

EXHIBIT DESIGN SYSTEM FOR CHILDREN'S MUSEUMS

by

Jorge Rodriguez Martinez

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by

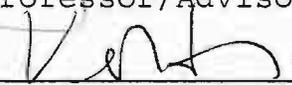
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To my family

To my friends

To Bob Anders, who gave me advice and direction.

## CHAPTER I

### INTRODUCTION

A museum is a unique place to satisfy interest or curiosity toward different fields of knowledge.

Not all people like to visit museums, however, even those located in their neighborhoods. There are a number of reasons to explain this attitude, but the main one is that most museums are boring places.

One solution to this problem is a new type of institution with a less formal approach and that achieves better results. This includes the hands-on and children's museums, with participatory and active exhibits.

These museums are places where visitors may really feel the displayed objects and experiments--where they are actors rather than spectators.

This kind of approach attracts children as well as adults to attend not just once, but several times. This is a sensation rarely felt in a visit to an ordinary museum.

I have visited or been in touch with several successful museums of this sort in the United States and Canada, such as the Brooklyn, Boston, Staten Island and Washington Children's museums; the Exploratorium in San Francisco, and the Toronto Science Center in Canada.

I think some of their ideas and their messages can be applied with success to museums in other countries, but adapted to those countries' local educational needs and economic resources.

In developing countries, there is a real need to have educational facilities that may reach most of their young population.

For example, the population group that I have chosen for my investigation is that containing children between the ages of two and twelve years old.

Children are an especially large group in developing countries which have an overwhelming young population and where more than half of the total population is under twenty years of age.<sup>1</sup> This is a very important fact, because childhood is the most vital stage of development in the human life--a time when learning and experience play an increasingly dominant role in development.<sup>2</sup> This is the period in which habitual patterns are created which will have a lifelong influence.

We must also take into consideration the fact that by the year 2000, some 630 million young adults will join the Third World's labor force, while industrialized countries will add only 20 million workers.<sup>3</sup>

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<sup>1</sup>Thomas E. Weil, Area Handbook for Mexico, 2nd ed. (Washington, D.C.: American University Press, 1975), p. 37.

<sup>2</sup>Elizabeth Hurlock, Child Development, 6th ed. (New York: McGraw Hill, 1978), p. 25.

<sup>3</sup>George Russell, "People, People, People," Time, 6 August 1984, p. 25.

These children must have the opportunity to develop their potential to its fullest. One way to accomplish this is through education--either formal, as in schools, or non-formal, which is acquired through visits to museums, outdoor activities, and so on. I am personally interested in the latter type, because it has many possibilities.

My own country, Mexico, fits within the category of developing countries and it has the need for non-formal educational facilities. My idea is the creation of a children's museum based on a modular system. It can be prefabricated and installed at the same time in different towns and cities.

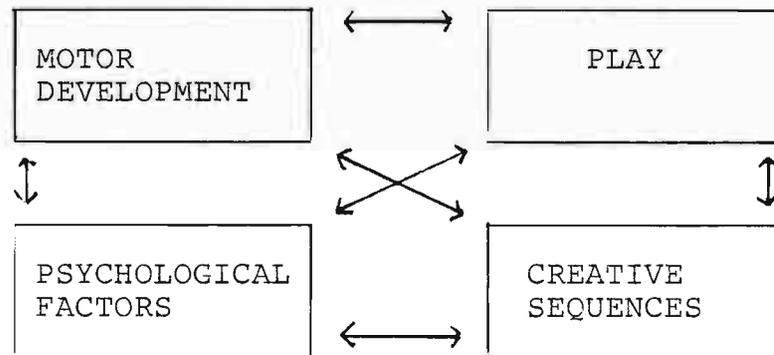
The exhibit itself aims to be a first or early hands-on experience for children. The purpose is to sensitize and make them aware of the world that surrounds them. All this will be based in the artistic, historic, and economic national values.

## CHAPTER II

### CHILD DEVELOPMENT

It is necessary to know the characteristics of child development because it will affect and will also lead to decisions taken in the final design.

The study of child development may be divided into four areas which are interrelated:



Any children's museum should consider them all, and look forward to obtain a harmonic, balanced relationship between them.

The museum may also play a very important role in the maturation and learning process by offering a stimulating environment full of new and exciting experiences, encouraging good physical and mental growth.

The study will focus on three age groups: preschool age (two to five years old), elementary school age (five to eleven years old), and eleven to fifteen years old.

Preschool Age (Two to Five Years Old)

Psychological Factors

The child's thought is primarily controlled by the immediate and the perceptual. It is a phase of sensory exploration of his world.<sup>1</sup>

Motor Development

Motor development begins with gross movements; large areas of the body are used in walking, jumping, etc.<sup>2</sup>

The principles of development follow this sequence: whole body, legs, feet; arms, wrist, fingers. Hand motor skills are most numerous and useful and for this reason better learned.

Creative Sequence

The child enjoys his own movements, the manipulation and cutting of materials. This is a period of all action; the child has little muscular control over his scribbling motions.<sup>3</sup>

Elementary School Age  
(Five to Eleven Years Old)

Psychological Factors

The child is not capable, at this stage, of abstract thought. For this reasons, abstract concepts should not

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<sup>1</sup>Gabrielle Pohle, "The Children's Museum as Collector," Museum News, November 1979, p. 18.

<sup>2</sup>Hurlock, Child Development, p. 38.

<sup>3</sup>Earl Linderman, Developing Artistic and Perceptual Awareness (Dubuque, Iowa: Wm. C. Brown Co., 1974), pp 49-50.

be used in children's museums.<sup>1</sup> At this stage, the child will focus his attention primarily on an object's size, color, or other physical characteristics, without realizing the relation among the objects and their context.

### Motor Development

Major fine coordination takes place, which involves the smaller muscle groups: grasping, writing, throwing.<sup>2</sup>

Children learn better during these years from a hands-on experience or by manipulating concrete objects than they do from symbols or abstract concepts.<sup>3</sup>

The more senses used in obtaining information, the closer and more long-lasting an image will be.<sup>4</sup>

### Creative Sequence

Until the age of eight the child uses symbols or schemas to convey meaning to his ideas. He can deal with constructing a work of art, and may become involved in the artistic process.<sup>5</sup>

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<sup>1</sup>Robert Matthai, "Child Centered Learning," Museum News, March 1976, p. 18.

<sup>2</sup>Hurlock, Child Development, p. 38.

<sup>3</sup>Pohle, "The Children's Museum as Collector," p. 34.

<sup>4</sup>Matthai, "Child Centered Learning," p. 17.

<sup>5</sup>Linderman, Developing Artistic and Perceptual Awareness, p. 49.

Junior High School Age  
(Eleven to Fifteen Years Old)

Psychological Factors

This is the final stage of development before adulthood. The child can carry out complex abstract and logical thought and deductive reasoning.<sup>1</sup>

Motor Development

The child almost reaches the adult level of perfection. The speed, strength, and economy of movements increase, improving his motor skills.<sup>2</sup>

Creative Sequence

Between the ages of eight and twelve, the child discovers new techniques and possibilities with art materials.<sup>3</sup>

There is a more realistic approach to the figure, and increase of details in specific objects. There is a definitive feeling for design qualities, such as repetition, color, texture, and harmonies.

Play

We almost always associate the word "play" with childhood, like that period when we were younger and had much free time, endless energy and imagination, and when we could transform any simple object and give it magic qualities.

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<sup>1</sup>Pohle, "The Children's Museum," p. 34.

<sup>2</sup>Hurlock, Child Development, p. 145.

<sup>3</sup>Linderman, Developing Awareness, p. 49.

During recent years, psychologists have been studying play, its meaning and how it contributes to children's personal and social adjustments.

Play is defined as any activity engaged in for the enjoyment it gives, without consideration of the end result. It is entered into voluntarily and is lacking in external force or compulsion.<sup>1</sup>

Play may be passive like watching television, or active, where the enjoyment comes from whatever the individual is doing. There are four different types of play: imitation, exploration, testing, and construction.

The basic motivations of a child's play are: first, the biological need for physical activity-- the child is still in the process of discovering his own body, its capabilities and limitations; second, exploration of the immediate environment; third, a desire for movement sensations (stronger in boys than girls); and fourth, and exploration of the cause-and-effect relationship with his surroundings, a measure of physical growth and curiosity.<sup>2</sup>

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<sup>1</sup>Hurlock, Child Development, p. 290.

<sup>2</sup>Todd Slaughter, "Design of a Play Area" (Master of Industrial Design Thesis, Pratt Institute, 1967), p. 35.

## CHAPTER III

### MUSEUMS

#### Definition

"Museum" is defined by the International Council of Museums in the following way: "A non-profit-making, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates, and exhibits, for the purposes of study, education and enjoyment, material evidence of man and his environment."<sup>1</sup>

Actually, however, museums, should be alive institutions, flexible and ready to cope and give an answer to the fast-changing times of these decades. For this reason, a shift is expected.

Some characteristics of museums in ten or twenty years:

They shall be planned for real people and real interests.

They will be fairly small.

The most adventurous, exciting, and socially relevant work will be taking place in provincial centers or unpromising areas of large cities.<sup>2</sup>

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<sup>1</sup>Kenneth Hudson, Museums for the 1980's (New York: Holmes & Meir Publishers, 1977), p. 1

<sup>2</sup>Ibid., p. 16.

### Trends in Non-Formal Education

Non-formal educational approaches and out-of-classroom facilities are spreading out, and if we want people's attention, in this case children's, we should think about a new type of institution, looking for participatory activities specifically.<sup>1</sup> The main reason for this is that we are faced today with a problem in education which is a direct result of the verbal literacy movement. Mass communications based on highly articulate, bright and dazzling productions has developed new expectations and literacies in its audience.

#### Mobile Museums

One of the new trends is the mobile museum, which may reach people in their own schools, houses, or work places, regardless of the geographical situation. One of the reasons for the need for this is that the public has become lazy due to new forms of mass communications. There is a widespread form of mental as well as physical laziness, and, in answer to this, the mobile museum has been created.<sup>2</sup>

When a museum or any institution has made the decision of having a mobile museum, the priority of the customers over the collections must influence the museum's entire attitude.<sup>3</sup> The museum must try to interest people in new ideas and to change their habits, expectations, and hold a fundamental aim of breaking down prejudice and widening horizons.

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<sup>1</sup>Gary Peterson, The Learning Center (New York: Linnet Books, 1975), p. 13.

<sup>2</sup>Hudson, Museums for the 1980's, p. 115.

<sup>3</sup>Ibid., p. 120.

We have two recent examples of mobile museums, one fairly sophisticated and developed in France mainly for urban areas.<sup>1</sup> The Linder vehicle has side walls and a roof which are telescopic, extending by means of hydraulic jacks; on the road the width is 2.5 metres, but for exhibition purposes it expands to 7 metres, thus giving visitors a feeling of space in an area of 56 square metres--almost like a small gallery (fig. 1).

The second example has its focus on roadless areas of rural communities. It is built in India and is simpler than the Linder vehicle. The unit consists of two parts: a truck carrying the crew, technical equipment and certain stores, and a trailer for the exhibition.<sup>2</sup> The trailer has an outside flap running its entire length, so that a complete row of exhibits can be viewed from the outside by people standing on the ground (fig. 2).

### Learning Center

Learning centers were created bearing in mind the improvement of learning within the different school levels. This gives the student a most adequate environment in which to assimilate knowledge, better than the classroom teacher-student relationship.

The learning center may be described as an amalgamation of four services: library, audiovisual services, non-

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<sup>1</sup>Ibid., p. 115.

<sup>2</sup>Ibid., p. 117.

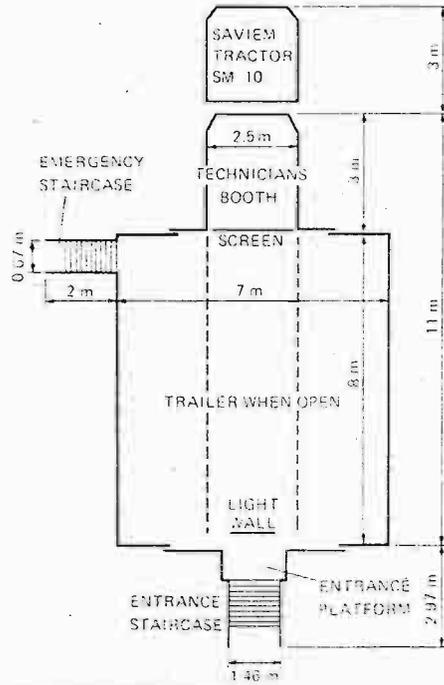


Fig. 1. Mobile Museum in France.

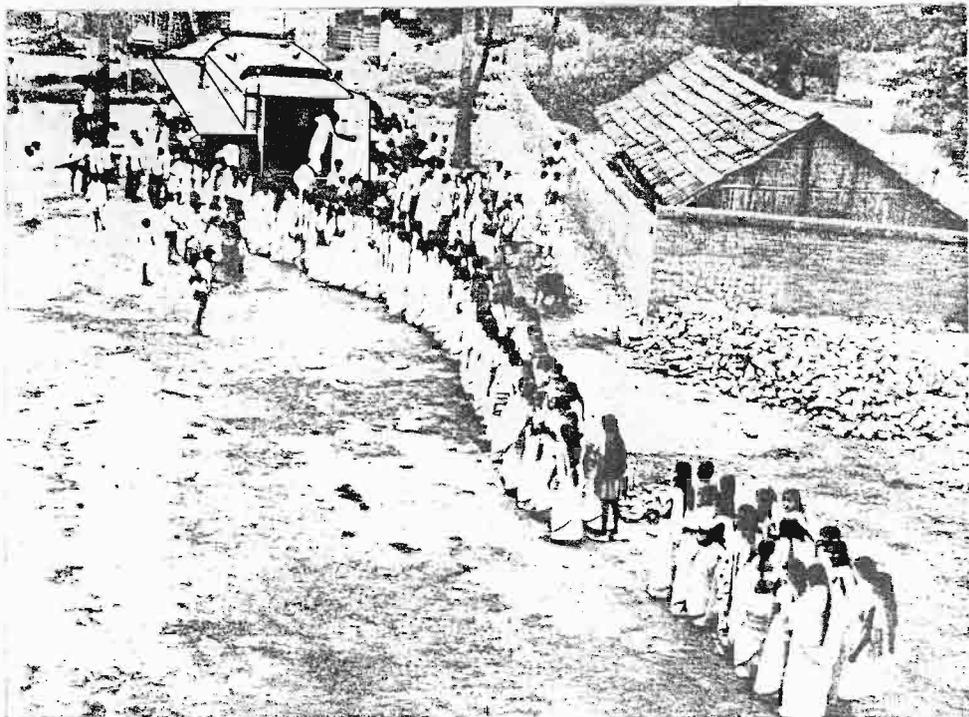


Fig. 2. Mobile Museum in India

traditional learning activities, and instructional development.<sup>1</sup> Its main characteristic is that it should act as a changing agent. "The future for learning centers is bright if their programs and personnel become heavily involved in the educational mainstream. These specialists, however, must be proactive more than reactive, flexible rather than rigid, visible rather than seclusionary, experimental and innovative rather than solid and unimaginative."<sup>2</sup>

The learning center is especially effective in enabling students to gain something more in intellectual content and skills than they would accomplish under conventional circumstances.<sup>3</sup>

The use of these centers may start at the preschool level, because they provide vicarious experiences and intellectual stimulation so that the youngster can enter the educational mainstream immediately. Field, trips, speakers, and so on can be supplied to provide more variety and greater depth of learning.<sup>4</sup>

#### Hands-On Museums

The third option in non-formal education is the concept of hands-on museums, which emerged in answer to two needs: first, the development of new kinds of museum

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<sup>1</sup>Peterson, The Learning Center, p. 9.

<sup>2</sup>Ibid., p. 20.

<sup>3</sup>Ibid., p. 14.

<sup>4</sup>Ibid., p. 64.

experience, especially for the young; second, the ongoing search for significant out-of-school educational opportunities.<sup>1</sup>

What makes them different from traditional museums is their approach. They are experience-oriented rather than object-oriented. They bring together the visitor and the museum resources in such a way that learning can occur. They maintain that the visitor can learn the most through an experience in which he is an active participant. It is a hands-on, get-involved approach, rather than a hands-off, just-look approach.<sup>2</sup>

This kind of museum may have an increasing role to play in the education not just of children but of individuals of all ages. They are concerned less with high culture than they are with popular culture.<sup>3</sup>

The focus of these museums may change, depending on whether they are in a large or small city. Large cities have a wider variety of museums, and they may center their attention unequivocally on children, while small cities have a great need of experience-oriented museums to assume a broader role.<sup>4</sup>

There is a growing interest about starting museums of this kind in different communities and cities throughout

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<sup>1</sup> Educational Facilities Laboratories: Hands-On Museums (New York: Educational Facilities Laboratories, 1975), p. 4.

