How Children Choose
Children's encounters with design

Learning Design: Occasional Paper no.2

Ken Baynes

Learning Design: Occasional Papers

THE SERIES

This is the second in a new series of occasional publications, <u>Learning Design</u>, which sets out to explore and explain the learning process in design at all levels of education.

It is directed particularly at teachers (and others concerned with child development) who wish to base their work on a deeper understanding of the nature of 'design intelligence' and the dynamics of teaching and learning in the area.

The second publication looks at pre-school children and explores the nature of their encounters with design. It traces the growth of choice, the stages of development in design awareness and discusses how to help parents and teachers work with children in this age group.

HOW CHILDREN CHOOSE
Children's encounters with design

Ken Baynes
With contributions from
Krysia Brochocka
Yvonne Outterside

Loughborough University

HOW CHILDREN CHOOSE
Children's encounters with design

The material in this publication is the copyright of the authors.

This edition:

First edition, 1996

CONTENTS

ACKNOWLEDGEMENTS

1   INTRODUCTION

For the past 30 years, there has been an always present concern in industry and the universities about the relatively small number of young people wanting to pursue careers in 'hard' areas such as Engineering and Industrial Design. This has been matched by a feeling that the general level of knowledge about design, industry and technology is low. The popular 'image' of these areas is surprisingly negative. In a world dependent on industrialisation, it can be startling to find that although Science may sometimes be identified with progress, it is also seen as dangerous. 'Progress' itself can appear negative. Industry and technology are frequently seen as exploitative, anti-human and damaging to the environment.

Evidently these ideas have deep roots. In spite of energetic efforts to improve education and awareness in these areas, negative attitudes remain widespread. One hypothesis worth exploring is that such ideas are in fact formed very early in childhood. In a study I carried out into nurse recruitment nearly 25 years ago, an extraordinary number of the nurses interviewed said things like:

'Oh, I've always wanted to be a nurse!'

'I've got a picture of me bandaging up my Teddy from when I was only three'

'My Auntie was a nurse: I never wanted to be anything else. I just played hospitals all the time'.

They referred either to a time in their lives 'beyond memory' or to events which happened before they were seven years old. Such early choice puts into perspective our efforts to influence career decisions or to encourage such ideas as 'technological literacy' or 'design awareness'. We usually concentrate on Secondary school children and often on post-fourteen year olds. It may be that by then we are wasting our time. Perhaps we would do better to work with very much younger children.

The aim of the How Children Choose enquiry has been to look again at the influence of early experiences on the image that children have of particular jobs and areas of activity. We have been particularly interested in the ideas which young children associate with such words as:

Technology
Engineer / Engineering
Designer / Design
Architect / Architecture

And how their ideas about such words relate (or do not relate) to their play activities, the toys they like and the attitudes of parents, friends and teachers. In short, how do children encounter (and react) to design?

Behind this general question is another, more specific one: can young children's choices be influenced and if so, how?

There have been four main Parts to the work:

1   Investigations of how and why children make choices, placing this into a general context of child development.

2   Investigations of the way young children think about Engineering, Technology and Design and how and why their ideas may change.

3   The development and trial of pre-school and Infant level approaches intended to improve children's understanding and awareness of Engineering, Technology and Design.

4   The writing and publishing (or broadcasting) of material for parents and teachers to raise awareness of children's development in relation to these areas.

Parts 3 and 4 have largely been conducted through the conception, design, development and touring of an interactive design exhibition for children in family groups and on school visits. Called DESIGN WORKS it was originally sponsored by Birmingham Museums and Art Gallery and has been seen in Birmingham, Edinburgh, Newcastle-upon-Tyne and Croydon. Visitors now exceed 150,000. It will also be shown in Manchester. It has proved to be a powerful tool for action research and some of the results have already found their way into workshops and courses for early years teachers. INSET files and teachers' photocopiable materials are now being developed to be known as the DESIGN WORKS RESOURCE. They will be published by Philip Allan Ltd beginning in 1997.

DESIGN WORKS also resulted in the production of a design 'comic' for children and the development (by Topologika) of computer software with which young children can manipulate colour, pattern and shape, design their own rooms and towns and experience the relationship between 2D and 3D forms.

The Appendix reproduces part of the teachers' guide to DESIGN WORKS and summarises the children's activities. A later publication in the present series will provide a detailed analysis of the exhibition's effects and the opportunities it highlights for co-operation between industry, education, galleries and the media.

The aim of the present publication is to provide a broad context into which to fit current thinking about 'How Children Choose' in relation to their experience of design. It is based partly on observations and enquiries at the DESIGN WORKS exhibition but more centrally on a review of up-to-date research into the nature of child development and the emergence of intelligence. To that we have added the results of research by post-graduate students (largely experienced early years and primary school teachers) and a growing body of papers presented each year at the IDATER Conference at Loughborough University.

Ken Baynes
July 1996

2   THE PLAN OF THE BOOK

There are three factors that dominate the lives of young children and which influence the choices that they make. These are:

1   The stages of the human developmental process;

2   Children's dependence on adults - particularly their parents;

3   The significance of play in their lives.

A chapter is given to each of these factors. Each chapter begins with a general discussion and ends by focusing on the twin themes of choice and design experience.

A final chapter looks at the wider range of influences on young children - the media; schools; holidays; visits; peer pressure - and attempts to assess their influence and the way in which they present and deal with design and technology. This chapter also outlines a strategy for working on design with pre-school children.

3   STAGES OF DEVELOPMENT

The study of child development has its scientific roots in the Nineteenth Century (Gardner, 1991) but a more general interest in ideas about growth, education and behaviour are very much older. Scholars in the Middle Ages (Sharar, 1992) who studied childhood even then divided human development into well-defined stages. What is more they used divisions into age groups that Piaget would have recognised in the Twentieth Century. The fact is that although there is much argument about the details of human development there is agreement on three broad fundamentals:

1   The first five years are formative. What adults become, what they can know, believe and do, is inescapably shaped by the experiences of early childhood.

2   There is a recognisable pattern and sequence in the early development of children. Physical and mental growth takes place in a pre-determined order and it is this order which gives each stage of childhood its unique character and potential.

3   The development of a child is the result of a subtle interaction between nature and nurture. What is fundamental and unalterable in each individual person is genetically determined. However, that inheritance is moulded and given a particular direction through the influence of other people and experience of the natural and made environment.

However, there are wide differences of view about the significance to be attributed to these fundamentals and how they work together. For example, Freudians concentrate on the emotional and sexual turmoil of a child's relationship with Father, Mother, Brothers and Sisters. They highlight what Alice Miller has memorably described as 'the drama of being a child'. For them, the sheer power of early inter-personal experience can leave a negative legacy which has to be confronted, acknowledged and overcome through analysis.

Analysts locate every child's formative environmental experiences at the earliest age, perhaps even before birth. Nurturing appears as the most basic environmental experience and they locate the natural, sensual and emotional worlds together in the Mother's body. For them, the Mother's body is the first 'object'. It is easy to accept the argument that these early emotional experiences shape personal and sexual choices in adulthood. It is also easy to understand that disruption to emotional security will damage other aspects of development. Clearly it can inhibit the development of intelligence and learning and produce perverted attitudes to people, things and nature. But it is less easy to see how to respond to the situation. The first acts of the drama of being a child are played out in an arena where good parenting is the only means of access.

When we move on to look at the work of developmental psychologists and cognitive scientists we find a picture that has changed dramatically over the last sixty or seventy years. The behaviourists established themselves in the thirties but their model of intelligence has been successively challenged by Piaget, Chomsky, the information theorists and now by the idea of multiple intelligence as identified by Howard Gardner. These changes are summarised in Table 1 on the next page. They represent a move

TABLE 1

CHANGING MODELS OF INTELLIGENCE

_____

- **BEHAVIOURISTS** Emphasised the role of reward and punishment. Tended to extrapolate from results of testing animals to human learning.

- **JEAN PIAGET** Emphasised the development of numeracy and logic as the key elements in intelligence. Based on a mass of observations of children carrying out experimental tasks.

- **NOAM CHOMSKY** Emphasised the acquisition of language as the key element in intelligence. Based on an analysis of the deep structures evident in all language. He put forward the idea that humans have a 'wired in' predisposition to develop and use language.

- **INFORMATION THEORISTS** Emphasise the brain as a computer. Their theories have become more useful and sophisticated as technologists have achieved greater sophistication in computers and computing.

- **HOWARD GARDNER** Emphasises the significance of different 'intelligences' which are located in difference regions of the brain including, for example, spatial and musical intelligence.

_____

THE THEORY OF MULTIPLE INTELLIGENCES

The following are the areas of intelligence identified by Howard Gardner as having a biological location in the brain, a distinctive 'code' for communication and an identifiable expression in human culture

- **LINGUISTIC INTELLIGENCE**

- **MUSICAL INTELLIGENCE**

- **LOGICAL - MATHEMATICAL INTELLIGENCE**

- **SPATIAL INTELLIGENCE**

- **BODILY - KINAESTHETIC INTELLIGENCE**

- **THE PERSONAL INTELLIGENCES**

_____

towards placing the development of mind more clearly into the context of biology and culture.

In <u>Frames of Mind</u>, Howard Gardner (Gardner, 1983) discusses the idea of 'multiple intelligence'. He describes the growing biological evidence for locating certain kinds of thinking and feeling in particular parts of the brain. Although it is clear that the brain has extraordinary recuperative powers and that it can shift functions around to circumvent damage, it is also clear that this work of substitution has rather strict limits. There is also a significant physical development process call 'canalisation' which has the effect of confirming and crystallising paths of use and custom in and between the different areas of the brain. It is rather as if a highway were to be made wider and its route more fixed directly by the passage and the amount of the traffic using it. After a certain point, different for different functions, the route becomes more permanent and cannot be changed or replaced.

Canalisation has wide implications for education and learning. It confirms what many have observed: that there are moments in life when it is easy to learn something. If the moment is lost, the task of learning becomes difficult, even impossible. Knowing more precisely 'when to teach what' has the potential to make schools more effective, saving both time and resources.

Gardner argues that with this new biological understanding goes a change of philosophical approach. Thirty years ago, the common view was that all 'intelligence' is really the same thing - a particular style of thinking and reasoning which we apply to widely differing activities. We can see that this idea has had a powerful influence in education where, for example, problem-solving has been identified as a fundamental human strategy discoverable in every subject. But with the strong physical location of different functions in the brain there has developed the concept that different kinds of intelligence actually depend on the existence of distinctive kinds of mental processes. Spatial intelligence for example, involves its own perceptions, depends on its own 'language' and is expressed in very particular behaviour. It also depends for its processing on a particular area of the brain.

