0	9.6	37.4		28.4
Cooperative act.		11.3	8.1			17.0
Parallel act.			55.5			
No evidence	100.0	36.6		63.0	80.7	14.6

The younger children appeared to engage in creating/constructing and non-cognitive activity about equal amounts of time. Whatever the behaviors might have been, the salient note about cognitive functioning in Type 3 lessons was that it included substantially greater amounts of higher order cognition than was observed in either of the other lesson types.

Language Behavior

The data for language behavior are presented in Table 10. For the younger children, the most striking observation was the absence of any speech in each of the lesson types (no speech: 93% in Type 1, 90% in Type 2, and 80% in Type 3). There was substantially more speech among older children but still less than fifty percent in each of the three lesson types (no speech: Type 1; 76%, Type 2; 57%, and Type 3; 52%). The dominant language modality in Type 1 and 2 lessons was recitation, as the structure in these lesson would suggest it would be.

Table 10 reveals a trend towards greater social and cooperative speech occurring for both groups of children an they experienced greater responsibility for pacing their activity (in Type 2 and 3 lessons). Furthermore, such speech appeared to be linked to activities which were not under the direct supervision of the teacher.

Peer Interaction

It is instructive to examine peer interaction in Table 11 in relation to language behavior for younger children. In Type 1 lessons, the structure precluded any peer interaction and language behavior was limited in the extreme. However, in Type 2 lessons there was substantial task related interaction (35% associative activitiy, 11% cooperative activity). Even though only small amounts of language behavior were observed, virtually all of it was related to peer interaction of one sort or another (5.7% social speech, 3.3% cooperative speech, and 1.3% in response speech). This pattern of increase in speech related to peer interaction was continued for the younger children in Type 3 lessons. Associative and cooperative activities diminished substantially (down from a combined 45% in Type 2 lessons to 18% in Type 3 lessons). However, there was an unusually high percentage of parallel behavior (56%) and a slight but seeming important increase in social, cooperative, and inquiring speech.

Peer interaction for older children was similar in some ways to that of the younger children. Type 1 lessons precluded peer interaction 63% of the time. The remainder was associative action but controlled by the teacher and the format of the lesson.

In Type 2 lessons the structure also precluded much interaction around tasks (81% no evidence, 18% independent activity). However, during independent activity, the chiliren did engage their classmates in substantial amounts of social speech (16%), perhaps while being off task. In Type 3 lessons, the older children made substantial contact with their peers (28% associative, 17% cooperative activity).

It should be noted that both younger and older children spent from one-fourth to more than one-third of choice time in independent action.

Materials Use

The data in Table 12 clearly reveal a relationship between lesson type and both the frequency and nature of materials use. This is especially true for the younger children where one can see an almost perfect correlation with few materials used in Type 1 lessons (95% no materials, 5% prescribed use) to materials being used 50% of the time in choice time and 37% of that in idiosyncratic and inventive ways.

The data for materials use by the older children also clearly indicates a lesson type relationship. However, these children tended to use materials in more conventional or prescribed ways than did the younger children. This may be accounted for by the fact that they used the computer during choice time and were often observed playing board games with one another.

Task involvement

Table 13 indicates, as mentioned earlier, some variance in on-task behavior across lesson types but substantial on-task behavior overall. The highest percentage of on-task behavior was observed in Type 1 lessons. However, note must be made of the fact that data for task engagement in large group, didactic lessons which require no materials manipulation by the children were taken by observing the visual attention and response behavior of the children. This may not provide one with an accurate estimate of actual engaged behavior.

It should also be noted that for the younger children task engagement decreased with the increase in their responsibility for directing their behavior. This was only partially true for the older children; there was a slight decrease under conditions of Type 2 lessons but an increase to 85% on-task behavior during choice time.

Profiles of Behavior by Lesson Type

Data were presented earlier indicating that children changed their behavior across lesson types. As important as these results are, the far more valuable information lie in descriptions of the nature of this behavior by lesson type. To address this a profile of behavior was drawn from all of the five categories of behavior for each of the three lesson types. These profiles were then contrasted, comparing the profile for each lesson with the other two lesson type profiles. Initially a separate profile was created

TABLE 12

Materials Use by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF USE						
No materials	94.5%	51.7%	50.9%	87.6%	29.2%	24.4%
Prescribed use	5.2	36.3	12.0	12.4	70.6	67.8
Open ended/invent.		12.0	9.6			2.2
Idiosyncratic			27.5			
Combining						5.7
Abuse	.3					

for the younger and older children, but examination made clear that the descriptions within lessons were similar. Hence, a composite profile by lesson type for both age groups was created.

