Abstract

Since the beginning of the 20th century, architecture went through several different developments. Throughout these developments a large number of movements and design models emerged, based on different design knowledge. The motivation for design projects is related mainly to historical, functional, or site related issues. Today's changes in social relationships and therefore living arrangements question the validity of existing traditional design solutions, especially in the case of disabled clients. A new or modified specific design knowledge base has to be considered in order to meet the specific client's needs. To satisfy the wide range of changing nontraditional criteria that face todays architechts, the new design procedure has to result in a simple yet flexible model. This thesis proposes one such solution as it is applied to Alzheimer's disease patients and their caregivers.

# A Knowledge-Based Design System
## for a Housing Project
## for Altzheimer's Disease
## Patients and Their Caregivers.

by

Karin S. Bannier

Thesis submitted to the Faculty of the Graduate School of
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To my Parents.

# Acknowledgment

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# Chapter 1

# Introduction

The following Thesis Project has two main approaches, theoretical and practical. The latter is a design project, explained in more detail in chapter 6. The theoretical side of this work is concerned with the issues of design, in particular with decision-making during the design process. The work then will concentrate on knowledge-based design and how knowledge is related to technical, formgiving, and user-related issues.

The motivation of this Thesis project was derived from a general interest in design and design developments, knowledge based design, and the present confrontation with an unusual user need.

The author has the opportunity to work on a research project for Alzheimer's disease patients and their caregivers and their problems with the environment. Modifications for a safer home environment are presently studied and a need for a non-traditional way of living with no precedence has to be faced. The confrontation with the aspect of different user needs that derive from different knowledge bases brought up the question of knowledge based systems in general and the use of computers during the design process.

On the other hand, the phenomena of another non-traditional way of design, that of Deconstructivism, also exists.

This lead to the decision to study the above mentioned topics more specifically. The first three chapters of this work explain the phenomena of knowledge based systems and different

models of design. Several general design models will be explained, along with knowledge-based systems, emphasizing knowledge as a common base for the development of the models and the systems.

In chapter four the approaches of the present design movement, Deconstruction, are defined. The work then continues by explaining the basic issues of Alzheimer's Disease in chapter five and its emerging problems of a living situation. Certain aspects of required modifications for a safer home environment will lead to the base for a new knowledge based design system in chapter six.

# Chapter 2

# General Knowledge-Based Systems

Knowledge-based systems, first appeared in the 1980s, are computer systems that try to take human knowledge of a specific area and make it available (Buchanan, 1982). The approach is to show this knowledge in a way that human beings as well as machines can work with. An often used term for those systems that carry knowledge of a specific area is called "expert systems" (Hayes-Roth, Waterman, Lenat, 1983). Knowledge-based systems are not regular computer programs in which one particular expectation of use will be satisfied. Two main factors form the system, the knowledge and the inference procedure. The inference procedure consists of the foreward-chaining inference (Davis and King 1977) and the backward-chaining inference.

The first is defined as an observation process that, together with the construction of a certain amount of inference chains, leads to conclusions. The second is defined as a process of making hypothetical statements and prove or disprove them. The inference procedure shows if the proposed design is consistently reasonable. Therefore, if a design suggestion does not lead to contrary facts it is sensible and of good value. Together knowledge and inference form knowledge-based or "expert" systems. Operating an expert system with a knowledge base gives the designer the opportunity to solve more than one task. It is supposed to answer questions, give alternative solutions of the existing problem, and explain the suggestions.

Motivations for using knowledge-based systems are the increase of productivity and the
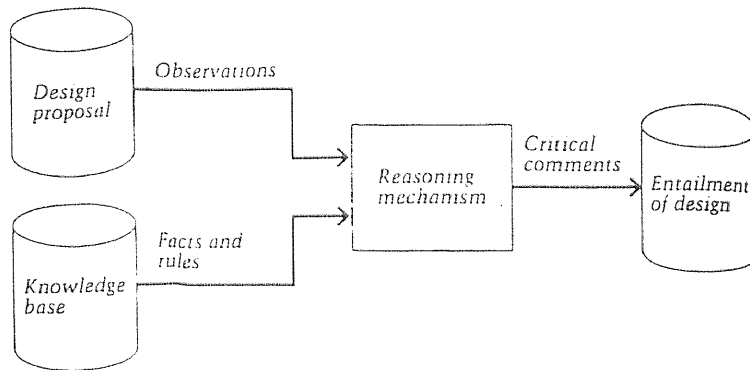
Figure 2.1: The different stages of a general Knowledge based system

increase of efficiency when used with computer systems.

With knowledge-based design systems a certain knowledge can be made accessible immediately for designers, anytime they need to use it. The key issues of knowledge-based design systems are KNOWLEDGE and REASONING. The optimum would be the existence of a system, based on rules, prototypes, etc. (knowledge), working together with a controller device (reasoning), which processes these rules, answers questions, etc.. (Figures 2.1 & 2.2)

## 2.1  Knowledge

Generally it can be said that knowledge is the amount of facts that one knows about something. It is one's knowledge base. It could be expressed in different kinds of ways, such as sentences, diagrams, computer programs, etc.. The amount of knowledge as well as the configuration bases, vary. Some are larger than others, some are more precise than others. In any case, it forms the pre-requisite for "...making and justifying critical comments..." and therefore evaluating some kind of design. It is possible to express a knowledge base as a number of axioms and facts (e.g. Euclid's geometry). Axioms are seen here as basic definitions. Facts originate from the axioms through application of the rules, which is at the same time the proof of the facts. There is a disproof if the facts are not consistent with the

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axioms. This system became the foundation for the development of "knowledge-based" computer systems. The axioms, facts, and rules of an architectural knowledge base applied to architectural design problems include a number of different issues such as physical geometry, classical physics, economics, social sciences, cultural framework, etc.. The more extensively developed these knowledge bases are the bigger the probability to fulfill an adequate design.

## 2.2 Reasoning

Reasoning is a process that formulates a group of rules, based on knowledge. Rules embody the knowledge of form, function, and their relationship. The object's essence is its function together with the context, shape, and material properties necessary for the performance of that function. Architectural compositions, generally divided into the two main categories "top-down" or "hierarchical decomposition" and "bottom-up" or "hierarchical decomposition-recomposition" approach, require a certain knowledge. (Further explained in chapter 3). This knowledge determines the selecting and shaping of elements, forms, and functions. It can be formulated as "shape rules." [9] The shape rules are divided into left and right sides. The left side specifies the shapes which are architecturally interesting and worthwhile because they have the potential to be further developed. The right side shows the result of this development, a new solution. Rules of an architectural knowledge can either lead to several possible design solutions or to a very restricted formal design, as it is the case in the Classical architecture or Mies van der Rohe's late work. However, it is possible to change the rules of a well recognized architectural language, by using new elements, as Alberti's example shows. If the new invention does not loose the adequate functional satisfaction of the original, it is a successful application of the shape rules. A personal architectural style is created by using the knowledge of the designer, including the knowledge of shapes, materials, and the way to use them. A second distinction is made between "weak" and "strong" rules. Strong rules are very limited in their ways of application, but efficient. The Classical

architecture or the Palladian villas are typical examples for strong rule architecture. Weak rules are less restricted, but also less efficient. They apply to the speculative stage of design, in general the sketch phase of a design. (Figure 2.3 & 2.4)

## 2.3 Design

Design is a process of questioning and searching during which forms of buildings and shapes are realized (Rowe). Design, as opposed to Science, is an unpredictable phenomenon. It is possible to structure some set of axioms, facts, and rules before a design process begins. However, design is not only an act that invents systems and forecasts their behavior in regard to fulfill certain requirements, but also an objective-dependent behavior that requires resolutions from its inventor (ARCHER). In other words the designer tries to reach a state with his/her product that fulfills desired performances. These performances are related to values, which, at the same time, are individual-dependent. Facts described in the world of design should be separated from facts of the knowledge base. It assures a clarity in the conceptual sense. Within the design process one is searching for a state in the conceptual world, the design world. As soon as a solution that satisfies the requirements of the knowledge base is found, this design state is reached.

Design can be influenced by science, problem solving, logic, and/or language theory. Partly, a design can be explained through theory, consisting of a set of rules, principles, and formulae. Although certain facts, objectives, or goals can be stated, there is no obvious logical step from a certain amount of requirements to a design (HILLIER, MUSGROVE, SULLIVAN, 1972). There has to be a cycle of generating, testing, and evaluating, before a design is acceptable. However, since design constantly undergoes changes during the design process, it is a phenomenon that can not be completely foreseen.

On the other hand, science describes existing phenomena and formulates a statement

about their behavior. Design and Science can be understood as two things that start from different viewpoints. In the former, predictions are developed through theories. In the latter, theories are developed through observations. Science defines knowledge, Design invents by using knowledge.

