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Importance of Spatial Arrangements for Young Children in Day Care Centers

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This article discusses some implications of spatial arrangements – qualitative aspects of the physical environment – for educational objectives in day care centers, particularly for young children. An educational proposal for day care centers is presented, which emphasizes the importance of both adult–child interactions and peer interactions for development and indicates how a semi-open spatial arrangement may promote those interactions. An empirical study which investigated the relations between spatial arrangements and the distribution of two- to three-year-old children in their playrooms in two Brazilian day care centers for low-income families is also presented. The data in that study were important for the elaboration of our educational proposal. Their relevance for designing children's collective environments is discussed.

Keywords: spatial arrangement, day care center, Brazil

INTRODUCTION

The recent increase in the use of day care centers as a context for development of very young children has created a pressure for studies on how to promote quality of care in order to guarantee good developmental conditions for them. Both developmental and environmental psychology can contribute to this objective.

The need for an integration between environmental and developmental psychology, and recognition of the challenges involved in forging such an integration have been discussed by several authors, as well as the challenges arising from that linkage (e.g., Moore, 1987; Wohlwill, 1980; Wohlwill & Heft, 1987). One of the challenges concerns questions of appropriate methodology. We agree with Zimring and Barnes (1987) on the necessity for carrying out studies in which aspects of settings are systematically manipulated. One environmental feature can be manipulated, and its relation to specific aspects of

children's behavior observed, in a representative environmental context.

However, given the complex interrelations between environmental variables and behavior, the experimenter must be aware that selecting just one factor to be varied constitutes a major 'simplification' of the environmental context, and must exercise caution in interpreting the data. If the experimenter assumes that such situations can be interpreted unidirectionally (that is, in terms of effects of environmental variable X on children's behavior Y under all possible conditions), he/she is assuming an elementary causality rather than systemic causality; the latter requires attention to the interaction of parts comprising the whole (Valsiner, 1987). In the present study, the environmental variable of spatial arrangement of the playroom was systematically manipulated while all other components of the settings were kept as constant as possible. Rather than interpreting variations in the children's activities as 'outcome', as in the traditional cause-effect frame, we interpret the data in accord with a systemic approach.

We conceive of day care centers as a major context for socialization of children in groups, a context in which the partners most available for interaction

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are other children – usually same aged peers. According to this view, peer interactions are as important as adult–child interactions in the children’s learning and development.

Our viewpoint is based on a systemic view of development which stresses a bidirectional relationship between the developing person and his/her environment (Bronfenbrenner, 1979; Bronfenbrenner & Crouter, 1983; Moore, 1987; Stokols, 1978, 1990; Valsiner, 1987; Valsiner & Benigni, 1986; Wohlwill, 1980; Wohlwill & Heft, 1987). On the one hand, children actively participate in their development through their relationship with the environment, mainly by the interactions with adults and children (same age or older), within a specific socio-historical context. Children explore, discover, and initiate actions in the environment; children select partners, objects, equipment, and places to carry out their activities, changing the environment through their behavior. On the other hand, children’s behavior is influenced by the environment provided by adults in accordance with personal goals based on their own cultural expectations about children’s behavior and development.

A number of studies have demonstrated the importance of physical features of the environment to peer interactions, especially during the first three years of life. Most have focused on the role of objects as support for young peer interactions (Eckerman & Stein, 1982; Jacobson, 1981; Mueller & Lucas, 1975; Nadel & Baudonnière, 1985; Smith & Connolly, 1980; Stambak & Verba, 1986). There is little research however, investigating the more qualitative aspects of the physical environment, such as its spatial characteristics (Ledingham & Chapus, 1986; Legendre, 1983, 1985, 1987; Legendre & Fontaine, 1991; Levitt & Weber, 1989; Moore, 1983, 1987; Neill, 1982; Weinstein & Pinciotti, 1988).

Although, at present, some attention has been called to the importance of spatial features in the design of group settings for children (for review, see Weinstein & David, 1987), few studies have documented the influence on children’s behavior of open or closed spaces, in terms of the absence or presence of barriers in the activity area, particularly in day care centers (Legendre, 1983, 1987, 1989; Legendre & Fontaine, 1991; Moore, 1983, 1987).

Legendre (1983, 1987, 1989; Legendre & Fontaine, 1991) has been carrying out studies on the role of spatial arrangements as support for peer interactions among two- to three-year-old children in French day care centers. Using the model of the ecological experiment (Bronfenbrenner, 1979; Legendre, 1985) his experimental manipulations include the modification of spatial areas or zones which are identified in the children’s usual playroom and have revealed the importance of circumscribed zones within specific kinds of spatial arrangements. Circumscribed zones are areas located in a corner of the room that are delimited on at least three sides by barriers formed by pieces of furniture, a wall, a difference in ground level, etc. (Legendre, 1987). The fundamental characteristic of a circumscribed zone is a topographical feature – enclosure.

