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"Unless children have the chance to experience novelty in the real world they will slip into the well-worn thoughtways of the adult status quo—biologically conservative before their time—where awareness is prematurely relegated to the nonconscious level of reflex, habit, and routine" - Robin C. Moore

The Environmental Design of Children-Nature Relations: Some Strands of Applicative Theory

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ABSTRACT. A brief framework for children-environment relations, focused on 8- to 12-year-olds and their natural environment, is based on the principles of maturation and Gestalt therapy. The concepts of "quality" and "place" are discussed. A comprehensive ecological framework is proposed, relating theory to the material resources used in place-making, together with a set of design criteria emphasizing the use of natural materials.

THE MATERIAL presented here focuses on "middle-aged", 8- to 12-year-old children; the nature of their relationship to natural resources; and some suggested criteria for the design of natural environments in urban areas. Let me stress that the focus is only partial. Children cannot be separated from society. Neither can nature be divorced from environment—they can only be distinguished. I write as a designer/researcher, interested in constructing a theoretical framework to guide more relevant research and help build child-environments that foster a higher degree of well-being. Thus far, my thoughts arise from a fruitful combination of theory, gleaned from clinical psychology, and natural ecology, plus my own empirical experience.

MATURATION AND ENVIRONMENT

The "principle of maturation", as reviewed by Hadfield *(1962)*, recognizes that the human organism is born with a set of innate capacities and urges that emerge in a predictable sequence of development. Although their initial appearance is presumed to be unrelated to external stimulation, their exercise and application are actually entirely dependent on the quality of the setting. As Hadfield says:

> "The [social] environment and the *material world* [my emphasis] . . . are the medium in and through which the potentialities in the child's nature are expressed and developed."

Thus, heredity and environment are a coacting duet. Heredity provides the potential for *action;* environment is the applicative *medium* for skill development, direction and purpose—what White *(1959)* calls the growth of *competence.*

Maturation theory enables us to identify and define stages of growth and development. It is quite unrealistic to treat children as a monolithic social group for the purposes of research and design. Hadfield identifies five "phases of development", from birth to adolescence, in terms of differing dominant characteristics. Before age 8 or so, a child's experience is mainly limited to the immediate home range by the scope of its natural desire to explore, plus parental fear of the world outside. Early childhood has included the playful exploration, discovery, imitation, and testing of the environment—a time of preparation, hopefully divorced from the harsher, dominating realities of the larger world. This has allowed the child's personality to emerge and be itself, without an irreparable amount of psychic warping.

THE PRIMITIVE YEARS

It is in their middle years (about 8 to 12) that children have their deepest and most extensive relationships with the outdoors. Hadfield (himself born in the South Sea Islands), calls this period the "primitive age" reflecting its behavioral characteristics. It is a phase when the child applies nascent skills to the real world, while still unaware of its real problems. The child can play beyond the now extinct functions of the home shelter, parental protection, and the necessity for adult endorsement.

These middle years are a unique period of freedom, health, and vitality (e.g. they have the lowest mortality rate) during which the child has a great interest in making a practical contribution to life around her/him. Playful behavior is retained from earlier periods, but its style and purpose have changed to serve in an apprenticeship for life. In this phase, interaction with nature on a large scale reaches its highest level of behavioral significance. Hadfield (1954) suggests that the principle of recapitulation/collective unconscious may be at work here, whereby behavior is informed by an archaic genetic memory of earlier human history. Edith Cobb *(1959)*, in her unsurpassable essay, talks about the innate genius of the child and the intuitive understandings that arise from its interactions with the natural world. Her evocative ideas do much to explain the overwhelming attraction of untrammelled natural environments but they need further development to be operational for design.

ENVIRONMENTAL ASSIMILATION AS GROWTH

Gestalt therapy theory, as presented by Perls, Hefferline, and Goodman *(1965)*, is an eclectic but unified system of concepts for understanding people-environment relations. It retains considerable evocative power, yet takes us many steps forward along the path of application.

Here we find growth and development described in terms of *assimilation* of environment by organism. In this process organism aggresses environment—"destroying" (destructing) it, to provide material for the "reconstruction" of a new actuality. It is an endless cycle of "creative adjustment", motivated by the organism's "excitement", via its environmental "contact", leading to/flowing from "awareness of self" as an "organism/environment field".

