

Use of Space by Children in Day Care Centers

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Results of studies we carried out in day care centers show the influence of spatial arrangement on the use of space and on children's activities. Following an ecological experimental methodology, data were recorded with photographic or video cameras throughout three phases. In the first one, in most studies, we kept the usual spatial arrangement (an empty central space, without circumscribed zones); in the second one, small shelves were put along the periphery of available space; the same shelves were used to structure the circumscribed zones in the last phase. An analysis performed on records, every 30 seconds or every minute, of the children's positions indicated the preferential use of specific areas, according to the kind of spatial arrangement and to the manipulated variables. Our results contribute to the understanding of the interdependence between spatial arrangement and the structuring role of the adult in peer interactions.

Index terms: Environmental psychology. Spatial arrangement. Peer interaction. Day care centers.

Ocupação do espaço por crianças em creches. Para evidenciar a influência do arranjo espacial sobre a ocupação do espaço e sobre as atividades infantis, apresentamos os principais resultados de nossas pesquisas com grupos de crianças em creches. Seguindo a metodologia da experimentação ecológica, registros foram tomados através de câmeras fotográficas ou de vídeo, em três fases. Na fase inicial, na maioria dos estudos, vigorava o arranjo espacial habitual (espaço central vazio, sem zonas circunscritas). Numa segunda fase, foram introduzidas estantes baixas nas laterais do local; essas estantes foram usadas para a montagem das zonas circunscritas, na última fase. A análise a cada 30 segundos, ou de minuto em minuto, da posição espacial de cada criança evidenciou a preferência por áreas específicas, dependendo do tipo de arranjo espacial e das variáveis manipuladas. Nossos resultados contribuem para a compreensão da interdependência entre o arranjo espacial e o papel estruturador da educadora no contato entre crianças pequenas.

Descritores: Psicologia ambiental. Arranjo espacial. Interação infantil. Creches.

The different ways of organizing space offer support to a wide diversity of social behaviors. Spatial organization is especially relevant in day care centers, where an adult takes care of many children and where partners most available for interaction are other children. Child-child interactions are as important as adult-child interactions for child development: they have different functions and demand different competencies from children (Carvalho and Beraldo, 1989; Hartup, 1987; Oliveira and Rossetti-Ferreira, 1993).

The younger the children, the more spatial organization supports their activities (Olds, 1987). Space is never neutral: the presence or absence of some elements and their organization always transmits a message, directly or indirectly to space users (Campos-de-Carvalho and Rubiano, 1996; David and Weinstein, 1987; Forneiro, 1998; Weinstein and Mignano, 1993).

A few studies, such as those of Legendre (Legendre, 1986; Legendre and Fontaine, 1991) and of Moore (1987) have investigated the

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influence on children behavior of open and closed environments, that is the presence or absence of barriers in the activity area.

In his studies with 2 to 3-year-old children in French day care centers, Legendre (1986, 1989, 1999) described three types of spatial arrangement, according to the way furniture and equipment are distributed and positioned in relation to each other: (1) *visually open arrangements* (called semi-open arrangements, in Legendre's first studies) which allow the children to have a complete view of the playroom, and which are characterized by the presence of circumscribed zones (areas delimited, at least on three sides, by barriers such as furniture, walls, a difference in ground level, etc.); the use of low barriers is necessary to permit children to see the caregiver, a requisite due to the attachment behavior typical of this age group (Rossetti-Ferreira, 1984); (2) *open arrangements*, characterized by the absence of circumscribed zones, usually with an empty central space; (3) *visually restricted arrangements* (closed arrangements, in Legendre's previous denomination): physical barriers such a high pieces of furniture divide the playroom into two or more areas and obstruct visual access to the caregiver. Children usually use circumscribed zones when they are available and it is in such zones that affiliative interactions among them take place. In the two other types of arrangements, the children tend to stay around the adult but do not have much interaction with him/her. Caregivers arrange the space in this or that way depending either on their assumptions about child development and education or on the assumption of those who run the organization, even if such assumptions are not explicitly stated (Campos-de-Carvalho and Rubiano, 1996).