The characteristics of three types of spatial arrangement and their relation to child–child and adult–child interactions have been described by Legendre (1985, 1987). These are a semi-open arrangement, an open arrangement, and a closed arrangement. In the *semi-open arrangement*, circumscribed zones afford the child a clear view of the entire field of action, including the location of the caretaker and other children. The children, usually in small groups, occupy mainly the circumscribed zones, even when they are located away from the adult. Such zones appear to foster a high proportion of peer affiliative interactions. Also, children’s approaches to the caretakers are less frequent, but tend to evoke more responses from them, in comparison with the other arrangements. In the *open arrangement*, no circumscribed zones are available and the central space is usually empty. The peer interactions are fewer, and many children tend to stay closer to the caretaker but there are few interactions with the adult. Excluding this tendency, generally the children are dispersed and move frequently from place to place. Finally, in the *closed arrangement*, physical boundaries (for example, a tall piece of furniture) divide the locale into two or more areas, obstructing the children’s view of the entire room. The children tend to remain near the caretaker, avoiding areas where the adult is out of view, and there are few peer interactions.

There is a basic feature about the establishment of circumscribed zones in a semi-open arrangement – even when the children are inside a circumscribed zone, they can still see the caretaker

and other children in any part of the playroom. This is a major consideration for two- to three-year-old children. The developmental pattern of attachment, described by various authors in samples from different cultures, indicates that two- to three-year-old children still show strong attachment behaviors not only towards the mother, but also towards other attachment figures such as their usual caretaker (Rossetti-Ferreira, 1984; Super, 1980). They tend to search for physical and/or visual closeness with the attachment figure. Thus, they do not stay long in areas where the usual contact with the adult is not possible. In such circumstances, they tend to remain in areas near the caretaker, as shown in closed spatial arrangements studied by Legendre (Legendre, 1983, 1987, 1989; Legendre & Fontaine, 1991). Therefore, the furniture used to structure the circumscribed zones must allow the children to maintain sight of the caretaker.

Legendre's observations are relevant to the unstructured context of Brazilian day care centers, which service a low-income population and which were studied by Rossetti-Ferreira et al. (1984). During activity periods in these centers, young children often stay in large groups (e.g., ten to 35 children between 18 and 36 months) under the supervision of one adult in a large empty area with a scarcity of furniture, equipment, and objects. This kind of environment does not facilitate the occurrence of adult-child interaction or child-child interactions, particularly in children under three years of age. Due to their growing social and verbal abilities, such young children may face difficulties establishing and maintaining interactions with peers in that kind of environment.

The potential significance of peer interactions in development raises questions about the ways environments promote or hinder these interactions, mainly among young children in group settings. The present paper is the first of a series focusing on the contribution of spatial arrangements to the opportunity for peer interactions. This study was conducted with groups of two- to three-year-old children in two Brazilian day care centers for low-income families. The traditional open arrangement of the children's daily free-activity area was modified to a semi-open arrangement in order to investigate the role of the spatial arrangement as support for early peer interaction. In this study, the children's distribution in the

space and chiefly their use of specific areas were taken as indicators of change in the system.

From Legendre's research, the following hypotheses were derived:

- (1) An open arrangement, as contrasted with a more structured semi-open arrangement, promotes children's use of the area around caregiver;
- (2) The circumscribed zones, the most attractive areas of the playroom, are preferentially used by the children.

Two groups of children and their caretakers were observed in three phases: I – open arrangement: the usual empty space (four sessions); II – open arrangement: inclusion of small shelves along the periphery of the space (six sessions); III – semi-open arrangement: establishment of two circumscribed zones with the shelves (six sessions).

METHOD

Subjects

Two groups of two- to three-year-old children and their caretakers (one per group) participated in this study. The children attended two day care centers in the region of Ribeirão Preto, a rich agricultural zone of State of São Paulo, Brazil. Both day care centers serviced low-income families.

Day care center 1 was located on the outskirts of Ribeirão Preto; the other was located about 40 km from Ribeirão Preto. Both were attended by children five days a week, approximately ten hours a day. The centers differed most notably in three respects. First, the building of Center 1 had been adapted for it. It was sorely in need of renovation and presented precarious sanitary conditions. It was poorly equipped, with little furniture and few objects and toys. The physical structure of Center 2 was rather good and had been specially designed for day care, with outdoor play equipment and good sanitary conditions. Although this day care center contained a variety of furniture, objects, and decorations, there were few toys available to the children, especially during their free activity periods. Second, in Center 1 each group of children, differentiated by age, stayed in a specific playroom for most of the day; in Center 2, the groups rotated through the

various rooms according to the program of activities. Third, the manager of Center 1, a woman social worker, allowed the staff of ten women to actively participate in the center's management. The manager of Center 2, a woman with no university degree, worked in close association with a part-time psychologist and phono-audiologist to plan the children's activities; the other staff (12 women, and two men) had little participation in the center's management. In both day care centers, the children were familiar with each other and with the caretakers.

Because the number of children in each session varied, we analyzed only the data from children who attended at least 50% of the sessions in each phase of the study. This yielded a total of 17 children (11 boys, six girls) in Group 1 (children in Center 1), Phase I. Mean age was 28 months (range = 19–35 months). Five additional subjects who failed to meet the participation criterion were eliminated. Phases II and III occurred six months after Phase I because of technical problems. By this time, the composition of the group had changed, with only two children who had participated of Phase I remaining. In these phases, 11 children (four boys, seven girls) of Group 1 participated. Their mean age was 26 months (range = 20–35 months). Two additional subjects were excluded for failing to meet the participation criterion.