<sup>2</sup> Ibid., p. 5.

<sup>3</sup> Ibid., p. 6.

<sup>4</sup> Ibid., p. 40.

the United States and other parts of the world. This is mainly due to the success that some other museums have had. The necessity for giving people a new kind of museum has therefore been recognized.

I will mention three museums that follow this tendency: the first, The Exploratorium in San Francisco, was created because of the need for a science museum that dealt with basic principles of physics in their essence. It is an interactive exhibit environment with a focus on perception. Visitors manipulate demonstrations that increase their understanding of their own senses--light, sound, color.<sup>1</sup>

The second museum of this type is the Jacksonville Children's Museum in Jacksonville, Florida. The exhibits are designed as total environments. The health exhibit, for example, features a huge human mouth and throat where kids crawl through to see a presentation on nutrition.<sup>2</sup>

The third museum is the Fort Worth Museum of Science in Fort Worth, Texas. It is the largest museum-school in the United States, where classes and workshops are giving in everything from film making to comet-watching.<sup>3</sup>

It is also worth mentioning that a children's museum of this type opened recently in Caracas, Venezuela--the first of its kind in south America (figs. 3-5).

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<sup>1</sup>Ibid., p. 16.

<sup>2</sup>Ibid., p. 14.

<sup>3</sup>Ibid., p. 8.

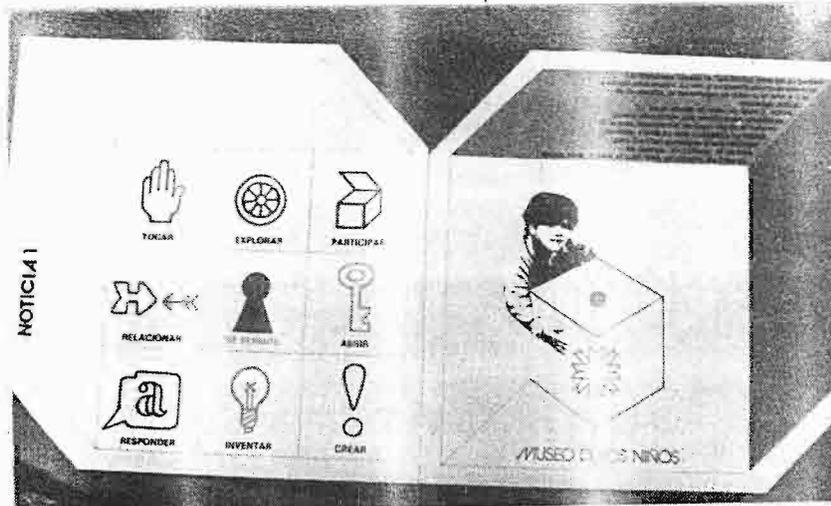


Fig. 3.4.5. Children's Museum in Caracas, Venezuela

The Museum Situation in Mexico

Museums must be an authentic expression of the history and creativity of the inhabitants of a region. In the same way, it must complement the programs of formal education in the area.<sup>1</sup>

Museums should be a real instrument for rescuing, keeping and communicating all those things of interest to the inhabitants of a community. They should be the most important cultural center, especially in those communities that just have schools for elementary education. For this reason, the museum must function in coordination with the educational programs, and work as a complement to them.

In Mexico, the Archaeology and History museums are the most numerous. This reveals that museum policy continues in a traditionalist vein, giving priority to archaeological investigations.

The specialized museums have not received the importance they deserve. Another problem is that cultural activities being developed must be focused toward the different population groups, putting special attention on young people and children.

Unfortunately, what has happened is that most museums in Mexico do not have a designated area for children.

In general, there is a lack of adequate non-formal educational facilities for children, and there is a need for

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<sup>1</sup>Yolanda Ramos, Proyecto Para la Creacion de Museos Locals en Mexico [Project for the Creation of Local Museums in Mexico]. Mexico City: Instituto Nacional de Antropologia, 1977), pp. 2-3.

children's museums or similar institutions, not just for the big urban centers, but also for small cities and towns across the country.

## CHAPTER IV

### CHILDREN'S MUSEUMS

The history of museums dedicated especially for young people goes back to 1899, when the Brooklyn Children's Museum opened its doors as the world's first museum of this type. It was dedicated to teaching children about themselves and the world in which they live through the interdisciplinary presentation and active exploration of museum objects.<sup>1</sup>

There has been a growing interest about museums of this kind recently. This can be seen in the fact that there are approximately 108 children's museums in the world, 88 of which are located in the United States. Ten percent of the United States total represent general museums, thirty percent constitute departments of larger museums, and the remaining sixty percent are junior's, children's, or youth museums--independent institutions geared especially for children.<sup>2</sup>

#### Their Approach

Most children's museums take a hands-on approach, the main purpose centering around the child and certain

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<sup>1</sup>Brooklyn Children's Museum, School Class Programs Booklet (Brooklyn, N.Y.: The Brooklyn Children's Museum, 1984), p. 4

<sup>2</sup>Pohle, "The Children's Museum as Collector," p. 33.

themes relating to him. Although there are museums like the one in Boston that have a new and broader sense of cross-generational purpose focused on helping adults as well as children, to perceive and understand the rapid social and technological changes occurring around them (fig. 6).<sup>1</sup>

The orientation of the museum is to develop new, less didactic educational methods, emphasizing participation by adults and children together in predominantly non-verbal, first-time learning experiences.<sup>2</sup> This is also reflected in the museum's choice of programs, games, multimedia presentations and other activities,<sup>3</sup> as well as the incorporation of the concerns of the environmental, civic, and ethnic groups in the communities.<sup>4</sup>

Loan cases are a very important extension of the function of these museums, forming the take-home collection program that provides teachers with didactic and tactile material that may reinforce the teaching of some courses.

The museum areas are concentrated on the areas of anthropology, physical and natural sciences, because such areas best correspond to the child's preoccupation with himself and the world around him.<sup>5</sup>

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<sup>1</sup>Jim Zein, "Beyond the Generation Gap," Museum News, November 1979, p. 27.

<sup>2</sup>Ibid.

<sup>3</sup>Aalber Heine, "Making Glad the Heart of Children," Museum News, November 1979, p. 23.

<sup>4</sup>Zein, "Beyond the Generation Gap," p.

<sup>5</sup>Ibid., p. 34.



1. FIRST, PLAY SOUND GEOGRAPHY ON THE SOUNDTRACK. CAN YOU FIND THE CITY IN THE UNITED STATES THAT'S KNOWN FOR ITS MUSIC?

2. THEN, PICK UP A TELEPHONE RECEIVER. CAN YOU TELL WHAT TIME IT IS BY THE SOUNDS YOU HEAR? TURN THE HANDS OF THE CLOCK TO THE HOUR THAT YOU'VE HEARD.

3. SOUNDS CHANGE WITH THE SEASONS TOO. OPEN THE SEASONAL SOUND WINDOW.

4. MANY YEARS AGO IN THE TIME OF YOUR GREAT, GREAT, GREAT GRANDPARENTS, THE SOUNDS AROUND WERE VERY DIFFERENT. FIND A PICTURE FROM LONG AGO AND TRY TO MAKE IT COME TO LIFE BY ADDING THE SOUNDS THAT FIT.

5. WHAT HAPPENS WHEN SOUNDS DON'T FIT THE PEOPLE, PLACES, AND THINGS THAT MAKE THEM? WATCH "IMAGINE IT" AND FIND OUT.

6. MOST FILMS HAVE A SOUNDTRACK. VERY OLD FILMS DIDN'T AND RELIED ON PANTOMIME AND TITLES TO MAKE THE WORDS CLEAR. TRY MAKING A SOUNDTRACK FOR OUR STORY: TALK INTO THE MICROPHONE!

7. NOW, STEP INTO THE MIRROR ROOM: YOUR BODY IS FULL OF MUSIC. HOW MANY WAYS CAN YOU PLAY THE MUSICAL YOU?

8. WHAT WALKS BUT HAS NO LEGS? CAN FLY LIKE A BIRD BUT HAS NO WINGS? YOUR VOICE! WATCH IT STEP, HOP, JUMP, AND LEAP IN THE SOUNDSCOPE. THEN TAKE A WALK WITH YOUR VOICE AT VOICEWALK.

13. IN THE CITY THERE'S PLENTY OF MUSICAL MATERIAL, TOO! THE MUSIC OF A CHISEL, THE RESONANCE OF A SAW BLADE, THE MELODY OF A PIPE. PLAY THE SOUND TWINNING GAME. PLUCK THE DEAN PIPE ZITHER. TAP THE FLOWER POT BELLS. PLUCK THE LAMP POST. RING THE RECYCLED OIL DRUMS.

14. THE CITY MUSIC SHOP CONTAINS COUSINS OF INSTRUMENTS YOU'VE SEEN BEFORE. THE FUNNEL TRUMPET SOUNDS LIKE THE CONCH SHELL. THE MERRYBONNE BUREL IS THE TIN VERSION OF THE GOULD GUIDO.

15. STROKE THE SPRINGS OF THE SOUND SCULPTURE CREATED BY FRANCIS AND BERNARD BASCHET, FAMOUS SOUND SCULPTORS FROM FRANCE.

16. NOW JOIN AN ORCHESTRA OF INSTRUMENTS MADE FROM FAMILIAR MATERIALS BY BILL AND MARY BUCHEN. TRY PLAYING TOGETHER WITH YOUR FRIENDS.

17. FOR THE GRAND FINALE, ENTER THE PERFORMANCE GALLERY. ARTISTS AND MUSICIANS HAVE USED EVERYTHING FROM BICYCLE PARTS TO FORKS AND SPOONS. EVERY THREE MONTHS THE DISPLAY WILL CHANGE. SO COME AGAIN WITH YOUR SENSES SHARPLY TUNED FOR THIS EXPERIENCE.

STATEN ISLAND CHILDREN'S MUSEUM  
14 BEACH STREET, STATEN ISLAND,  
N.Y. 10314, TELEPHONE: (516)  
235-2000

THE MUSEUM IS OPEN 1-5  
TUESDAY-FRIDAY AND  
MONDAYS WHICH ARE SCHOOL  
HOLIDAYS; 8-9 SATURDAY;  
11-7 SUNDAY.

ADMISSION: \$1.50  
  
THE STATEN ISLAND CHILDREN'S  
MUSEUM WAS FOUNDED IN 1974  
TO PROVIDE PARTICIPATORY  
LEARNING EXPERIENCES FOR  
CHILDREN AND ADULTS. THE  
MUSEUM IS A PRIVATE, NON-  
PROFIT EDUCATIONAL  
INSTITUTION CHARGED  
BY THE STATE OF NEW YORK

Fig. 6. Children's Museum in Staten Island, N.Y.

The Boston Children's Museum offers the example of two different exhibits that they have developed.<sup>1</sup> The first is Museum Playspace, a unique environment where preschoolers can climb up, down and around fanciful structures seeking hidden visual surprises, by the use of toys and games (fig. 7). The second, What If You Could Not? introduces non-disabled children and adults to simulate experiences with orthopedic, visual, hearing, learning, emotional and mental handicaps and their treatment.<sup>2</sup>

The Museum of Modern Art in New York has presented a special exhibit called Children's Carnival, which is divided into two areas. The introductory area is semidark, with some pools of light. The children play with toys; there are no spoken or printed words, but they are unconsciously introduced to the physical characteristics of the objects. From the first area, they emerge into the brightly lit and colorful studio-workshop area, where they have tools and materials to work with.<sup>3</sup>

As we can see from these examples, the choices and directions that a children's exhibit may take can be very different; the imagination must be the limit.

#### Museum Areas

To have a better and clearer idea of how children's and youth's museums are organized in their collection,

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<sup>1</sup>Ibid., p. 24.

<sup>2</sup>Ibid.

<sup>3</sup>Hudson, "Museums for the 80's," p. 104.

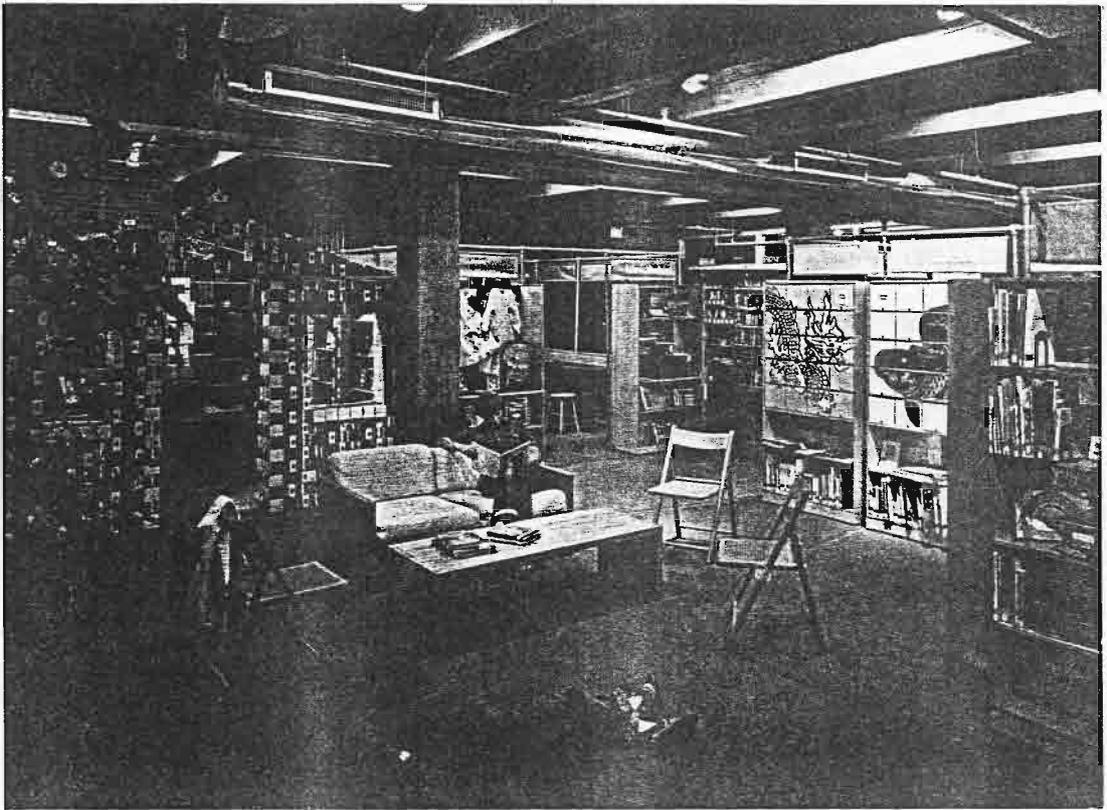
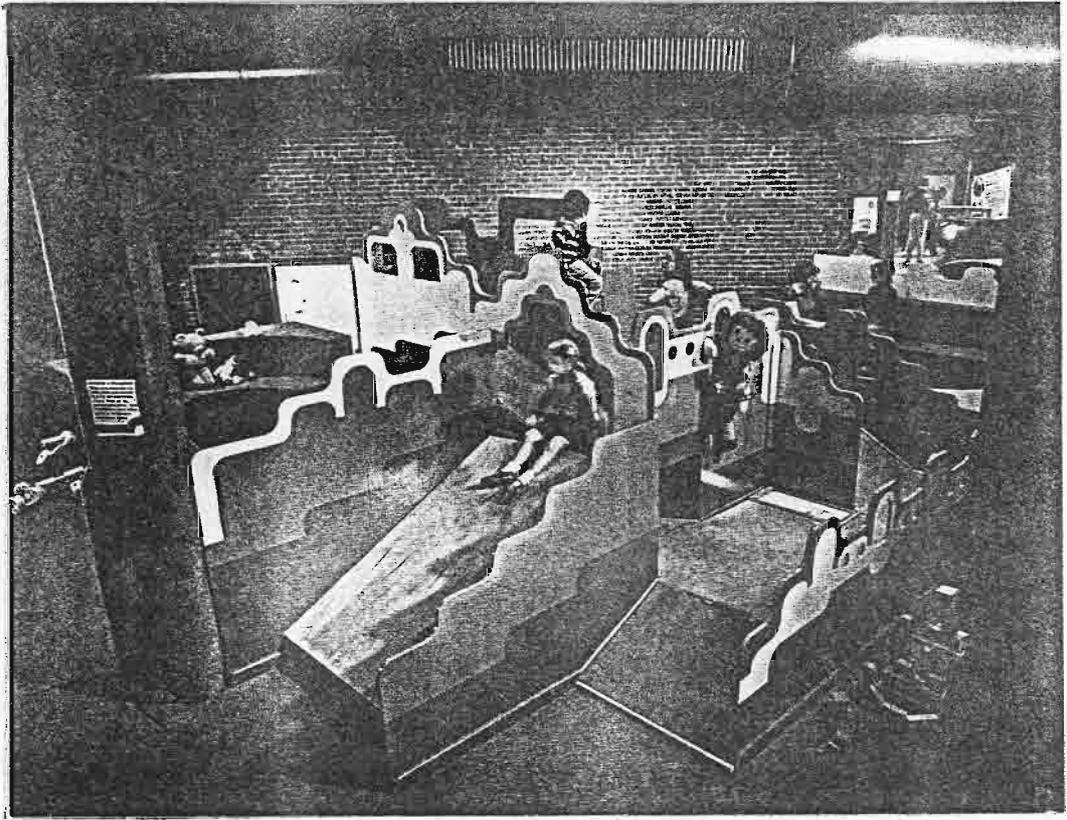
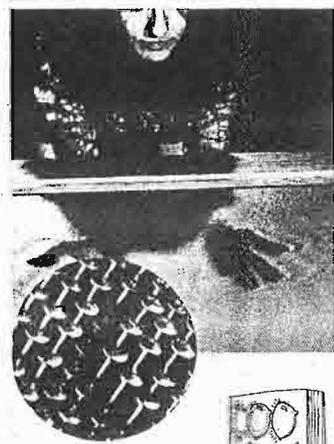
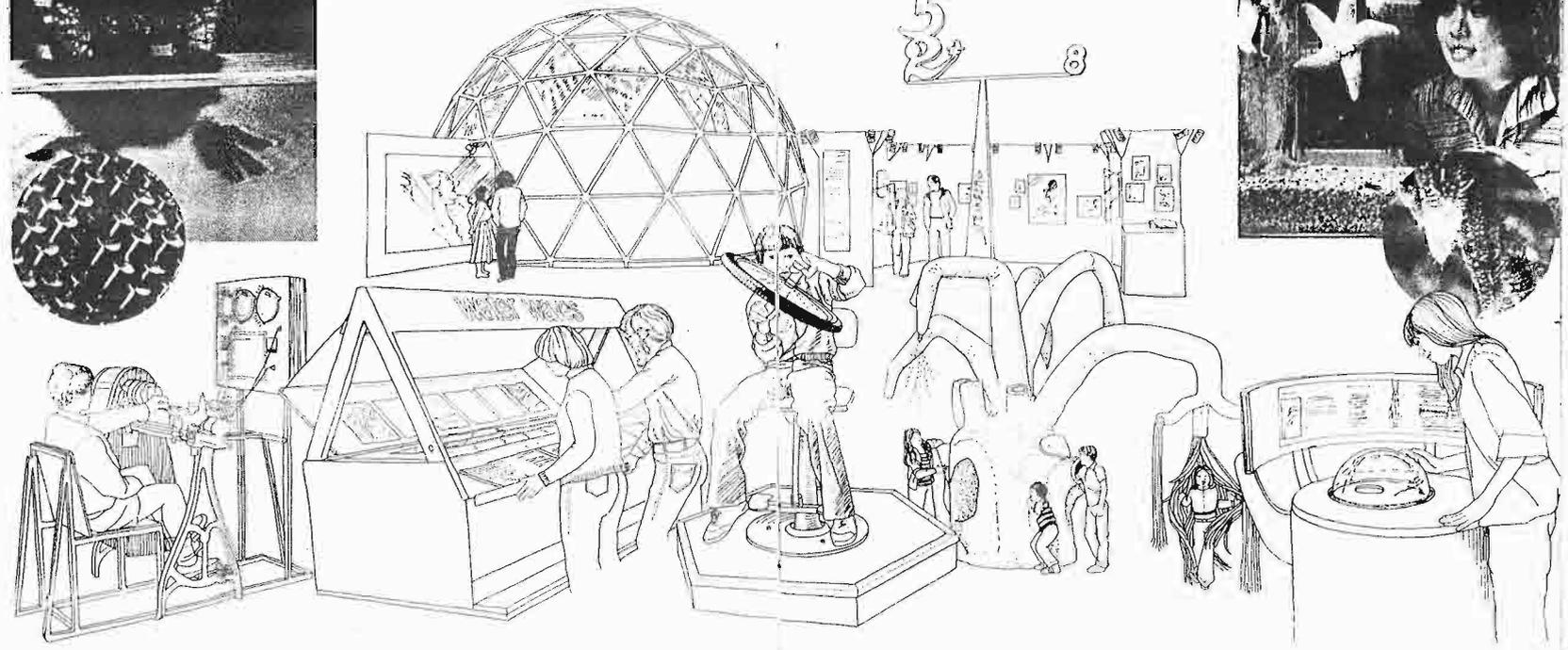