The inventors of gestalt therapy were mainly interested in interpersonal relations. We need to apply their theory to the material environment, and thus provide ourselves with a tool for people-environment research. Environmentally, the primary factor involved is *novelty/diversity*. The excited organism seeks novelty. To satisfy this need, the environment must supply sufficient diversity to *accommodate* varied user-needs, over an extended period of time.

Although natural environments provide a necessary (and unbeatable) opportunity for overt manipulation, creative adjustment can take place in other ways. Some environments can be perceived anew with each visit, each time stimulating new imaginings and reinterpretations of reality. Natural resources are especially potent because of their sensory complexity and attendant characteristics of change.

Unless children have a chance to experience novelty in the real world they will slip into the well worn thoughtways of the adult status quo—biologically conservative before their time—where awareness is prematurely relegated to the nonconscious level of reflex, habit, and routine. Therefore, let us say that "strong contact" with natural resources is necessary (but not sufficient) for complete well-being. For the purposes of research and design we need to elaborate the point a good deal further.

QUALITY IN CHILDREN-ENVIRONMENT RELATIONS

When we talk of a "responsive environment" we are referring to a *relationship* between the organism and its immediate surroundings. Gestalt therapy talks about the excitement of growth that arises in a person as a result of strong, aware contact. But what part does the physical setting play in this process.?

Anyone who has been in the company of children, in a diverse natural setting, must have been impressed by the way certain objects and materials seem irresistibly to draw attention to themselves. I call this characteristic *incitation*. The setting incites, from the outside; the user

excites from inside. Both characteristics must be present to a balanced degree for creative aware contact to be initiated and grow into a qualitative relationship.

There is no other type of relationship between organism and environment except a qualitative one *(Pirsig 1974)*. In essence it is an expression of *values* between the two. Thus the designer-as-interpreter-of-values must help provide an environment for the propagation of "good quality" user-setting relations. If we now incorporate this point of view within an ecological framework, we can operationally recognize the fact of human volition and self-government and give tangible expression to the concrete manipulable designable elements of the material world.

THE MATERIAL BASIS OF CHILDHOOD ECOLOGY

Childhood quality arises from the *interaction* of children with a *diversity* of surroundings. It is a process of continuing growth, learning, and *change* resulting in the *adaptations* of children and environment to each other *(Moore 1974 b)*.

Figure 1 illustrates the person-environment basis from which this ecology is generated. The diagram is derived from an earlier one of Billings' *(1970)* illustrating plant-environment, rather than child-environment relationships.

Since children (unlike plants) can manipulate their environment, all the relationships are potentially two-way (double-ended arrows). For example, if it rains or the wind blows, children