Gardner's theory highlights the importance of providing a broad range of experiences for young children. The idea of multiple intelligences interacts with the effect of canalisation to make infancy a series of opportunities for learning which can easily be lost. Even though children themselves are 'programmed to learn', it is up to adults to make sure that the appropriate raw materials are provided.

It is now commonplace that three to five year olds learn by doing. But this has not always been clearly recognised. In fact, an earlier view of learning (the Empiricist), saw the child as an empty vessel waiting to be filled with knowledge. The truth is certainly otherwise. (See Table 2, overleaf.)

TABLE 2

CHANGING VIEWS OF THE CHILD

EMPIRICIST

Sees the child as an empty vessel waiting to be filled. The role of the adult is to identify missing experiences, skills and concepts and to provide them for the child.

NATIVIST

Sees the child as biologically pre-programmed to develop and grow in certain pre-determined ways. On this view human knowledge and skill are built into the organism. Growth is seen as following a pattern laid down prior to and independent of actual experience. It is 'maturational'.

INTERACTIONIST

This is a more sophisticated view which emphasises the dynamic nature of development and gives weight both to what is biologically pre-determined and that which results from experience. The role of the adult is to provide knowledge and experiences in harmony with the child's exploration of the world.

TABLE 3

TWO MODES OF UNDERSTANDING

- **A SENSORIMOTOR** way of knowing, dating <u>from infancy</u>, in which children come to know the world primarily through the operation of the senses and taking direct action on the environment.

- **A SYMBOLIC** way of knowing, dating <u>from early childhood</u>, in which children come to know the world through the use of the various symbol systems that have been evolved by the particular culture in which the child happens to live.

There can be serious conflicts between the understandings generated by these two modes and one of the problems faced by children in learning is to find ways of resolving these conflicts.

From the moment they are born children are curious about their surroundings and very soon begin to influence them. Babies use their sense of sight intelligently but they also rely on sucking and holding as important ways of learning about their surroundings. At first, they focus very largely on people. Gradually, however, they begin to be curious about and take pleasure in the world of nature and things. They enjoy the fact that different materials provide different sensations and that handling toys can be surprising and entertaining. From this pattern of early 'design-related' activities, the human mind is structured so that people quickly develop the desire not only to understand their surroundings but to modify, organise and interact with them.

Growing up in surroundings that are natural or made, leads to a basic awareness of space, shape, colour, texture and taste. At a very early stage, the human mind has learnt how to interpret the mass of information that bombards our senses. By the time children are crawling and walking they have a new freedom to explore the world independently and a new appreciation of the qualities of space.

From the start, children are active agents of their own learning. The view today is that children experience an interactive, dynamic development that reflects two different modes of understanding. These are a Sensorimotor mode (dating from infancy) in which we come to know the world through senses and direct action on the environment and a Symbolic mode (dating from early childhood) in which we come to know the world through various symbol systems. (See Table 3.)

There can be serious conflicts between these two modes and it is a characteristic of young children that they will oscillate between the two in an attempt to make sense of their experience. Significantly, taking direct action on the environment in order to change it and representing the environment symbolically are the two most fundamental aspects of design behaviour. They emerge in the earliest stages of a baby's life.

Table 4 on the next page lists some of the challenging learning tasks mastered by human children in the first five years of life. It is interesting to notice how many milestones in learning are actually about objects, the made world and choice.

The developmental importance of a child's environmental and object-based experiences during these early years cannot be over-estimated. Learning begins at the moment of birth and even the youngest babies are keen and enthusiastic investigators of the strange but exciting world into which they have suddenly been plunged. At once they begin exploration, using their senses to find things out and learning how other people - and such things as goods and toys - respond to their sounds and movements.

Much of this early learning concerns things that as adults we are unaware of having had to learn. Seeing, for example, is not simply a mechanical matter. The brain literally has to learn to see and people whose mechanical sight is restored later in life have the greatest difficulty in attaining the necessary perceptual and cognitive skills. Children also have to learn to understand that words have meaning. They do it almost entirely by listening, imitating and learning in an environment where talk is the norm. They learn to speak in exactly the same way.

TABLE 4

LEARNING FROM BIRTH TO FIVE YEARS
SOME IMPORTANT MILESTONES

_____

- Motor control of hands and arms, ability to reach out, move and sit upright

- Moving, crawling, walking

- Physical independence including control of bladder and bowels, ability to feed oneself

- Expression of personal feelings of happiness, sadness including feelings about stories, music, art, places, things and the natural world

- Expression of personal preferences and interests, particularly in food and drink, clothes, toys and choice of favourite activities

- Control of destructive impulses

- Beginnings of knowledge frameworks about materials, the natural world and cause and effect

- Mastery of tools and utensils, eating implements, toys, switches and controls.

- Empathy with other people (and animals and plants)

- Control over the immediate environment

- Beginnings of an awareness of past, present and future

- Ability to 'model' experience through the medium of play, to take the part of characters and play to roles

- Ability to abide by the rules of simple games

In terms of the made world, young children's experience is shaped by every kind of physical stimulus from the sound of an unfamiliar vehicle to the vivid colours and shapes on the wall of the child's bedroom. Learning goes forward as a constant process. However, it is not random. The maturational framework determines the sequence of learning and the stages of development.

There are differences of detail between the 'ages and stages' patterns of individual schools of psychological thought. However, a broad pattern is accepted.

The following charts (Table 5) covering the years 2 to 5 are based on work by Lesley Britton using the framework developed by the well-known Italian educationalist Maria Montessori. (Britton, 1991.) In them, the aim is to place the environmental and design aspects of a child's development in the broader framework of general maturation and learning.

It should be stressed that although children all pass through the same stages they do not pass through them at the same speed and this is quite normal. In any age group there will be some children who are more developed and some who are less.

TABLE 5

STAGES OF DEVELOPMENT FROM TWO TO FIVE YEARS OF AGE

_____

AGE   **STAGE AND DEVELOPMENT**
2

Unconscious Absorbent Mind: Physical Growth/Skills
- balance, physical control and mobility increase considerably
- climbs up and down stairs, reads everything in sight
- learns how to run and jump, pushes, pulls and lifts objects and toys in environment
- learns how to kick, throw and catch a ball
- awareness of self in relation to space
- fine motor skills develop and change; now begins to manipulate small objects
- hand-eye co-ordination develops

Emotional and Social
- develops sense of self, personal choice becomes important
- begins to develop ideas of gender roles - reinforced by parent reactions
- fear of strangers and separation may develop - often quite marked at this age

Intellectual
- nerve connections in brain reach peak; those that are used survive (canalisation)
- learning through senses; sight and hearing improve considerably
- keen observation of small objects
- tends to attribute life to inanimate objects and human attributes to animals, for example, talks to them like human beings
- thinking skills develop; child begins to use symbols
- fantasy play rich during this period
- memory and attention; steady improvement in long - and short-term memory
- ability to concentrate for longer periods

Language
- names objects, obeys commands, understands much

Words
- 200/300 words productive speech

_____

AGE 3   **STAGE AND DEVELOPMENT**

Conscious Absorbent Mind: Physical Growth/Skills
- physical abilities undergo steady progress
- walks and runs with confidence
- becomes physically daring, climbs anything
- fine motor skills; drawings begin to include recognisable shapes
- able to handle a range of simple tools

Emotional and Social
- self concept still being formed and influenced by reaction of others
- describes him or herself in physical terms - colour of hair etc
- begins to make friends; co-operative activity centred on shared play things
- attachment behaviour strong in strange situations, needs familiar person near at hand, attachment often extends to 'special' objects
- desire for independence
- emotional stability depends on quality of relationship with adults

Intellectual
- imagination vivid
- concepts become more complex as the child constructs a picture or model of the world
- strong desire to investigate things
- gradual increase in short term memory; can remember 3 digits
- begins to identify events in past and future

Language
- rapid increase in language
- incessantly asks questions

Words
- 1000 words productive speech

AGE 4   **STAGE AND DEVELOPMENT**

Physical Growth/Skills
- very active, enjoys gymnastics, can control movements and responds to adult directions
- begins to walk up and down stairs using alternate feet
- fine motor skills developing; draws what is known rather than what is seen
- can draw shapes; writing begins to have more control
- can build using card and other materials that require processing

Emotional and Social
- gender role develops; prefers to play with friends of same gender; identifies with adult roles related to gender
- friendship plays a stronger more important role; children distinguish between what others do and what they do, and they begin to make choices about who they play with
- social skills now quite developed and confident children leave parents to go to school or other people's houses without problems
- personal preferences in food, clothes etc now strongly marked

Intellectual
- understanding concepts is increasingly being affected by the use of symbols and models, mental images and language; more aware of wider world around, for example, neighbourhood, parks, woods, seaside
- fantasies and stories may become wild and humorous
- stories based on reality help children of this age to sort out fact and fiction

Language
- speech grammatically correct
- counts up to 20
- may begin to read and write

Words
- 1500 words productive speech

_____

AGE 5 **STAGE AND DEVELOPMENT**

Physical Growth/Skills
- has developed poise and control and is no longer restless and constantly moving
- enjoys playing physical games: the social content of playing important
- enjoys riding a bicycle and roller skating where co-ordination and skills are involved
- fine motor control now good - enjoys counting, building and drawing – and playing games that involve fine motor skills; making construction toys, collage, handling natural and made objects carefully
- drawing and writing continue to become more refined

Emotional and Social
- gender role; at this stage most children develop stereotypical views of acceptable behaviour of male and female
- friendships become more stable; personalities and interests are involved in the choice of friends
- conscience develops; children understand and follow rules
- ability to grasp concepts of caring and a wider concern for plants, animals, places and objects

Intellectual
- growing understanding of relationships in the natural and made worlds around them
- begins to understand the difference between made and natural
- begins to understand quite complex processes such as where food comes from
- developing reading, writing, modelling and number skills
- aided by a clear framework and a concrete approach to learning

Language
- fluent speech
- reads and writes

Words
- 2000 words productive speech

_____

Based on original material compiled by Lesley Britton

4   DEPENDENCE ON ADULTS

J A and T H Simms (Simms and Simms, 1969), writing twenty-five years ago, gave a clear picture of the family unit as the fixed point at the centre of the child's world of human relations:

'At the moment of birth the child enters upon an immediate and absorbing relationship with two people his [sic] mother and his father. When he comes into existence he creates a new social unit, the family, which consists of a complex of inter-relationships between himself, his parents and other children ...