Based on the definitions presented in this chapter, the theory behind knowledge-based design will be further investigated in the following chapter.
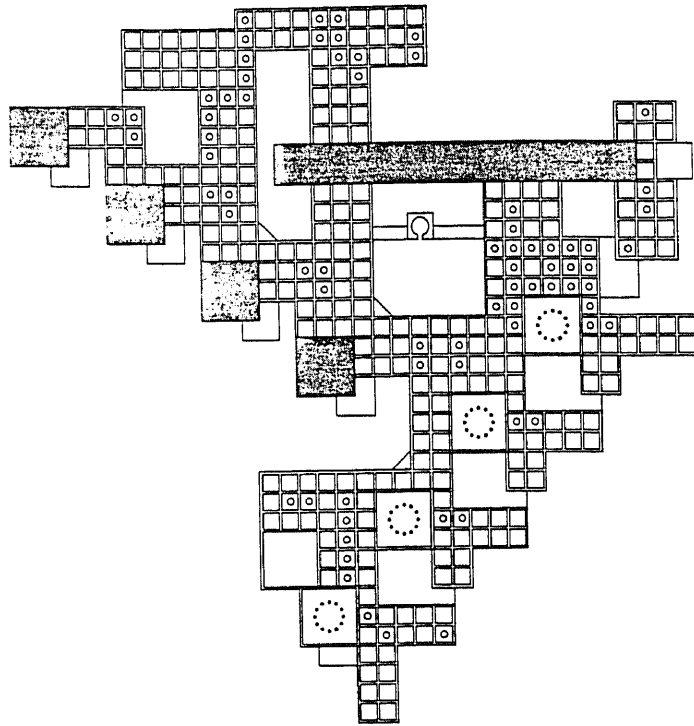
Figure 2.2: A form based on an axiom of modularity. Children's Home, Amsterdam, 1958, by Aldo Van Eyck
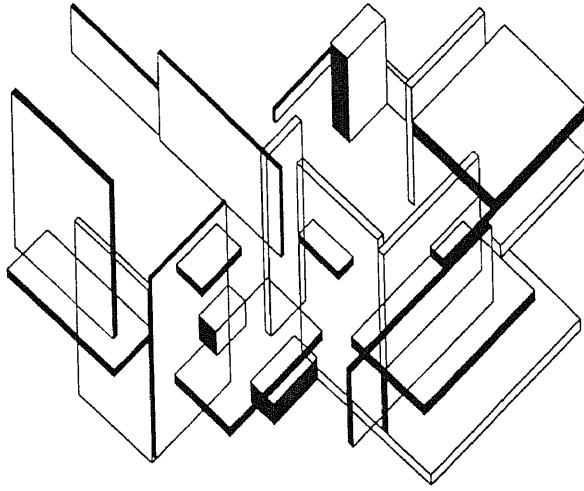
Figure 2.3: A form based on an axiom of strictly orthogonal intersecting cuboids, Van Doesburg and Van Eesteren, 1925
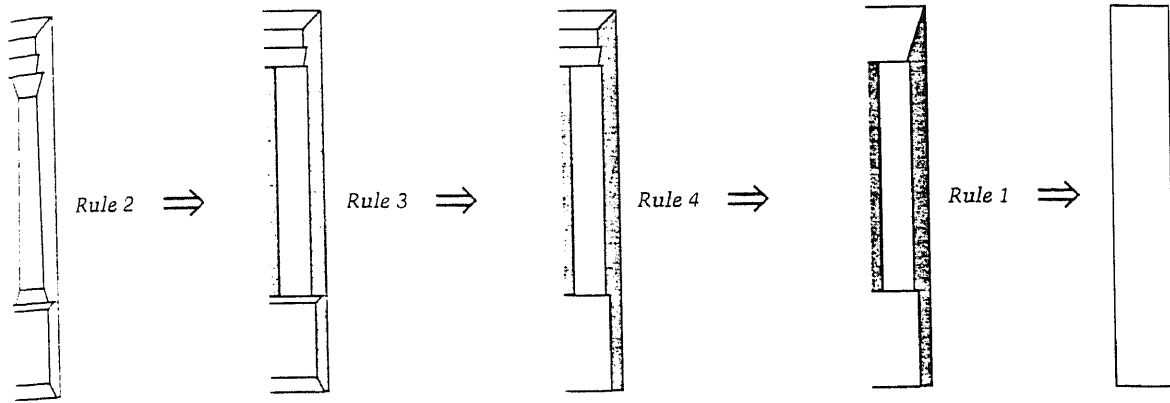


Figure 2.4: Reductions of a Classical order

# Chapter 3

# Knowledge-based Design

In order to explain the basics of knowledge-based design, it is important to define several other phenomena, such as models of design, phase models of design, information processing theories, and different knowledge as it is related to design. Several aspects of the design process will be discussed. Also, every design process has to have some goals and objectives. Goals can be developed by different strategies to reach the objectives. Therefore, there is not only one, but multiple ways to reach goals. Computation, Representation, and Topdown are examples for different strategies that have been described in more detail in a comparison between different Computer Aided Design Systems later in this chapter.

## 3.1 Models of Design

Since the end of the 19th century different theories about problem solving have been developed. Some of them are influenced by a mechanistic way, such as Associationism, while others by a more behavioral and nonmentalistic way, such as the Würzburg School, the Gestalt Movement, and the Behaviorism.

### 3.1.1 Associationism

One of the main issues in this concept about problem solving is the association of ideas. It occurred at the end of the 19th century. Around 1900 the supporters of this movement

split into two different camps. On one side, the adherents of the basic doctrines, such as Wilhelm Wundt, and on the other, people such as Brentano who followed the psychologically influenced theory. The associatists distinguished "...between a concept of mind and a concept of body...." [4] Mental issues were not important.

## 3.1.2 The Wuerzburg School

Around 1910 the W"urzburg School replaced the Associationism. Kulpe, Ach, and Buehler are main figures who initiated this development. Instead of associations, which were crucial for Associationism, the "Aufgabe" task became the "...controlling mechanism..." [4] in this model. Another main difference was the introduction of "...systematic introspection...." [4]

## 3.1.3 The Gestalt Movement

At the beginning of the 1920s the Gestalt Movement was introduced by Koehler, Koffke, Wertheimer, and others. The mechanistic attitude of Associationism was replaced by "...holistic principles for organizing information, embodied in the concept Gestalten..." [4]. People, such as Bartlett introduced the term "schemata" in connection with creative thinking.

## 3.1.4 Behaviorism

Around 1913, Behaviorism appeared, a doctrine that all human actions could, if full knowledge were available, be analyzed into stimulus and response. Opposite to Associationism, the behavioristic attitude believes that human actions can not be explained in a mentalistic way, but rather in a nonmentalistic way. Influenced by Watson and Pavlov, the Behaviorism reached its peak during the 1930s and 1940s and became popular through Skinner (1953). Related to problem solving theories, this model became one of the phase models, in which activities are separated into different phases of behavior:

- Preparation of the task

- Incubation

- Illumination or inspiration (state when a solution occurs)

- Verification

## 3.2  Phase Models of Design

During the late 1950s and early 1960s design models were invented that require a series of steps, dominated by the analysis part, the synthesis part, and the evaluation part. (Figure 3.1)
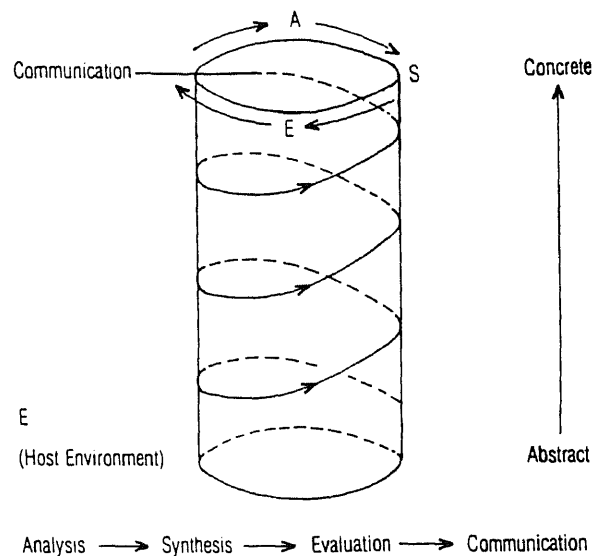


Figure 3.1: An iconic model of a design process

The architectural teaching of former schools - during the 18th and 19th century - such as the Ecole des Beaux Arts or the Ecole Polytechnique worked already with this kind of model base, although in a much more rigid way imposed on the students. A systematic reading and interpretation of the projects' programs was followed by the exploration of ways in which the

programs could be met. The designer then drew a parti. Further concept phases included detailed drawings with plan, section, and elevation drawings.

### 3.2.1 The three-phase design model by Asimov

Morris Asimov developed during the 1960s a model that also consists of three main steps, analysis, synthesis, and evaluation. Within analysis, the designer needs to state his/her goals. The second step will require a sketch of a solution. The third, but not last part, includes the evaluation of the sketch and leads the designer at the same time to a revised version, a next suggestion, and another sketch. The model implies two structures, the vertical and the horizontal. Whereas the former works with a sequential phasing of activities, the latter requires a decision-making cycle to all phases. (1962)

The following phases, that have to be followed chronologically, characterize the vertical structure of Asimov's model:

- Primitive need

- Phase I - Feasibility study

- Phase II - Preliminary design

- Phase III - Detailed design

- Phase IV - Planning for production

- Phase V - Planning for distribution

- Phase VI - Planning for consumption

- Phase VII - Planning for retirement

Since phases I - III are related to the initial design process, it is necessary to explain them in more detail.

## Phase I - Feasibility study

The very first step in this phase is to prove that the original need is feasible. Then, one has to explore the actual design problem developed through the need and define the constraints and other main design criteria that occur. At this point, the first solutions will be suggested, from which the best will be selected, based on physical realizability, economic worthwhileness, and financial feasibility. The purpose of this first phase is to determine the existence of further needs and problems and whether useful solutions can be found. [5]

## Phase II - Preliminary design

Out of the collected useful solutions found in the first phase, the designer tries to determine the solution that seems to be the best as a base for a future design project. It will then be examined to set up the span within which the main design factors must be controlled. The following period studies main components and materials, that will be applicable to the design process. Additional possible internal and environmental factors will be searched for what could influence the design. The last part of this second phase considers factors of economical issues and the "...rate of obsolescence... ." With this information in consideration one approaches the next phase.

## Phase III - Detailed design

At the beginning of this third phase the designer is equipped with an overall provisional synthesis, a design concept, and preliminary synthesis information. The next goal is to achieve a detailed design. Some components may cause changes as soon as the designer reaches the more detailed stage of the design. Problems and mistakes from the conceptual level become now visible and require changes. Different means such as model building, which are not suitable to final disposition by analysis, are available to check out ideas. Since the need to examine more detailed components arises, a series of tests of partial prototypes, components, and finally complete prototypes take place. Several redesign and refinement

processes are necessary until a final design, that fulfills the given requirements, is achieved. This model does not give the possibility for a complete analysis. However, each additional solution brings one closer to one's goals. (Figure 3.2)
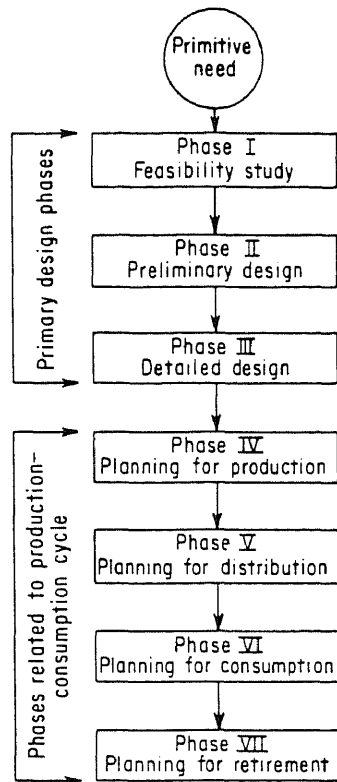


FIG. 3.1 The Phases of a Complete Project.