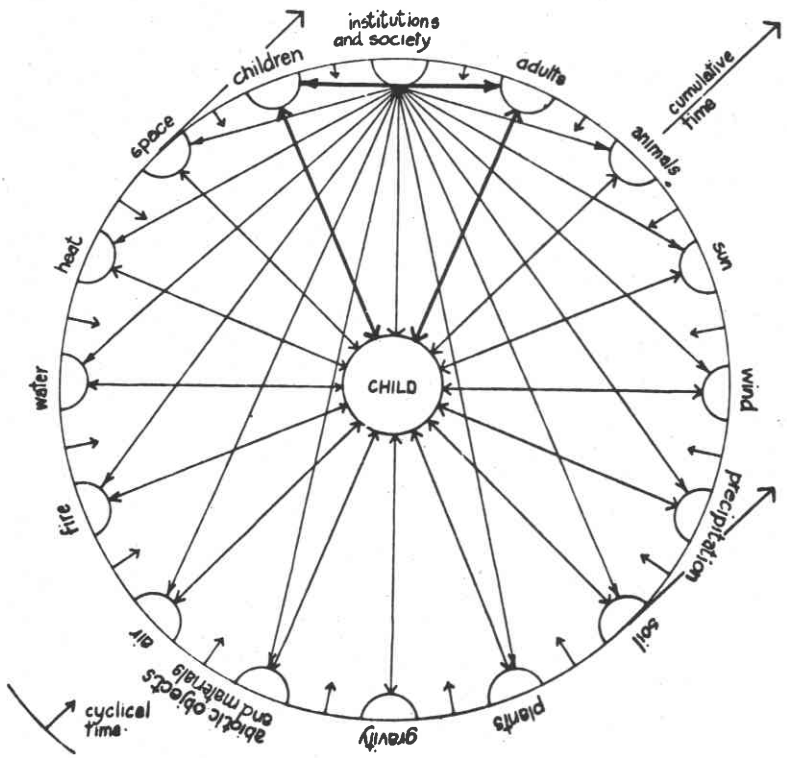

Figure 1.—The ecology of childhood (derived from *Billings 1970*).
The individual child has interrelationships with two sets of factors:
***Social:* Interactions with other children, adults and social institutions which lead to generational cultural continuity or change.**
***Natural:* Interactions with biotic and abiotic objects materials and phenomena in play and learning places.**
Planning, Design, and Education can directly influence children-environment interaction by intentional physical change, or influence the "controlling institutions" by changing values.

can move to shelter (if available) or make their own (if materials are provided).

Since it is adults-as-society who are ultimately in control, "institutions and society" is given a one-way connection to all other factors. Individual adults can limit or extend children's experience as indicated. Factors also have independent relationships with each other (not shown). Many such relationships can be modified by design—leading to changed relationships with children; e.g., high buildings frequently blot out the supply of sunlight to plants, depriving children of the experience of vegetation.

The primary pattern of life evolves in the realms of space, time, and social relations. The social processes of play are represented by the "child"-"children" link.

The *time* factor is present in many forms. There is a long-term temporal scale of *cumulative* cultural change and individual development; there is the *sequential* process of maturing, of moving through different stages; there are the *cyclical* changes of seasons, of day and night; and the repetitive dynamics of weekday and weekend, close to a child's daily life. Time is expressed in movement and speed, which are central to a child's continuous behavior. Space and time are so closely interwoven in a child's life that they must be considered as the single factor: *space-time.*

A child's pace is entirely different from an adults. This gives leisure planning a primary task of ensuring that children have an opportunity to live in their own space-time; divorced from the tightly scheduled materialistic adult world. It is critically important that children have escape places of their own, where time is suspended, so they may explore the nature of themselves and the physical world.

Space, for the sake of symmetrical elegance, is shown as merely one factor on a par with the others. In reality, space is the experiential locus of all other factors. The factors shown have been chosen for their presumed universal significance in childhood experience. I hope that the level of generality chosen for each factor defines it as a separate entity. If the subsumed levels are mentally included, a universe of organism/environment potentiality is represented—a diversity accommodating the child's process of learning, growth, and mutual adaptation.

The factors can be subdivided into three major groups:

- *objects:* visible, holdable, differentiated "things".
- *materials:* amorphous, undifferentiated "stuff".
- *natural phenomena:* manifest properties of environmental *processes,* rather than substances; e.g., the weather.

An obvious phenomenon is "gravity", a natural limiting condition that is always present to be explored, played with, and pushed to its limits: "how high can *you* jump? Tree climbing, tree forts, rock throwing, ball playing and all varieties of swinging, sliding, jumping, and climbing are further expressions. "Wind" is another phenomenon important enough to include, although in fact it is only one of many expressions of the material we call "air". In combination with the phenomenon known as "precipitation", air has many phenomenological faces: just think of all the varieties of mist, fog, drizzle, and downpour—including smog. The sun adds a further dimension of heat and light; diffused, scattered, or obscured by clouds, trees, buildings, etc.

Other factors can be classed as *materials;* "water" is a good example. Although changes of stage give it many properties, as noted above, it nonetheless exists as tangible, tastable, touchable, stuff-on-the-ground. "Soil" or "dirt" is similarly a basic material. It too has a phenomenological role, as in the topographic system of drainage and erosion. In essence, "fire" is a phenomenon, but in the experiential world of children it can also be "used" as a play material. In addition, a fire can be perceived as an object: a place to sit around—a social setting.