The results revealed three quite different behavioral profiles, each corresponding to lesson type. They are: (1) a *passive-responsive profile* for lesson type 1; (2) an *active-responsive profile* for lesson type 2; and (3) an *interactive-generative profile* for lesson type 3. The data from which these profiles were drawn are presented in Tables 9-13. Each profile was developed by analyzing behaviors in all five categories, (cognitive functioning, language, peer interaction, materials use, and task involvement), within lesson type for both younger and older children. A summary of the profiles is presented in Table 14.

The *passive-responsive profile* can be characterized as follows. The whole class sat facing the teacher (and one child for parts of some lessons). Interaction was typically linear in nature between the teacher and a child. Such interaction occurred in turns; individual children would be called upon to answer questions or offer comments.

TABLE 13

Task Involvement by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
On task	92.7%	86.5%	74.2%	86.7%	74.3%	85.3%
Off task	7.3	10.8	11.4	12.3	25.7	14.4
Transition		2.7	14.4			.3

TABLE 14

Characteristics of Behavioral Profiles.

I. *Passive-Responsive Profile*:
1. Visual and auditory attention to the teacher in whole class, didactic instructional mode;
2. linear teacher-child interaction, one child at a time, invitations to respond;
3. no provision for child-child interaction;
4. no materials use by children; and
5. language is entirely the means of instruction.

II. *Active-Responsive Profile*:
1. Varied instructional format including large group didactic instruction, small group recitation, and independent seatwork;
2. limited linear teacher-child interaction, initiative and participation by the children encouraged in small group settings;
3. child-child interaction encouraged;
4. materials use required, active engagement with materials necessary; and
5. children responsible for pacing much of their activity.

III. *Interactive-Generative Profile*:
2. Children directing their activity, selecting from among the array of activities present in the classroom, responsible for pacing their activity;
2. higher order cognitive functioning behavior, creative, constructive behavior and selecting among alternatives and reasoning behaviors prominent;
3. materials use predominates, inventive constructive use of material; and
4. substantial amount of cooperative and associative activity, active social engagement.

There were no provisions made for child-child interaction. Children would visually and auditorially attend to the teacher (or in the case of authors, the child reading his/her paper) and respond only when invited to do so. Materials were generally not used by the children nor were they expected to manipulate those which may have been used by the teacher. Language was entirely the means of instruction.

The *active-responsive profile*, observed in Type 2 lessons, was considerably more varied than the *passive-responsive profile* observed in lesson Type 1. The variety of activities presented in Type 2 coupled with variation in instructional structure required active participation and even initiative on the part of the students. Often students were given instructions for tasks they were to complete independently of any direct teacher supervision. At other times they were organized in small instructional groups where both recitation and initiating responses were encouraged. Although the end-state or product of the lesson was determined by the teacher, children had to be active in responding to the lesson requirements in order to achieve success. Children used materials in these lessons, albeit most often in a prescribed way. This structure also provided for active engagement with other children in completion of some lesson tasks. This was especially true in the classroom with younger children.

The profile for Type 3 lessons is characterized as *interactive-generative*. The structure of choice-time in each classroom produced substantial variation in the ways in which children became engaged in cognitive functioning, language behavior, materials use, and peer interaction. Children sought engagement in activites in a cooperative or proto-cooperative modality. They demonstrated higher order cognitive functioning behavior uncommon in the other lesson types. They used materials more frequently and in a wider variety of ways than they had in the other two lesson types. And, some children made use of choice-time to seek assistance from the teacher on tasks related to other lessons. There was not a substantial loss in task engagement behavior, in fact for the older children the percent of on-task behavior was higher than in Type 2 lessons. The children were active in generating ways of engaging various features of their classroom environment.

It should be clear from these descriptions of the alternative behavioral profiles that children in each classroom changed their mode of interacting from one lesson type to another. Furthermore, they were able to make these shifts without special instructions on the part of the teacher, although one must recognize that some instruction in this regard must have occurred over the course of the school year. Nonetheless, it is important to note that the children easily perceived the profile expected of them in each lesson type and were able to meet the behavioral requirements without any apparent difficulty.

Discussion

This study was designed to investigate aspects of children's classroom behavior under different instructional formats. Three questions were asked: (1) Do children in the same lesson structure behave alike or different? (2) Do children change their mode of interacting as they move from one type lesson to another? and (3) Does there appear to be lesson type related effects on children's cognitive, language, mate-

rials use, peer interaction and task involvement behaviors?

The data make clear that questions 1 and 2 can be answered as follows: children behave much the same way in the same lesson and can readily shift their behavior to accommodate to a different lesson structure. In this sense, Barker's assertion regarding the coercion of setting is supported. This conclusion would appear to have profound meaning for teachers of young children both in terms of the selection of types of lessons provided for children and in the temporal and spatial design of the classroom.