From Group 2 (children in Center 2), a total of 11 children (four boys and seven girls) with a mean age of 28 months (range = 26–31 months) participated of Phase I. Phases II and III occurred 3 months after Phase I. At this time, nine children who had participated in the preceding phase remained and two additional children were included, yielding a total of 11 children (five boys, six girls), with a mean age of 28 months (range = 26–31 months). Additionally, one subject was excluded from Phase I and two from Phases II and III, for failing to meet the participation criterion.

Setting

All data were collected during regularly scheduled free-activity periods. Usually the caretaker brought a sack of scrap material which she placed in the middle of the activity area. Neither setting had equipment or furniture in this area, which was essentially an empty space, without

circumscribed zones, defining an open spatial arrangement.

For Group 1 data were collected in a covered shed with an area of about 126 m². The shed contained a platform of concrete (5.56 × 2.68 × 0.45 m) with a step for access; columns of concrete around the borders, and a concrete tank that was inaccessible to the children because of its height. During the remainder of the day, children stayed in a room also with an open spatial arrangement, where they engaged in structured activities.

For Group 2, data were collected in a room 60 m². It contained only a wooden bench (1.90 × 0.30 × 0.30 m) and two stacks of mattresses (inaccessible to the children) that were used during the children's naps.

Apparatus and Data Collection

Two automatic cameras, located high on opposite walls, were simultaneously activated every 30 seconds by a remote control outside the setting. A sequence of 30 to 40 photos was thus obtained by each camera in each session. The two photos, simultaneously taken, were printed on a single page to provide a complete view of the experimental area. A transparent template dividing the area into square meters was placed on each photo to determine the location of each child and the caretaker in the sequence of photos; each square was identified by the abscissa and ordinate, marked by letters and number, respectively.

Small wooden shelves (1.10 × 0.30 × 0.50 m), each containing one division, were introduced into the shed and room of each day care center; ten in Center 1 and eight in Center 2. Four of the shelves had cardboard on the back, and two in Center 1 and one in Center 2 had a second piece of cardboard on the side, forming a kind of corner.

Procedure

Phase I: Usual open arrangement

Four photographic sessions were conducted in each day care center, spread over a period of four (Group 1) and 2 (Group 2) weeks.

Phase II: Open arrangement

This intermediate phase was necessary in order to allow the children to become familiar with the wooden shelves that would be used to structure

the circumscribed zones needed for a semi-open arrangement (Phase III) in the usual empty spaces of the day care centers.

The empty small shelves that functioned as partitions were introduced and placed in predefined positions on the sides of the shed and the room, in order to preserve the open spatial arrangement (see the location of shelves in Figures 1b and 2b). Six sessions, spread over three weeks, were conducted in both day care centers, after a familiarization period to the shelves of 18 (Group 1) and 14 (Group 2) days.

Special instructions were given to the staff and caretakers to ensure that the shelves were placed in the space daily and not only on the days of data collection. The caretakers were also instructed to avoid structuring the children's activities (although they could respond to all approaches made by them) and to remain seated in a specific area, which was defined by the data of Phase I, indicating the most used area by each caretaker.

Phase III: Semi-open arrangement

The shelves were moved in order to form two circumscribed zones (CZ), thereby changing the open arrangement to semi-open. CZ1 was away from the caretaker and was more structured than the other zone (greater number of shelves; presence of shelves with and without cardboard; more enclosure containing a small entrance). CZ2 was near the adult but was less structured than CZ1; it was delimited on three sides by two shelves without cardboard and a wall; its fourth side was open (see the location of zones in Figures 1c and 2c).

Six sessions spanning either three weeks (Group 1) or five weeks (Group 2) were completed after an initial familiarization period of five days in both day care centers. The instructions from the preceding phase were maintained.

RESULTS

The data are collapsed across sessions within each phase, but the same trends were observed in most sessions.

Spatial Distribution of Children

Figures 1 and 2 show the children's spatial distribution in each phase for Groups 1 and 2, respectively.