Fig. 7. Children's Museum in Boston



When stroked, the rocking motion of the pins in Ward Fleming's Pin Screen creates visual "echoes". The Pin Screen exhibit contains 170,000 straight pins inserted into a metal screen.

The saltwater tanks in the Animal Behavior section are open to viewing on all sides allowing easy observation of details such as the sucker feet of a Pacific starfish.



• Sound • Hearing • Sight • Color • Vision •

Fig. 7b. Different Exhibits in the Exploratorium Museum

activities, and facilities, I assembled a chart which includes twenty United States museums with information provided in the 1978-79 Official Museum Directory, which lists members of the American Association of Museums (table 1).

These are the conclusions I reached regarding the priority of specific aspects of the museums to the museums themselves. I have ranked them in order of importance within each category:

A. Collections

1. Natural Science, e.g. wildlife
2. Man and Culture, e.g. archaeology, corn, cribmills
3. Daily life, e.g. grandmother's attic, costumes, cycle of life
3. Others, e.g. transportation, shoes
4. Science, e.g. scientific demonstrations, machinery, technology
5. History, e.g. historic house.
6. Toys and dolls.

B. Activities

1. Exhibits (temporary, permanent, and travelling)
2. Guided tours; for visiting museum exhibits
3. Lectures about various themes
4. Theatre; using puppets and/or drama
3. Workshops: arts and crafts, hobbies, candle-making, weaving
5. Films and slides
6. Music, e.g. concerts, music appreciation
7. Outdoor education, e.g. nature trail, field trips

TABLE I  
 CHILDREN'S AND YOUTH MUSEUMS  
 COLLECTIONS, ACTIVITIES, AND FACILITIES

	Collections						Activities										
	Science	History	Man/Culture	Toys/Dolls	Daily Life	Others	Films/Slides	Theatre/Puppets	Lectures	Guided Tours	Exhibits*	Workshops	Outdoor Educ.	Music	School Loan Kits	Library	Sale of educ. material
Children's Museum Kingsport, Tenn.							x	x	x	x	P						
Children's Museum Indianapolis, IN	x	x	x	x			x	x	x	x	PT Fr	x	x	x	x	x	x
Children's Museum Boston, MA			x								PT Fr				x	x	x
Children's Museum Dartmouth, MA				x	x	**	x		x	x			x		x	x	x
Children's Museum Denver, CO			x		x	x		x									
Children's Museum Omaha, NE											Tr					x	
Creative Museum for Youth Hickory, NC							x		x	x	PT Tr		x				
The Discovery Center Fresno, CA			x						x			x					
Discovery Museum Essex Jct., VT	x				x												x
Jacksonville Museum Jacksonville, FL				x				x			PT Tr	x			x	x	
Junior Museum of Bav. Panama City, FL		x	x		x	x		x	x	x	T		x				
Junior Mus. Metro. Mus. New York, N.Y.												x	x				
Living Arts & Science Ctr. Lexington, KY						x			x		Tr			x	x	x	
Children's Museum Mishawaka, IN			x		x					x					x		
Mus. of Art & Sci. for Ch. San Juan, P.R.	x						x										
Children's Museum Portland, OR		x	x		x	x											
Children's Museum Rocky Mount, NC	x					x		x		x	P T	x	x			x	
Children's Museum Staten Island, NY	x					x	x	x	x	x	PT Tr		x		x	x	
Youth Mobile Museum Haddam, CT		x	x						x		T	x			x		
Children's Museum Brooklyn, NY	x				x						P T	x	x		x	x	x
TOTAL	6	4	8	3	7	7	6	7	8	9	12	8	4	5	8	9	7
PRIORITY WITHIN CATEGORY	4	5	2	6	3	3	5	4	3	2	1	3	7	6	2	1	3

SOURCE: American Association of Museums, The Official Museum Directory, 1978/79 (New York: American Association of Museums, 1979).

\*\*Shoes

TABLE 1--Continued

Facilities								Other Comments
Nature/Outdoors	Botanic Garden	Zoo/Aquarium	Classrooms	Exhibition Gallery	Discovery Room	Hobbies	Others	
	x							Over 800 exhibits for loan; T.V. studio, 850-seat auditorium
	x					x		
						x		Educational programs for teachers and children
						x		Educational programs for teachers and children
x								"See and feel" classes; Science center
x		x						Housed in 1850 school building
			x		x		x	Planetarium
x						x		80-Seat auditorium; Puppet theater
				x				Exhibitions from the Metropolitan Museum of Art; Auditorium
		x	x				x	Teachers' workshop; educational class for children
	x							Housed in an old pioneer home (1860)
								Collection that encourages touching and manipulating
		x						Housed in an 18th Century fortress; 100-seat auditorium
	x						x	Planetarium
			x					Participatory events; docent programs
							x	Art festival; educational programs for teachers and children
	x	x						250-Seat auditorium; outdoor theatre
3	5	1	4	3	1	3	4	
6	4	7	5	6	7	6	5	

Some of the museums also have educational workshops for teachers, adults, and children.

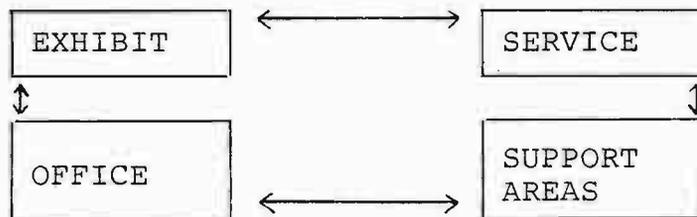
### C. Facilities

1. Library: most museums have a children's library
2. School loan kits: to extend the educational benefits from the museum to schools.
3. Sale of educational material (an important source of income for the museum)
4. Botanical gardens: the idea is to have children in contact with nature, and teach them the growth cycle of plants.
5. Classrooms: to complement the museum visit by the students
5. Others, e.g. discovery room, aquarium, photography, dark room, small zoo.

### Design Points

From the reading of different articles and books that mention children's museums as their main point I have been gathering design hints that will help to realize a better project.

Every museum has four different areas of activity, demonstrated by the following chart:<sup>1</sup>



This project will concentrate on the exhibition area.

---

<sup>1</sup>Educational Facilities Laboratories, Hands-On Museums, p. 42.

The museum staff's biggest challenge is to stimulate, to interest, and to create the desire to discover.<sup>1</sup> Reaching these objectives may be achieved by having a new sense of educational purpose on helping children as well as adults to perceive and understand the rapid social and technological changes occurring in the world around them.<sup>2</sup>

The role of the exhibit designer or the industrial designers is that of providing the environment that is necessary to obtain these objectives, through a satisfactory, appealing and functional hands-on exhibit design.

It must not be forgotten, however, that for the design of a children's museum and of its exhibits, the first thing that should be taken into account is the scale of children, their interests and their way of thinking.<sup>3</sup>

The ideal situation for the museum building is to have a structure designed specifically for the purpose of housing a children's museum.<sup>4</sup> If this is not possible, it should be arranged in such a way that it will not cool the desire to participate in what happens inside. This is the case at the Boston and Portland Children's museums, which are housed in large older residences from the nineteenth century.

Layout of galleries and other areas must have a specific objective to achieve. The sequence should be

---

<sup>1</sup>Heine, "Making Glad the Heart of Children," p. 24.

<sup>2</sup>Ibid., p. 27.

<sup>3</sup>Educational Facilities Laboratories, Hands-On Museums, p. 42.

<sup>4</sup>Heine, "Making Glad the Heart of Children," p. 24.

planned as to how one area relates or complements the others. It is possible to use the floor and its configuration or color to direct visitors, or even to draw board games or other types of games on the floor.<sup>1</sup>

We shall set some goals to attain with the exhibit, such as what its meaning is, what it will do for the visitors, and how it will help them to understand the world and their place in it better.<sup>2</sup>

Exhibit cases: they should be built low enough to allow even the smallest to look into without trouble. A child's angle of vision is totally different from that of an adult. Some technicians sit on the floor to see the exhibit as the child sees it.<sup>3</sup> There should be no open light sources or unfinished surfaces in those angles from which the child sees the object, and it should also avoid adult lines of sight that might cause objects to cover each other.

Play area: a design for this type of area should incorporate both static and dynamic configurations which would channel movement and also offer open and closed areas. It should also possess both horizontal and vertical forms.<sup>4</sup>

Bob Russell of the Omaha Children's Museum has provided some exhibit guidelines in order to give exhibit designers

---

<sup>1</sup>Ibid.

<sup>2</sup>Hudson, Museums for the 80's, p. 16.

<sup>3</sup>Heine, "Making Glad the Heart of Children," p. 24.

<sup>4</sup>Slaughter, "Design of a Play Area," p. 36.

some guidance in designing and building exhibits for children's museums.<sup>1</sup>

A. Exhibit design characteristics

1. Children are capable learners on their own. Exhibits should be designed so they are self-sufficient and need no guide.
2. Exhibits will be constructed to withstand the rigors of many thousands of hands-on experiences.
3. Exhibits will be designed to be easily maintained.
4. Exhibits will be constructed so that they can be easily dismantled and re-installed in another area or shipped to another museum.
5. Exhibits will be designed to be aesthetically appealing, with no hand-lettered signs or makeshift displays.

B. Exhibit and the museum environment

1. The world is not experienced in separate compartments. Exhibits should relate to diverse disciplines and show art, science, and other areas important to each other.
2. Children learn through self-directed play and exploration. "Please touch" is the museum slogan. All exhibits should be designed to actively engage the child's interest and participation.
3. Exhibits should be non-threatening and should have "success" or immediate feedback built-in.
4. Adults are valuable guides. Exhibits should encourage adults and children to learn together.
5. Exhibits should appeal to a broad age range, although each exhibit will not be entirely accessible to all ages; there should be activities in each exhibit for all ages.
6. Exhibits should be designed to be accessible to young children and the handicapped.

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<sup>1</sup>Bob Russell, "Exhibit Guidelines Memo." Omaha Children's Museum, Nebraska, 1984. (Typewritten.)

7. There will be no permanent exhibits. The exhibits should be continually evaluated and re-designed, whenever necessary.

### Conclusions

The children's museums I have visited or read about, I do not like, this being the result of the fact that each staff has its own concepts, personality, and originality.<sup>1</sup>

But the time and money spent for the development of a museum is very high, because everything must be specifically designed. There are few cities or communities that can afford this expense.

I do believe that a standardized system may be feasible to develop as a starting point for a children's museum. This may be adapted or modified to the particular characteristics that are required, curring down the costs and making it accessible to a larger group, thus helping children to develop their own potential.

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<sup>1</sup>Heine, "Making Glad the Heart of Children," p. 23.

## CHAPTER V

### EXHIBIT DESIGN SYSTEM

#### Antecedents

I began my thesis by doing my directed research, which gave me an overall view of the subject, but I went even further through readings of different books and magazines. I have also visited four children's museums: Brooklyn, Statn Island, Washington, D.C. and the Manhattan Laboratory Museum.

I sent approximately thirty letters (appendix 1) and received answers from fourteen museums (appendix 2). The information they forwarded has been very useful for the development of my project. They included photocopies of different papers on the subject, catalogs, photographs, and some of them even answered the seven questions included in my letter (figs. 8 & 9).

Bob Russell of the Omaha Children's Museum gave me the address and some other indications of the Association of Science-Technology Centers based in Washington, D.C. This enabled me to get information on the traveling exhibition service that they have for rent, and I bought an excellent book they published. It was the only book I encountered during my research that focused entirely on children's museums. This was Museums, Magic, and Children by Bonnie Pitman Gelles.