'From the comparatively limited environment of the family which includes grandparents, aunts, uncles, baby-sitters and the like, each with different roles to play, the child moves normally into the company of his friends from other families ...

'... the family is set in the context of the neighbourhood. The neighbours may provide face-to-face relationship with people who reinforce the standards and outlook of the family. It may provide a window-to-window relationship, but even the implicit assumptions of the neighbours exercise a powerful influence...'

The Simms visualise the family as being surrounded by spheres of relationship which reach out, like ripples, into the whole community. These wider relationships are experienced by the child in visits to places and meeting people, in hearing talk about events, in looking at pictures and, as he or she begins to read, in the material provided by comics and books.

By the age of five, the child is the centre of a complex of forces originating at first within the family and widening to take in the society at large.

Since 1969, three big upheavals have had an effect on this apparently stable picture.

- New types of family unit have emerged - in particular, there has been a substantial growth in one parent families.

- The mass-media, most notably television, play an ever increasing role in the cultural life of children.

- In the eyes of parents and carers, the world has become a more dangerous place for children.

However, the adults who care for children on a daily basis remain the most important single influence on their growth and development. They shape not only what children know but also their attitudes. The American child psychologist, Bruno Bettelheim (Bettelheim, 1987), makes it clear that children learn from the actions of their parents. Children are alert to hypocrisy. From an early age they are disturbed and confused when they detect a conflict between what adults say about behaviour and what they actually do.
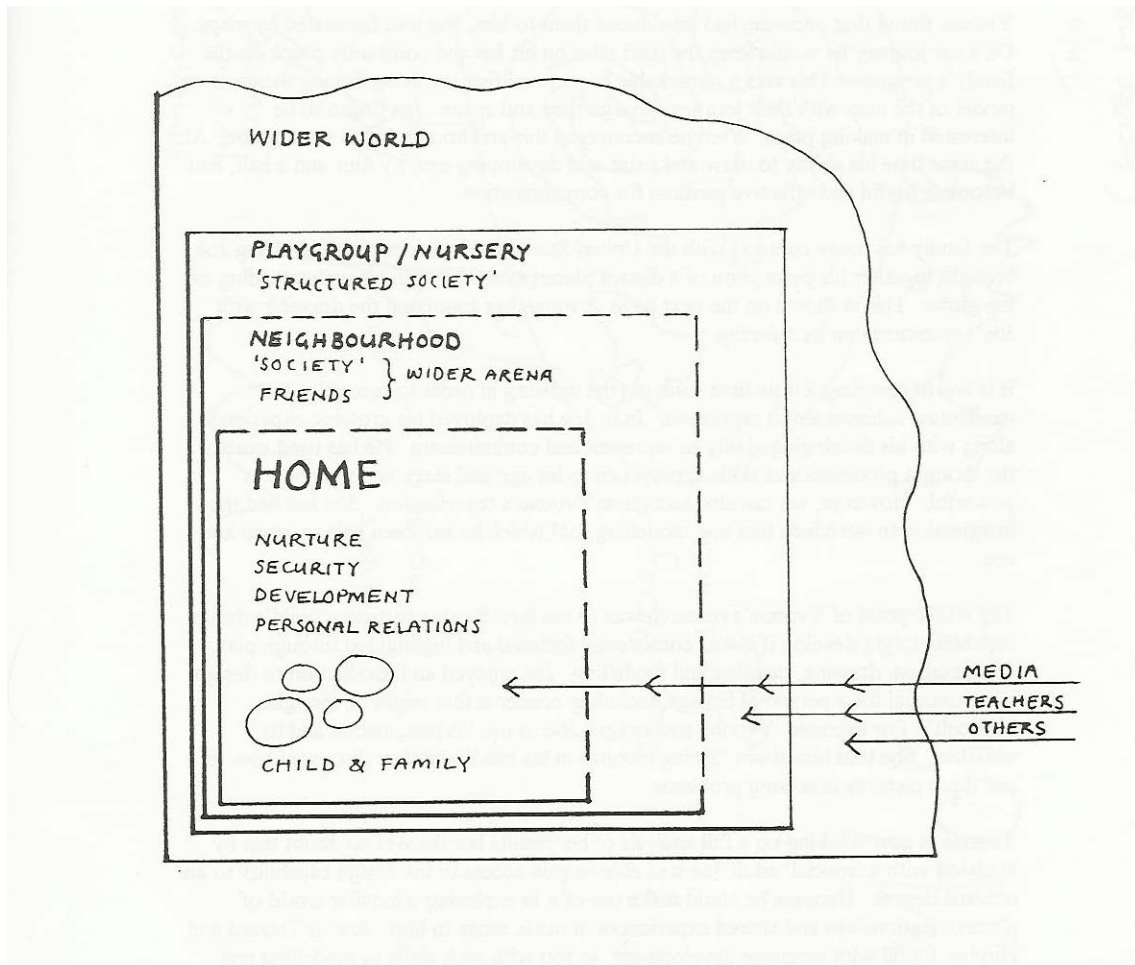
In considering children's choices we can say that the greatest influence upon them is exercised by adults. What adults <u>do</u> is the most important. What they <u>say</u> comes next. And, of course, it is also each child's adults who organise and monitor what the child does, what experiences are promoted and what books, toys or television programmes are viewed and valued.

We can say that the developing child has no choice but to see the world through the lens of the parents. It follows that the way parents understand and value the world of engineering, architecture and design will also be the way that it is first made evident to children.

The diagram on the next page attempts to represent this situation. It shows how the child is supported by but enclosed in the home.

The resources of the family may be a limiting factor. On the other hand, Mothers and Fathers are uniquely equipped to work with their own children. In a recent study, <u>Young Children Learning</u> (Tizzard and Hughes, 1984), Barbara Tizzard and Martin Hughes highlight the role of mothers in encouraging language development. Whatever their class background, and whatever their own language skills, mothers proved to have the decisive advantage that they know their children very well and share a direct experience of the things they talk about. This intimate relationship meant that (unlike nursery nurses, for example) they operated from 'inside' the child's personal world of ideas and experiences, interests and anxieties. In presenting ideas about the made world and making it accessible it should be possible to encourage and build on this intimate 'conversation' between adults and children.

HOW HOME AND FAMILY ARE AT THE
CENTRE OF THE CHILD'S WORLD

WIDER WORLD

PLAYGROUP / NURSERY
'STRUCTURED SOCIETY'

NEIGHBOURHOOD
'SOCIETY' } WIDER ARENA
FRIENDS }

HOME

NURTURE
SECURITY
DEVELOPMENT
PERSONAL RELATIONS

CHILD & FAMILY

MEDIA
TEACHERS
OTHERS

Our own research highlights the importance of these immediate personal relations in determining the content and style of young children's learning.

One of our postgraduate students, Yvonne Outterside (herself an experienced early years teacher and now a university lecturer), has been carrying out a very detailed study of the conceptual development of her own grandson, Joe. Her aim has been to concentrate on a particular aspect of thinking: the human ability to construct non-verbal models of reality or imaginary things. This modelling ability is central to design and is important in areas such as art, geography and technology. It is relevant, for example, to making and interpreting maps.

Yvonne found that once she had introduced them to him, Joe was fascinated by maps. On a car journey he would keep the road atlas on his lap and constantly check on the family's progress. This was a remarkable conceptual feat involving linking the abstract model of the map with their journey through time and space. Joe began to be interested in making maps. Yvonne encouraged this and bought him a small globe. At the same time his ability to draw and paint was developing and, by four and a half, had become a useful and effective medium for communication.
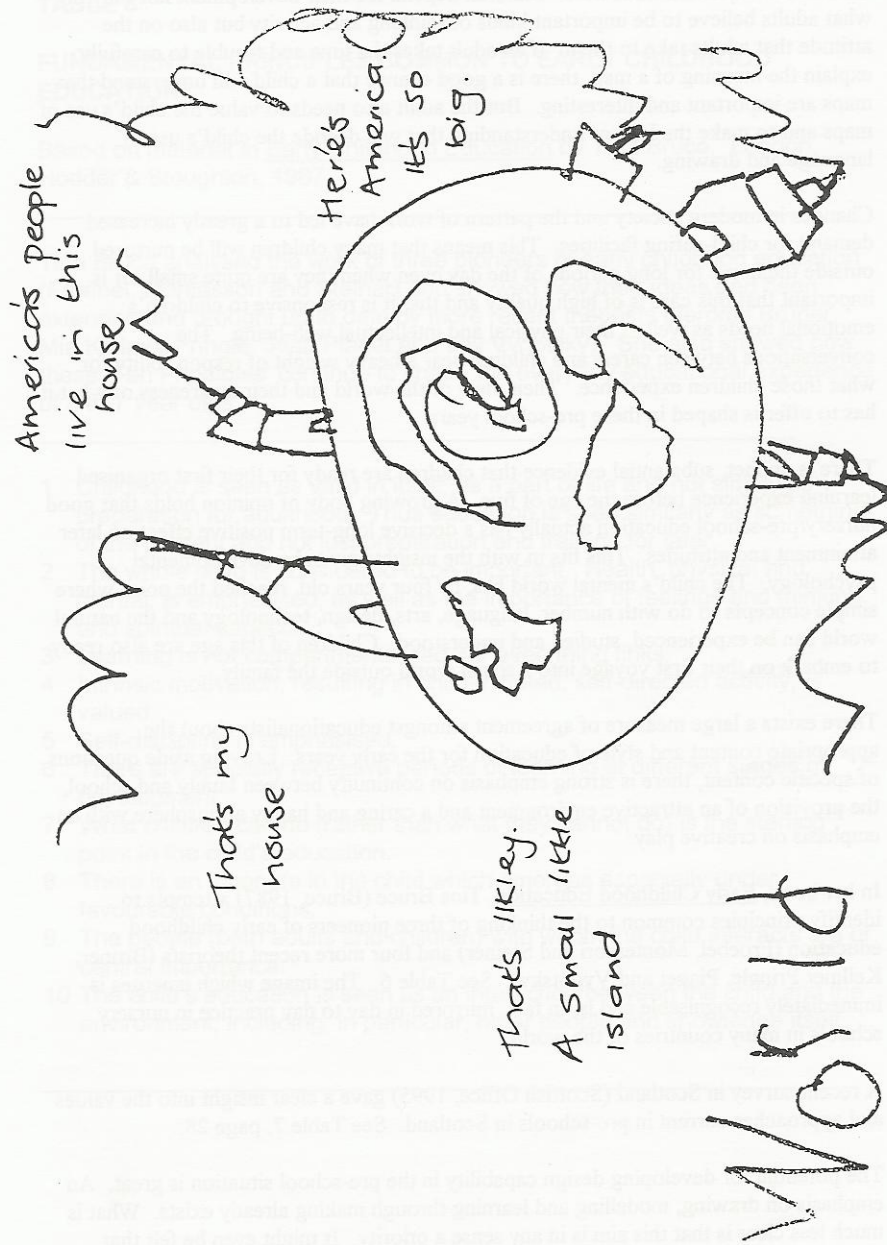
The family has many contacts with the United States and in a remarkable drawing Joe brought together his perception of a distant place (America) with his understanding of the globe. This is shown on the next page: Yvonne has annotated the drawing with Joe's comments on its meaning.