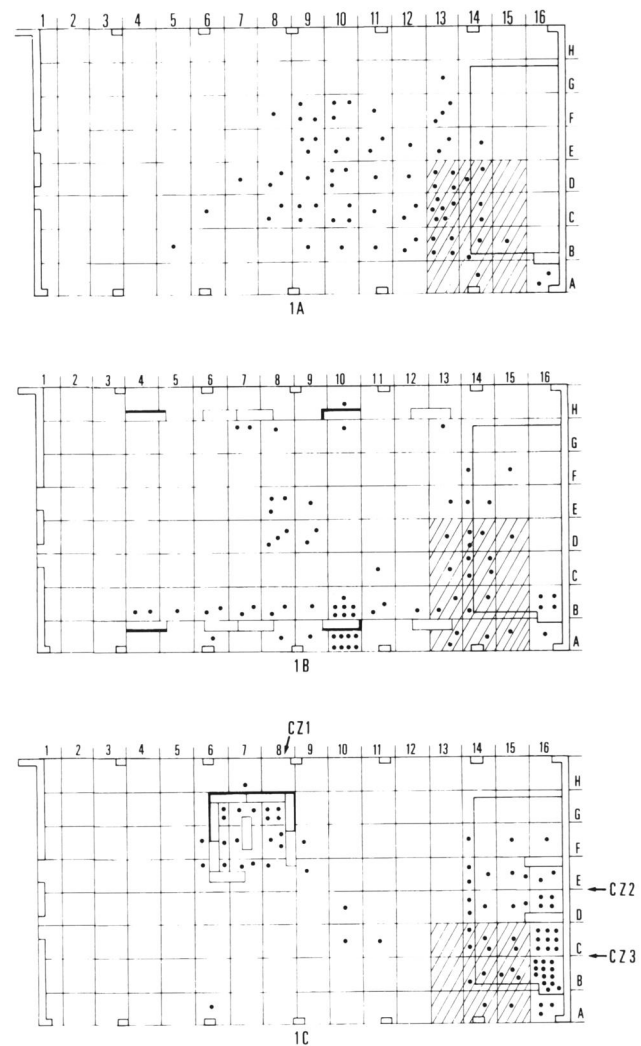


Figure 1. Spatial distribution of Group 1 children in each phase – 1a, Phase I; 1b, Phase II; 1c, Phase III. Each point indicates 1% of use of each square, considering all positions recorded in it and taking all positions recorded in the phase at 100%. The hatched portion indicates the area surrounding the adult's most frequent locations (greater than 20%). In 1b, smaller rectangular areas indicate the locations of shelves. In 1c, CZ1, CZ2 and CZ3 indicate the circumscribed zones away from the adult, near the adult, and unplanned zone, respectively.

Both figures show that the pattern of occupation of the space by the children changed at each phase. The pattern was the same in both day care centers, despite the differences between them.

Phase I

To analyze the children's occupation of the area around the adult, we tallied their positions in the same square in which the adult was located and in