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BRIDGEFORD  
DIRECTOR

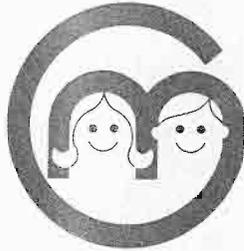
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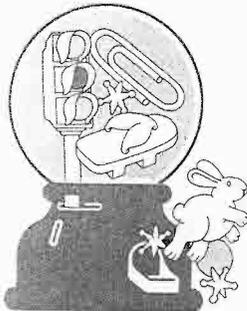
Association of Science-Technology Centers



The Children's Museum  
P.O. Box 3000 Indianapolis, Indiana 46206 317 924-5431



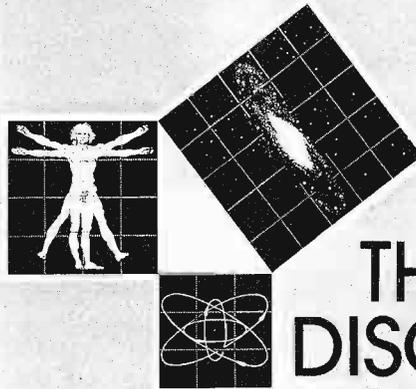
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**Children's Museum**

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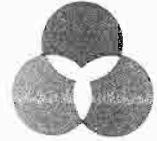
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Fig. 8. Graphic Symbols of Children's Museums

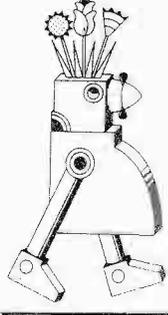


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AED

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# Omaha Children's Museum

Fig. 9. Graphic Symbols of Children's Museums

### Exhibition Program

The name of the museum will be Sensatorium, because it involves all different senses.

Its purpose will be to be the first or early overall experience for children with their senses, with the aim of sensitizing and making them aware of the world that surrounds them.

The intended audience will be children between two and twelve years old, which is preschool through elementary school age. Although the objective is to bring together people of different ages, as has been mentioned before, there is a need for non-formal educational facilities, especially for young people under twenty years of age.

The location should be based on the idea that it must reach not only the big cities and capital of the states, but also villages and towns of more than five thousand inhabitants. There are more than three thousand of these urban centers in the country and the number of museums is relatively small.

The museums will be placed next to schools or community centers. The museum shall work in coordination with other educational programs, because it is the complement of formal education. The installation of the museum will be temporary, in order to cover different cities of the same region within a certain period of time.

As a frame of reference, the exhibit will be based in the artistic, historic, geographical and economical national or regional values.

The museum will be sponsored by the federal and state governments and the Ministry of Education.

Admission will be free or subject to a symbolic donation, but the museum will receive income from the sale of educational materials, for courses or any other special event that is organized.

System characteristics: it will be based in the modular unit of 4' X 4' (1.22 m X 1.22) and its multiples and submultiples (fig. 10). This module is applied for the layout, furniture, walls, and so on, so that it will be install or knock down, and to be carried to different towns nearby using trailers which have a standard width of 8' (2.5 m).

The museum will be prefabricated with standard elements so that it can be installed at the same time in different cities across the country, cutting down dramatically the cost of installation for a regular museum.

If the museum is installed with all the originally planned areas it will consist of three zones which will be as follows:

Introduction zone: this has five areas, the frist being orientation, and the other four, divided according to senses, are the seeing area, the hearing area, the touching area, and the chemical senses area which includes both smelling and tasting.

Activity zone: this has three areas--theater, library, and workshops.

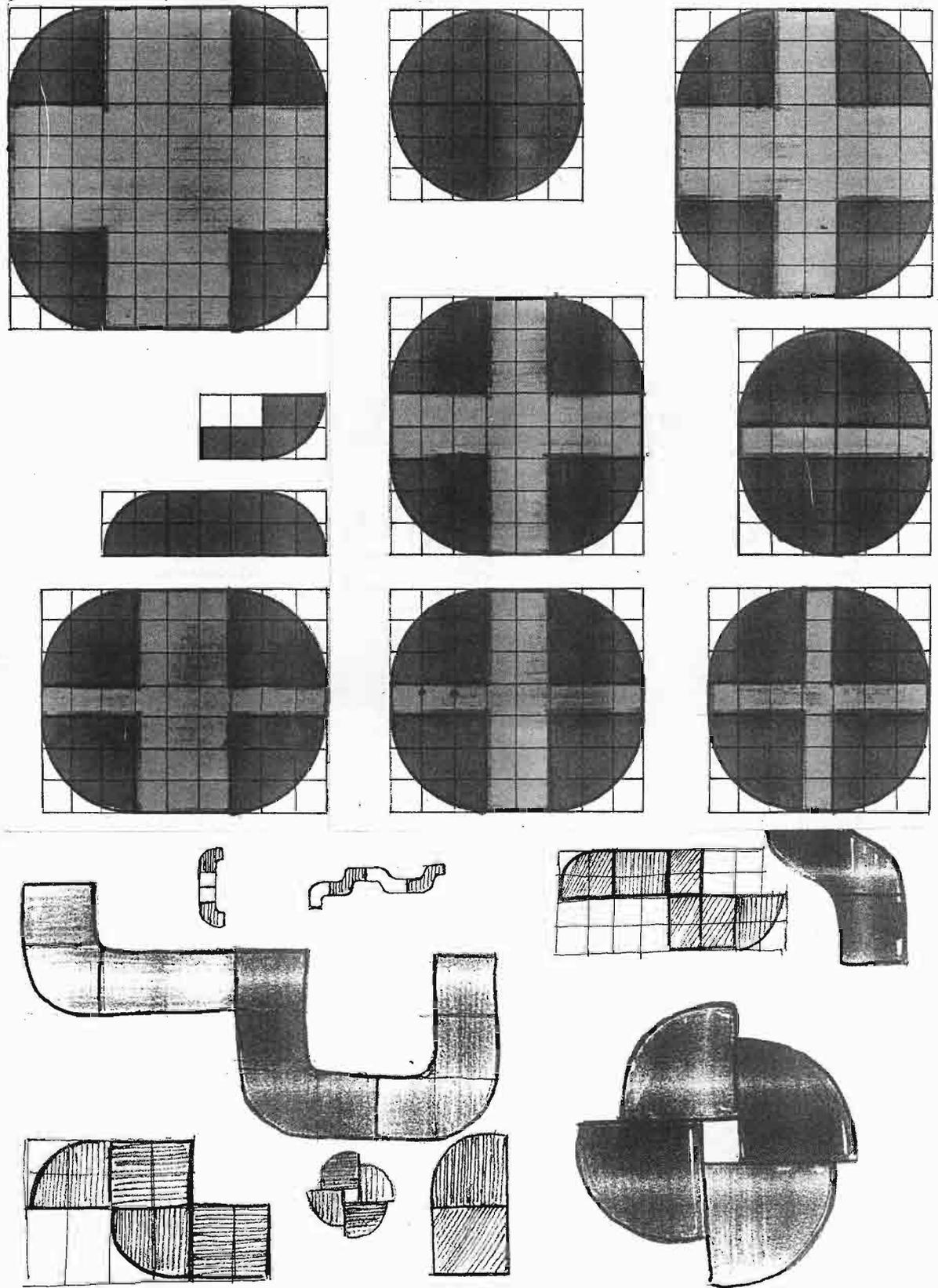


Fig. 10. Use of modular unit of 4' by 4' and its multiples and submultiples

Ancillary zone: this has four areas--staff, storage, toilets and sale of educational materials.

### Country Summary

#### A. Geography and population

1. Area: 760,000 square miles
2. Population: 75 million
3. Topography: northern half dominated by Sierra Madre Oriental and Sierra Madre Occidental mountain ranges and barren intervening plateau

Central Mexico is volcanic highland region of high peaks and basis and where nearly half the population resides; Southern Mexico, where most of major river systems are located, dominated by complex mountain systems

4. Climate: subtropical to temperate climate and generally scanty rainfall in half of the country lying north of the Tropic of Cancer; wide range of climate conditions in southern half of country
5. Population structure in percent:<sup>1</sup>

Age group	Male	Female	Total
0 to 4	8.6	8.3	16.9
5 to 9	8.2	7.8	16.0
10 to 14	6.8	6.5	13.3

6. Young population: between 1960 and 1970, the proportion of the Mexican population under the age of twenty increased from 54.3 to 56.7 percent of the total; the country was one of the countries having the youngest population in the Americas
7. Population problems: there has been an excessive urbanization, and an uneven geographical distribution of the population, which is mainly concentrated in three cities: Mexico City, Guadalajara, and Monterrey

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<sup>1</sup>Weil, Area Handbook for Mexico, p. 57.

8. Education: during the early 1970's over 11 million students were enrolled in public and private schools amounting to about 25% of the population; more than 80% of the total were in six-year primary school programs; elementary school is mandatory, and most students at all levels were in schools in urban facilities; illiteracy is still a problem in some remote and rural areas of the countryside
9. Agriculture and industry: the country is nearly self-sufficient in all crops; industry makes most consumer goods and many intermediate and capital goods
10. Transportation: there is a good road system; railroad system connects main population areas with seacoasts and borders; domestic aviation is well developed and international service connects Mexico with most countries

### Storyline

I tried different possibilities for the layout (fig. 11) but the one that worked better is based on independent areas of square or rectangular shapes with rounded corners and connected in between them with straight walls (fig. 12).

The distribution is asymmetrical, in order to have a dynamic flowing pattern that makes people walk and discover. The layout follows this sequence: introduction, touching, hearing, seeing, chemical senses area; from there to the activity area, workshops, library, and theater.

Each of the different areas will be focused on one sense, so it is necessary to know how each sense functions and have an overall view of how it is divided, setting up the parameters for every area.

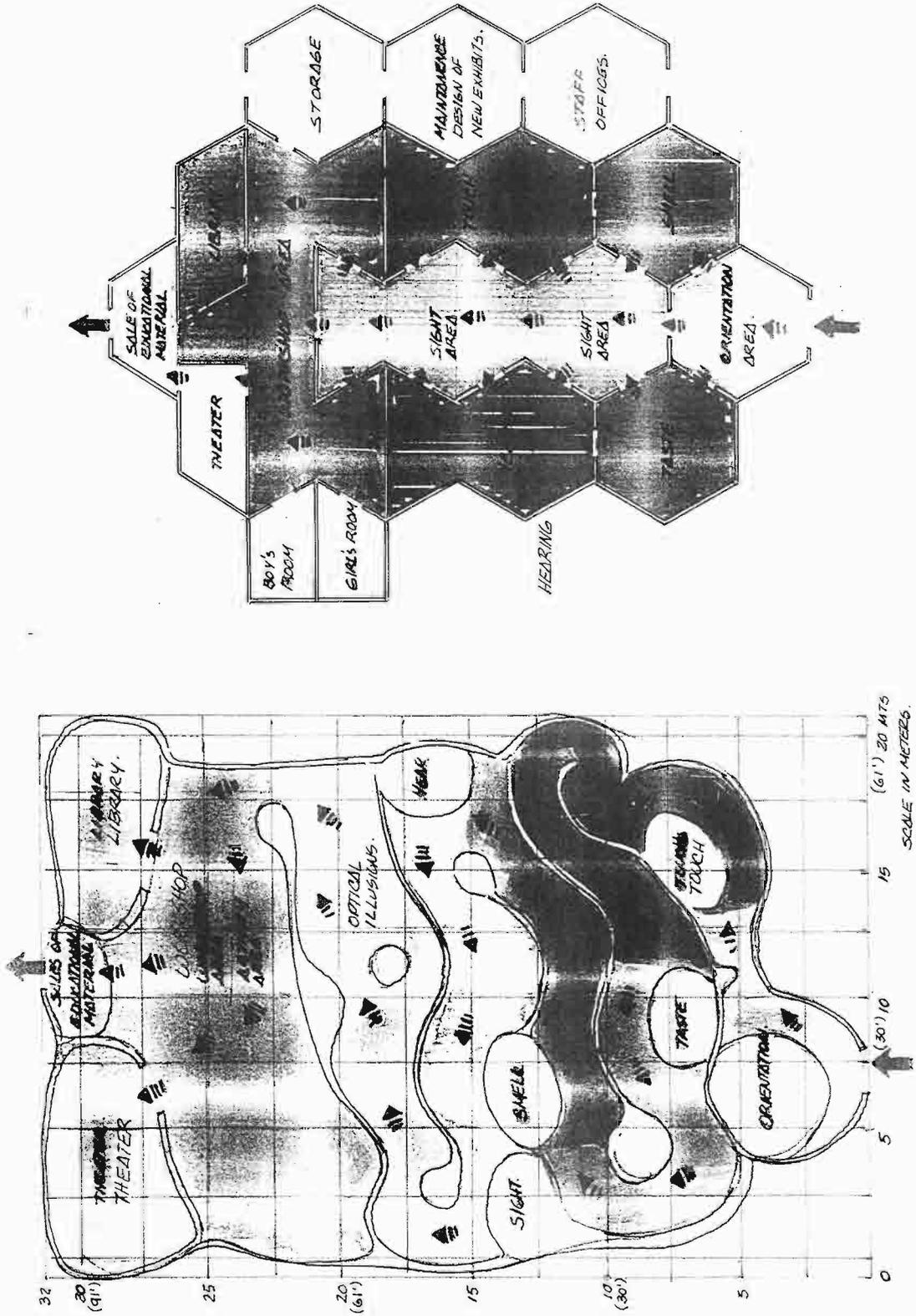


Fig. 11a. Layout Proposal

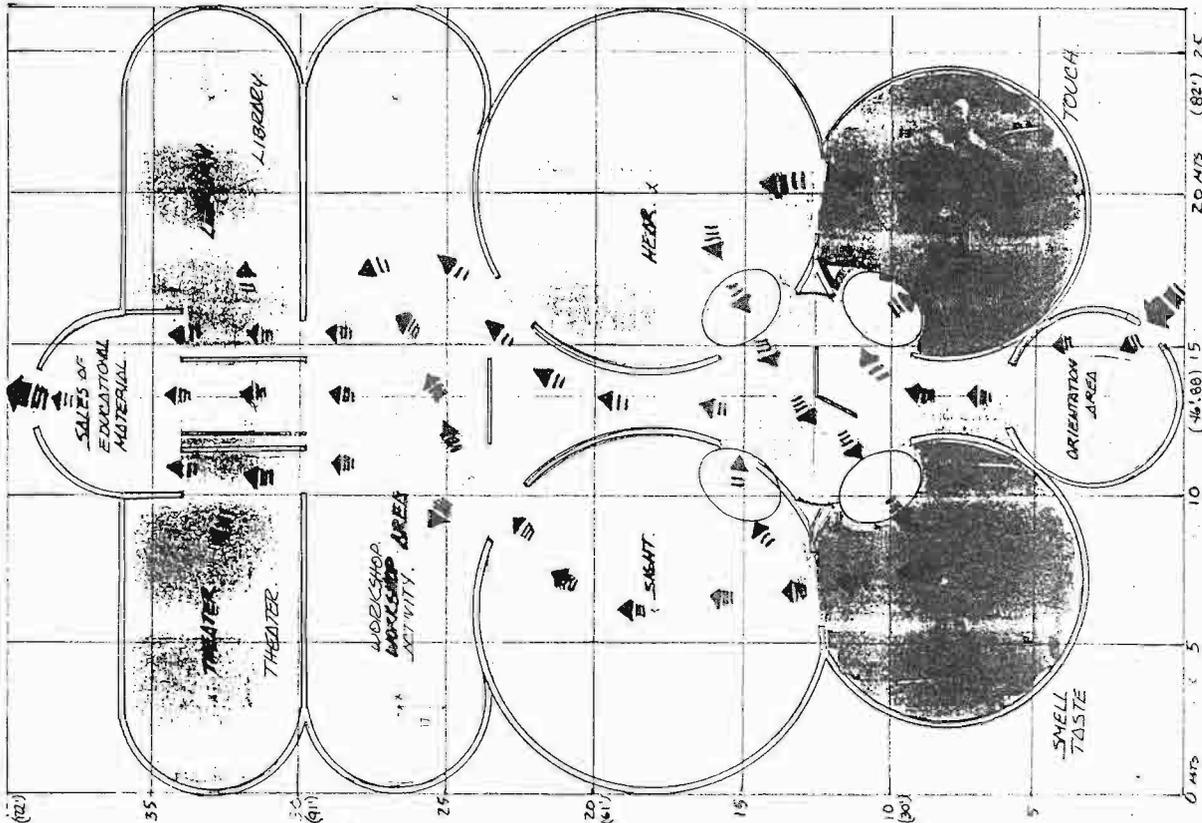
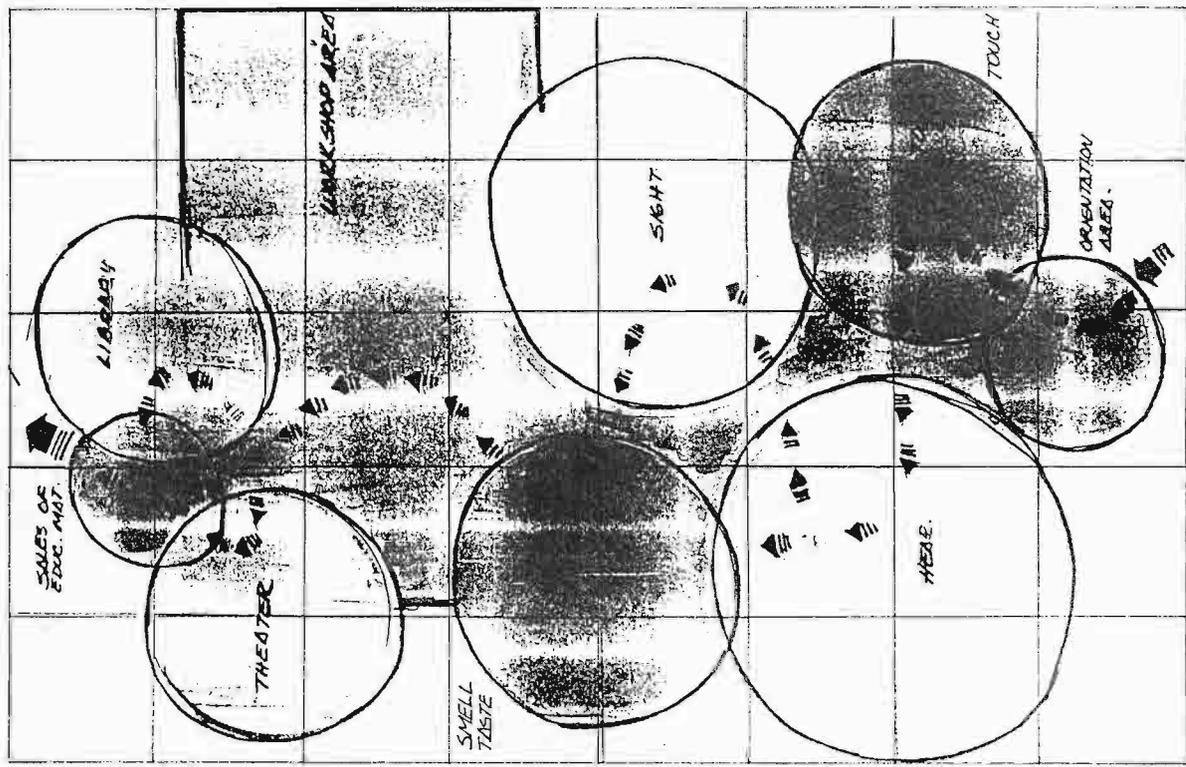