The child's world often seems to be composed largely of a universe of *objects,* although only one or two classes are shown diagramatically. "Plants" and "animals" are included from the natural world, as things kids respond to directly. A child's behavior, and presumably his/her perception of the world, appears very often to be "object-oriented". Thus, the "abiotic" category (I prefer to call it "peoplemade" rather than manmade) is the rubric for a multitude of "things": cars, toothbrushes, shoes, houses, bits of wood, nails, and so on; including the tools used to modify, transform and reassemble such materials: hammers, saws, shovels, etc. The distinction between "tools" and "objects" is fre-

quently absent from childrens' behavior. This lack of functional object definition lies at the heart of a childs' intuitive relationship with the physical world. For convenience we can refer collectively to natural objects, materials, and phenomena as *natural resources.*

PLACE AS QUALITY

Places arise from the stable combination of space, objects, materials, and phenomena. Place is the nexus of quality. Children are place-oriented organisms; thus places, together with the pathways connecting them are the habitat systems of childhood. From a design point of view it is worthwhile to highlight the four major classes of place-making variables:

- Fixed features: Spaces and fixed objects.
- Loose parts: Objects and materials that can be manipulated or moved around. (Term first coined by Simon Nicholson, *1971).*
- Natural phenomena: The given natural dynamics.
- Populations: The surrounding communities (both human and non-human) which instill a pattern of social dynamics within the space, as a result of being attracted (incited) by resources and phenomena within it.

Most designed spaces, with the exception of adventure playgrounds, weigh heavily on the side of permanent fixed features rather than manipulable/interactive resources. Once a place has an equitable fixed/loose balance, the spectrum of play patterns broadens considerably *(Moore 1974 a).* Natural settings, again, do this most effectively.

Since most *institutional* arrangements for children fall far short of providing conducive social settings, kids are more inclined to find places for themselves in unofficial hidden-away corners. There are a multitude of potentially secret places, especially in older and lower-density areas. At higher densities, where space is more tightly organized, and also in newly built areas designed by so-called systematic, rational methods, the probability of finding or creating private nooks and crannies is negligible. Roger Hart, in a study of children's play patterns in Wilmington, Vermont, documented how children use unkempt, rough, overgrown spaces, rather than the highly manicured suburban landscape *(Hart 1974).*

The ubiquitous attraction of natural resources and their contribution to childhood quality are undeniable. The challenge for planning and design is to find ways of incorporating far more of these natural "found place" qualities into official public space. Here is a list of criteria, all of which can be applied to the utilization of natural resources in the planning and design of places for children:

Flexibility. A terrain that to a degree can be changed and moved around to generate new patterns of relationship.

Permanence. Elements that remain unchanging, to provide familiarity, security, and identity; e.g., large rocks, mature trees.

Change. A variety of elements that will indicate changes in season, climate, and life in the community.

Open-endedness. Situations that users can manipulate and build onto for their own reasons.

Manipulability. A choice of materials and objects that users can work with manually—sand, dirt, water, vegetation, and assorted objects.

Diversity and choice. A guiding principle that applies to everything: colors, smells, textures, shapes, sizes, sounds, objects, materials, interactions, people, climate, time, space, movement, change, and so on.

Ambient microclimate. Elements that protect users from excessive wind, rain, sun, shade, and noise. An environment that provides year-round comfort. Vegetation is invariably an effective modifier of climate, because it is so varied and therefore provides a greater range of climatic choice. It has a less cut-and-dried effect than manmade structures. Trees are hard to beat as shade elements; spreading deciduous species that shed their leaves to let the winter sun through are especially good.

Social interaction. A variety of places for different sizes of groups, to facilitate social and working relationships. Undoubtedly, natural settings are especially conducive to interaction.

Privacy. A choice of situations where individual users and groups can be left alone in peace—especially places where children can get away from adults and intrusive stimuli.

Safety. The complete avoidance of situations that could result in *serious* injury.

People-plant interaction. A spectrum of

places where users can make contact with the growing/living environment to varying degrees, depending on the amount of vegetative protection provided. They should range from limited-access fragile environments to open rough ground covered with the hardiest impact-resistant plants.

Wildlife habitats. The provision of shelter and food sources for small animal life—birds, insects and other organisms. Vegetation, rocks, logs, marshes, and ponds can support the modest scale of wildlife that children find attractive; e.g., beetles, salamanders, snails, sowbugs, ants, fish, shrimp, worms, caterpillars, tadpoles, ladybugs, butterflies, spiders, and so on.