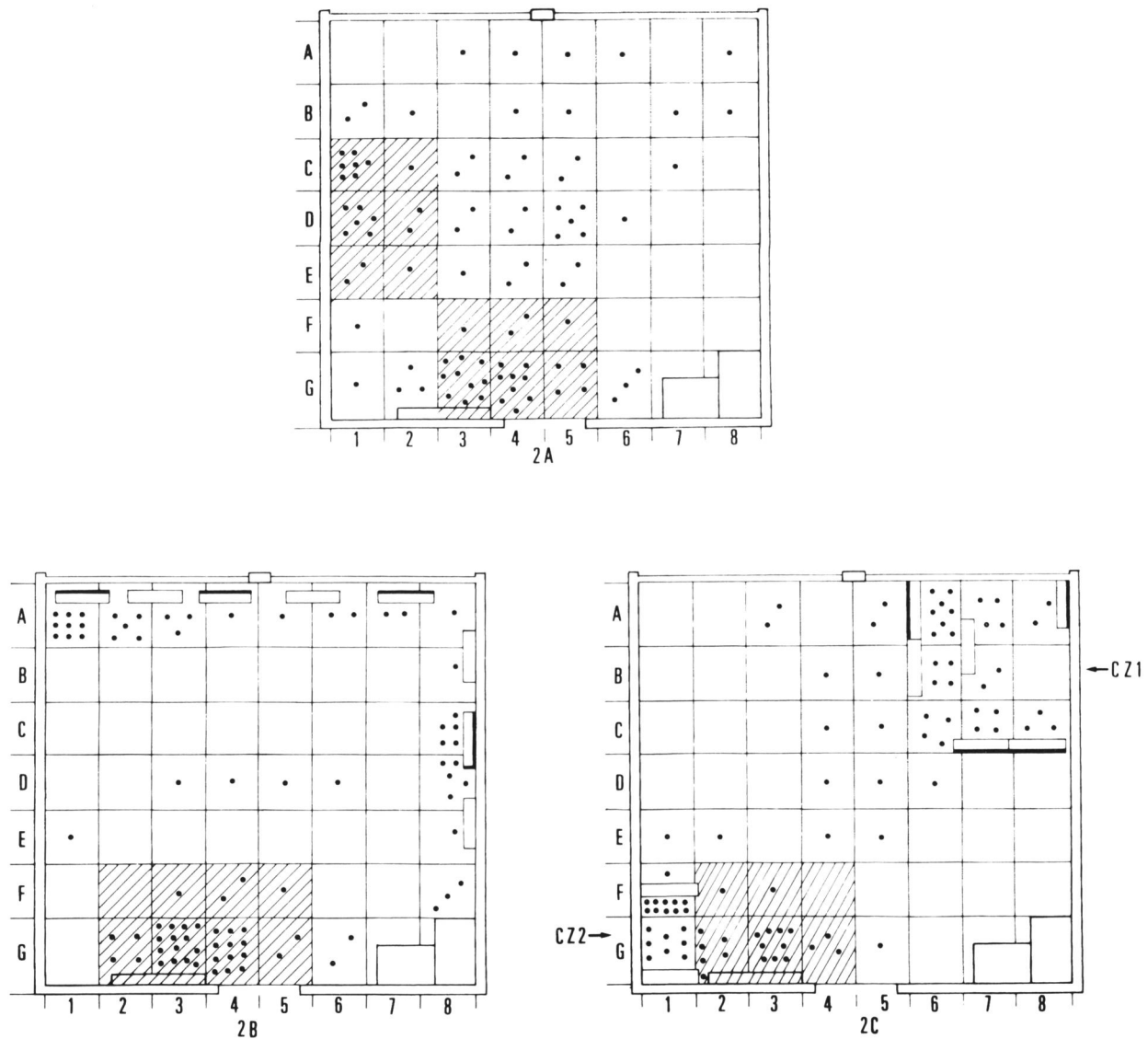


Figure 2. Spatial distribution of Group 2 children in each phase – 2a, Phase I; 2b, Phase II; 2c, Phase III. Each point indicates 1% of use of each square, considering all positions recorded in it and taking all positions recorded in the phase as 100%. The hatched portion indicates the area surrounding the adult's most frequent locations (greater than 20%). In 2b, smaller rectangular areas indicate the location of shelves. In 2c, CZ1 and CZ2 indicate the circumscribed zones away from and near the adult, respectively.

the eight immediately adjacent squares, according to the adult's position in each photo. Figures 1a and 2a show that the squares in the vicinity of the caretaker were more frequented by the children. Except for this concentration, the majority of the remaining squares had a low percentage of use; children spent their time over a wide area and moved frequently from place to place.

In Group 1, the caretaker usually moved around a lot, often playing games with the children or stimulating them to play. Squares B14 and C14 were most frequently occupied by the caretaker

(31%). The hatched area in Figure 1a indicates the eight squares surrounding squares B14 and C14.

In Group 2, the caretaker typically remained seated quietly and rarely played with the children. She remained primarily in the squares G3 (15%) and G4 (27%) and, in session 1, in square D1 (35%). The hatched area in Figure 2a shows the areas around squares D1 and G4. However, we considered the squares G3 and G4 as the area most frequented by the adult (42%), and used this area as the basis for her position in the subsequent phases.

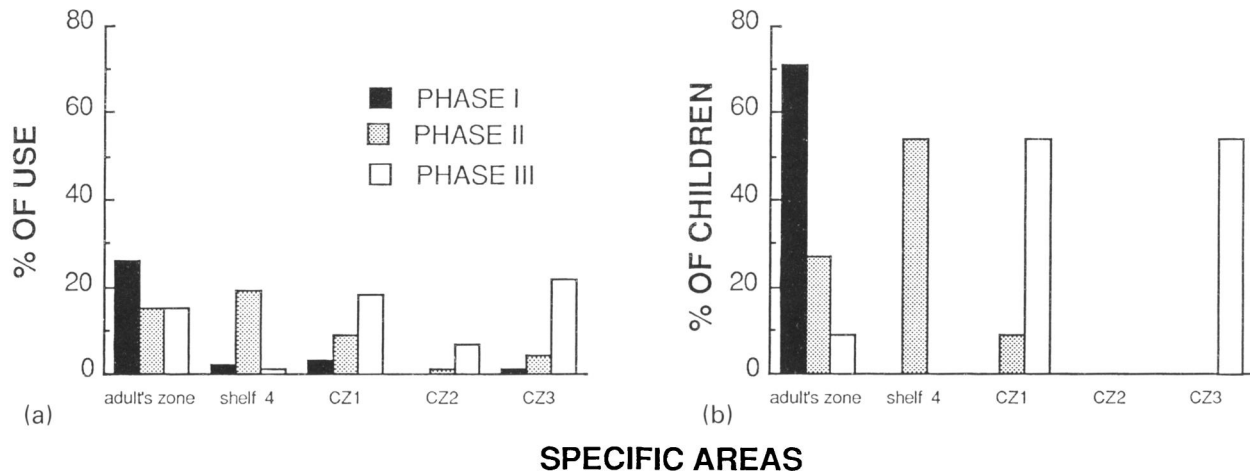


Figure 3. Percentage of use (a) and of children with minimum occupation of 20% (b) of specific areas by Group 1. Adult's zone, the area around the adult; shelf 4, the most used shelf in Phase II (and corresponding area in Phases I and III); CZ1, CZ2 and CZ3, circumscribed zones away from the adult, near the adult and unplanned zone, respectively structured in Phase III (and corresponding areas in Phases I and II).

Phase II

Figures 1b and 2b show a preferential use of the area around the shelves and around the caretaker.

The children in Group 1 showed a preferential use of the shelves located on the near side of the shed, which opened onto a central patio in which people frequently circulated (lines A and B, Figure 1b). The other side of the shed opened onto a sharp slope, making its use unsafe for the children. There was also a large concentration of children around the most structured shelf with the cardboard that formed a corner (shelf 4, squares A10/B10, Figure 1b).

In Group 2, there was a preferential use of areas around the two more structured shelves (shelves 1 and 7, squares A1/A2 and C8/D8, Figure 2b). Only shelf 7 had cardboard that formed a corner, but shelf 1, with a cardboard on the back, was located quite near the room's corner.