Fig. 11b. Layout Proposal

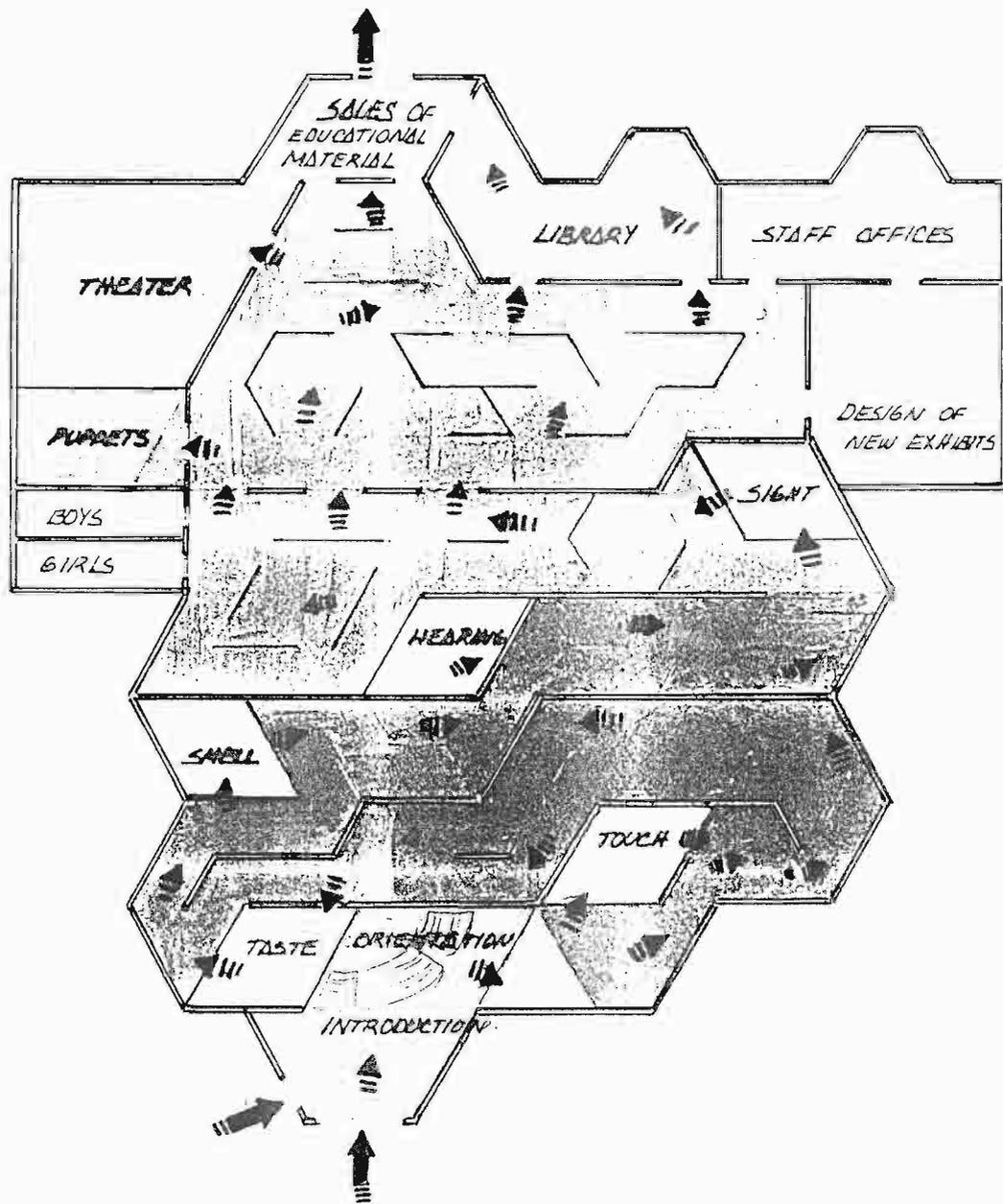


Fig. 11c. Layout Proposal

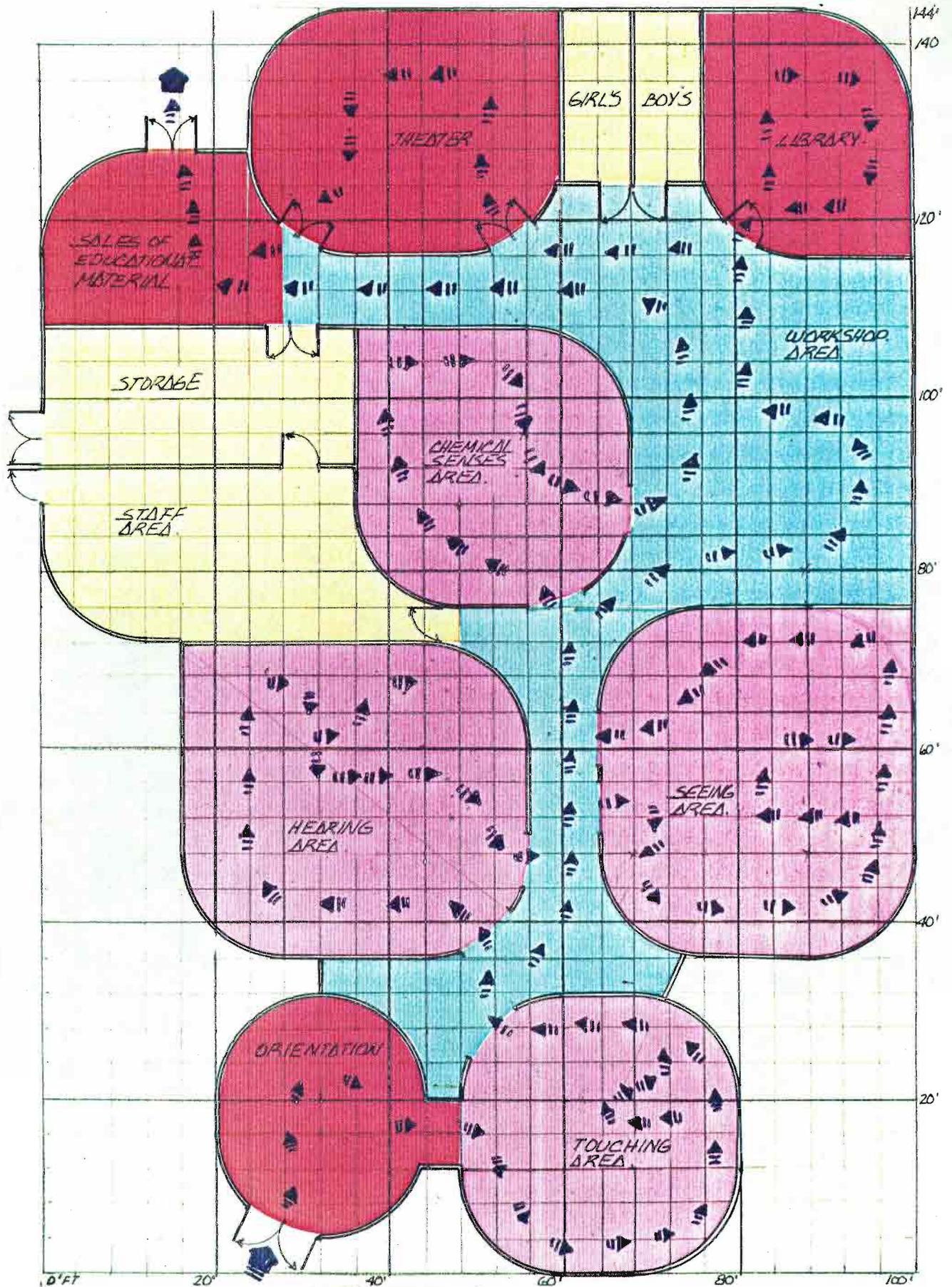


Fig. 12. Final Layout

### Introduction Area

Purpose: to awake and to involve the children's attention towards the importance of the brain and the senses as members of a great system in the human body that allows us to perceive light, sound, chemicals, and pressure, which are sent to the brain in the form of messages.

Description: it has an ovoid shape, with a semicircular seating area for twenty persons.

Ambiance: semidark with some pools of light.

Duration: Visitors will be here between three to five minutes while being shown an audiovisual or short film about the senses, plus a two-minute verbal explanation of the museum.

### Touching Area

Purpose: to increase tactile sensitivity or learning how things feel to our touch (fig. 13).

Ambiance: well illuminated, with some semidark areas with pools of light.

The sense of touch is important during childhood because "the shape and form of the outer world of reality, its figures and the background from which they emerge are gradually built by the infant out of the building blocks of its experience, entering through all its senses, always contingent, correlated, measured, and evaluated by the criterion of touch."<sup>1</sup>

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<sup>1</sup>Ashay Montagu, Touching (New York: Columbia University Press, 1979), p. 196.

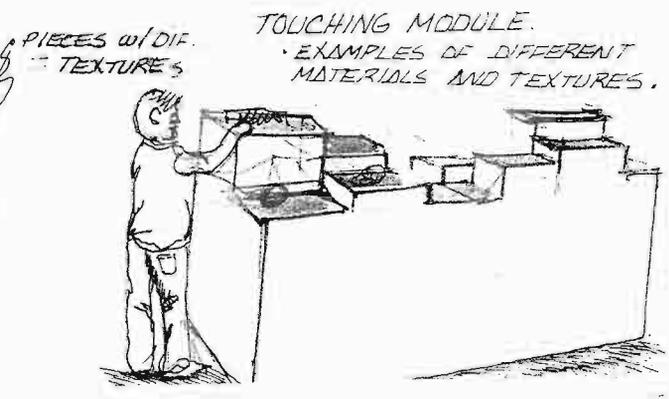
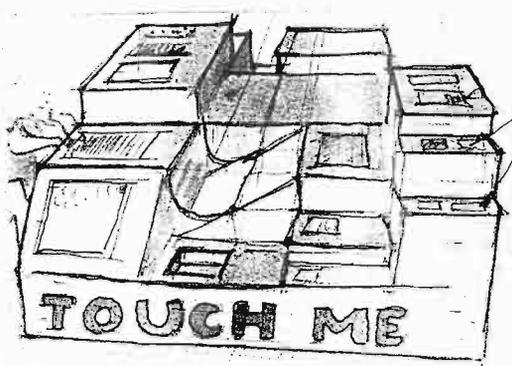
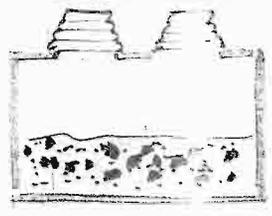
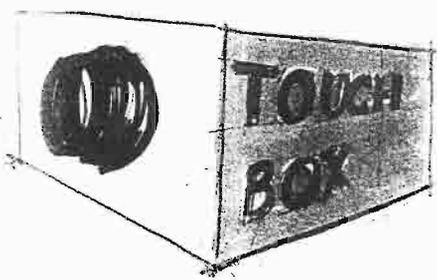
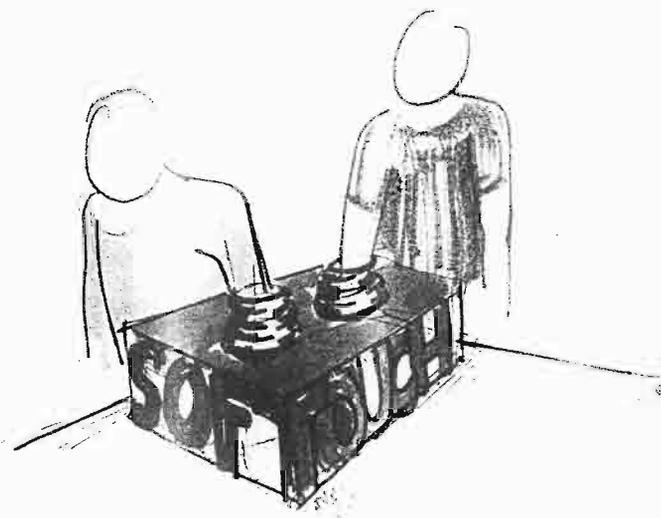
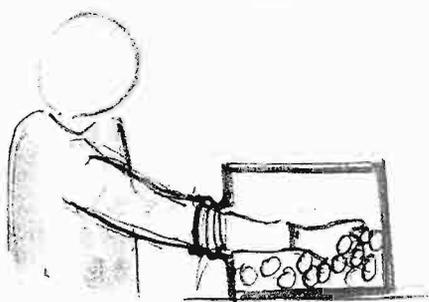
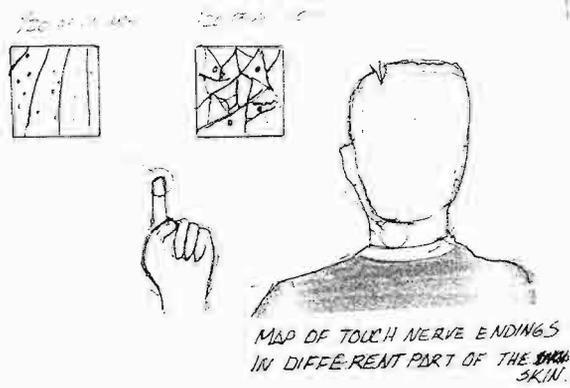
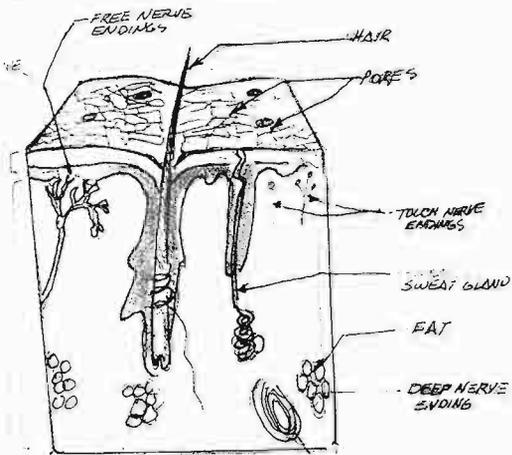
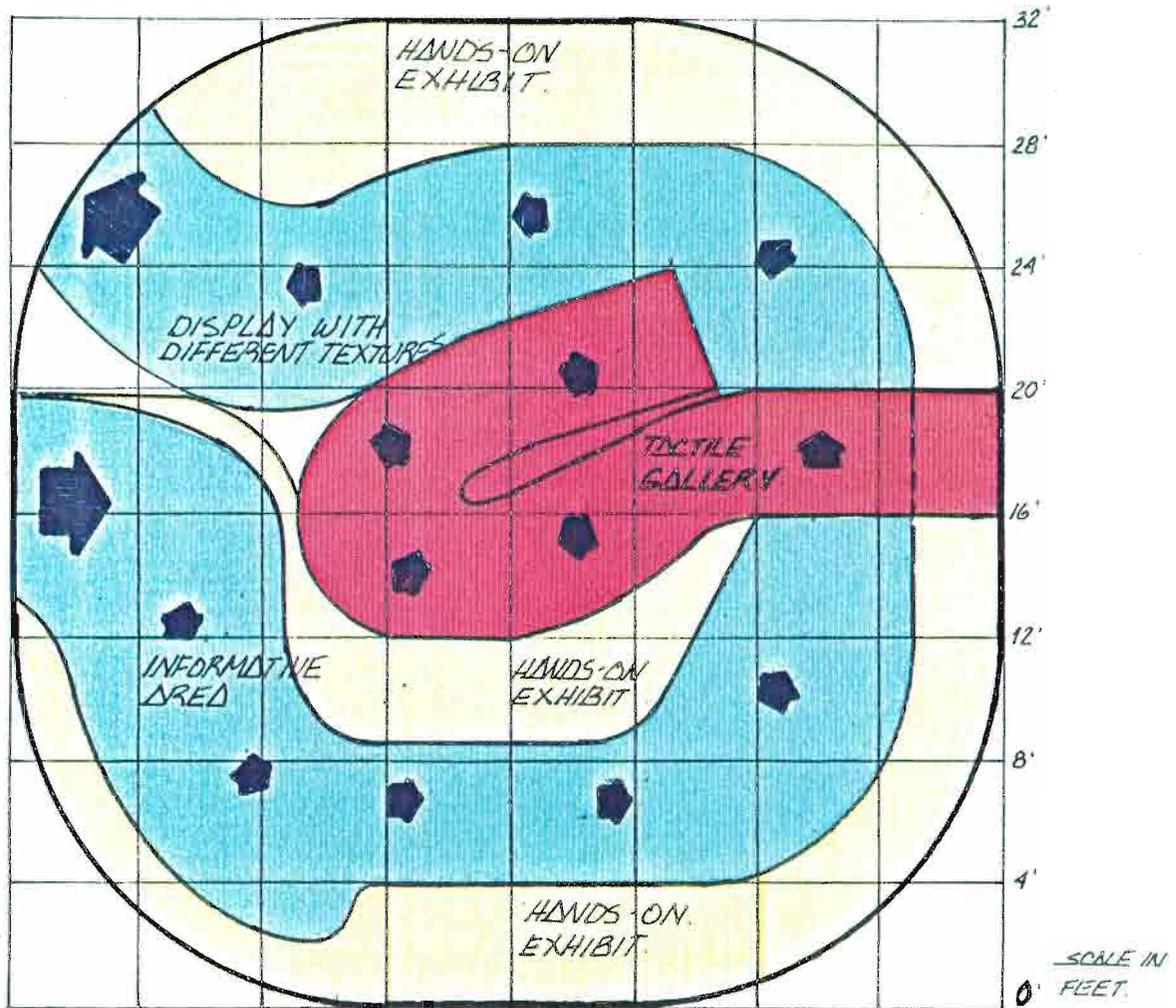