Using Legendre's studies as a starting point, and the systemic and ecological perspective (Barker, 1965; Bronfenbrenner, 1979, 1993; Bronfenbrenner and Morris, 1998; Campos-de-Carvalho, 2003, in press; Stokols, 1978), we have been studying the influence of spatial arrangements on the use of space by groups of young children in day care centers and have assessed the contribution of spatial arrangement on the occurrence of interactions

of children with other children or with adults. We use an ecological experiment methodology (Bronfenbrenner, 1977, 1979) in which there is a systematic manipulation of a single variable – in our case, spatial arrangement – keeping constant the other environmental features. In other words: manipulations are done in the inside of the ecological system where the studied phenomenon occurs, keeping, as much as possible, the web of interdependency among other environmental features.

I here pretend to present a summarized account of the main results obtained in our studies with groups of children in day care centers, giving special attention to the support offered by spatial arrangement for the use of space and the occurrence of children activities (detailed descriptions may be obtained in the original articles listed in the references).

We began our studies with groups of 2 to 3-year-old children and their caregivers in two custodial day care centers of the region of Ribeirão Preto (State of São Paulo, Brazil) and in the day care center of the University of São Paulo at Ribeirão Preto. More recently, we extended our study to groups of 1 to 2-year-old children and 3 to 4-year-old children in municipal day care centers of Ribeirão Preto.

We assessed the preference of children for specific spatial areas simultaneously available in the playroom by analyzing the spatial location of the caregiver (or caregivers) each minute (or each 30 seconds, in our initial studies), following the behavioral mapping technique (Elali, 1997; Ledingham and Chappus, 1986; Proshansky, Ittelson and Rivlin, 1970; Sommer and Sommer, 1997).

We examined the influence of three sets of variables on the use of space by children. *First group*: studies investigating what we called *immediate context variables*, such as localization and size of the circumscribed zone (Campos-de-Carvalho and Rossetti-Ferreira, 1993); manipulation of variables such as circumscription (circumscribed zones versus areas without circumscription), support surface (circumscribed zones furnished with shelves with and without a support surface) and number of

circumscribed zones (the presence of one to three circumscribed zones) (Campos-de-Carvalho and Mingorance, 1999). *Second group*: studies about *variables of the interaction situation* such as group size (two, three, four, five or more components (Meneghini and Campos-de-Carvalho, 1997), types of groups (preferential or non-preferential groups) (Campos-de-Carvalho and Padovani, 2000). *Third group*: studies about *personal variables* such as level of interactions (subgroups of children with high, medium and low interaction frequency (Meneghini and Campos-de-Carvalho, 2000); age (spatial use pattern of groups of children aged 1-2, 2-3, and 3-4) (Bonfim and Campos-de-Carvalho, 2002).

Trying to preserve the complexity of the ecological system in the analysis of one of its components, our manipulations of the spatial arrangement are done within the ecological system in which the phenomenon under study occurs (relationship between spatial arrangement and spatial use), that is, in the usual meeting place and time of the groups of children and their caregivers, already familiarized to each other, for free activities. Data collection is only performed if the caregiver and at least 70% of the children of the group are present. Furthermore, we try to maintain the remaining environmental conditions: the materials of the day care center commonly used by the group are employed; the caregiver, as ordinarily, is responsible for the duration of the sessions; data recording is done automatically by cameras (both photographic and video) in the absence of the researcher and camera operator. Other methodological cautions are taken: the cameras are camouflaged, their wooden supports are always present but also hidden (cameras are attached to them before recording sessions); data collection is done with the usual arrangement of the place before it is spatially manipulated; familiarization of the group (children and caregiver) with the new arrangement occurs before recording begins, etc.