Figure 1b shows some frequenting of the central area of the shed where the scrap material had been placed. Few children remained in this area, however, and the material generally became spread around the shed. Consequently, it was not possible to analyze its effects.

Phase III

Figures 1c and 2c show a preferential use by the children of the circumscribed zones (CZ). Figure 1c shows, in addition to CZ1 and CZ2, a third, unanticipated circumscribed zone (CZ3). This

zone was not originally planned in the experimental design, but it was used by the children. CZ3 was delimited by one shelf, the wall, and the platform's slope with a little step. CZ3 was located as near to the adult as CZ2, and may actually have been more structured than CZ2, as a result of the difference in ground level. Some use of the adult's zone by the children was also observed.

Use of Specific Areas

Besides the percentage of occupation of specific areas, the data show the percentage of children with 20% or more of their positions recorded in each area. This minimum criterion of use was chosen as an indication of a minimum permanence in the area.

Group 1

The comparison among data obtained in Phase 1 and subsequent phases should be considered as suggestive rather than conclusive, due to the considerable alteration in the composition of the group between the initial phase and succeeding phases. In the statistical analyses, therefore, only data from the children who had participated in both Phases II and III were compared by means of the Wilcoxon Matched-Pairs Signed-Ranks Test.

Comparison of the data among phases, as shown in Figure 3, indicates that the children used the adult's zone more in Phase 1 and most of them met the minimum criterion of its use. Despite the

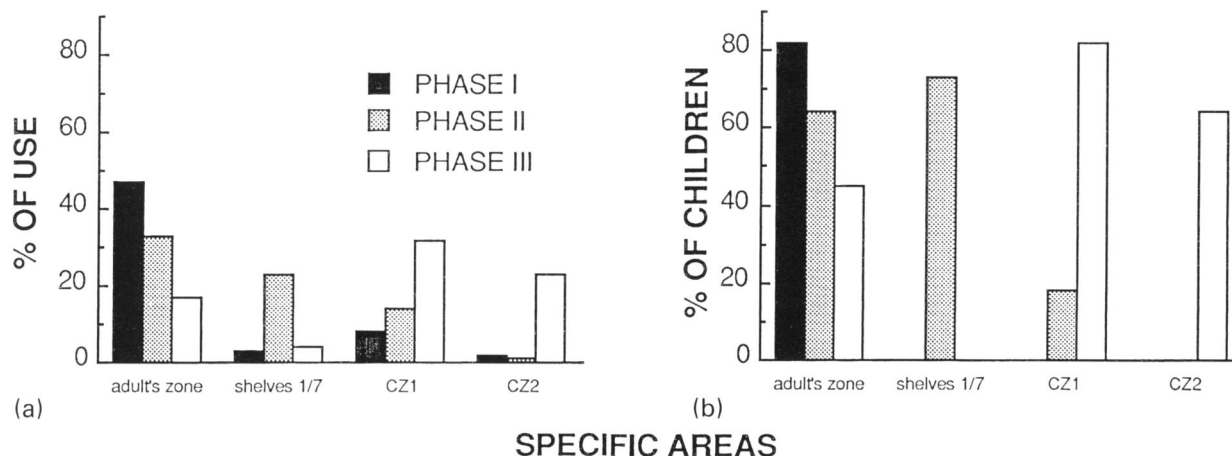


Figure 4. Percentage of use (a) and of children with minimum occupation of 20% (b) of specific areas by Group 2. Adult's zone, the area around the adult; shelves 1 and 7, the most used shelves in Phase II (and corresponding areas in Phases I and III); CZ1 and CZ2, circumscribed zones away from and near the adult, respectively structured in Phase III (and corresponding areas in Phases I and II).

same percentage of use of the adult's zone in Phases II and III, a much smaller proportion of children reached the minimum criterion in Phase III. In this phase just one child remained close to the caretaker, the same child that had exhibited the highest percentage of permanence in the adult's zone since Phase II.

In Phase II, the area around the most used shelf, shelf 4, shows a percentage of use slightly higher than that of the adult's zone (see Figure 3). However, the number of children who reached the minimum criterion of permanence in the area around shelf 4 was twice that of the adult's zone. The use of the area around this shelf was substantially greater than the use of the same space in the two other phases (empty spaces in Phases I and III). This result makes clear that use of that area in Phase II was due to the placement of the shelf. There was a significantly higher occupation of this area in Phase II than Phase III ($T = 0, p < .005$).

The two most structured circumscribed zones (CZ1 and CZ3) were preferentially used in Phase III and most of the children met the minimum criterion of permanence. CZ2 was the least used zone and also had a lower percentage of use than even adult's zone. If a 1 m area around CZ1 is also considered, its percentage of use increases from 18% to 25%. More important, only one child did not reach the minimum criterion of its use. This was the same child who had always remained close to the caretaker, since Phase II; even this

child, however, used it for a longer period in the last session than the preceding sessions.

The percentage of use of the area corresponding to CZ1 increased from Phase I (empty space) to Phase II (see Figure 3). This may have resulted from the placement of two shelves in that area in Phase II. In Phase III, however, there was a higher use of each of the three circumscribed zones than the use of same spaces in the preceding phases, with a significant difference between Phases II and III (CZ1: $T = 2, p < .005$; CZ2: $T = 0, p < .005$; CZ3: $T = 0, p < .005$). These data indicate that the establishment of circumscribed zones clearly affected the children's spatial use.