People-made/nature mix. Children respond with greater imagination to the intimate fine-grained combination of people-made and objects and natural materials.

Indoor-outdoor relationships. A variety of juxtapositions between buildings and the outdoors, with transitions ranging from slow to abrupt. The use of intermediate spaces such as terraces, decks, verandas, and pagodas is recommended. Architecture and landscape should be articulated as varied interpenetrating systems; sometimes contrasted, sometimes ambiguous; always working together for the benefit of overall quality.

Scale, size, shape, enclosure, and continuity. These basic dimensions of spatial design must be varied, juxtaposed, contrasted, and orchestrated to produce a coherent whole encompassing a range of spatial experience. *Scale* refers to the relative size of something; *size* refers to the actual dimensions; *shape* refers to the geometrical characteristics; *enclosure* is the sense of being contained by space; and *continuity* means the ability to move through space from one point to another.

Intrinsically, natural resources provide a far greater range of scale of possible interaction than people-made environments, and present it more coherently. The range extends from the microcosmic collecting of grass seed, to climbing and playing in trees, to large-scale exploration. A more varied spatial and textural setting is achieved with vegetation, which has a complexity and subtlety beyond that possible using solely people-made elements.

Vegetated enclosures give a "boundary depth"—a less intimidating territorial ambiguity. The division of space by natural resources can produce an infinite variety of shapes. The result is a better social ecology, with more room for social maneuverability. This is a definite advantage to children. The precise boundaries produced by fences give an advantage to adults, making it possible to keep children more tightly controlled. A prime example is the school yard surrounded by chain-link fences.

Third dimension.—Think of spatial experience in all three dimensions. Children are particularly attracted to moving up and down, as well as through space. Consider the climability of all elements, including trees.

Explorability/experimentation.—This criterion is really the sum total of several others, but it is inserted to emphasize the overall effect of natural resources on child-environment interaction.

Affiliation/identity.—Many children seem to find natural environments more comfortable than people-made ones for social activity *(Moore and Wochiler 1974).* The higher the rate of use, the higher the sense of attachment. Natural objects that have a clearly differentiated identity, such as trees, large rocks, ponds, streams, etc., seem to produce a strong image in the mind of the user, judging from children's cognitive maps.

Continuity.—The importance of interconnectedness in the motor-related environment has been noted by several researchers and was verified in the Lenox-Camden Experiment *(Moore 1966).* Continuity is achieved by joining elements together so that "play circuits" can occur. Movement experience can be greatly improved by the incorporation of vegetative and other natural resources. A simple comparative example is the difference in feeling between a path that is a bland strip of asphalt and one where planting has been used to create sequences of texture, smell, light, shade, and color.

Access.—The basic need for access per se is not much affected by the presence of natural resources; but since access for children is normally via foot paths or bikeways, quality is increased by using topography and by following natural features such as creeks. In designing pathway systems one should bear in mind that the experience of the journey is as important as the arrival.

Also let me say that it makes no sense to

provide natural-resource areas for children unless they are readily accessible—an issue frequently not taken seriously enough in urban open-space planning.

Conservation.—A point to emphasize is that it is far easier to incorporate play into an existing natural scene than vice versa. The incorporation of natural resources into bland urban play areas is a management challenge at best. Better to conserve natural resources in the first place, by conscious planning.

Application.—These criteria can contribute to, but not produce, a design solution. Hopefully, they provide some systematic guidance; it is up to the designer's consciousness, imagination, and skill to create an environment that will embody high-quality human experience. Each site, community, and planning process is unique. This necessitates a wide margin of choice, interpretation, and combination of elements to fit many different circumstances.

Much depends on the designer's willingness to team up with the user-clients *(Nicholson and Schreiner 1973, Moore 1975).* Social science isn't going to. Under Schumacher's *(1973)* broadside, the myth of value-free science seems to have finally succumbed. It's time for those whose job it is to deal directly with the messy world to ignore the intimidations of social science and get on with their own high-utility systematic investigations—where it counts. For a solid base of empirical work is urgently required.

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