Our procedure includes three phases of manipulation of the spatial arrangement. There are at least two sessions for data collection in each phase, during the free activities. In most of our studies, the first phase occurs when the place is still in its usual spatial arrangement,

generally characterized by an empty central space without circumscribed zones (areas delimited – at least on three sides – by barriers: furniture, walls, a difference in ground level, etc.). To introduce circumscribed zones into the usual arrangement, it is always necessary to include low wooden shelves, used to delimit the zones, as day care centers do not dispose enough furniture or even lack furniture. During the intermediate phase, the shelves are placed at the periphery of the place, in order to maintain the usual spatial arrangement (empty central space and absence of circumscribe zones). Data recording starts after twelve days of familiarization of the group with the shelves, a necessary methodological precaution since we are not interested in the immediate reaction of children to the transformations introduced. In the next phase, two circumscribed zones are structured using, whenever possible, a corner of the room to delimit two sides and putting low shelves to structure the other two sides, keeping a small opening for children to get in and out. Figure 1 shows, as an example, a room with a group of 2-3-year old children in the three phases of the study.

The results of our studies have shown the importance of spatial arrangement as a support to the use of space by children and to their activities. They have also shown the interdependency between the type of spatial arrangement and the structuring role of the caregiver. Some of the basic results are now highlighted.

1. In *less structuring arrangements* (arrangements without circumscribed zones, in which the adult was the sole structuring element of the environment ; or arrangements with only one circumscribed zone), we observed: (a) a stronger role of the adult, in the sense of keeping many children around him/her. This aspect was more evident when we compared the spatial distribution of two types of children groups, the preferential groups (with a frequency of association between members of two or more standard deviations above the mean frequency of association for the whole group) and the non-preferential ones (which did not meet this criterion).



Figure 1. Pictures of a 2 to 3-year-old children's playroom spatial arrangement, during each phase of data collection. From top to bottom: phase 1, phase 2, phase 3a, phase 3b.

We found that proximity to the caregiver was more frequent in non-preferential groups, as the use of the area around the adult (the *adult zone*) was significantly higher in a spatial arrangement without circumscribed zones; (b) higher frequencies of the following classes of behavior, in the adult zone: spectator (attentive observation of people or of the situation), isolated activities (which also occurred frequently in other areas of the room) and peer interaction (which had similar frequency of occurrence in the circumscribed zone with a support surface).

2. *More structured spatial arrangements* (with at least two circumscribed zones) lead to: (a) a reduction in the use of the adult zone; in this area, isolated activity, spectator and interaction behaviors were significantly lower than in the case of less spatially structured arrangements; (b) a decrease in groups formed with the adult and an increase in number of groups formed of children, either preferential ones (with members who often associated with one another) or non-preferential ones, but especially so for those with three or more children; (c) a higher occurrence of peer interaction, socially directed and spectator behavior and a reduction of isolated activity; (d) a preferential use of circumscribed zones, with a significant difference in non-preferential groups. The four classes of behaviors occurred with a significantly higher frequency in the circumscribed zone with a support surface than in other areas; particularly, peer interactions occurred more significantly in this zone in all the types of arrangements. With a higher number of circumscribed zones, there was also a significant use of such zones with support surface in the isolated activities and socially directed behavior; (e) less isolated activity and spectator behavior in children with high interaction frequency; in this case, there was less peer interaction in the adult zone (a significant decrease relatively to arrangements with a smaller number of circumscribed zones), while children with a low level of interaction did not perform any interaction in the circumscribed zones.

3. The analysis of *spatial distribution patterns* for different age groups showed that children aged 3-4 displayed a pattern of space use similar to the one observed with children aged 2-3: in the usual arrangement, without circumscribed zones, there was a preferential use of the area around the caregiver; in the phase when shelves were introduced, still without circumscribed zones, a preferential use of space around the shelves was observed; in arrangements with circumscribed zones, such zones were preferentially used. Children aged 1-2 showed a different pattern of behavior in arrangements with circumscribed zones: they showed a similar frequency in these zones as in the adult zone. This indicates that children of this age need more the proximity of the caregiver than older children, in any type of spatial arrangement, due probably to the existence of attachment behaviors (Rossetti-Ferreira, 1984).