Fig. 13a. Touching Sense Exhibit



- EXHIBIT ZONE
- ENCLOSED ZONE
- TRAFFIC FLOW



**TOUCH**

Fig. 13b. Plant View of Touching Sense Area

In fact, this is a sense that should be taken more into account, because tactile experiences play a fundamentally important role in the growth and development of man, especially during the first stages of childhood, because the senses develop in a definitive sequence: first tactile, then auditory, then visual.

As the child approaches adolescence the order of precedence reverses itself: first visual, then auditory, then tactile.<sup>1</sup>

Division: Herbert S. Zim says that there are various skin senses found in the skin: pressure, with nerve endings located inside of the skin, some for touch and some for pain (the highest concentration of nerve endings are in the fingers, followed by the lips, face, arms, back, etc.); texture, with recognizable sensations from smooth to rough; position and pull, which are in the muscles, joints, and tendons, and help us decide what to do and how much force to apply; temperature, discerning heat from cold; and pain. Anything that affects any of our senses too strongly causes pain. The touch sense brings most of the pain we feel, such as cuts, pricks, stings, or burns.<sup>2</sup>

#### Hearing Area

Purpose: to increase auditive sensitivity or learning to listen.

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<sup>1</sup>Lloyd Kaufman, Perception (New York: Oxford University Press, 1979), p. 293.

<sup>2</sup>Herbert Zim, Our Senses and How They Work (New York: William Morrow & Co., 1956), p.

Ambiance: well illuminated, with some semidark areas with pools of light.

Sound insulation: some of the exhibits use acoustic walls.

Importance: This is our second most important sense next to seeing. Hearing is the most highly developed sense, although ears are just flaps and funnels to help gather the waves of vibration travelling through the air.<sup>1</sup>

The parts of the ear that do the hearing are inside the head. The ear is made up of three parts: the outer, middle, and inner ear (fig. 14).

Division and sound characteristics: Sound has three qualities: pitch, which increases with the number of vibrations, higher or lower; overtones, which is what gives sound quality, what makes a voice sound different from another voice or a musical instrument; and loudness, which depends on the height or strength of the vibrations, louder or softer. The scale of loudness is measured in decibels and goes from zero, which is absolute silence, to twenty, which is a whisper, to fifty for normal conversation, to one hundred and ten decibels, which are produced by an air hammer.<sup>2</sup>

There is sound that we cannot hear, because it differs in wave, length, and frequency. Sounds with a higher frequency than those that the human ear can hear are called ultrasounds. Dogs and cats can hear some ultrasonic

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<sup>1</sup>Zim, Our Senses, p. 26.

<sup>2</sup>Ibid., p. 30.

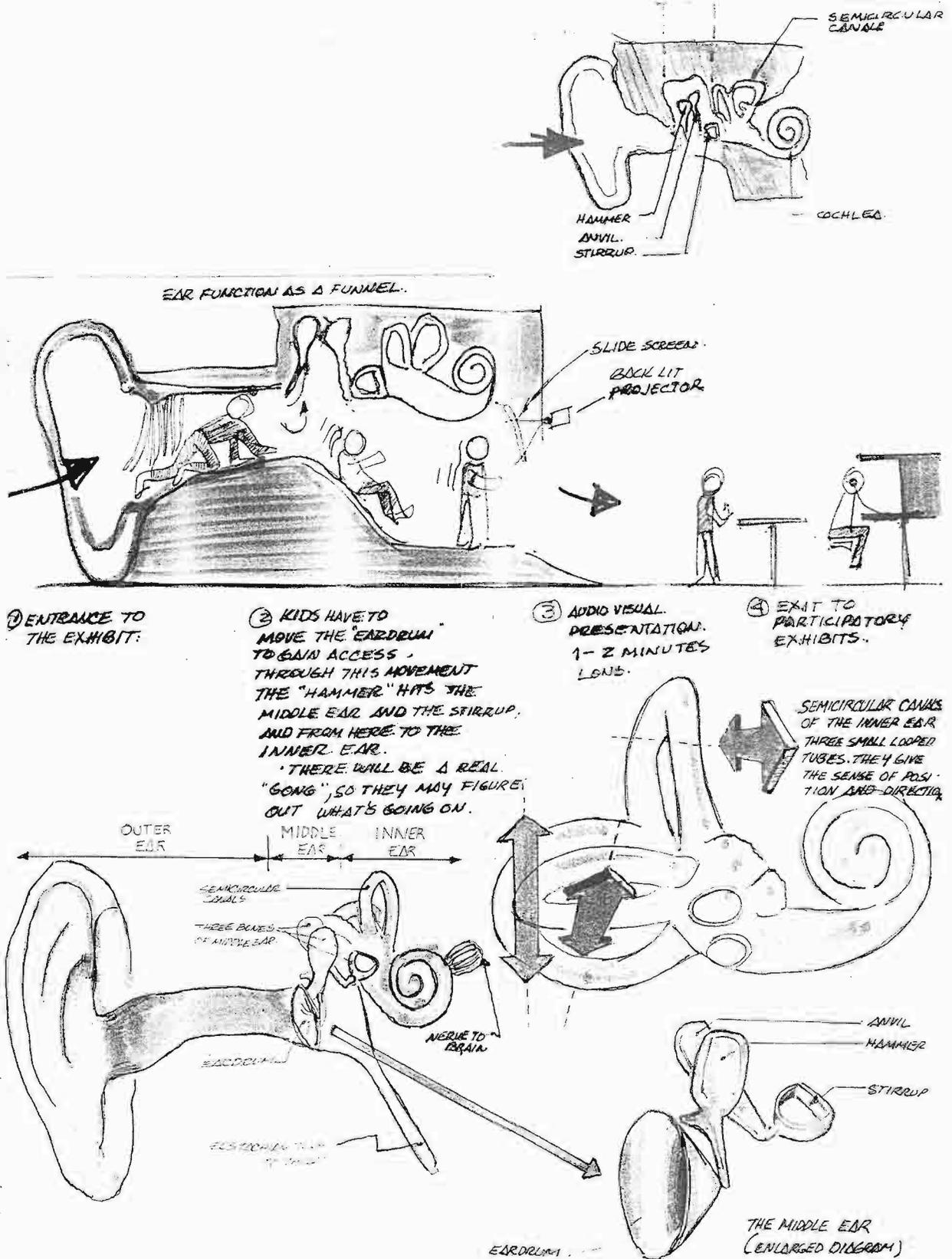


Fig. 14a. Hearing Sense Exhibit

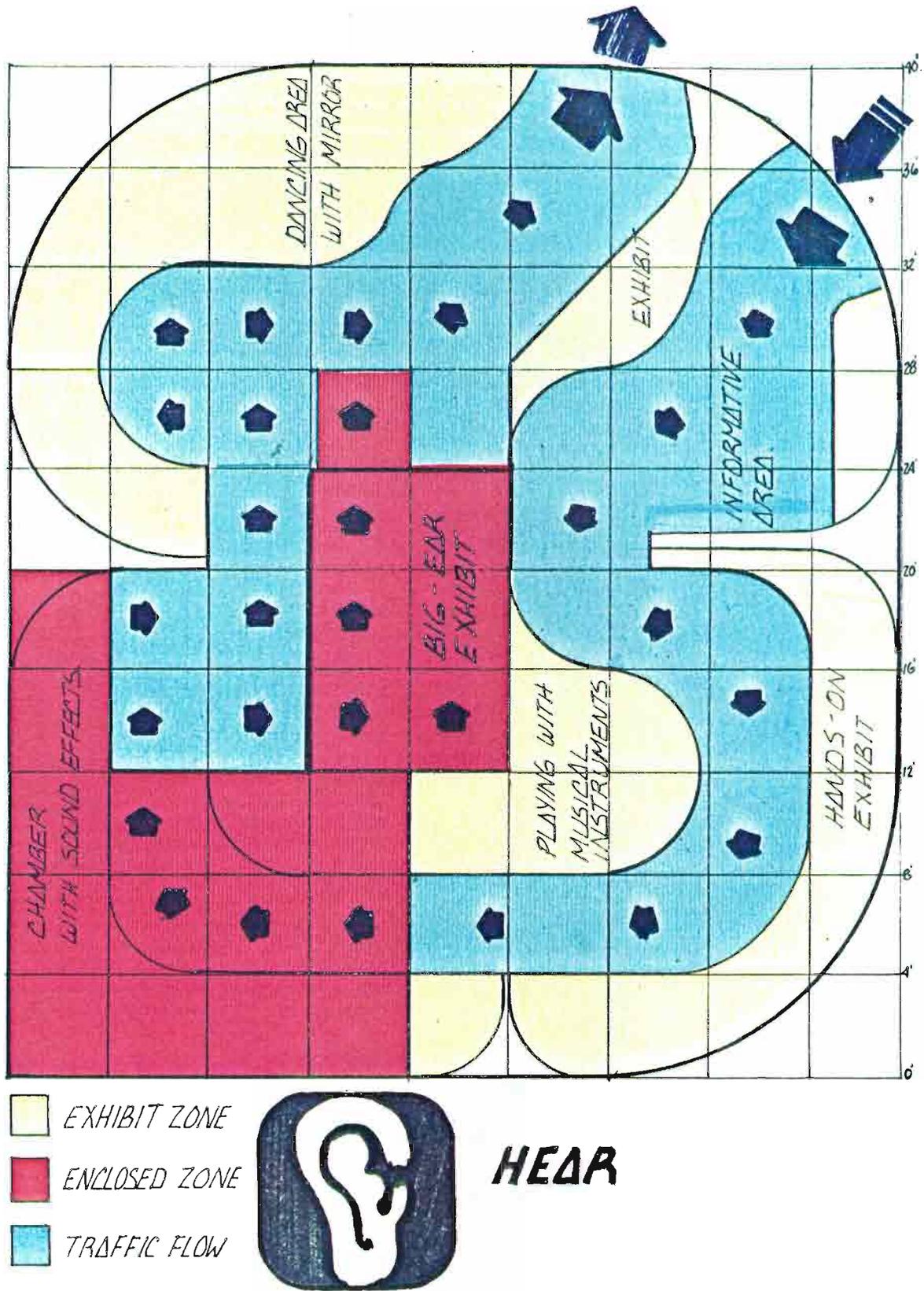


Fig. 14b. Plant View of Hearing Sense Area

sounds. The cry of a bat is an ultrasonic sound that it uses when it is flying to avoid obstacles. The principle of radar is similar to this.

### Seeing Area

Purpose: to increase visual sensitivity or learning how to observe with our eyes.

Ambiance: well illuminated, with use of light of different colors for some exhibits.

Importance: sight is the most highly developed of our senses. Our eyes do more than just see; through them we may judge size and distance. They help us to keep our balance, and most importantly, we get a true picture of the three-dimensional world.<sup>1</sup>

Mechanically, the eye is an instrument which collects light rays and focuses them into an image registered on its rear surface. Light enters through the cornea. Because of its rounded shape, the cornea acts as a convex lens of a camera, bending light rays together (fig. 15).<sup>2</sup>

Physically, the eyeball is roughly spherical, with a slight bulge in front made by the cornea, a transparent shield which protects the lens.<sup>3</sup>

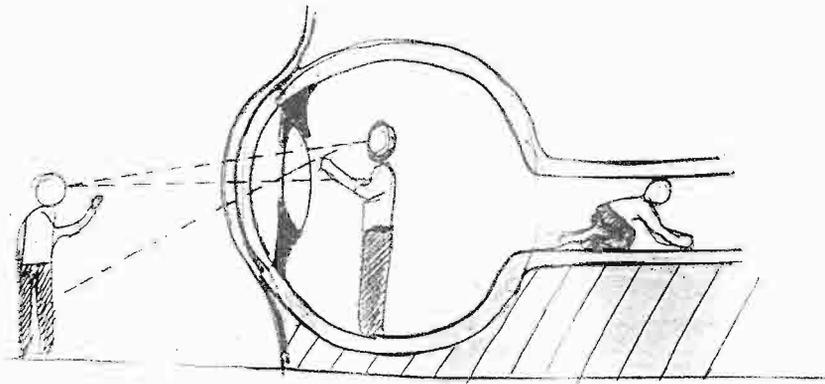
Between the cornea and the lens lies the iris, an opaque disc which may have different colors. In the center

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<sup>1</sup>Zim, Our Senses, p. 24.

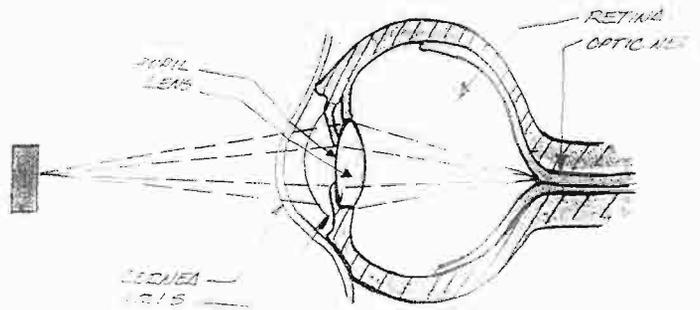
<sup>2</sup>Conrad Mueller, Light and Vision (New York: Life Science Library, 1966), p. 84.

<sup>3</sup>Zim, Our Senses, p. 9.