Information from the analysis of the categorical behavior data, within and across lesson type, also has implications for teaching. The following are some we believe to be especially compelling. The first four statements are drawn from an analysis of categorical behavior across lesson type. The last three are drawn from the data taken from the behavioral profiles within lesson type.

1. *A relationship was observed between lesson structure and level of cognitive functioning.*

In Type 1 lessons, and to a lesser degree in Type 2 lessons, children's cognitive activity fell primarily at the lower end of the spectrum. They engaged in recitation, oral recall, providing answers to questions, and completing worksheets. However, when children chose their activity and were largely responsible for pacing their engagement, they tended to exhibit substantial amounts of higher order cognitive functioning. Under these conditions, they were observed creating and constructing, exploring alternatives, and engaging other children in cooperative and proto-cooperative activities. The evidence for higher order cognitive functioning may not have been as compelling as one would have liked, and certainly the range of behaviors was limited. However, the observed relationship between lesson structure and level of cognitive functioning ought to be noted.

2. *The absence of individual child speech was profound, even deafening.*

It can be accepted that classrooms for young children will have speech most of the time; language will be heard in these classrooms. However, it is important to note the nature of that speech. First, it is apt to be linear in the sense that it involves one child with the teacher, with children taking turns. The effect of this model of verbal interaction is that at any time most of the children in the classroom will be silent. Furthermore, under such conditions child-child talk is discouraged because it is perceived to be a lesson distraction. In Type 1 and 2 lessons, language is controlled by the teacher and is didactic in nature.

Second, social and cooperative, or task related, speech increased with changes in lesson structure in the same direction observed for cognitive functioning.

3. *Opportunity for peer interaction resulted in both substantial amounts of associative and cooperative activity as well as time spent alone.*

Clearly, increase in the opportunity to choose activities was linked to increased time spent in social and task related interaction with other children. However, younger children, either by choice or aptitude, appeared to have established fewer relat-

ionships with others during choice-time than did the olders. They spent substantial amounts of time off task and alone. One might suggest that teachers consider helping children learn more about what choice-time offers in terms of directing one's activity and becoming engaged with peers in cooperative and associative activities.

Observations of the older children during those times when they could direct their activity provide useful data. The older children engaged one or two other children in interactive group settings; rarely was their group size larger than three. This would appear to be valuable datum in informing teachers about children's perception of optimal group size and in the design of small group work spaces in the classroom.

4. *Materials were rarely used in structured lessons*

This may be a logical consequence of the logistics of large group instruction; it may be difficult to manage large group use of materials, although this may reflect conventional thought more than reality. Whatever the reasons may be, one ought to consider the effects of instruction entirely by language in light of the importance of manipulation of phenomena in contemporary learning theory. Related to this is the observation that much materials use in these classrooms was prescribed. It is not necessarily bad for children to be required to use materials in prescribed ways, as for example, in completing written exercises or performing measurement tasks. However, the ratio of prescribed to open-ended use of materials ought to be considered particularly because prescribed use, by definition, inhibits generative manipulation and higher order cognitive activity.

The following comments are related to the profile data.

1. *Barker's coercive effect was observed in this study*

Children behaved similarly within lesson types and altered their behavior in like ways from one lesson type to the next. Teachers ought to be aware of the ways in which lesson structure influences the responses children will make. It is entirely possible that lesson structure can preclude the achievement of lesson goals in ways that have nothing to do with the character or competence of the children.

2. *Children's accommodating to lesson types appeared to be done without difficulty or resultant inhibition of behavior*

Children did what was necessary for participation in each lesson type; they appeared to be adept at perceiving how they were expected to behave. Furthermore, their behavior within each lesson probably was functionally appropriate for each child in the study had been judged by the teachers to be an effective learner.

3. *Implications for the conventional interpretation of learning styles may be drawn from these data*

We would propose that each profile represents a functional learning style. If one can accept this proposition, we would further suggest that teachers and researchers consider the possibility that children may have multiple learning styles which they use as the learning context or their internal needs requires. Such a suggestion is not entire-

ly dissimilar from Gardner's notion of multiple intelligences (Gardner, 1983).

If this analysis is accurate, and more research would be needed to make that determination, one could envision young children having a wide repertoire of alternative learning styles each having functional value. One way teachers could accommodate to such a reality would be through the design of classrooms in which provision is made for the regular use of these alternative learning styles (Day, 1983).

This was a limited study of the relationship of young children's behavior to different lesson types. The study was informative for all the reasons just suggested. It must be noted, however, that one can only conjecture about the broader implications of this study; this study needs to be repeated in diverse school environments, with children who may be having difficulty with school, and with larger numbers of children. Notwithstanding, the data presented here help one understand context specific classroom behavior, something we need to know more about.

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