It is worth spending a little time studying the drawing in order to recognise the intellectual achievement it represents. In it, Joe has deployed his growing experience along with his developing ability to represent and communicate. He has used exactly the thought processes and skills appropriate to his age and stage and the result is powerful. However, we can also recognise Yvonne's contribution. She has had the imagination to introduce him to a modelling tool which he has been able to grasp and use.

The whole point of Yvonne's research was to see how far this particular child's design capability might develop if it was consistently fostered and highlighted through play, conversation, drawing, painting and modelling. Joe enjoyed an introduction to design quite unusual for a person of his age, including concepts that might be thought 'difficult'. For example, Yvonne encouraged Joe to use his imagination and to visualise. She told him about 'seeing pictures in his head' and they discussed how to use these pictures in solving problems.

Yvonne is now working on a full analysis of her results but there is no doubt that by studying with a 'special' adult Joe was able to gain access to his design capability to an unusual degree. Because he could make use of it in exploring a familiar world of ' places, relationships and shared experiences, it made sense to him. Just as Tizzard and Hughes found with language development, so too with such skills as modelling and problem solving.

r.S Joe

America's people live in this house

Here's America. Its so big.

That's my house

That's Ilkley.
A small little island

World

Two islands here
(Later he was to say one
was Bradford)

There is an important issue here. Children depend for their development not only on what adults believe to be important kinds of thinking and activity but also on the attitude that adults take to them. If an adult takes the time and trouble to carefully explain the meaning of a map, there is a good chance that a child will understand that maps are important and interesting. But the adult also needs to value the child's use of maps and to make the leap of understanding that will decode the child's use of language and drawing.

Changes in modern society and the pattern of work have led to a greatly increased demand for child-caring facilities. This means that many children will be nurtured outside the home for long periods of the day even when they are quite small. It is important that this care is of high quality and that it is responsive to children's emotional needs as well as their physical and intellectual well-being. The conversations between carers and children bear a heavy weight of responsibility for what those children experience. Their view of the world and their awareness of what it has to offer is shaped in these pre-school years.

There is, in fact, substantial evidence that children are ready for their first organised learning experience before the age of five. A growing body of opinion holds that good nursery/pre-school education actually has a decisive long-term positive effect on later attainment and attitudes. This fits in with the insights given by developmental psychology. The child's mental world has, by four years old, reached the point where simple concepts to do with number, language, arts, design, technology and the natural world can be experienced, studied and understood. Children of this age are also ready to embark on their first voyage into a social world outside the family.

There exists a large measure of agreement amongst educationalists about the appropriate content and style of education for the early years. Leaving aside questions of specific content, there is strong emphasis on continuity between family and school, the provision of an attractive environment and a caring and happy atmosphere with an emphasis on creative play.

In her book, Early Childhood Education, Tina Bruce (Bruce, 1987) attempts to identify principles common to the thinking of three pioneers of early childhood education (Froebel, Montessori and Steiner) and four more recent theorists (Bruner, Kellmer Pringle, Piaget and Vygotsky). See Table 6. The image which emerges is immediately recognisable and is, in fact, mirrored in day to day practice in nursery schools in many countries of the world.

A recent survey in Scotland (Scottish Office, 1995) gave a clear insight into the values and approaches current in pre-schools in Scotland. See Table 7, page 25.

The potential for developing design capability in the pre-school situation is great. An emphasis on drawing, modelling and learning through making already exists. What is much less clear is that this aim is in any sense a priority. It might even be felt that concentrating on such a specific aspect of intelligence could be counter-productive. Further, educational psychologists have argued that young children are incapable of some of the thought processes fundamental to design activity. These include: the

TABLE 6

FUNDAMENTAL PRINCIPLES COMMON TO EARLY CHILDHOOD EDUCATION

Based on material in <u>Early Childhood Education</u> by Tina Bruce. London, Hodder & Stoughton, 1987

_____

Tina Bruce analysed the work of three pioneers of early childhood education (Froebel, Montessori and Steiner) and showed how their ideas had been extended and brought up to date by more recent theorists (Jerome Bruner, Mia Kellmer Pringle, Jean Piaget and Lev Vygotsky). She also showed how these 'Ten Principles' continue to shape the everyday educational experience of 3 to 7 year olds.

_____

1. Childhood is seen as valid in itself, as a part of life and not simply as preparation for adulthood. Thus education is seen similarly as something of the present and not just preparation and training for later.
2. The whole child is considered to be important. Health, physical and mental, is emphasised, as well as the importance of feelings and thinking and spiritual aspects.
3. Learning is not compartmentalised, for everything links.
4. Intrinsic motivation, resulting in child-initiated, self-directed activity, is valued.
5. Self-discipline is emphasised.
6. There are specially receptive periods of learning at different stages of development.
7. What children can do (rather than what they cannot do) is the starting point in the child's education.
8. There is an inner life in the child which emerges especially under favourable conditions.
9. The people (both adults and children) with whom the child interacts are of central importance.
10. The child's education is seen as an interaction between the child and the environment, including, in particular, other people and knowledge itself.

_____

TABLE 7

WHAT IS LEARNED IN PRE-SCHOOLS?

from Interchange No 32: <u>Social and Educational Services for Children Under Five</u>.
Scottish Office, Education Department, 1995

_____

- Providers felt that the major benefits to children's learning were in terms of general social and emotional development and communication with their contemporaries and with adults outside their own family as well as the development of skills which would be useful to them later in life - in school and outside.

- Observations of 96 (mostly four year old) children in a variety of group settings showed that two thirds of time (62%) was spent in activities directly related to the [subsequent] primary school curriculum (the 5 - 14 Development Programme).

- The four most common areas of activity were: paints, crayons, felt tips, etc; preparing and/or eating food; story or poem read aloud; materials for construction. The four most common actions were: observing; describing; drawing, painting, modelling or printing; and asking questions. For as much as a third of the time, children were watching other people and activities in the centre.

- The level of involvement of children varied between types of provision, with the highest levels found in nursery school and playgroup centre and the lowest levels in the private nurseries. It is quite possible that this might relate to the age of the children and length of sessions, as nursery schools and playgroups tend to operate shorter sessions and have older children than in private nurseries.

- Staff said that they tried to create a learning environment which is compatible with, and extends, children's experiences in the home and the community. Pre-five settings buzz with activity and staff claimed their skill was in knowing how to support children's learning, when and when not to intervene.

- Group providers also suggested that pre-five experience would have benefits for children when they went to school since they develop their skills in listening (especially to adults), sitting still, and concentrating while surrounded by many other people and stimuli.

- Parents and providers generally felt it appropriate and valuable to familiarise children with the multi-cultural and multi-ethnic nature of today's society.

ability to connect cause and effect; and the ability to look at a situation from another person's point of view.

Both theses ideas stem from the pioneering work of Jean Piaget. The great Swiss psychologist studied young children's thought processes and set out the first comprehensive picture of children's mental development. His theories continue to have a direct influence on what young children are taught and how they are taught it.

Piaget believed that rational ideas of cause and effect are completely foreign to under-sevens. In his view, younger children always attribute natural phenomena to the actions of people, God or some magical pourer. For example, Piaget (Piaget, 1973) records numerous conversations with children about water, ice, rivers and lakes:

GRIAR (5 ½): 'What is rain?'
  <u>It's water</u>
  Where does it come from?
  <u>The sky</u>
  Is there water in the sky?
  <u>God sends it down</u>
  How?
  <u>He throws out buckets of water</u>
  Who told you that?
  <u>No one</u>

BOIS (5 ½): 'How is snow made?'
  <u>It is made by men</u>
  How?
  <u>They make it right up high</u>
  What does that mean?
  <u>They built it</u>
  What makes it fall?
  <u>They make little holes</u>
  Where?
  <u>In the sky</u>

All the children interviewed had similar ideas. Piaget records children's views on the nature of consciousness, the concept of life, the origin of the sun and the moon, trees and mountains. The under-seven is, in Piaget's terminology, an 'artificialist'. That is: he or she believes that everything has been deliberately made by somebody or something. Thus there is no clear distinction between the made and the natural worlds and, ironically, many children do not have a clear idea that the made world results from the actions of people!

What has emerged more recently, is the insight that all human beings - children and adults - use a variety of ways of understanding the world in which they live. Susan Carey, (Carey 1995) in the United States, carried out a fascinating piece of research into 'misconceptions' about biology. She showed how people's ideas about the natural world changed and developed but she also showed that a characteristic bundle of concepts (many incorrect!) went with each age group. From our own work with infant and primary teachers it is clear that they share many misconceptions about the nature

of design activity and specific technological concepts to do with forces, structures and mechanisms. So when young children use misconceptions, they are simply sharing with adults the fact that most people have a very imperfect picture of the natural and made worlds.

Piaget was interested in the development of rationality and scientific reasoning and since scientific reasoning is to a degree 'counter intuitive' (Wolpert, 1992) it poses special problems for adults and children alike. However, more recent research suggests that Piaget seriously underestimated the capacity of children to reason.

Margaret Donaldson (Donaldson, 1978) has been particularly effective in devising experimental situations that allow children to perform well in tests of reasoning. Her results challenge Piaget's assumptions about the youngest children:

'Children are not so limited in ability to reason deductively as Piaget - and others - have claimed. This ability shows itself most markedly in some aspects of their spontaneous behaviour - and we have seen that it reveals itself with great clarity in the comments they make whilst listening to stories. But it can be demonstrated also in the contrived situation of an experiment from about the age of four, if not sooner, even though many experiments have failed to elicit it. At least from age four, then, we must again acknowledge that the supposed gap between children and adults is less than many people have claimed.'

'Children are not at any stage as egocentric as Piaget has claimed. For all human beings, the taking of another point of view requires a certain effort, and the difficulty is bound to vary from one situation to another in many complex ways. But the gap between children and adults is not so great in this respect as has recently been widely believed.'