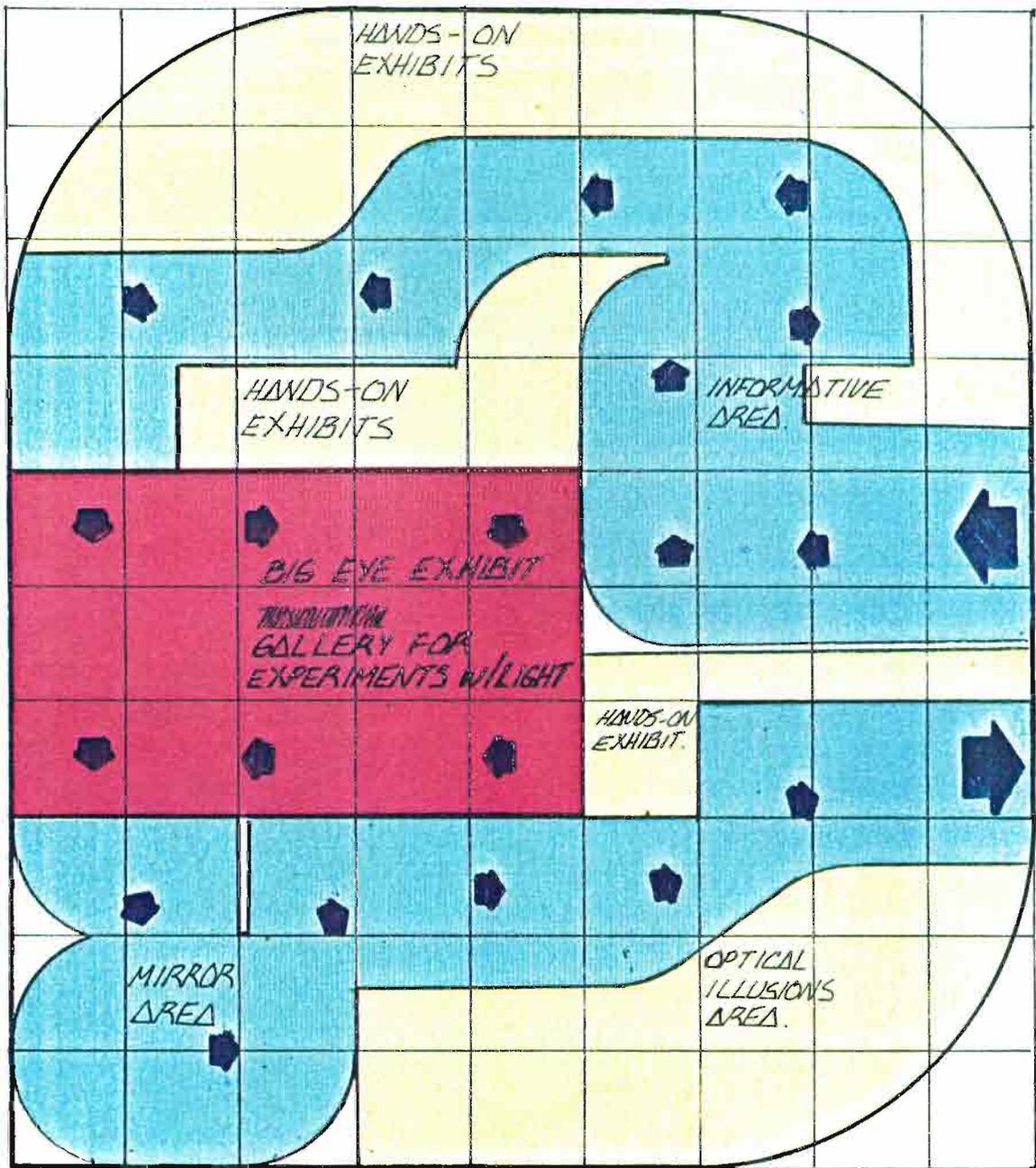
① KIDS CAN MANIPULATE  
THE PUPIL AND PERCEIVE  
THE AMOUNT OF LIGHT  
THAT REACHES THE EYE.

② KIDS CRAWL  
FOLLOWING THE  
OPTIC NERVE TO VISIT  
THE BRAIN.



CROSS SECTION OF THE EYE.

Fig. 15a. Seeing Sense Exhibit



- EXHIBIT ZONE
- ENCLOSED ZONE
- TRAFFIC FLOW



**SEE**

Fig. 15b. Plant View of Seeing Sense Exhibit

of the iris is the pupil, a hole through which the light rays pass, going through the inside of the eyeball to reach the back of the eye where the optic nerves end and join the membrane. The retina is made of very special nerve cells that are sensitive to light and color; a nerve cord connects the retina of each eye to the brain. Two main kinds of nerve cells make up the retina. Near the center most of the nerves have cone-shaped endings.

Cones do the job of detailed, direct seeing. They work best by day and also give color vision.

Rod-like endings exist mostly at the sides of the retina. These cells work best with dim light and give side vision.

One of the most successful applications of the sight process has been the camera, because it imitates the structure of the eye. Both have lenses and both have irises--diaphragms to regulate the amount of light let in.

Color comes from different kinds of light reflected into the eye. This changes the chemicals in the diverse cone cells of the retina.

#### Chemical Senses Area (Smelling and Tasting)

Purpose: to increase our olfactory and tasting ability, and to learn about things through the use of these two senses.

Ambiance: well illuminated, although colored light may be used to show how our perception of food changes under different color environments.

An oven and small grill will be used for food preparation, so an air extractor or adequate ventilation is needed.

Introduction: taste and smell are chemical senses and they work together. Part of what we call taste is often smell--that is the reason that when we have a cold and the nose is clogged not even our food tastes good.

Taste comes from chemicals in the food, and the sense of smell is even more sensitive than the sense of taste. The smallest particle of something carried in the air is enough to excite the nerve endings in the nose that are sensitive to smell.

The taste sense: we can taste only things that are dissolved, either in water or in the saliva of the mouth. We taste something when the dissolved chemicals touch the taste buds of the tongue. Nerve cells branch into the taste bud from the lower end, and these join to form a nerve fiber that connects with the brain.<sup>1</sup>

The nerve ends for taste are packed in little clusters of cells called taste buds. Most of these are in the tongue, but some are tucked away at the back of the mouth where the throat begins (fig. 16).

The taste buds sensitive to sweet and salt are near the tip of the tongue. The buds sensitive to sour tastes are mainly at the sides of the tongue. The bitter sensation buds are towards the back of the tongue. So even though the taste buds look alike, some seem to react more to one kind of the four tastes than the others.

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<sup>1</sup>Zim, Our Senses, p. 36.

<sup>2</sup>Leonard Blochman, Understanding Your Body (New York: Crowell-Collier Press, 1968), p. 34.

Taste can be reduced to four basic ones: bitter, sweet, salty and sour. These alone or in combination give the taste to the food we enjoy.<sup>1</sup>

What we commonly call flavor is a combination of the four basic tastes with impressions from the four other senses: touch, smell, pain, and the hot-cold sense. Even sound sometimes plays a part in our tasting process like crispness or the sound of a crunch.

The smell sense: the olfactory nerves end at the rear of the nasal cavity, at the highest point close to the brain. The nerve endings are stimulated by fumes, smoke, vapor, gases, and air-borne particles in solid or liquid form. They set up a chain of effects that makes the brain aware of an odor (fig. 17).<sup>3</sup>

Division: Hannig's odor prism includes all the six odors: fragrant, putrid, ethereal, burned, spicy, and resinous.<sup>3</sup>

### Activity Zone

Purpose: it is the practical application of what has been learned through the introduction zone. Here the visitor has these options: the workshop area, the library, or the theatre.

### Workshop Area

Purpose: to be a space for creative activities. It may

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<sup>1</sup>Zim, Our Senses, p. 35.

<sup>2</sup>Blochman, Understanding Your Body, p. 33.

<sup>3</sup>Kaufman, Perception, p. 86.

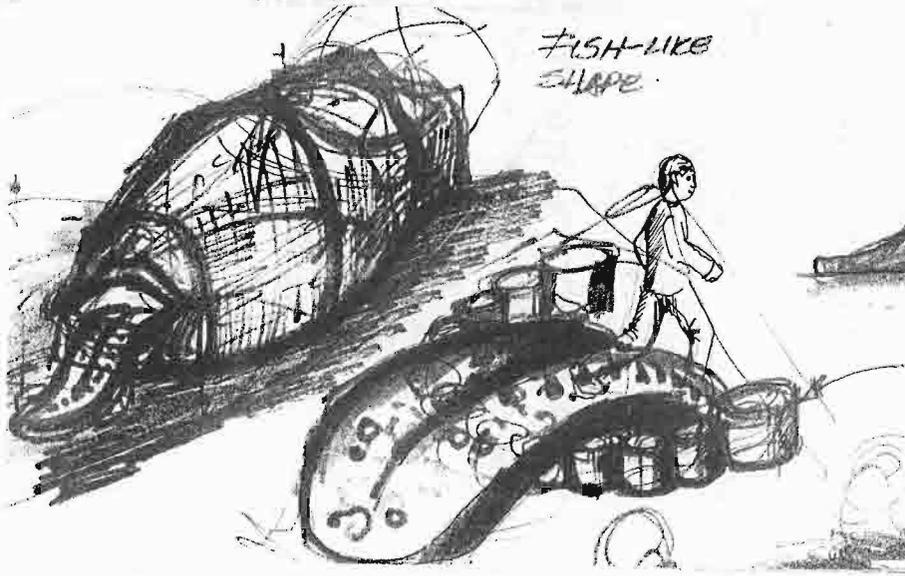
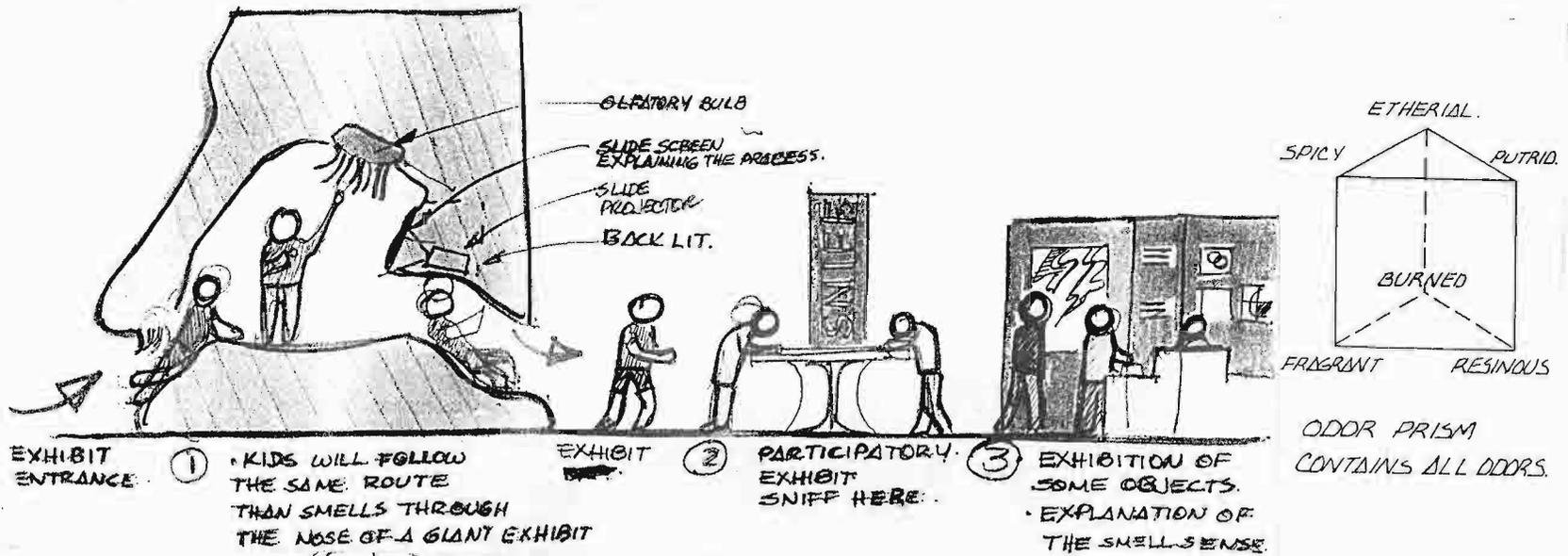


Fig. 16. Tasting Sense Exhibit

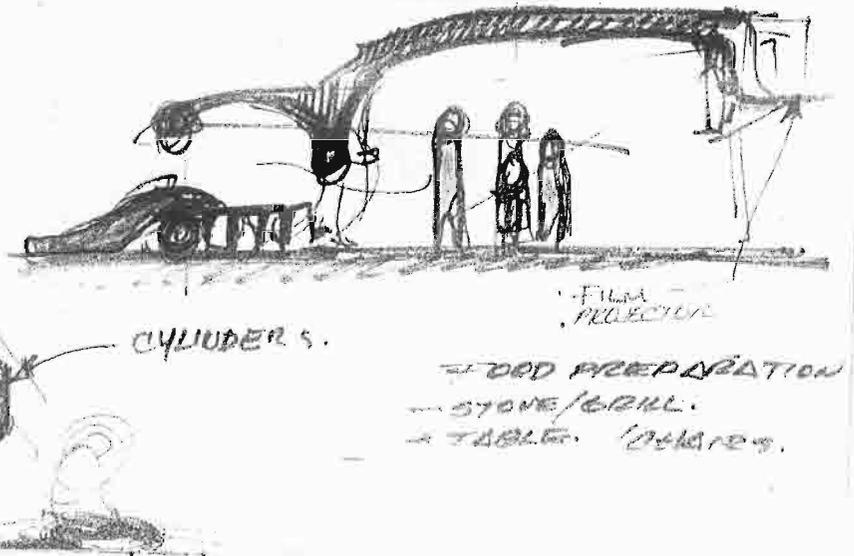


Fig. 17a. Smelling Sense Exhibit

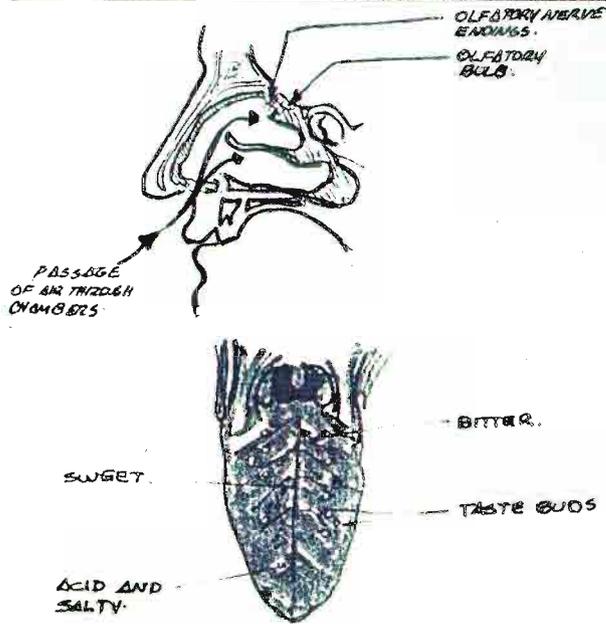
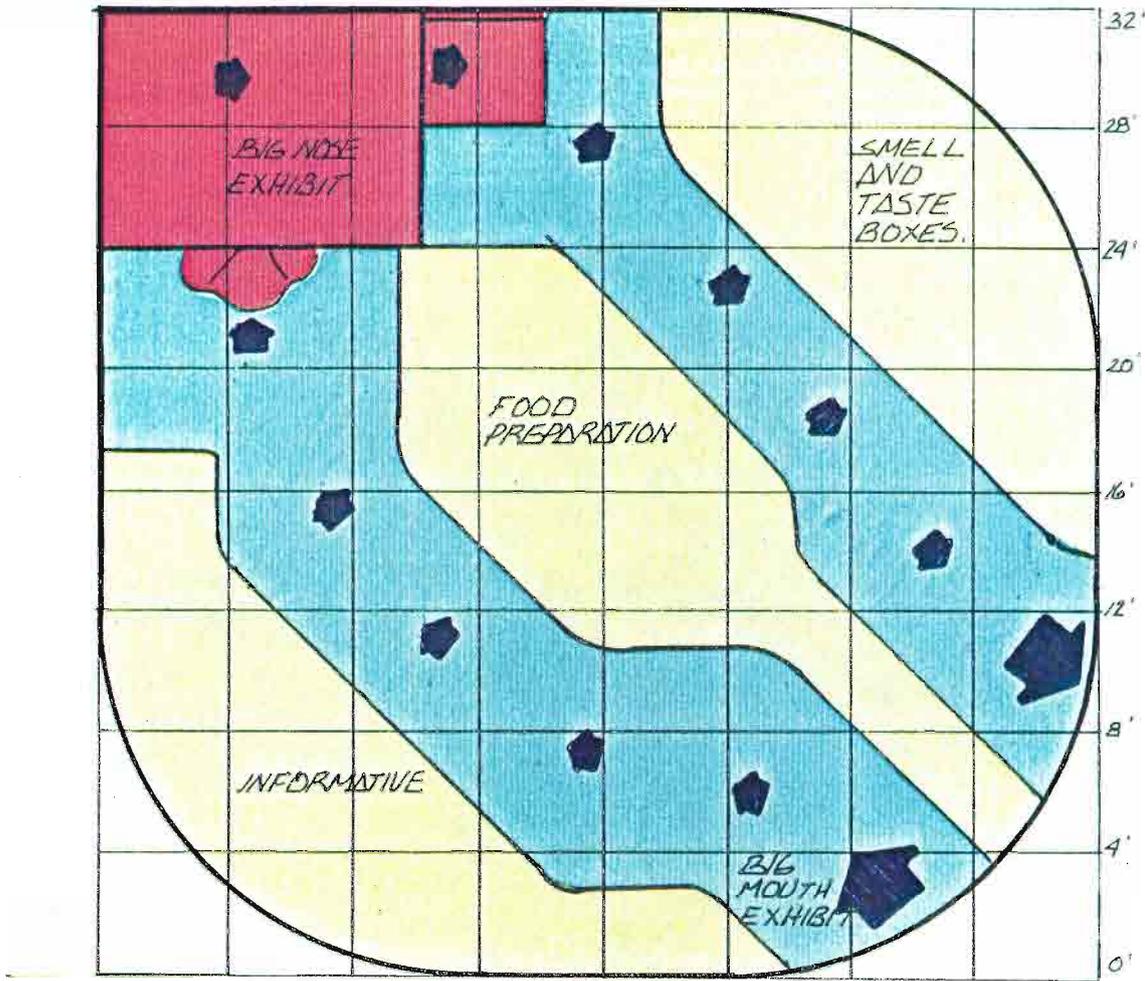


Fig. 17b. Plant View of Chemical Senses Exhibit

be subdivided into two different areas: one for manual activities such as model-making, use of clay and other materials, drawing, music and others; the second area for five personal computers where children may play different games.