Figure 3.2: Phases I-VII

Other models of problem solving in design that base their theories on a process of phases include:

- the model for the Hochschule für Gestaltung at Ulm

- the decision making model of Bruce Archer

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- the three steps model of Jones (Jones 1970)

### 3.2.2 The model of the Hochschule fuer Gestaltung at Ulm (Maldonado & Bonsiepe, 1964 Gugelot, Broadbent,1973, Maldonado, 1972, etc.)

The goal was a very rigid one, influenced by Behaviorism. A design should be approached in a "scientific" way and completely objective. Every issue that was involved in design ought to be stated clearly and explicitly. This concept, however, was of short existence, before it failed in 1968.

### 3.2.3 The decision making model of Bruce Archer

Archer stated a similar model of design, although he relied on feedback loops more than his precedents.

### 3.2.4 The three steps model of Jones (Jones 1970)

A very similar approach is the one that includes the three following steps divergence, transformation, and convergence. Divergence specifies the frame of an environment, where it should be possible to identify a solution for a design. In the transformation process, parts are joined together differently, before getting tested in the third step, the convergence.

## 3.3 Information processing theory in Problem Solving

At the beginning of the 1930s this theory suggested that not only behavioral, but also mental aspects influence humans' decision making processes. Newell, Shaw, and Simon (1957) became important figures in the theory of problem solving known as "information processing theory". It was described by basic mechanisms such as processing information, strategies, and computer programs.

### 3.3.1 Newell, Shaw, Simon (1967)

**a)** A "problem space" consists of "knowledge states", some of which represent solutions to a problem.

**b)** One or more "generative processes" exist, where knowledge states (input) produce new knowledge states (output).

**c)** Within the "test procedures", knowledge states, that are supposed to carry solutions, are compared with one another. Therefore, differences among knowledge states will be found. Test procedures also decide which generative process and test procedures will be used.

### 3.3.2 Three-class-activity in problem solving

It is possible to separate problem solving into three different classes of activity:

**a)** the problem representation, where problem spaces will be defined.

**b)** the solution generation, where solutions are generated within this phase.

**c)** the solution evaluation, where suitable solutions will be evaluated.

Ways to generate solutions can be of different nature. The possibilities are as follows:

The Trial-and-Error Procedures

The searching for solutions is random and without intermediate testing. Information out of former experienced trials is neglected. A situation where for example a piece of land is supposed to be used in different ways, is called a space-planning problem. (Figure 3.3)

The Generate-and-Test Procedures

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This procedure is similar to the one mentioned before, but information gained out of tests of former experienced trials is taken into account to find solutions. This system is also called "hill climbing", a development where the designer slowly approaches the goal by going from worse to better solutions. The top of the hill describes the place where the best solution is to be found.

The Means-and-Ends Analysis

Three factors need to be available to follow the process of means-and-ends analysis,

**a)** a definition of actions (means)

**b)** a definition of goals (ends)

**c)** a definition of decision rules

## The Problem-Space Planning

The purpose of processes for problem-space planning is to find the most suitable solution for a given problem. Problem-space planning subdivides larger problems into smaller subproblems. It also tries to create ways how to use strategies and procedures. We can differentiate between two main groups of problem-space planning, a) "top-down" or "hierarchical decomposition" (Pena, 1977) and b) "bottom-up" or "hierarchical decomposition-recomposition" (Alexander, 1964) concepts.

a) "top-down" or "hierarchical decomposition"

These concepts of problem solving start with a more general structure and gradually reach the more detailed level of a problem. In other words, the process works from a schematic design, drawn as a parti with simple construction lines, towards a detailed project, such as a single-line floor plan to a double-line floor plan, etc. The more detailed the objectives, the easier it is to evaluate them. (Figures 3.4 & 3.5)

**b)** "bottom-up" or "hierarchical decomposition-recomposition"

These systems build up complex drawings by starting with "...fundamental components..." [4]. The tool to search for programmatic solutions is the "fractal process", which consists of a "base" and one or more "generators". The base stands for an original state of some shape, whereas the generators are rules or requirements which are related to a program of a specific design. Both, base and generators, can be replaced.

The difference of both systems is that the first one works from a general scheme towards a detailed one, whereas the second concept works vice versa.

## 3.4 Knowledge as Related to Design

All design systems have in common a certain knowledge - philosophically, historically, or individually related - that creates the base of the system. Factors, such as constraints or rules, can influence a knowledge-based system. The constraints can be:

**a)** an immediate contextual constraint such as a site, a social purpose, etc..

**b)** a historical constraint (building precedent). The new design is related to an already existing architectural or non-architectural object.

**c)** a theoretical constraint such as an idea, conceptual and/or technical. In general, constraints can originate from safety or political, technical, or economical contexts, or other issues.

Different requirements relate to different knowledges. Knowledge-based systems need to show these differences. To achieve an efficient and satisfying system, configurations should be created to satisfy the user's needs. It also seems to be more possible to provide knowledge-based systems for objectives that are difficult to translate mathematically.

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## 3.5 Design Aspects

As mentioned earlier, a design is an unpredictable evolving process. However, each design is developed in certain distinct interrelated steps, each bringing the design closer to its final stage. The following is a discussion of some of the aspects of the design process.

### 3.5.1 Generic Design

Design knowledge can be defined generally as something that expresses spaces of designs. Design space defines an area where designs relate to specific meanings and syntax. Typologies, rules, procedures, and existing designs are used to express this knowledge more specifically. Knowledge expresses generic designs. Instead of using rules developed from a certain grammar, one uses "generic models" to explain a specific design space. For example, a small house has certain criteria, which can either be listed or described through a diagram. Some existing design examples are named "archetype", because they express typical characteristics of a specific class. Knowledge gives us the opportunity to realize the importance of the archetype, what is represented, etc.. Using archetypes is helpful, since it gives the designer existing examples, rather than discussing abstractions. (Could be used for critique).

### 3.5.2 Prototypes

A "prototype" is an original from which other instances develop. There are three possible ideas of a prototype:

- a definition of a class of designs (particular design)

- a description of a class of designs (diagram/description)

- other definitions to determine a design (set of rules, etc.)

There are three different groups of prototypes:

- prototype refinement

  Refining an existing design and producing a new prototype within the boundaries of the specific class of designs.

- prototype adaptation

  Developing a better new design by using the knowledge that crosses the existing boundaries of a specific class of designs.

- prototype creation

  Developing a complete new prototype. (First automobile, first airplane, etc.)

### 3.5.3 Problem Solving and Design (Popper)

One method, described by Popper, is called the problem-solving model. Through a process of generating and testing of hypothetical solutions the goal will be reached eventually. Simon and Newell (1969, 1973) define this process as an attempt to search through a "state space" for a design. Others suggest a more hierarchical process. Newell and Simon (1972) are the leading figures in automated problem-solving systems. One of their examples is the General Problem Solver (GPS). With the use of GPS the designer is able to formulate the present situation and its diversity, the goals and how to get closer to them. A controller device should be available to decrease the time factor of searching for a design and to lead it in the right direction. Akin (1978/1979) researched that the different strategies, which are used by designers, are similar to the ones that are used in artificial intelligence:

- "hill-climbing"

- "heuristic search"

- "forward processing"

## 3.5.4  Simulation, Optimization, and Design

The two models of computer system techniques that regulate search in design are simulation and optimization. The simulation process is defined as something that can forecast the performance of an existing design. Optimization defines only the best designs for specific existing problems from a specific point of view.

Simulation as well as optimization both start with goals. These goals can only be reached if certain objectives are fulfilled. The objectives, however, can only be reached by fulfilling certain performance variables (areas, air temperatures, costs, etc). They are influenced by criteria (general directional terms) and/or constraints (specific terms), which are existing within a specific range. Finally, the decision variables (lengths, widths of spaces, types of components, thickness of materials, etc.) define the position of the design. A well selected decision variable defines the so called "state space" and is directly related to the individual designer's knowledge and experience.

Simulation

Given is one design solution, together with decision variables and their values. The values of the performance variables are acquired through calculation and observation. Within the following step the existing criteria are examined and evaluated. If the result does not satisfy the expectations or requirements, changes have to be applied and the whole process starts from the beginning. This pure evaluation process stops as soon as a satisfactory result is achieved.

Optimization

This synthesis and evaluation model tries to find the optimum of a design, depending on the existing circumstances. Performance criteria and constraints, and decision variables have to be defined. The former in order to lead the search within the best possible environment, the latter to determine the span of values. Only then the actual search can take place.

### 3.5.5 Logic and Design

In this model design is seen as a logical process. A set of goals is defined and through reasonable or required deductions a design will be reached eventually. This design model had already been used during the 18th century by Abbe Laugier and during the 20th century by the architects of the Modern Movement, proclaiming "form follows function". Another version of this method works with deductions based on logical issues, such as the design's costs, suitability, efficiency, etc..

### 3.5.6 Language and Design

There is a very obvious similarity between design and language. Both work with such issues as vocabulary, composition, style, context, meaning, rules, semiotics. We are able to distinguish between rules within language, for example, that create certain ways of how to put words together. Similarly, certain rules to compose a design exist. Also, a design holds a message about function and usage. In computer design, certain terms of language serve for the generating process of a design. Only it uses symbols to achieve a way of communication, instead of letters or sentences.

### 3.5.7 Typology and Design

The typology model works with prototypes to achieve a certain goal. Types are defined as a combination of features, which are usually shown as diagrams. To create a design, the user chooses a specific type and evaluates and refines it in regard to a specific environment.

### 3.5.8 Optimization and Design

The main issue in optimization and design is to fit decisions to performances. Therefore a design is dependant on "decisions" and "descriptions" such as length, width, materials, etc., and on "performance variables", such as area, construction costs, etc. This dependency can be shown graphically as a two dimensional relationship. Generally, design is not possible

without knowledge. By using knowledge, a system can be constructed. In return, the system allows this knowledge to become available. It is a counterdependency. For a better understanding the knowledge has to be something that can be seen separately - on one hand the knowledge that is responsible for the control, on the other the one that is responsible for the specific design objective.

## 3.5.9   Syntax, Semantics, and Design Systems

Most models work with mathematical terms. In computer systems the "description" of a product is a set of elements that form a database. The "performance" is a set of issues which are not specifically formulated, but important and included in the description. Compared to language, the "sentences" are the design descriptions (Syntax) and the "meanings" are the performance variables (Semantics). Design can be seen as identifying a description in the syntactic space that is related to performances in the semantic space. This identifying process is done through knowledge. If the descriptions are legal is dependant on another knowledge, the "grammar". In Knowledge-based systems the knowledge itself has to be accurately defined in order to be used efficiently.