Group 2

The data from children who had participated in all of the three phases were compared by means of a Friedman Two-Way Analysis of Variance. All post hoc tests were by multiple comparison.

Figure 4 shows that the adult's zone was most frequently used in Phase I, and this use gradually decreased over phases, with a significant difference between Phases I and III ($\chi^2 = 10.5, p < .006$; $R1 - R3 = 13.5, p < .013$). A gradual decrease over phases was also observed in the number of children who reached the minimum criterion of use of the adult's zone. In Phase I the majority of the children had stayed in this zone.

In Phase II, the use of the area around shelves 1 and 7, the most used shelves, was 10% less than in the adult's zone, but a slightly larger number of

children stayed in it than in the adult's zone, according to the minimum criterion of permanence (see Figure 4). The fact that the use of the area around the shelves 1 and 7 was clearly higher than the use of the corresponding spaces in the two other phases suggests that its use in Phase II was due to the placement of the shelves. However, a significant difference was observed only between Phases I and II ($\chi^2 = 6.5$, $p < .004$; $R1 - R2 = 10.5$, $p < .048$).

In Phase III, children preferentially used the two circumscribed zones (CZ1 and CZ2). Moreover, their use of CZ1, the most structured zone away from the caretaker, was almost twice that of their use of the adult's zone in this phase. Also, a greater number of children reached the minimum criterion of use in CZ1 and CZ2 than in the adult's zone. If the 1 m area adjacent to CZ1 is also considered, then its percentage of use increases from 32% to 38%. Most important, all children reached the minimum criterion of permanence in CZ1.

Figure 4 also shows clearly the greater use of the circumscribed zones in Phase III than the use of the same areas in the preceding phases. The use of the area of CZ2 was significantly higher in Phase III than the two preceding phases ($\chi^2 = 13.72$, $p < .013$; $R1 - R3 = 12.5$, $p < .013$; $R2 - R3 = 14.5$, $p < .013$). The use of the corresponding area of CZ1 increased significantly from Phase I to III ($\chi^2 = 8.67$, $p < .010$; $R1 - R3 = 12$, $p < .013$). In Phase II however, the corresponding area of CZ1 had included two shelves, one of which was shelf 7, which had been used frequently by the children.

DISCUSSION

When the data obtained in Phases I and III are compared a greater use of the adult's zone during the open arrangement of Phase I than in the more structured semi-open arrangement of Phase III is shown. In spite of the different behaviors of the two caretakers in Phase I, both in terms of their movement and their involvement in the children's activities, a similar pattern of children's spatial distribution was observed in the two day care centers: except for their tendency to stay near the caretaker, children were otherwise highly dispersed and changed locations frequently. This pattern offers evidence of the significant role of

adults in large and empty settings with a scarcity of materials.

In spite of the increasing skills of the under-three-year-olds in establishing and maintaining peer interactions (Baudonnière, 1988; Hartup, 1983), they do need some environmental support for their interactions. Because the role of objects has been well documented as necessary to peer interactions, the scarcity of objects during free-activity periods in the two day care centers may have contributed to the children's remaining in close proximity to the adult and to their frequent movements. However, a similar pattern of behavior was observed by Legendre (1983, 1987) in two- to three-year-old children, in French day care centers, during free-activity periods in playrooms that also had an open arrangement. Because those playrooms contained a greater quantity of equipment, furniture, and objects than the day care centers of the present study, we suggest that the common pattern of results reflects the influence of the open arrangement on the spatial distribution of two- to three-year-old children.

Although the comparison between Phases I and III supported the hypothesis 1 – more frequent use of the adult's zone in open arrangement than in semi-open arrangement – we did not observe this in the data from Phases II (open arrangement) and III (semi-open arrangement). Surprisingly, in Group 1 children exhibited the same use of the adult's zone in both phases, but few children reached the minimum criterion of permanence in that zone. Although the use of adult's zone had decreased across phases in Group 2, the decrease was not significant.

This unexpected result may indicate the supportive role for the children's spatial distribution and activities that the shelves had in the open and poorly equipped space of both Centers. Chiefly in the less structured space of the open shed of Group 1, the shelves provided some enclosure in Phase II. Also, the less structuring behavior of Group 1's caregiver after Phase I, which was due to our instructions to avoid getting involved in the children's activities, may have allowed them more opportunity to use the area around the shelves than the adult's zone.

In fact in Phase II, children in both day care centers preferentially occupied the area around the shelves, especially the most structured

shelves. Because the shelves were the unique, accessible equipment in this broad and empty space with a scarcity of objects, they constituted a strong point of attraction for the children. We observed the children using the shelves as support both for their objects and for their activities (e.g., they climbed, lay down, sat down on the shelves, etc.). These activities were completed individually as well as in groups of two or more, without the caretaker. In Phase I, in contrast, groups of children usually engaged in activities only when the caretaker was also involved.