Ambiance: well illuminated and an informal atmosphere.

Requirements: tables or work surfaces, stools or seating areas, storage, at least one sink.

### Library

Purpose: this is a support area, to increase the knowledge in a specific subject or theme presented in the museum.

Ambiance: well illuminated and an informal atmosphere.

Requirements: tables or reading surfaces, chairs or a seating area; bookshelves and/or circular book display; magazine racks; and a carpet for the floor.

### Theater

Purpose: to provide space that may be used for representations, puppets or classes.

Ambiance: the lighting will be controlled according to the presented activity.

Requirements: this must be a versatile space, able to be used for diverse activities. So we may deduce that the seating area must be mobile and also a small stage should be assembled or taken down easily for theatre or puppet presentations.

### Staff Area

Purpose: it will be used as a lounge and for office work for the staff people working in the museum.

Ambiance: well illuminated

Requirements: regular office furniture, and one couch.

### Services

Purpose: to provide bathroom service for the girls and boys visiting the museum.

Ambience: well illuminated.

### Sale of Educational Material

Purpose: to provide an income for the museum.

Ambience: well illuminated

Requirements: counter, magazine and book rack, display of various educational materials.

### Scenario

Each exhibit area will be divided according to its content in two parts: informative and hands-on exhibits.

I mention different possibilities for these two parts, because even though the museum is based on a modular system, the exhibit itself may vary, so not all the time the stuff presented will be the same. The system must also be flexible, and in constant renovation and improvement through the feedback given by the visitors.

### Informative Area

Purpose: to communicate to the visitor some specific information using charts, diagrams, photographs, slide shows, music, and different objects.

This area gives an introduction of the sense, how it is divided and how it may be measured; it compares the human

senses with those of different animals. It also presents a small collection of objects directly related to the sense, and gives some other interesting information. Examples of how this may be used in every area are:

Touching Sense: animal skins and characteristics, for example, how it is used for camouflage; sand, wood, and other natural elements from different areas of the country.

Hearing Sense: musical instruments, telephones, radios, explanation of how a radio program is recorded. Technology and the industrial techniques involved in sound reproduction. Sound characteristics and how they are applied to various devices like radar.

Seeing Sense: cameras, kaleidoscopes, boxes with animated figures, optical illusions, masks from different parts of the country, photographs, color technology.

Chemical Sense: exhibit about natural and canned food, junk food. Explanation of why they are called chemical senses.

#### Hands-On Area

Purpose: to give the visitor an experience with his senses by manipulating an object, doing an experiment, or playing a game.

This is a tendency that many museums actually have especially when they are dealing with children. The reason for this is that it has been proved that what is seen and touched is always made part of ourselves more intensely

and more meaningfully than what is only seen.<sup>1</sup> There is also a Chinese proverb that reflects this: "I hear and I forget, I see and I remember, I do and I understand."

I will describe how the hands-on approach is used in every area.

Touching sense: The central exhibit of this area is a tactile gallery that is a kind of dark chamber, that is explored by using only the sense of touch (fig. 13).

Touching small live animals like rabbits, turtle, etc. inside of a sand tank, so children may play with them.

Exploring the relationship of objects with different textural qualities with adjectives like soft, hard, sandy, fuzzy, cool, dry, rough.

Development of fine and gross muscular movements by using challenge games.

Feeling boxes or surprise boxes.

Braille system, or how blind people may read by using their fingers.

Hearing sense: The central exhibit of this area is a big ear where children gain access crawling and following the same route that sound waves do as they reach the ear. They may learn how the internal structure of the ear looks (fig. 14).

Sound exercise box, which is made with a collection of several objects in a box by fastening, hanging and positioning.

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<sup>1</sup>Linderman, Developing Awareness, p. 91.

This gives the visitors the chance to produce unusual sounds. According to Linderman, sounds may be divided into three categories; we may have different hands-on exhibits in each.<sup>1</sup>

Musical sounds: those which are made by voices singing or instruments being played in a rythmical sequence. We may use as a reference drums, harps, trumpets, guitars. We may create our own musical instruments with bottles, pipes, strings.

Sounds in nature: there are many sounds in nature which are both beautiful and rythmical to hear if we learn to listen and become aware of them, like the sound of wind, running water, and so on. What can be used in the museum is some pre-recorded special effects records.

Man-made sounds: there are many sounds in our everyday environment which are pleasing and stimulating to listen to. Exhibits can be related to the sounds that we can listen at certain time of the day, like during the morning when the breakfast is being prepared, or the alarm clock ringing; or what happens at night time, with the television or the radio on.

Seeing sense: The central exhibit is a big eye, where children may learn the sight process, and may see the comparison of how the camera imitates the structure of the eye (fig. 15).

Curved mirrors can be used to distort the reflected image. Shadows on a screen may be projected using hands, body, etc.

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<sup>1</sup>Ibid., pp. 87-91.

Eye charts may be used to explore how well we see.

Different types of lenses, such as wide angle, concave, convex.

Chambers with various colors to create color environments.

A color wheel, with a demonstration of how white light is the mixture of all the colors.

Basic color theory, and practical application by using exercises to show refraction of light.

A periscope with many peepholes pointing in different directions.

Chemical Senses: There are two central exhibits: visitors walk into the exhibit through a big open mouth; the second one is a big nose, children get into it and follow the same route as do smells (fig. 15, 16).

To increase the awareness of differences and similarities of the chemical senses, smell and taste boxes are used. This shall be complemented smelling and tasting a wide assortment of fruits and vegetables in season.

Some indoor activities are: food cooking, with something quick and easy to prepare, such as cookies, cakes, yogurt.

Outdoor activities that can be organized are visits to a nearby market, or grocery, restaurant, or bakery.

#### Design Package

The exhibit system will be prefabricated. The dimensions of the structure, exhibit and furniture of the museum are based on a square unit of four feet by four feet

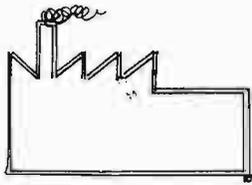
(1.22 metres by 1.22 metres), and its multiples and submultiples (fig. 10).

The purpose of this is to facilitate transportation by trailers that will carry the system to the different temporary locations (fig. 18).

The trailer crew will install the museum following the manual with assembly instructions; the installation should last one or two days according to the size of the exhibit. After that, the crew will leave it there for a period that may go from fifteen to ninety days. The crew will help to relocate another museum in the same region, all this based on a scheduled program for museum rotation.

A shelter for the staff people will be installed at the same time as the museum, since they will remain there as long as the exhibit lasts. They will work closely with the educational programs of the region.

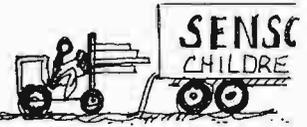
The layout of the museum will be based on the one shown in fig. 12, but it may be smaller or larger according to the size of the population where it is installed.



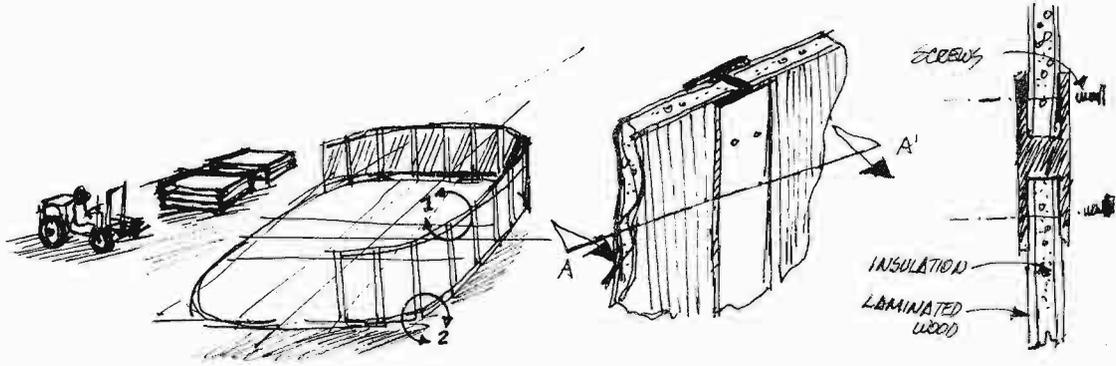
STANDARDIZED SYSTEM  
PREFABRICATED.



MUSEUMS WILL BE INSTALLED  
ACROSS THE COUNTRY.



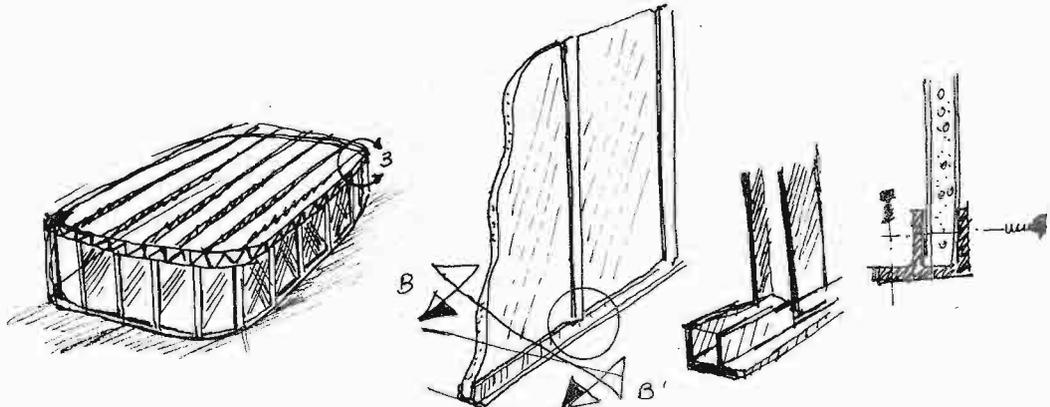
MUSEUMS WILL BE  
SET UP IN 1 OR 2 DAYS.



INSTALLATION PROCESS.

VERTICAL SUPPORT  
ELEMENT HOLDING PANELS.

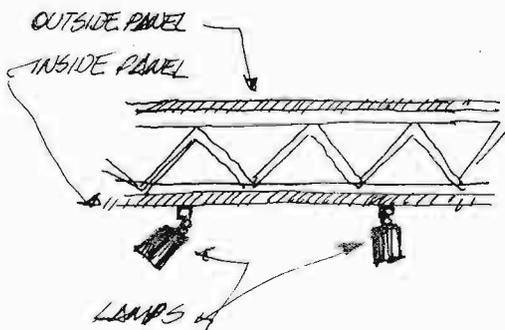
DETAIL 1



MODULE INSTALLED.

BEE SUPPORT ELEMENT.

DETAIL 2.



DETAIL 3 ROOF

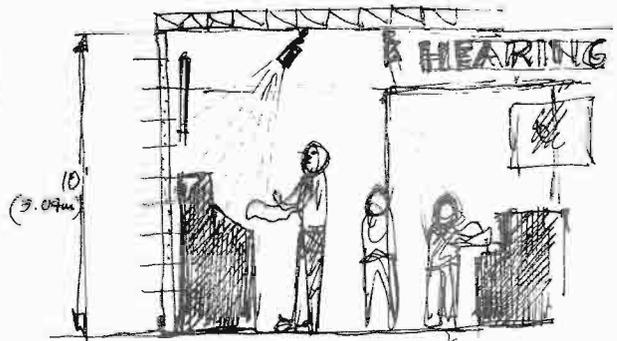


EXHIBIT.

Fig. 18. Installation Process of the System

## CONCLUSIONS

I consider this thesis to be a first stage of a very ambitious project: the use of a modular design system for the creation of children's museums in Mexico.

I say first stage, because if this project comes true one day it will be carried out by a multidisciplinary team that will include government officials, educators, exhibit design specialists, graphic designers, scientists, engineers, and the key element of this project, the staff members, who will be trained to make the visit to the museum a unique experience that will give visitors a new way of understanding his senses.

The content of most of the information that I have gathered is based on children's museums in the United States, because this is the country with more museums and experience in this field. As I indicated in the research, none of the museums I was in touch with looked like another, this being the result of the fact that each city and building where they are installed, as well as the staff working for them have their own concepts, personality and originality. So the time and money spent on the development of each museum is very high.

My proposal for a country such as Mexico with an overwhelming young population, with a lack of non-formal edu-

cational facilities and with scarce resources is a modular exhibit design system for children's museums.

The system is prefabricated and can be installed at the time in different towns and cities across the country, currying down the cost and time for development and making it feasible for a large group of the young population.

Every museum that is installed will follow the same outline and purpose, and make use of the same modular system, but the exhibit itself, even though it is born from the same idea, may vary from one museum to the other, because there will be a constant evaluation of the goals achieved by the exhibit and this will lead to change.

## APPENDIX 1

### TEXT OF LETTER TO MUSEUMS

Dear :

I am a student in the masters program of Industrial Design at Pratt Institute in Brooklyn, New York, and starting to prepare my thesis. My subject deals with the development of an exhibit system and learning areas for children's and/or youth's museums.

I would appreciate it if you would send me a booklet or any other information explaining the activities of your museum, if possible with some photographs or illustrations.

If you have the time, please answer the following questions which will guide me in my design. I am getting the theory through various readings, but you have the practical knowledge because of your everyday activity with children.

1. Which criteria did you follow to organize and develop the museum?
2. What are your priorities?
3. How are the exhibits and hands-on participatory learning areas designed, and who is the designer?
4. From your museum, what is it that children like most, and what should be improved?
5. What shall I take into account if I want to design a modular system able to be used in any children's museum?
6. Do you think this is a feasible idea?
7. Have you had any experience with mobile museums or travelling exhibitions? If so, please explain.

Sincerely,

Jorge Rodriguez

APPENDIX 2

LIST OF MUSEUMS RESPONDING TO LETTER

1. Exploratorium Museum, San Francisco, California
2. Capital Children's Museum, Washington, D.C.
3. Manhattan Laboratory Museum, GAME, New York
4. Brooklyn Children's Museum, Brooklyn, New York
5. The Children's Museum, Denver, Colorado
6. The Living Arts & Science Center, Lexington, Kentucky
7. Ontario Science Center, Toronto, Canda
8. The Discovery Center, Fresno, California
9. Children's Museum, Boston, Massachusetts
10. Children's Museum, Detroit, Michigan
11. The Children's Museum, Indiannapolis, Indiana
12. Children's Museum, Portland, Oregon
13. Staten Island Children's Museum, Staten Island, N.Y.
14. Omaha Children's Museum, Omaha, Nebraska

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## LIST OF SLIDES

### Slide

1. Study Model
2. Study Model
3. Study Model
4. Study Model
5. General View of Final Model
6. General View of Final Model
7. General View of Final Model
8. Introductory Area
9. Touching Sense Area
10. Hearing Sense Area
11. Seeing Sense Area
12. Chemical Senses Area
13. Workshop
14. Library
15. Theater