Arround the late 60s a new approach to architecture was developing. This new theory seemed to break all barriers in the sense that it had no rules. It is known as Deconstructivism.
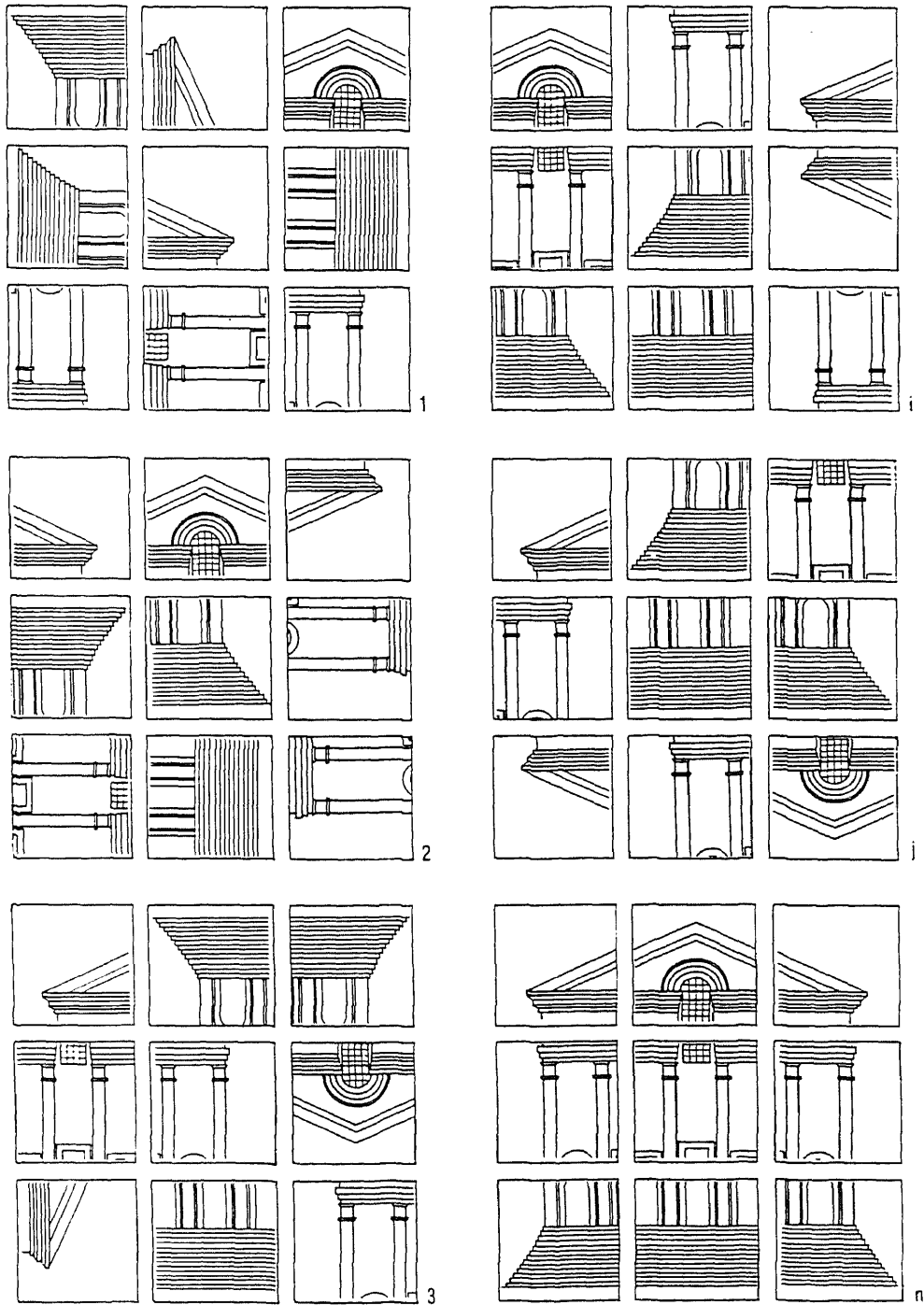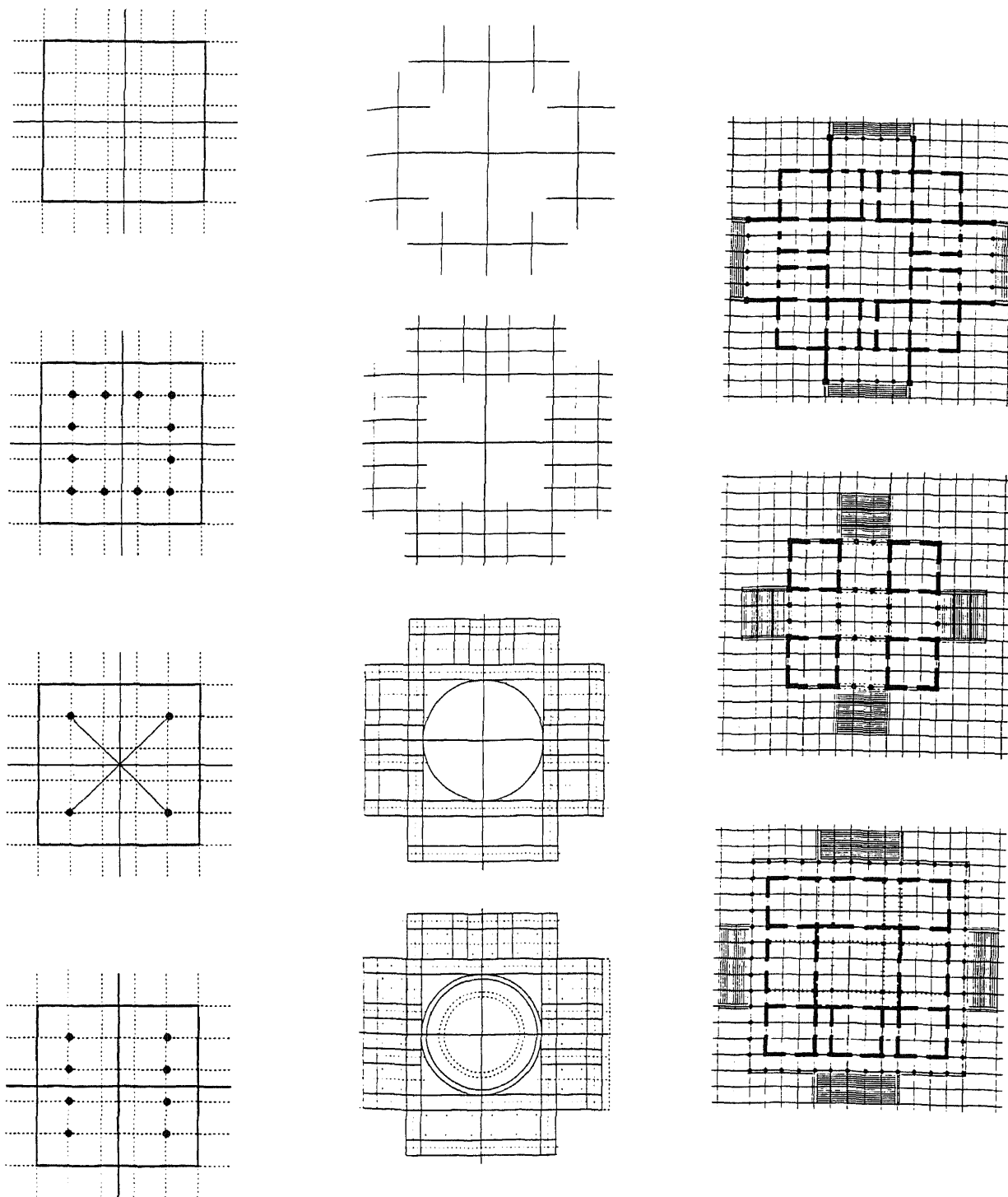
Figure 3.3: Trial and Error

Figure 3.4: Top-Down Process (Column 1), Alternative Substitutions (Column2), Combinations of Elements (Column 3).
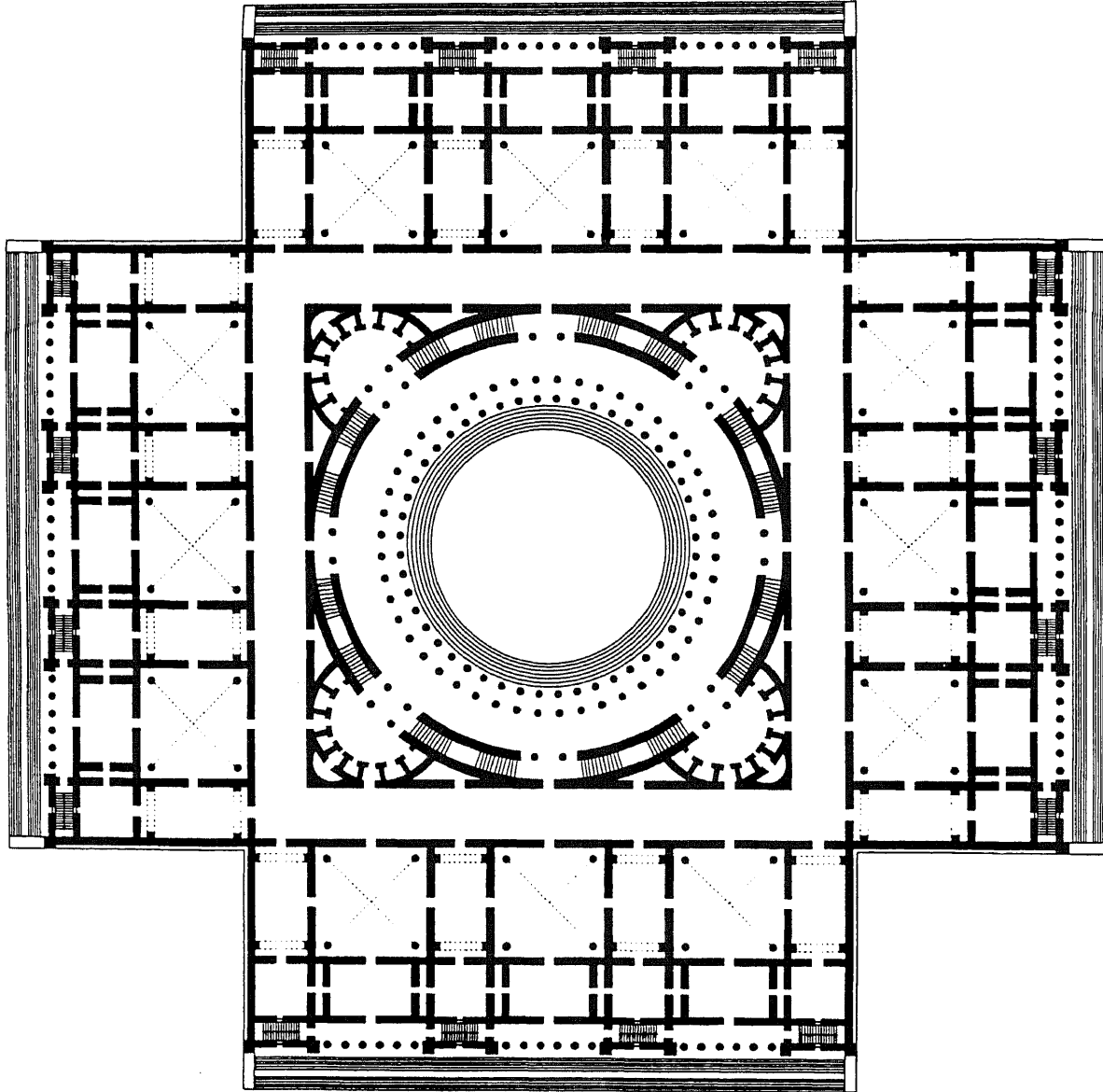
Figure 3.5: Detailed Floor Plan of Top-Down Process