Margaret Donaldson's identification of four years old as the moment when a new kind of understanding emerges is borne out by our own observations. This suggests that nursery schools are on firm ground when they ask four and five year olds to make simple deductions from observations and design their own experiments to find out more.

However, the scientific mode is not the one that comes most easily to under-fives. They see the world principally through personal relationships, stories, working with materials and play. In these activities they use all their senses and employ language, visual art and models to express their ideas. Science may often be woven into these other activities and scientific ideas may be brought alive by a story or direct, concrete experience. Looked at from the point of view of Craft, Design, Architecture and Engineering, however, these early childhood activities look very much more promising.

In a recent report [1] for Scottish Natural Heritage, Ken Baynes and Krysia Brochocka wrote:

_____

[1]Unpublished report, 1995.

'We might perhaps say that children's ideas about nature show in embryo the attitudes of the scientist, the artist, the moralist, the vet, the farmer, the caring environmentalist and even plants and animals themselves. These are mixed together without too much ability to differentiate one from the other. But this still does not capture the essence of children's thought because, unlike much adult thought, it is founded in action. Children find out by doing and they discover ideas by representing them. They respond, as Piaget accurately observed, to concrete experience. If children's vivid and active curiosity can be coupled to a strong affective feeling for the natural world, the basis is there both for knowledge and concern.'

Much the same could be said of the world of design. In relation to made things children show in embryo the attitudes of the scientist, the technologist, the architect, the fashion designer, the consumer and the critic. Just as they can imagine themselves to be animals, so too they can play the role of a vehicle or a house. Objects, such as Thomas the Tank Engine, are to them fully developed personalities as well as machines. Their way of finding out - through concrete action - and their way of dealing with ideas by representation and modelling are particularly close to designing.

Children have the intellectual and physical resources to enjoy a vivid relationship with the made world and to develop the ways of thinking and acting that are relevant to design. Whether this goes beyond the limitations of each child's maturational drive and is deliberately fostered by learning and encouragement is in the hands of adults: Parents first and foremost, then carers, teachers, relatives, friends and acquaintances.

5   THE ROLE OF PLAY

In introducing her excellent book on creative play, Dorothy Einon (Einon, 1985) highlights the difference between play for adults and play for children:

'I suspect that adults take juvenile play too much for granted. Because it is fun, and because it is usually harmless, we tend to see it as less serious than comparable adult activity...'

'Anyway, play is a feature of adult life as well as childhood ... so what sets childish play apart from other sorts of recreation?

'Adults play when they have nothing better to do; in fact a philosopher once described adult play as "useless in the eyes of the beholder". ... Adult play is a means of filling in time between mainstream activities - like earning a living and rearing children. By contrast, practically everything a child does, when he has not been asked to do something else, is play. It can be joyful, it can be serious, it can be solitary, it can be social. It is frequently repetitive. And it is almost always creative'.

The learning value of play is widely recognised in pre-school and nursery classes. For example, the Kindermucking Science programme from the city of Hamilton in Ontario, Canada (City of Hamilton, 1992) uses games with 'Kinderguck' to explore ideas about water and materials. Amongst suggestions are:

Play with finger jello
Make mud pies
Try foot painting with soapy paint
Pretend to be a Guck monster under the sea

In nursery education play is being gently channelled so that it retains its free motivation but also provides a degree of pre-determined learning content.

Dorothy Einon highlights the significance of physical experience in play and makes an interesting distinction between direct and indirect learnings. She identifies play with the 'Sensorimotor' mode of learning.

'We learn all through life, and in two distinct ways: directly or indirectly. By indirect learning I mean receiving knowledge through others as intermediaries; it encompasses everything picked up through reading, watching the television, witnessing cultural events or sitting in a classroom. Its essence is profiting from the knowledge of others, which in turn allows short cuts to be taken. One does not have to work out the principles of cake-making for oneself if one has learned them indirectly from a cookery book. A sponge cake could win a prize at a show without the cook ever knowing that the reason for beating fat and sugar or eggs and sugar together is to incorporate air; and that it is added air which makes the cake rise.

'Direct learning, on the other hand, comes without the benefit of other people's experience. One simply discovers for oneself. Much of what one learns as a child, has, because of its nature, to be learnt directly, often enough by trial and error.

'The motor skills, those involving muscle movement, and ranging from writing to skating, are typical examples of skills that can be acquired only by direct learning. No one can explain exactly which muscles to use when riding a bicycle; you learn to master the machine just by riding it. The list of motor skills a baby, and a young child, must learn this way is practically endless; and it does not stop at motor skills. Vision, perception, language and social behaviour all come largely by the same process, particularly in the first year of life. Indeed, they cannot be learned in any other way, for a child cannot go on to learn indirectly from parents or schoolteachers until he has these essential basic accomplishments.

'This goes far to explain why young animals and children are capable of playing irresponsibly, wildly, and even dangerously. Play is the only way they have of learning in the early years, and learn they must in order to survive.'

So play is not simply a pastime or an amusement. It is central to learning all the things that children have to learn. In itself it is practical and direct but it also provides a useful forum for indirect learning.

Psychologists have categorised the developmental functions of play in a number of different ways. The approach of the Australian educationalist, John Gabriel, seems particularly helpful. He sees play as encouraging children to continue to practice the skills that good parents quite naturally and unselfconsciously help their baby to practise as he or she grows up. These include:

Sensory skills
Exploratory skills
Manipulative skills
Emotional skills
Identification skills
Social skills

See Table 8

Of course, children do not separate these things out. They experience play as a whole. But it is useful to look at them separately when trying to understand what play is about and how it relates to the made world and design.

Sensory skills Much play in the first two years is about the acquisition of sensory experience. Looking, hearing, feeling, tasting and moving are important features of infant activity. Babies delight in looking at brightly coloured and moving things: the bath sponge or a plastic rattle are objects to be held and so enjoyed through the sense of touch. Everything gets put into baby's mouth. A one-year old will feel and stroke an unfamiliar thing even if it is a person!

Toddlers love the experience of running and rolling. They are gradually learning how to understand space and to experience the pleasure and excitement of moving. Riding a swing or the more organised exertion of dancing or Ring-a-roses are

TABLE 8

A TYPOLOGY OF PLAY

From John Gabriel <u>Children Growing Up</u>, London 1964 and 1971

PLAY AND THE DEVELOPMENT OF KNOWLEDGE AND SKILL
_____

SENSORY PLAY

Learning through the senses and developing sensory skills

EXPLORATORY PLAY

More deliberate and controlled use of the senses to find out about the world. Particular interest in handling adult tools and equipment

MANIPULATIVE PLAY

An extension of exploratory play. The child attains 'mastery' of specific tools and equipment

EMOTIONAL PLAY

Playing provides children with a kind of 'theatre' where emotions are experienced and sometimes shared. Some types of play evoke specific emotions - caring, fear, aggression

IDENTIFICATION PLAY

Through play children identify with other roles and characters. They learn about the world by enacting

SOCIAL PLAY

Playing with other children provides a social world that is at least partly separate from adult society. Children develop their own social rules for play
_____

tremendously satisfying experiences for this age group. Moving about in the world, reveals its physical and aesthetic characteristics.

The development of sensory skills is fundamental to understanding and appreciating the natural and made worlds and mastery of movement and space give access to ideas about planning and organising the relationships between people, objects and places.

Exploratory skills Touching, tasting and the other elements in sensory experience are exploratory but the desire to explore becomes more deliberate and organised as babies develop. A toddler will want to search out unfamiliar objects - especially those that are forbidden or said to be dangerous. Their sense of danger is much less acute than their curiosity!

A two-year old is fascinated by all the things that are in the world (natural as well as made) and wants to try them all out - but just a little of each. Watch children of this age in the garden. They wander around, looking into everything. 'Let me do it', they say and grab the trowel for a moment before going on to try out the spade and tip up the wheelbarrow.

The activities sometimes seem pointless to adults because they are disjointed and don't seem to accomplish anything. However, what they really represent is a long-drawn out exploration of the physical world.

Manipulative skills Exploration grows into more organised and controlled attempts to work with tools and equipment. Before they are two, children join in housework or gardening and want to operate the controls of the TV or video player. But it takes a while before skills in building, balancing and construction fully emerge.

When a variety of manipulative skills are used together, children have the experience of 'mastering' an aspect of the world. Riding a tricycle provides a good example. At two it is hard work even to push a tricycle and grown-ups will be needed to provide the motive power. At three, riding round the garden is easy. At four, it is possible to ride along the pavement and control speed so as to keep pace with someone else's rate of progress.

As they grow up, children attain mastery of a remarkably varied range of tools and equipment. They learn to paint and draw, cut-out and construct, build sandcastles, eat with grown-up cutlery and use swings and see-saws.

It is clear not only that children take great pleasure in mastering these skills, but that using the skills opens up new worlds of play and activity including those fundamental to engaging with the environment in a creative way.

Emotional skills Play engages the emotions. It is exciting, funny, exhilarating. Sometimes it involves pain and disappointment. Role play enables emotions to be experienced in a way which can make them less threatening.

Even so, there is sometimes an element in play that is frightening in a rather special way. Chasing games and games where a parent pretends to be a 'scary' something are examples of play where an element of fear is actually enjoyable.

Children first experience strong emotional attachment to objects in their toys. Frequently one particular toy will become an indispensable companion. The chosen object must travel everywhere with the child and must always be available at moments of stress such as bed-time or meeting strangers. Here are the roots of people's symbolic and affective use of objects to mobilise affection and focus emotion. Play gives considerable opportunities for this kind of experience.

Identification skills Skills in handling emotions can be extended into identifying with or relating to the situations and experiences of other people. A four-year old watching a cartoon film will suddenly say: 'I'm the black puppy and you're the brown puppy'. Children want to model themselves on people they admire or like (real or fictional) and will often mimic them very effectively.

In early years it can be very simple acting out. Telephoning, powdering the face, carrying Daddy's huge umbrella or wearing Mummy's shoes. By four, there is much more elaboration and new interest in the roles of people outside the family. Dressing up and playing a part become very important as children become more aware of the world's variety and want to find out what it might be like to be an adult. Which adults roles are modelled affects not only what is learnt but what actions and attitudes are given value.

Social skills By the age of four, the focus shifts to the experience that children gain from playing together. To begin with, babies play with a range of toys or objects in activities initiated by their grown-ups. Later, toddlers are very self-absorbed and possessive but they soon enjoy playing alongside other children. They also get pleasure from simply watching older children play. It is only gradually that real co-operative play develops however, and it is at this stage that playschools and other group experience become valuable.