Besides the supportive role of the shelves in Phase II, in Group 1 the two circumscribed zones near the adult may have contributed to an increase in the use of the adult's zone, during Phase III, as a passage of children from or to those zones, particularly the highly occupied CZ3. Individual analysis indicated that three out of the five children who showed an increase of the occupation of the adult's zone from Phase II to III, had a very large number of positions recorded in the circumscribed zones near the caretaker. Moreover, the fact that only one child reached the minimum criterion of permanence in the adult's zone in Phase III reinforces the idea that its use was mainly due to the passage from or to the circumscribed zones.

An appraisal of the results obtained in those analyses supports a systemic view of development as they clearly point to the interdependence of the adult's role, the spatial structure of the environment, the scarcity of objects, and the developing social skills of those young children.

The supportive role of the circumscribed zones was confirmed in Phase III, as children demonstrated a clear preference for them especially for the most structured (CZ1 and CZ3 in day care center 1; CZ1 in day care center 2). These data confirm our hypothesis 2 about the attractive role of that kind of zone. Moore (1983, 1987) has also called attention to the importance of well-defined areas inside a playroom; besides other features, there should be an enclosed space with clear boundaries.

What might be the possible function of the circumscribed zones? Legendre's data (1983, 1987, 1989) and our own subsequent observations have revealed that young children are able to remain in

the circumscribed zones in small groups, generally in dyads, and participate in joint activities without the adult's mediation. In general, these shared activities are more lasting and structured than their activities in other areas. Therefore, the circumscribed zones appear to promote and sustain peer interactions. They may facilitate the continuity of play activities by diminishing the probability of interruption by other children or by the caretaker – an occurrence that is frequent in open spaces. The circumscribed zones may also provide a sense of protection or privacy, allowing the children to focus more their attention on the activity being developed and on the partner's behavior in a joint activity. The ability of children to exhibit mutual orientation or joint attention is considered essential for the occurrence of peer interactions (Camaioni, 1980). In contrast, in the adult's zone few peer interactions transpire; instead, children's efforts are directed towards attempts to interact with the caretaker. This result is consistent with Hartup's (1983) analysis that the adult is a prime competitor for the child's attention. In the adult's zone, therefore, it is hardly surprising that peer contact among children was minimal.

The evidence of the selection of more structured areas by children so young indicates their perceptual ability to discriminate such areas: Phase I, adult's zone; Phase II, shelves; and Phase III, circumscribed zones. Especially in day care Center 1, the use of the unplanned circumscribed zone (CZ3) makes clear the children's active role in the choice of areas to carry out their activities. This selectivity is not specific to young children but has also been reported for adults (e.g., Proshansky *et al.*, 1970; Sommer, 1969). Perhaps this selectivity is a fundamental characteristic of human social organization that appears quite early in the development.

Valsiner (1985, 1987, 1989) has argued that the physical structure of the environment is established by the caregivers in accordance with their personal goals and on the basis of their interpretations of cultural expectations, which in turn generate expectancies about children's behaviors. In addition, we believe that the spatial arrangement of environments for children in groups, for example, in day care centers, shows a linkage with the educational philosophy of the day care center. Even in better equipped day care centers, we observed the caretaker placing the

furniture near the walls to obtain a large and empty central space, suggesting an assumption that young children need an open space to engage in physical play activities. Moreover, an educational model centered on the adult's role, may view young children as unable to remain in a joint activity without the caretaker's mediation. An open spatial arrangement might facilitate adult direction. However, with Stambak and Verba (1986) we question the adequacy of that model, a model which is widely diffused in day care centers of most countries.

Furthermore, Stambak and Verba (1986) and our own studies (Rossetti-Ferreira et al., 1991) have shown that very early, young children are able to play together with no direct mediation of the adult. The caretaker should structure and organize the environment and the routine in order to promote the children's involvement in activities and interactions with peers. By doing so, she/he will be more available for interaction with an individual child who, at a given moment, needs her/his cuddling or attention, or free to develop an interesting activity with a small group of children.

The organization of the physical environment, including the spatial arrangement, often contributes to the quality of care provided. Besides the physical aspects, there are other features contributing to the quality of care. For example, Brazilian day care centers for low-income families, which usually present a low quality of service, generally are linked to social-assistance organizations, with emphasis on the security, hygienic, and nutritional features; there is little official financial support, and nonqualified staff with an excessive quantity of work, etc. (Campos, 1992).

In conclusion, the considerable similarity in the children's spatial distribution across the two day care centers as well as with Legendre's data, in playrooms that had the same kind of the spatial arrangement but many other different aspects, ensures the generalization of our results to other similar groups in similar conditions.

The present study was important for the elaboration of our educational proposal for day care centers, which emphasizes the importance of both peer interactions and adult-child interactions for the development of the child. After the conclusion of data collection and analysis, we had

an opportunity to give guidance to the staff of both day care centers, particularly about the organization of the space; again, it was evident that the spatial arrangement is one aspect of the environmental context that exerts a major influence on the pattern of use of the space by children, and consequently, on the opportunity for interactions among them and with the adult as well. As a result, besides other aspects emphasized in the current literature (e.g., Weinstein & David, 1987), the spatial arrangement must also be considered in the future design of education and caretaking settings for young children in groups.

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