# Chapter 4

# Deconstruction

Over the past 20 years Deconstruction or Deconstructivism in architecture - a contemporary way of problem solving - seems to be a controversy in itself. There is no existing definition for it and Jacques Derrida, the French originator of Deconstruction, does not give an explanation about what Deconstruction really is. He neglects the idea that it has an essential nature.

## 4.1  Philosophy

Deconstruction first appeared as a philosophical attitude, purely theoretical, then related to literature. Only through the presence of architectural metaphors in philosophy and a close contact and exchange of ideas between Derrida, Bernard Tschumi, and Peter Eisenman, Derrida, as well as Tschumi and Eisenman, now believe that there is an existing Deconstructivist architecture. Their most important project is the Parc de la Villette in the northern part of Paris, "...a kind of post-structuralist theme park...." [2] Other followers of the Deconstructivist movement, besides Tschumi and Eisenman, are architects such as Frank Gehry, Zaha Hadid, Rem Kohlhaas, etc.

While Peter Eisenman's approach is more of a psychological nature, Tschumi bases his attitude on the change of society through the dominant presence of time, expressed through communications, airlines, Stock Exchange, etc. For him, scale in the traditional sense is not needed anymore since nothing is lasting. (Figure 4.1)

Deconstruction can not be explained without talking about the Russian avant-garde movement Constructivism. Constructivism is defined here as a construction of ideas, or way of thinking, as an "...intellectual category...."

One main difference between Deconstruction and Constructivism is that the Russian movement derived from a "machine age", where the process of thinking was influenced by an environment that was dominated by mechanical engineering. Not high-tech information sources but plain machines were the base of life and thinking. Building design was seen as something that was highly dependent on a linear, deterministic logic, where function played a key role. (Figure 4.2)

Today, the structuring of one's mind is influenced by time. The use and acceptance of a building highly determine the building's individuality and how it is understood. Deconstructivism is, as well as every other movement, a product of its society. Today's society is high-technologized, in which information and science play key roles. There has been an essential change from the "machine age" to the "information age". The point in Deconstructivist architecture is not necessarily to locate the obvious, but to understand that the so called "mistakes" are not necessarily mistakes, but an indication for a deeper meaning of the building or its structure. The view of the world changed from a mechanistic to an organic, holistic, and ecological view. Also, it resulted from the radical changes in modern physics. There, the machine age was seen as a "...multitude of objects...." Here, the world is seen as a "...cosmic with interrelating objects...."

Deconstructivism has a similar approach as systems analysis in regard to a search for hidden "real realities"; in regard to a way of redefining the boundaries of the real; in opening up existing situations to go beyond what is supposed to be a term. And even the Constructivists realized already in 1930 that there will be a shift from the attitude that the universe is a machine like phenomenon towards an attitude that the universe is a "...great thought...."

Factors of the information-based society of the future, such as transport and communication, would highly influence and change peoples' attitude about life and therefore the architecture of the city and building forms, "...space is... measured by time...." [2] The Constructivists foresaw that the city would change from an "...organism..." to a conglomeration of "...linked functions making up a single organisational complex...." This new complex will be called a process, and this process will be known as "Disurbanisation...." The future form of settling will be "...not...according to the principles of crowding, but according to the principle of maximum freedom, ease and speed of communication...." The Russian architects expressed this Disurbanism through a row of "functional zones", parallel to each other with pavilions of standard elements, which can also be found in a similar way in the work of Deconstructivists, such as Bernard Tschumi.

The sociologist Mikhail Okhitovich, who was close in his opinions to the Constructivists, stated "...the revolutionary dispersal will free building construction for a technical revolution for which it is already beginning to prepare..." [2] Okhitovich also said that a building form will not be determined by "...internal requirements..." or materials, but by "...external spatial requirements and the geometrical possibilities of maximum density..." [2]. During this time the social revolution experienced also a technical revolution in the sense of changes from heavy to flexible forms. Demountable, prefabricated buildings would "...answer the needs of developed man...." (Figure 4.3) The Constructivists were convinced about a "...necessity of closeness...." Ivan Leonidov opposed this attitude by saying that the spatial future of a building is not something that is contiguous, but has a certain discontiguity. Today, architects such as Rem Kohlhaas with OMA, and his former student Zaha Hadid are examples for Deconstructivists who are using Leonidov's attitude as a base or influence for their own work and architectural expression.

Constructivism deals with "...real materials in real space...." Another movement - and additional influence of the Deconstructivist movement - that derived from Constructivism is

called Suprematism and deals with space in the fourth dimension. Space does not have "...real dimensional measure..." and prefers "...pure form..." as opposed to "... real material...." Basic forms such as circle, line, and rectangle as main geometrical shapes, together with planes and figures without a human scale, are interconnecting in a way that could serve as a "...real spatial relationship...." (Figure 4.4)

Ivan Leonidov, El Lissitzky, and Iakov Chernikhov, all architects who tried to find a synthesis between Constructivism and Suprematism, became the first Deconstructionists. In their work they tried to express the conflict of having, on one side, the "building" as something that lasts, something physical, and, on the other hand, the "time" as something that brings an end to existence. Whereas Lissitzky took a middle position between Constructivism and Suprematism and expressed his attitude in painting as well as in architecture, Malevich and followers tried to show architecture in painting. Both ways of expression show other parallels to today's Deconstructivism such as the work of Zoe Zenghelis for example. (Figures 4.5-8)

Deconstruction does not claim to be a style or movement, but a "...cultural phenomenon..." that includes philosophy as well as methodology and architecture. It bases its ideas mainly on Jacques Derrida, a French philosopher, and Constructivism, the Russian avant-garde movement. Derrida says that "...Deconstruction is conceptual structure... and is first and foremost a suspicion directed against just that kind of thinking - 'what is...?', 'what is the essence of...?' and so on...." [2] Deconstruction mainly distrusts the obvious and tries to find the meaning beyond. It questions "...apparent meaning and form...." It is concerned with "...binary structures of meaning..." such as mind and body, theory and practice, male and female, speech and writing, etc. These terms are usually used together in a hierarchical way, one is the dominant, the other the weak. Deconstruction then tries to show that the weak one has an "...equal claim..." to be treated like the stronger one. In architecture the binary structure would consist of opposites such as abstraction and figuration, structure

and decoration, figure and ground, form and function. And the Deconstructivist attitude in architecture tries to explore a middle ground where opposites might meet in order to bring to the surface the repressed of Classical and Modern architecture. The intention would be to achieve a new architecture.

Deconstruction in architecture is not a method, there are no specific ways or steps to follow in order to find a Deconstructivist solution for a problem. It is an idea with the goal to make the impossible possible, to open up the obvious and show the restricted. Or as Peter Eisenman explains, "...to make the repressed structural...." [2] No specific meaning or hierarchy within architecture, is the goal of Deconstruction.

## 4.2   Problem Solving Processes

There is no specifically proclaimed methodology or model of design process in Deconstructivism that can be identified. However, in some architects' work it is possible to find similarities within the way they approach and arrive to design solutions. There exists a repetitive figure of bands and symbols, that gives the drawings some kind of direction. A layer system of points, lines, and surfaces - which reminds of Klee and Kandinsky - is found within Deconstructivist architecture as well as issues usually found in Modernism, such as rectangular boxes. In Rem Kohlhaas' work for example an architectural language is created that reminds of Mies van der Rohe, Malevich, or Leonidov - all of them Modernists. Only Kohlhaas' way of combining things is different. He uses layers "...of opposed systems..." as it is exemplified in the Parc de la Villette. (Figure 4.9)

The first layer shows several bands of different activities or planting, symbolized by little elements. The second layer includes existing buildings and bigger elements, followed by a layer of circulation and connecting layers. There is no existing overall figure that connects these different layers. A deconstructivist scheme without orientation is created.

Main characteristics that appear in the work of Deconstructivist architects are items like

grids, missing walls, cut planes, uncolored surfaces (Figure 4.10-14).

Peter Eisenman is one of the main figures in the architecture of Deconstruction. For him the human being "...is no longer viewed as an originating agent..." and "...objects are seen as ideas independent of man...." [2] These objects can be built in a non-traditional scale and abstract. The elements and processes that he uses such as grids, decentring, and transformations, are helping him to achieve an architecture that expresses "...partness and instability...." Other criteria are L-shapes, excavation (an orientation to the past), scaling (an non-human proportion), and a topological geometry (in difference to the Euclidean geometry).

Examples of Peter Eisenman's work include:

- Houses I to E leven Odd

- the Social Housing project in Berlin

- Cannaregio, Venice

- Parc de la Villette (with Derrida)

- The Wexner Center for the Visual Arts in Ohio

- The Bio-Center in Frankfurt-am-Main

- The Guardiola House in Santa Maria del Mar

- The Carnegie - Mellon Research Institute

- Housing project in Netherlands

The Bio-Center in Frankfurt-am-Main as well as the Guardiola House in Santa Maria del Mar are two examples in which the emphasis of the conceptual idea and its realization become very obvious.