It is easy to see that this long build-up towards playing with other children must be related to the gradual widening of the child's horizons, socially and environmentally. It is also easy to appreciate the vital importance of the process for the child's future happiness. The ability to relate to other people, to respect their ideas and to be able to compromise with them are vital social skills that emerge through play and through the example set by grown-ups. Here again the specific content of play is important for the development of future attitudes.

In talking about play in the pre-school years, it is interesting to notice that girls and boys show very little sex difference in their choice of games. By four boys certainly show a tendency towards replicas of technological things while girls lean towards domestic objects but they are not embarrassed to exchange these roles. Girls can enjoy locomotives and boys can work happily at arranging furniture in a dolls house.

Although most adults take a positive view of play, they are sometimes astonished by the imaginative - or fantasy - content of play. This flight into the world of stories and

'pretend' may sometimes seem counter-productive but it is in fact quite normal and enables children to have an experience of many characters, ideas and events that would otherwise be closed to them. From the point of view of design children's imaginations represent a learning resource of great flexibility and effectiveness. The imaginative power of children enables them to identify with the made world - and people concerned with it - in a way which is quite inaccessible to gown ups[2].

Surprisingly the range of children's imagination has not been analysed to the same extent as their physical and social development or their abilities as problem solvers. However, David Cohen and Stephen A MacKeith (Cohen and MacKeith, 1991) have published a fascinating review of 'children's imaginings' drawn from interviews and literature searches. Most of the imaginative activities they record are relevant to the three to five age range although some of the more extended imaginings only emerge after seven and fade away again at adolescence.

Table 9, overleaf is taken from their book. It will repay careful study because many design experiences and explorations can be built around these worlds of imaginative play.

Objects have a special role in play. They act as a catalyst and an enabler. In attempting to focus on this, a group of design teachers described play as 'role playing with props'. Observations of solitary play show how important these props are. A child can create a complete world of actions and stories using toy cars and construction kits or, even more remarkably, out of a few twigs and stones. (See diagrams on page 39.) There is in the experience of children a deeply creative relationship with objects but it is not a 'caring' one in the conventional sense. The props are used and discarded, picked up again and discarded again. These are not the specially loved 'chosen objects' but a resource of products, materials and models that can represent and stand for the equipment and places of the adult world.

---

[2] This is discussed at greater depth in: Ken Baynes, Designerly Play, Loughborough: Loughborough University, 1994.

TABLE 9

CHILDREN'S IMAGININGS
From David Cohen and Stephen A MacKeith *The development of Imagination*, London 1991

A DESCRIPTIVE CLASSIFICATION
_____

1   SIMPLE CREATIVE BEHAVIOURS

    1.1   TRANSMUTATORY
           Imagining that one object is another, quite different object

    1.2   ANIMISTIC
           Imagining that an inanimate object has life- often turning it into another person or an animal with human characteristics

    1.3   INVENTING PEOPLE
           Imaginary conversations with people, things, trees or animals
           Imaginary friends or companions, often real or toy animals

2   ACTING A PART

    2.1   PRETENDING TO BE A MACHINE

    2.2   PRETENDING TO BE A NON-HUMAN LIVING BEING
           This game may continue for an extended period and involve quite complex and realistic behaviour

    2.3   PRETENDING TO BE ANOTHER (Particular) PERSON
           This kind of imagining offers scope for realistic role play as well as acting the part of a 'super-hero' or other storybook character

    2.4   ENACTING AN INCIDENT
           For example: a battle story, a ceremony or ritual

3   IMAGINING TAKING PART

    3.1   LISTENING TO A STORY
           Under this category we should include watching film or TV as well as stories told by an adult or being read to

    3.2   READING A STORY TO ONESELF

    3.3   CREATING A DRAMA (or story) USING A 'STANDARD' PLOT
           For example, producing Cinderella using a model theatre

4   INVENTED STORIES

4.1   'FREE-FLOATING' DAY DREAMS
Spontaneous uncontrolled reverie
A study in 1933 (Jersild, Markey and Jersild) identified 31 typical topics for children's day dreams

4.2   PRE-SLEEP SERIAL STORIES
An 'evening-dream' type story which continues from one evening to the next
Sometimes told by one child to another but more often by parents. Many adults have vivid recall of stories told in this way
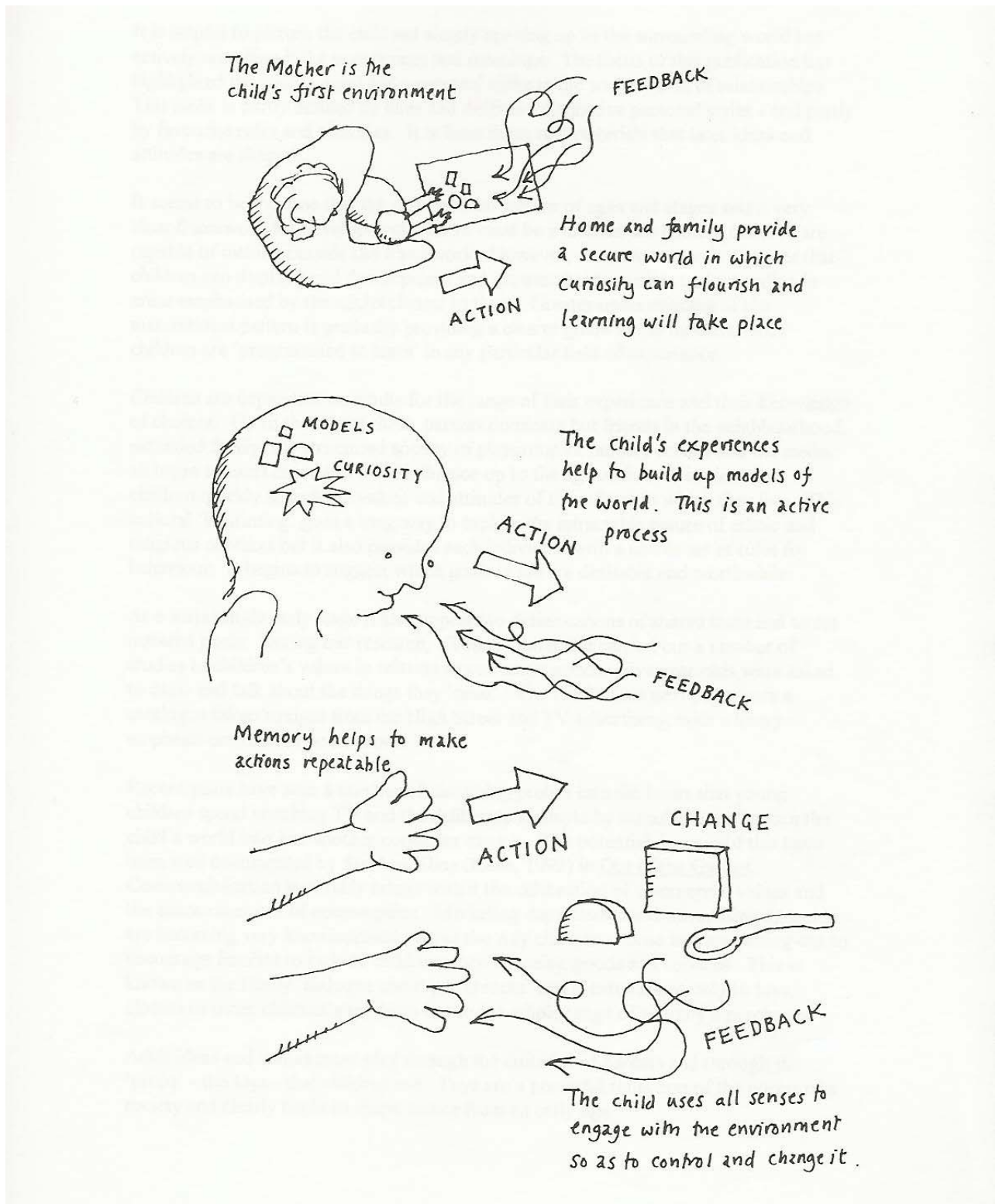
4.3   DAY-TIME STRUCTURED STORIES
Usually told silently to oneself but sometimes shared between children. Sometimes a child can be observed quietly talking out a story that is enacted in play

4.4   PARACOSMS
This is a term invented to describe the creation of a complete and self-consistent world. This is usually done by older children and may involve a complete imaginary town or country or a family with all the realism of the characters in a soap opera.

_____

PLAY AS DESIGN ACTIVITY

The Mother is the child's first environment

FEEDBACK

ACTION

Home and family provide a secure world in which curiosity can flourish and learning will take place

MODELS

CURIOSITY

ACTION

FEEDBACK

The child's experiences help to build up models of the world. This is an active process

Memory helps to make actions repeatable

ACTION

CHANGE

FEEDBACK

The child uses all senses to engage with the environment so as to control and change it.

6   INFLUENCES ON CHOICE

It is helpful to picture the child not simply opening up to the surrounding world but actively searching it for experiences and meanings. The focus of this publication has highlighted the child's quest for a personal niche in the social world of relationships. This niche is partly defined by likes and dislikes - distinctive personal styles - and partly by favourite roles and activities. It is from these raw materials that later ideas and attitudes are shaped.

It seems to be the case that the maturational pattern of ages and stages sets a very clear framework for development. There must be a limit on the choices children are capable of making outside the framework. However, our own research suggests that children can display rapid development and apparently precocious understanding in areas emphasised by the adults closest to them. Greater understanding of the maturational pattern is gradually providing a clearer guide to the moment when children are 'programmed to learn' in any particular field of experience.

Children are dependent on adults for the range of their experience and their knowledge of choices. Up to the age of three, parents dominate but friends in the neighbourhood, extended family, the structured society of playgroup or nursery school and the media all begin to exert more and more influence up to the age of five. It is clear that children quickly absorb the values and attitudes of the culture in which they live. This cultural 'imprinting' goes a long way to explain the intractable nature of ethnic and religious conflicts but it also provides each individual with a usable set of rules for behaviour. It begins to suggest which goals in life are desirable and worthwhile.

At a surprisingly early stage it also appears to define canons of shared taste and to set material goals. During our research, Yvonne Outterside carried out a number of studies of children's values in relation to consumer goods. Five year olds were asked to draw and talk about the things they 'need'. The results (see next pages) are a catalogue taken straight from the High Street and TV advertising, with a heavy emphasis on material possessions.