Our results contribute to the understanding of the interplay of spatial arrangement and the structuring role of the caregiver in the way small children interact with each other, and indicate that spatial arrangement is a relevant mediating feature of peer interaction. They indicate that, in arrangements without circumscribed zones, non-preferential groups and groups with three or more children keep close to the caregiver, a result which highlights the supporting role of the caregiver in an empty space, with scarcity of material and furniture. Circumscribed zones offer support for such groups. Besides, we found a preferential use of circumscribed zones, especially the ones with a support surface, for the occurrence of peer interaction, of socially directed behavior and of isolated activity.

The preference for circumscribed zones can be attributed to the feelings of protection and privacy such types of spatial zone offer to children, and to the fact that they facilitate the continuity of children activities by reducing the probability of interruption by other children or by the caregiver, as often occurs in non-circumscribed areas. In our studies, the circumscribed zones were the only spatial areas of the place which offered some privacy to children. Among the three types of private

spaces – individual, intermediate and semi-public (Olds, 1987; Trancik and Evans, 1995), the circumscribed zone would be classified as an intermediate private space (activities carried out in subgroups with few children), being also a shelter to the excess of stimulation from activities in larger groups (semi-public space). The circumscribed zone can also help the child to focus his/her attention on the activity and on partners' behavior, a necessary condition, according to Camaioni (1980), for the occurrence of longer interactions among children, especially those less than three years old, a period during which the social and verbal abilities are still developing.

We have also shown, using as a framework the theoretical-methodological Network of Meanings Perspective (Rossetti-Ferreira, Amorim and Silva, 2000), that the circumscribed zones may facilitate the appearance of specific action, expectancy, meaning and intention repertoires related to activities which usually occur, in our culture, in delimited and elevated surfaces such as tables, chairs, beds, ovens, cars, big cushions, benches, shelves, closets, etc. The circumscribed zone, especially the one delimited by shelves with a support surface, favors the present appearance of meanings, actions and knowledge already experienced by many children (coconsidering, therefore, the ontogenetical time), facilitating the sharing of activities in the here/now and the occurrence of longer interactions which consequently supports the creation of new games and new meanings shared by those children who took part of that construction during interaction (Carvalho, 1992).

Our results have relevant implications either from the practical or from the theoretical point of view. From the practical point of view, they point to the relevance of spatial arrangement in the planning of children activities in day care centers to favor not only interactions among children but also their interactions with adults. Through low cost manipulations, structuring the space with circumscribed zones, the caregiver promotes interaction among children without his/her direct mediation and may become more available to establish contact with an individual

child or with a subgroup, and to contribute thus to the improvement of quality in the collective care of young children.

The organization of educational spaces for children (either internal or external) so that children have autonomy to explore and to decide where, how, with what and with whom they will use such spaces is a way of promoting security, comfort, personal identity, interest, growth, competence and autonomy in children. Besides circumscribed zones, it is important to offer rest zones (as cushions, mattresses, large steps, etc.) which give children the opportunity to rest without getting out of the activity area, and areas which allow more privacy, either for small subgroups (circumscribed zones of different sizes can facilitate the choice of areas and activities requiring different number of participants) or single children. The presence of undefined areas for the children to structure in a creative way are also important (Campos-de-Carvalho and Rubiano, 1996; David and Weinstein, 1987; Forneiro, 1998; Olds, 1987; Prescott, 1987; Weinstein and Mignano, 1993).

There are two general points to be discussed, from a theoretical point of view. The first point is about the emphasis on systemic and ecological perspectives, which constitute the framework for our studies, put on the interdependence and dynamic influence of variables, especially the contextual ones, on human behavior. Some authors (Kaplan, 1988, among others) ask instead researchers to focus on variables which have considerable control over behavior, health and welfare of people, regardless of the assumption of complex and reciprocal influences among variables. Our studies have shown that spatial arrangement is one of such variables, especially if collective environments of children under three years of age are taken into account.