The Guardiola House points out the "...meaning of place, and how it has been affected by a changing understanding of the world...." Interweaving L - shapes, which penetrate three planes together with two steel grids that locate the structure, are means to express the questioning of the traditional idea of place.

The Bio-Center is an addition to the J. W. Goethe University which locates research laboratories and support spaces. Because of the function as a Bio - Center the possibility occurred of using biology as a theme to represent architecture. The system of the DNA processes was translated into architecture. The use of a fractal process questioned the traditional "...Classical Euclidean geometry...." [2] The similarities between both processes allowed to make a connection between them - and therefore between biology and architecture. The production of the DNA is mainly characterized through three main actions, replication, transcription, and translation. By transforming these phenomena into architectural forms, together with the use of the biologists' color code for the DNA, a form was created.

Another example for current Deconstructivism is, as mentioned before, the work of Bernard Tschumi. He uses an architectural language that is extremely constructive in order to make opposing statements, showing non-structure, and questioning the conventional way of building. He also uses a way of combining and permuting to produce different kinds of forms, parallel to Chernikhov's architecture. Similar to the approach of Disurbanism, point, line, and plane are main issues of Tschumi's work to organize different dimensions such as the Parc de la Villette. In the architecture of Constructivism the projects are supposed to be "...spatially and organisationally independent...free to find their own optimal form...." Similar to that goal, Tschumi's Tokyo National Theatre lines up a specific amount of activities like a ribbon and each user can choose his or her own individual way. The following is a list of items and processes for form selection in Deconstruction:

Items

- color

- lines

- circles

- planes

- grids

- points

- surfaces

- rectangular shapes/boxes

- layers

- repetitive figures

- missing walls

- cut planes

- uncolored surfaces

- L-shapes

- topological geometry

Processes

- scaling

- transformation

- translation

- replication

- transcription

- decentring

- excavation

- fractal process

- symbolism

## 4.3 Examples

Although Deconstructivist architects do not want to follow any specific model of design, there are built examples that were created by using a certain design method. Peter Eisenman's Bio-Center in Frankfurt-am-Main exemplifies a project where a knowledge-based system with a fractal process as one of the basic elements of the design system has been used. With the help of the computer, certain basic forms, and the application of specific generating rules new architectural forms have been created.

The program required a design solution for a Biological Research Facility for the University of Frankfurt, Germany, with office spaces, lecture and seminar rooms, and laboratories as well as the possibility of expansions. Eisenman finds similarities between fractal geometry, arabesque ornamentation, and DNA/RNA biological processes. They are generative processes that can be easily used for a design "...of an interdisciplinary biology center...." It also enables to produce equivalent future expansions.

The fractal process works with a "base" - an original state of some shape - and one or multiple "generators" - a rule or requirement. This rule is usually related to an existing program of a specific design. It is possible to replace the base and the generator (Figure 4.24).

In some cases the generator can replace all segments of the base, in other situations the generator can be changed at execution time. The designer can switch from earlier to later

design solutions, and as long as there are no requirements within the process the choices are widely spread. Usually the designer decides on the desirable amount of steps that are to be taken in connection with the existing programmatic requirements and transmits the concept into a 3-D building parti (Figures 4.25 & 4.26).

In the case of the Bio-Center design the fractal process and the earlier mentioned remaining processes such as arabesque and transition process - in connection with the existing programmatic requirements - have been used to create the final project form (Figures 4.27-30).

The fractal process itself was mainly based on the basic processes of the DNA to produce protein: replication, transcription, and translation. The forms which have been used for the architectural design solution are related to the geometric figures biologists use to explain these processes of this biological system as well as the chosen colors. Transition as well as arabesque process were more specifically described in a paper about Computation, Representation, and Topdown systems. Figures 4.31-34 shows the combination of DNA and fractal processes and the final building form of the Bio-Center. In this particular case the motivation for choosing certain systemized processes have been functional aspects. In other projects of Peter Eisenman the criteria for form selection seem to be of historical nature and site related (the Wexner Center), or purely conceptual justified (House E leven Odd and the Guardiola House). In any case the motivation for all of Eisenman's buildings is to create non-traditional buildings, only the reasons for it vary.
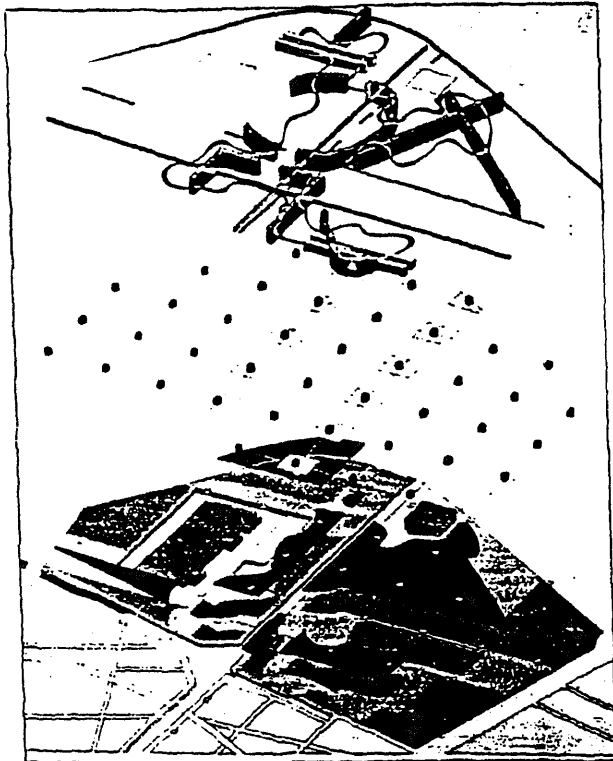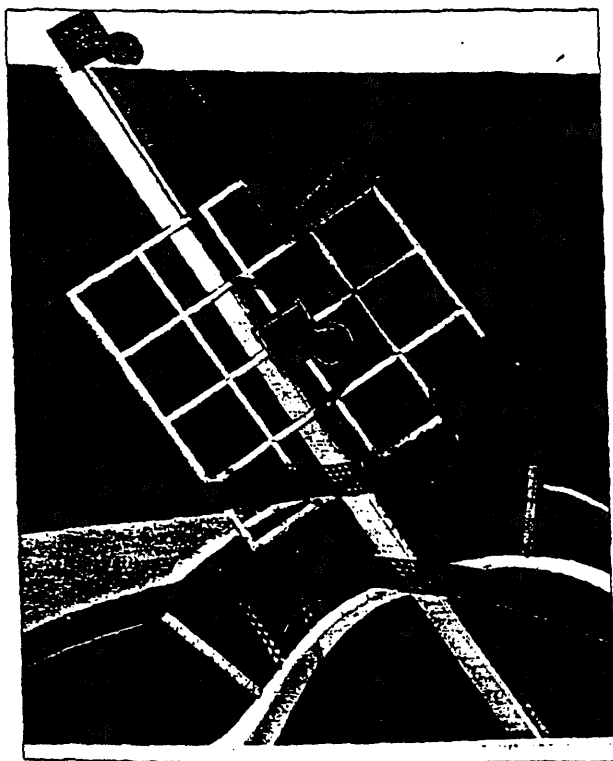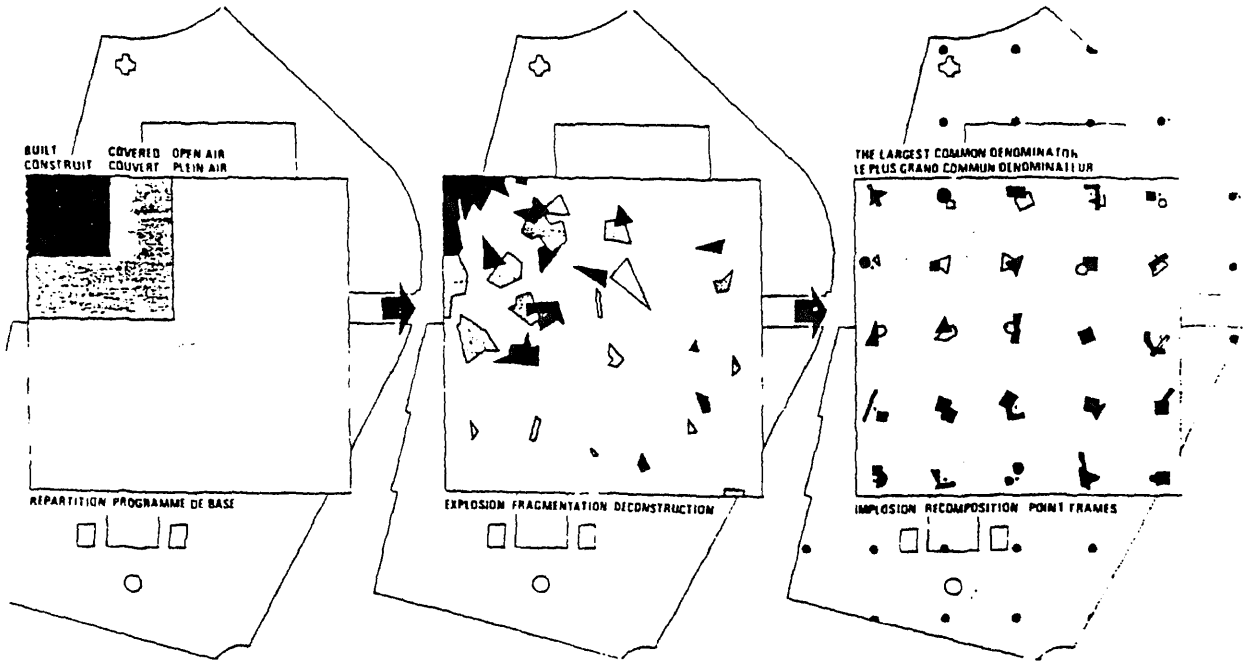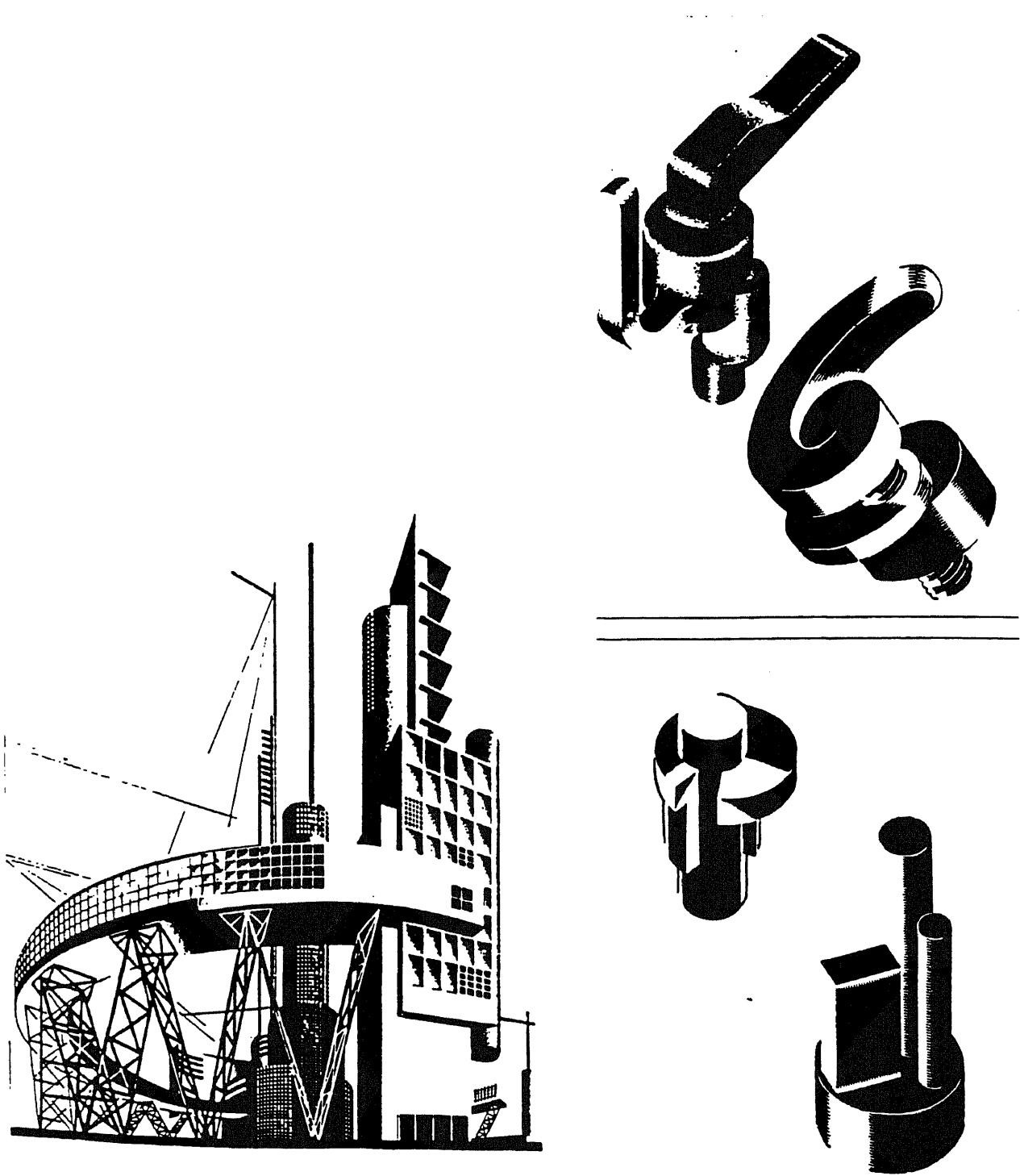
Figure 4.1: Parc de la Villette.