Recent years have seen a number of disturbing probes into the hours that young children spend watching TV and the deliberate attempts by manufacturers to turn the child's world into just another consumer market. The potential dangers of this have been well documented by Stephen Kline (Kline, 1993) in <u>Out of the Garden</u>. Commercialisation inevitably brings with it the celebration of commercial values and the encouragement of consumption. Marketing departments and advertising agencies are becoming very knowledgeable about the way children choose and are setting out to encourage families to include children when choosing goods and services. This is known as the family 'dialogue about preferences' and it extends not only to toys, clothes or other children's products but to the whole range of a family's purchases.
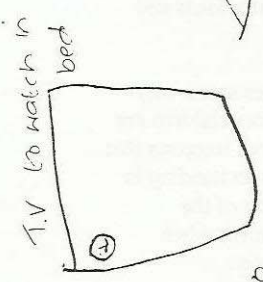
Adult ideas and values enter play through the attitudes of parents and through the 'props' - the toys - that children use. Toys are a powerful reflection of the norms of a society and clearly begin to shape choice from an early age.

YR R

TEMMASHARROCK. 5
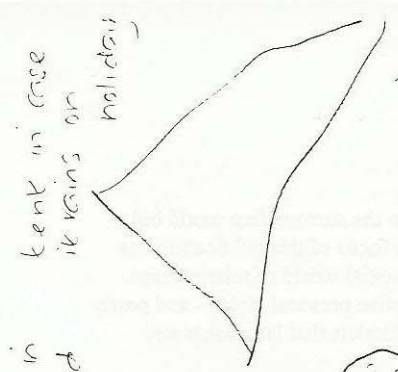
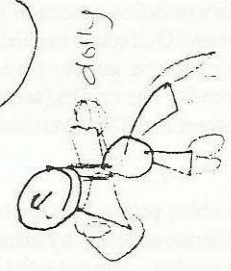tent in case it rains on holiday

T.V to watch in bed

real pet rabbit cos I wanted one

phone to phone sister in another bedroom

skipping rope 'cos I want one

gun cos I want to play with one

T.V for sister

doll daily

skirt to go to school so gun don't show
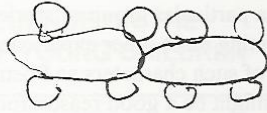
disc hopper 'cos I wanted one

trees for garden to look nice

desk to write on
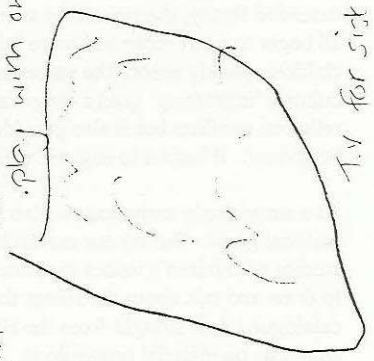
Danielle Wintr Burn ~ 5

Yr R

roller boots
'cos my sisters
got some

real rabbit
for when I
grow up
(might not keep
good care when
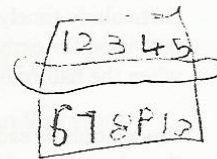I'm little)
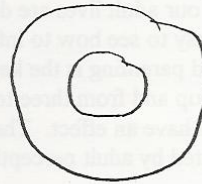
disco hopper

(other one too little)
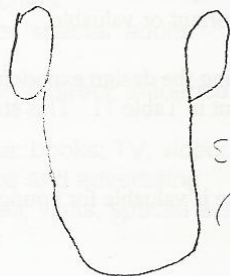
skipping
(other one breaking)

12345
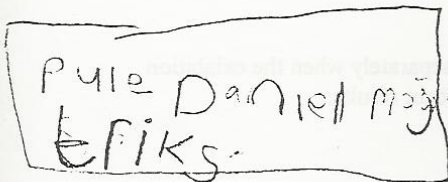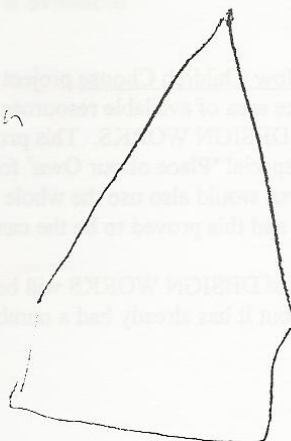678910

phone to ring
people up in t
night

T.V.
so I can watch
it in bed

Pule Daniel Majik
triks.

so I can play tricks

pencil case
to keep paints in

In attempting to make sense of the chaos of direct experience, children search for useful explanations and analogies in the stories, toys and observations already known to them. What is more, at any one time, a particular group of stories may become dominant, providing a key way of interpreting most other experiences. This goes some way to explain the extraordinary success of such characters as Postman Pat or Thomas the Tank Engine and suggests that there might be a good reason for using them in interpretative work with young children.

If it is clear that our adult lives are decisively shaped by experiences in early childhood, it is much less easy to see how to influence those early experiences. At the earliest stage of all, good parenting is the key. From one year to three the field of influences gradually opens up and from three to five the wider world of people, education and culture begins to have an effect. The picture of the world presented to the child is at all times dominated by adult perceptions of what is important or valuable.

What does this mean from the point of view of influencing the design experience of young children? The conclusions of the study are set out in Table 11. This states that there are two possible areas for action:

- Persuading the relevant adults that design experience is valuable for young children;

- Making sure suitable resources are available for them to use.

The first could be seen simply as a logical extension of the general campaign to affirm the importance of Engineering, Architecture, Design and Industry but the moment is particularly timely. The renewed focus on nursery education makes the whole of provision for early childhood into a topical - even a political - issue. This is a moment when the nature of the pre-school curriculum will be a matter for debate.

Pre-schools already give children many experiences that are relevant to design. What they do not provide is a clear focus on this aspect of human development to go alongside their concern with language, number and social skills. Partly this is a matter of priority but it is also a matter of training and resources. People who work with young children need to feel more 'at home' with Design and Technology than they in fact do.

One aim of the How Children Choose project was to attempt to make a direct contribution in the area of available resources. The medium chosen was an interactive exhibition called DESIGN WORKS. This provided a learning environment for 3 to 12 year olds with a special 'Place of our Own' for the youngest children. It was assumed that young children would also use the whole show, making expeditions from their own special area and this proved to be the case.

A full evaluation of DESIGN WORKS will be published separately when the exhibition tour is complete but it has already had a number of significant results:

TABLE 11

**POINTS OF INFLUENCE ON THE
EXPERIENCE OF YOUNG CHILDREN**

_____

- The 'key players' who influence the experience of young children are:

  Parents
  Relatives/extended family
  Friends
  Carers
  Teachers
  Other 'special' adults

- Other, indirect, influence is exercised by:

  Media: books; TV; video; CD Rom
  Shops and advertising
  Places, visits, special events
  Toys

- Whether or not any particular experience is offered to children depends on:

  How it is valued by relevant adults

  Whether suitable resources (toys, places to visit) are available

- Any attempt to widen young children's experience of design therefore depends on:

  Persuading the relevant adults that it is valuable

  Making sure suitable resources are available

- it attracts large numbers of pre-school children to engage in design and technological activities

- it attracts visits by pre-school and nursery school groups and serves as an informal learning situation for the teachers

- it attracts visits by family groups providing a setting for the family to share ideas and experiences relevant to Engineering, Architecture and Design

- it resulted in the development of new interactive learning materials about Design and Technology for 3 to 12 year olds

- resources based on the exhibition will be published in 1997 so becoming more widely available.

The experience of DESIGN WORKS demonstrates that it is possible to provide for the youngest children and that there is an unsatisfied demand from parents and teachers.

REFERENCES

Bruno Bettelheim, <u>A Good Enough Parent</u>, London: Thames and Hudson, 1987

Lesley Britton, <u>Montessori Play and Learn</u>, London: Vermilion, 1992

Tina Bruce, <u>Early Childhood Education</u>, London: Hodder & Stoughton, 1987

Susan Carey, <u>Conceptual Change in Childhood</u>, Cambridge: MIT Press, 1985

David Cohen and Stephen A MacKeith, <u>The Development of Imagination</u>, London: Routledge, 1991

Margaret Donaldson, <u>Children's Minds</u>, Glasgow: Fontana/Collins, 1978

Dorothy Einon, <u>Creative Play: Play with a purpose from birth to ten years</u>. Harmondsworth: Viking, 1985

John Gabriel, <u>Children Growing Up</u>, London: University of London, 1964 and 1971

Howard Gardner, <u>The Unschooled Mind</u>, New York: Basic Books, 1991

Howard Gardner, <u>Frames of Mind</u>, London: Heinemann, 1983

City of Hamilton, <u>Kindermucking</u>, Ontario, Canada, 1992

Stephen Kline, <u>Out of the Garden</u>, London: Verso, 1993

Jean Piaget, <u>The Child's Conception of the World</u>, St Albans: Paladin, 1973

Scottish Office, <u>Interchange no 32: Social and Educational Services for Children Under 5</u>, Edinburgh, 1995

Shulamith Sharar, <u>Childhood in the Middle ages</u>, London: Routledge, 1992

J A Simms and T H Simms, <u>From Three to Thirteen</u>, London: Longman, 1969

Barbara Tizzard and Martin Hughes, <u>Young Children Learning</u>, London: Fontana, 1984

Lewis Wolpert, <u>The Unnatural Nature of Science</u> London: Faber, 1992.

APPENDIX

DESIGN WORKS

TOUR

Gas Hall Gallery, Birmingham
City Art Centre, Edinburgh
Laing Art Gallery, Newcastle-upon-Tyne
Clocktower Gallery, Croydon
Museum of Science and Industry, Manchester

The first 4 showings have attracted approximately 140,000 visitors.

The exhibition occupies approximately 1,000m^2.

The following text is taken from the Teachers Notes for the exhibition and shows how some of the basic ideas about Design and Technology were handled for adults concerned with young children.

The tables on pages 51 and 52 summarise the exhibits and interactive experiences provided in the exhibition and workshops.

CHILDREN AND DESIGN ACTIVITY

In order to design, people use certain mental, physical and social abilities.

1 **The ability to imagine the world being different in the future from the way it is now**. This ability is based on 'cognitive modelling' or 'imaging' which enables us to form models of the future in our minds. This is 'seeing in the mind's eye'.

2 **The ability to externalise these ideas so that they can be shared by others.** This ability is based on the use of language and models (plans, maps, prototypes, numbers, specifications). These things help to make people's ideas visible.

3 **The ability to use tools and natural resources to make these ideas real.** This also needs social action, since people, usually need to work together to bring things into being.