The second point, related to the first one, is about the similarity between data we collected in different day care centers, as well as between our results and those of Legendre obtained with children aged 2-3 in Parisian day care centers, in sites with the same type of arrangement as our places but different in many other aspects. Such similarity allows us to generalize our results to other educational contexts with young

children, especially day care centers. Generalization of findings is, however, but one among the difficulties faced by an ecological approach (Campos-de-Carvalho, 1993; Weiz, 1978; Wohlwill, 1980).

References

- Barker, R. G. (1965). Exploration in ecological psychology. *American Psychologist*, 20, 1-14.
- Bomfim, J. A. O. & Campos-de-Carvalho, M. I. (2002). Arranjos espaciais e ocupação do espaço por crianças de 1-2 e 3-4 anos em creches. *Artigos do V Seminário de Pesquisa (Tomo II) do Programa de Pós-Graduação em Psicologia do Departamento de Psicologia e Educação da Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto – Universidade de São Paulo*, 139-148.
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 513-531.
- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge: Harvard University Press.
- Bronfenbrenner, U. (1993). The ecology of cognitive development: Research models and fugitive findings. In R. H. Wozniack & K. W. Fischer (Eds.), *Development in context: Acting and thinking in specific environments*. New Jersey: Erlbaum.
- Bronfenbrenner, U. & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology* (Vol. I). New York: Wiley.
- Camaioni, L. (1980). *L'interazione tra bambini*. Roma: Armando Armando.
- Campos-de-Carvalho, M. I. (1993). Psicologia ambiental - Algumas considerações. *Psicologia: Teoria e Pesquisa*, 9, 435-447.
- Campos-de-Carvalho, M. I. (2003). Pesquisas contextuais e seus desafios: Uma contribuição a partir de investigações sobre arranjos espaciais em creches. *Estudos de Psicologia*, 8, 289-297.
- Campos-de-Carvalho, M. I. & Mingorance, R. C. (1999). Zonas circunscritas e ocupação do espaço por crianças pequenas em creche. *Revista Interamericana de Psicologia*, 33, 67-89.
- Campos-de-Carvalho, M. I. & Padovani, F. H. P. (2000). Agrupamentos preferenciais e não preferenciais e arranjos espaciais em creches. *Estudos de Psicologia*, 5, 443-468.
- Campos-de-Carvalho, M. I. & Rossetti-Ferreira, M. C. (1993). Importance of spatial arrangements for young children in day care centers. *Children's Environments*, 10, 19-30.
- Campos-de-Carvalho, M. I. & Rubiano, M. R. B. (1996). Organização do espaço em instituições pré-escolares. In Z. M. R. Oliveira (Ed.), *Educação infantil: Muitos olhares*. São Paulo: Cortez, 3ª ed.
- Carvalho, A. M. A. (1992). *Seletividade e vínculo na interação entre crianças*. Tese de livre-docência não publicada. Instituto de Psicologia da Universidade de São Paulo. São Paulo, SP.
- Carvalho, A. M. A. & Beraldo, K. E. A. (1989). Interação criança-criança: Ressurgimento de uma área de pesquisa e suas perspectivas. *CADERNOS de Pesquisa*, 71, 55-61.
- David, T. G. & Weinstein, C. S. (1987). The built environment and children's development. In C. S. Weinstein & T. G. David (Eds.), *Spaces for children - The built environment and child development*. New York: Plenum.
- Elali, G. A. (1997). Psicologia e Arquitetura: Em busca de locus interdisciplinar. *Estudos de Psicologia*, 2, 349-362.
- Forneiro, L. I. (1998). A organização dos espaços na educação infantil. In M. A. Zabalza (Ed.), *Qualidade em educação infantil*. Porto Alegre: ArtMed.
- Hartup, W. W. (1987). Relations and growth of social competence. In *International Society for the Study of Behavioural Development, China Satellite Conference*, Beijing, China.
- Kaplan, S. (1988). Comment about "Handbook of Environmental Psychology"- Some principles the "Handbook" left out: Notes to the neophyte researcher interested in changing the world. *Journal of Environmental Psychology*, 8, 165-166.
- Ledingham, J. E. & Chappus, F. T. (1986). Behavioral mappings of children's social interactions: The impact of the play environment. *Canadian Journal of Research in Early Childhood Education*, 1, 137-148.
- Legendre, A. (1986). Effects of spatial arrangements on child/child and child/caregivers interactions: An ecological experiment in day care centers[artigo completo]. *Anais da 16ª Reunião Anual de Psicologia da Sociedade de Psicologia de Ribeirão Preto*, 131-142.
- Legendre, A. (1989). Young children's social competences and their use of space in day-care centers. In B. H. Schneider, G. Attili, J. Nadel & R. Weissberg (Eds.), *Social competence in developmental perspective* (pp. 263-276). Holland: Kluwer.
- Legendre, A. (1999). Interindividual relationships in groups of young children and susceptibility to an environmental constraint. *Environment and Behavior*, 31, 463-486.
- Legendre, A. & Fontaine, A. M. (1991). The effects of visual boundaries in two- year- olds' playrooms. *Children's Environments Quarterly*, 8, 2-16.