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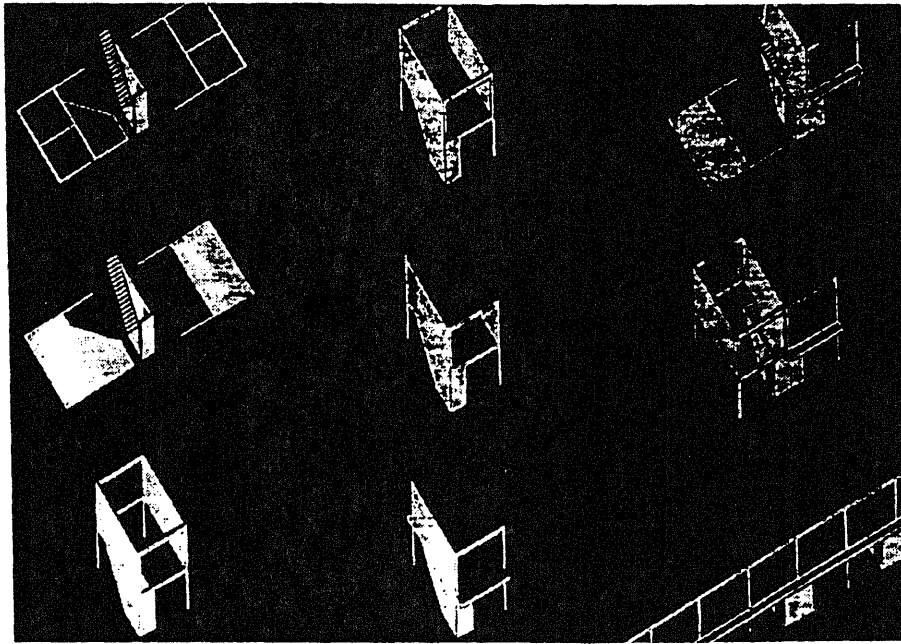Figure 4.2: Constructivism; Embracing, and Mounting.