From the earliest days, men and women designed and made things for their own use: tools, weapons and clothing. Later as people evolved from food gatherers to farmers and settled into larger and more permanent communities, some individuals concentrated on designing and making specific things. With specialisation came increase skilfulness in the design and manufacture of houses, utensils, furniture, clothing jewellery and other goods. As our societies became more complex, making things sometimes became separated from designing or planning them. And so the design specialities which we know today as different design professions (for example, engineers, architects, fashion and graphic designers) gradually came into existence.

However, we all also use our own design ability in our daily lives. When we re-plan our homes, select a new wardrobe or design the garden, we are using exactly the same skills as an architect or engineer.

In the same way children, from a very early age, are developing design ability:

- They are curious about their environment and want to influence and change it.

- They can imagine themselves in strange places and be in other people's shoes.

- Children have a direct, concrete relationship with their surroundings and for them this is a major way of learning about design and technology.

- Children use role-play, games and toys to enact and so learn about the made world and the way it relates to people.

- Children soon begin to express personal taste about made things, choosing food, clothes, toys and things for their own room.

- Long before they come to school, children begin to design and make things for themselves.

Design knowledge and skills are unusual because they link Science and the Arts. Why is this? If you think about all the things that people design and make - buildings, clothes, machines - you will see that they need to succeed in two contrasting ways. First they have to work. They have to function properly and stand up to the physical pressures of gravity, weather and use. But secondly they also have to meet people's need for satisfying and meaningful products and surroundings. Taken together it is these contrasting requirements that determine the form of everything that is designed.

Ove Arup, one of the world's most famous civil engineers (he solved the problem of how to build the Sydney Opera house) once wrote:

'An engineer who doesn't care a damn what his design looks like as long as it works and is cheap, who doesn't care for elegance, neatness, order and simplicity for its own sake, is not a good engineer.'

At its own level, DESIGN WORKS takes up this theme, inviting children not only to build strong structures but also to consider their appearance and their impact on our lives.

HOW DESIGNING WORKS

IMAGING, MODELLING AND CUMMUNICATING

People use **imaging** to visualise or 'see' in the mind' eye'. They **communicate** about the things they have visualised by means of **models** – drawings, plans, prototypes, roughs.

Designers use 'models' not only to communicate with other people but also to show their ideas to themselves. This is fundamental to the process of developing ideas.
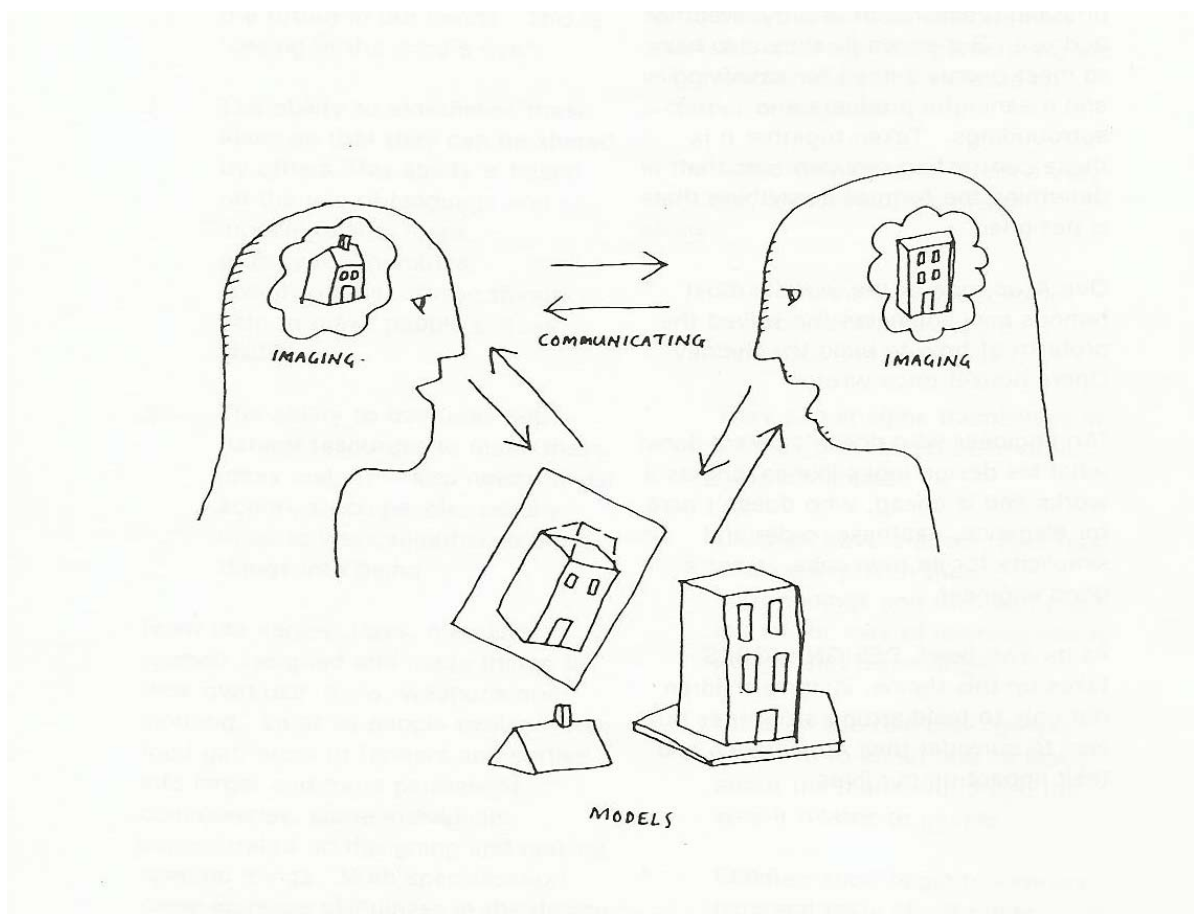
THE DESIGN WORKS APPROACH

DESIGN WORKS begins from a direct experience of the qualities of design and the excitement of using our own design ability in activities and experiences that are entertaining.

- It consists of a series of interactive, structured experiences.

- It provides children and adults with an active way of enjoying and becoming involved with design.

- DESIGN WORKS is for everyone but the concepts are targeted at the 3 - 12 years age group.

- The whole exhibition is both entertaining and educational. The organisers have set out to create an educational environment about Design.

- The experiences will raise awareness about Design by building on the fact that we all have the ability to design. We are involved with it every day of our lives and what we design and make is a statement about ourselves.

Designerly experiences need to be drawn from the adult art and design forms that children can best understand. For example, an architect can be seen as someone who plays with building blocks to create new building ideas! There is a similar relationship between dressing dolls and the fashion/textile designer. This type of designerly play can lead towards an artistic and technological design experience.

The element of playfulness is one that characterises all creative investigation. It helps to generate new ideas and provides the freedom necessary to experiment with various courses of action.

Children's imagination thrives on play. Play for children is an integral part of living. For children, play takes place anywhere, anytime and with everything about them. It is a way of researching, allowing them to approach everything as if new and to discover and explore unknown and interesting ideas which help them create thoughtful and exciting works of their own. Play therefore can provide a powerful way of learning through experience. The experiences can be designed to elicit a wide range of responses and possibilities, allowing the children to work at their own level and to determine the results of their own actions. This is what we have set out to do in DESIGN WORKS.

THE INTERACTIVE EXPERIENCES

The interactive situations in DESIGN WORKS are intended to encourage varied experiences of 'being, doing and making' allowing knowledge to grow from exploration. They provide children with the opportunity:

- To design and make simple models

- To look at and analyse things that other people have designed and made

- To select and make choices about such things as:

  Structures
  Colour
  Pattern
  Use of space

- To work with and see the relationship between two and three dimensional models

- To see how design affects everyday life through the buildings, products and communications that we use

- To use their imagination to develop personal ideas

- To sharpen their awareness of the world around them

DESIGN WORKS
EXHIBITS AND ACTIVITIES

	DESIGN WORKS STRUCTURES	DESIGN WORKS CONNECTIONS
EXHIBIT	• Huge woodblock model of Manhattan • Showcases of structures	• Architect's model of local town centre • Dis-assembled products: teddy; bike; walkman; umbrella • Designers' models
INSTALLATION	• Dome made of Mottik construction kit bricks • Wood dome structure	-
WORKING MODEL OR KIT	• Building challenge: Crocodile Crossing. Woodblock bridge model to cross a gorge • Building challenge: Build as high as you can using wood blocks	• Large town plan tables with model buildings to arrange and re-arrange • Kitchen planning models
FREE PLAY RESOURCE	-	• 'Dolls House' models for designing 'my own room'
FREE MAKING RESOURCE	• Quantities of woodblocks and Mottik bricks to 'build what you like'	-
INTERACTIVE COMPUTER PROGRAM	• A design program for the Mottik bricks allowing 2D and 3D views to be seen	• My Room design program • Kitchen design program • My Town design program
INTERACTION WITH ENABLER	• Demonstrations of bridge building using the woodblocks	-
SPECIAL EVENT	• Special bridge building event using many different materials	• Visits by local architects to talk about ideas and plans for the future of the city
OUTREACH	• Prepack for schools • Copies of computer programs available • Workshop for teachers	• Prepack for schools • Copies of computer programs available • Workshop for teachers

**DESIGN WORKS
EXHIBITS AND ACTIVITIES**

	DESIGN WORKS COLOUR, PATTERN, SHAPE	DESIGN WORKS MOVEMENT
EXHIBIT	• Big screen presentation of computer generated program on colour, pattern and shape • Showcase of colours, patterns, shapes	• Automata of working jungle animals, brass band and circus • Huge mobile showing the sun, moon and stars
INSTALLATION	-	• Paddington Bear's re cycling plant - demonstrating a variety of useful mechanisms
WORKING MODEL OR KIT	• Mottik to create patterns and tiles • Games involving pattern making, colour matching etc	• Movement games: ball race and other games with marbles • Challenge: Great Egg Race kit with slide and car
FREE PLAY RESOURCE	• Slotty to build coloured and patterned constructions	• Demountable vehicle models • Construction kits: Lego, Meccano etc
FREE MAKING RESOURCE	• Finger painting on computer • Free drawing program (Imagine) on computer	• TacTic to build any vehicle, mechanism or other 'moving' thing
INTERACTIVE COMPUTER PROGRAM	• Colour, pattern, shape, program • Kaleidoscope program • Build-a-tree program • Make-a-snowflake program	-
INTERACTION WITH ENABLER	• Imagine program demonstrations	-
SPECIAL EVENT	-	• TacTic building demonstration for teachers
OUTREACH	• Prepare for schools • Copies of computer programs available • Workshop for teachers	• Prepack for schools • Workshop for teachers