- Meneghini, R. & Campos-de-Carvalho, M. I. (1997). Arranjo espacial e agrupamentos de crianças de 2-3 anos em creches. *Revista Brasileira de Crescimento e Desenvolvimento Humano*, 7, 63-78.
- Meneghini, R. & Campos-de-Carvalho, M. I. (2000). Relação entre áreas espaciais e interação de crianças pequenas em creche. *Artigos do III Seminário de Pesquisa (Tomo II) do Programa de Pós-Graduação em Psicologia do Departamento de Psicologia e Educação da Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto – Universidade de São Paulo*, 101-107.
- Moore, G. T. (1987). The physical environment and cognitive development in day care centers. In C. S. Weinstein & T. G. David (Eds.), *Spaces for children: The built environment and child development*. New York: Plenum.
- Olds, A. R. (1987). Designing settings for infants and toddlers. In C. S. Weinstein & T. G. David (Eds.), *Spaces for children - The built environment and child development*. New York: Plenum.
- Oliveira, Z. M. R. de & Rossetti-Ferreira, M. C. (1993). O valor da interação criança-criança em creches no desenvolvimento infantil. *Cadernos de Pesquisa*, 87, 62-70.
- Prescott, E. (1987). The environment as organizer of intent in child-care settings. In C. S. Weinstein & T. G. David (Eds.), *Spaces for children - The built environment and child development*. New York: Plenum.
- Proshansky, H. M., Ittelson, W. H. & Rivlin, L. (Eds.) (1970). *Environmental Psychology: Man and his physical settings*. New York: Holt, Rinehart & Winston.
- Rossetti-Ferreira, M. C. (1984). O apego e as reações da criança à separação da mãe. *Cadernos de Pesquisa*, 48, 3-19.
- Rossetti-Ferreira, M. C., Amorim, K. S. & Silva, A. P. S. (2000). Uma perspectiva teórico-metodológica para análise do desenvolvimento humano e do processo de investigação. *Psicologia: Reflexão e Crítica*, 13, 281-293.
- Sommer, B. & Sommer, R. (1997). *A practical guide to behavioral research: Tools and techniques* (4^a ed.). New York: Oxford University Press.
- Stokols, D. (1978). Environmental psychology. *Annual Review of Psychology*, 29, 253-295.
- Trancik, A. M. & Evans, G. W. (1995). Spaces fit for children: Competency in the design of day care center environments. *Children's Environments*, 12, 311-319.
- Weinstein, C. S. & Mignano, (1993). *Elementary classroom management*. New York: McGraw-Hill.
- Weisz, J. R. (1978). Transcontextual validity in developmental research. *Child Development*, 49, 1-12.
- Wohlwill, J. F. (1980). The confluence of environmental and developmental psychology: Signpost to an ecology of development? *Human Development*, 23, 354-358.

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