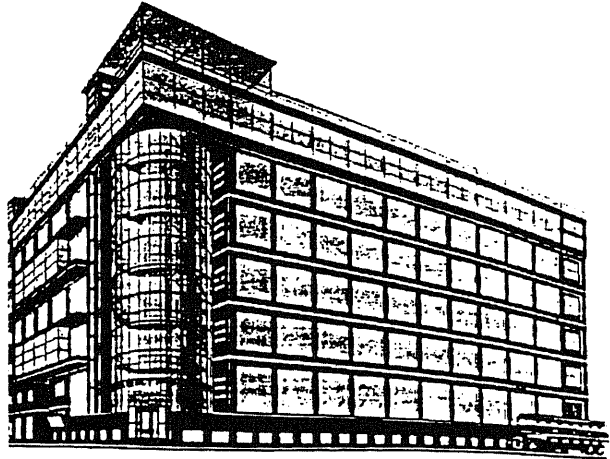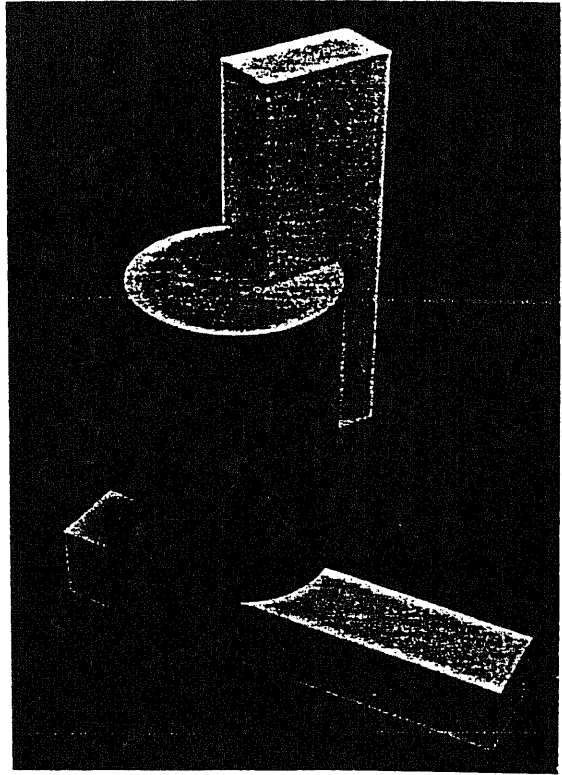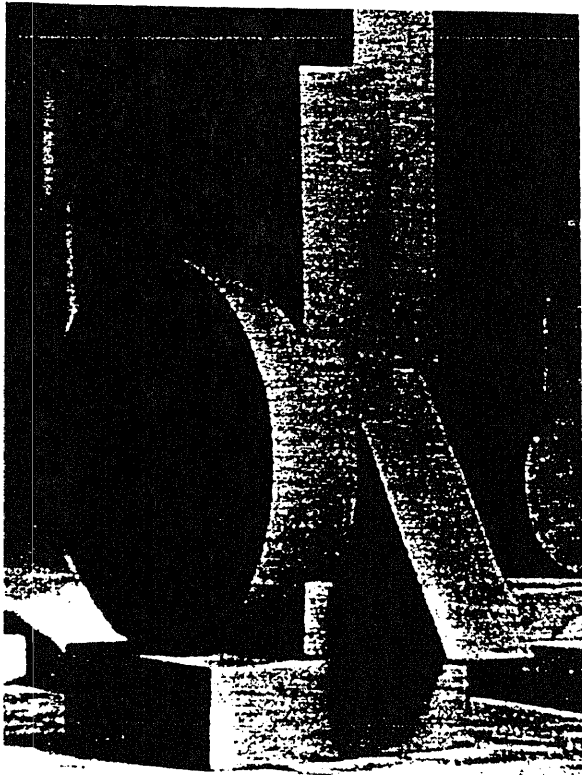Figure 4.3: Prefabricated Houses in Constructivism by Ginzburg & Barshch, 1929-30.
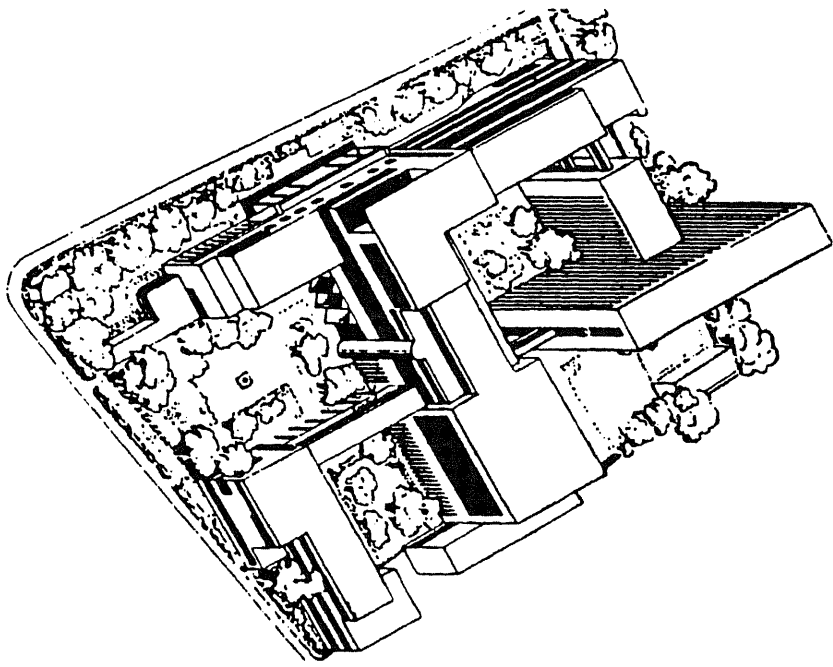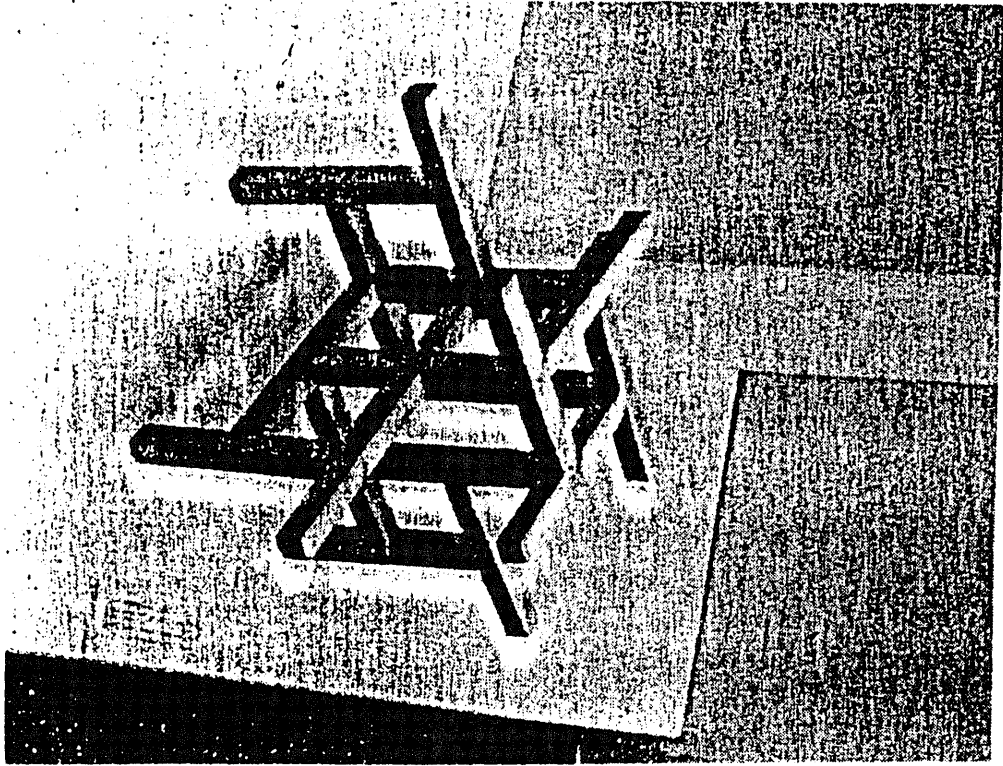
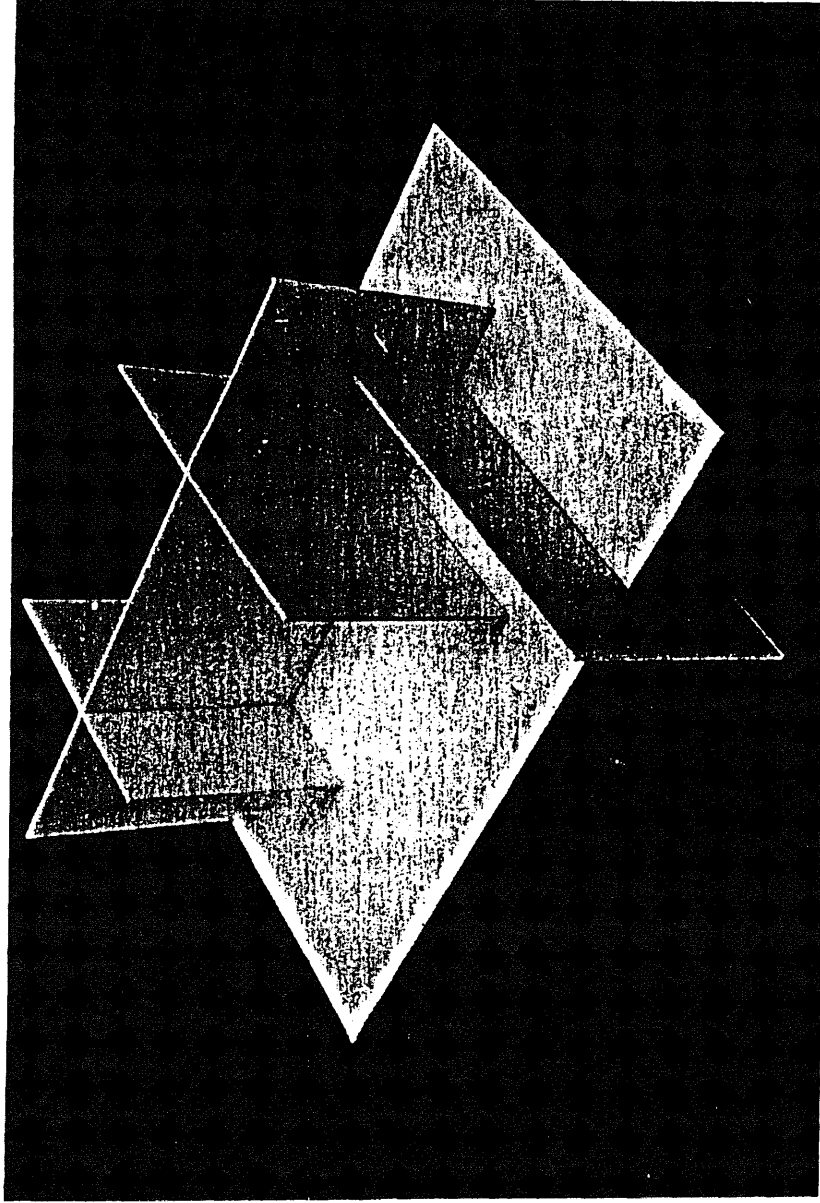Figure 4.4: Basic Shapes in Constructivism.
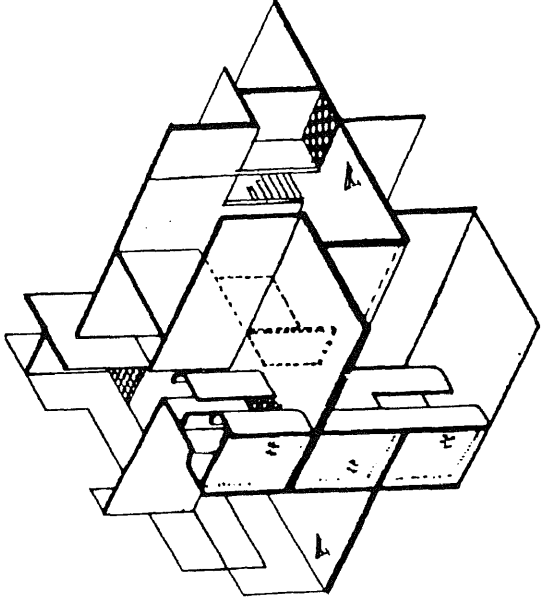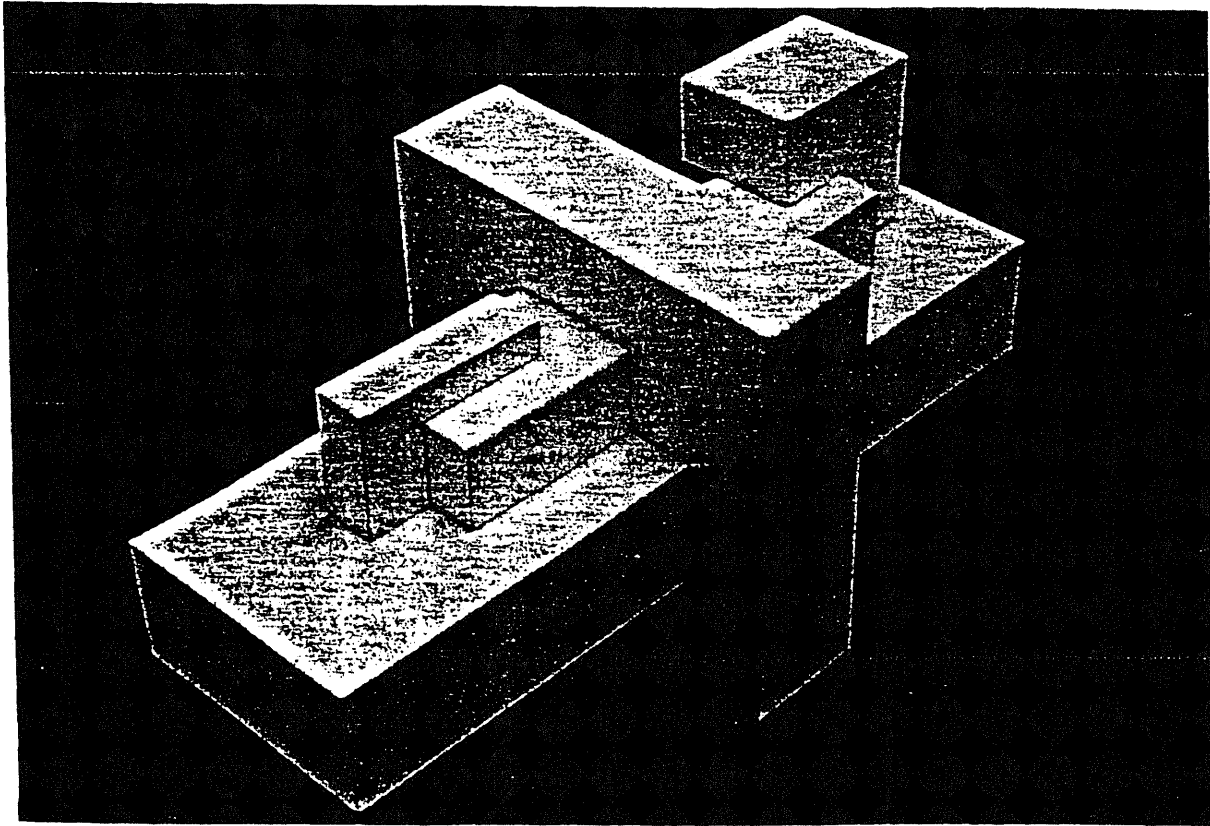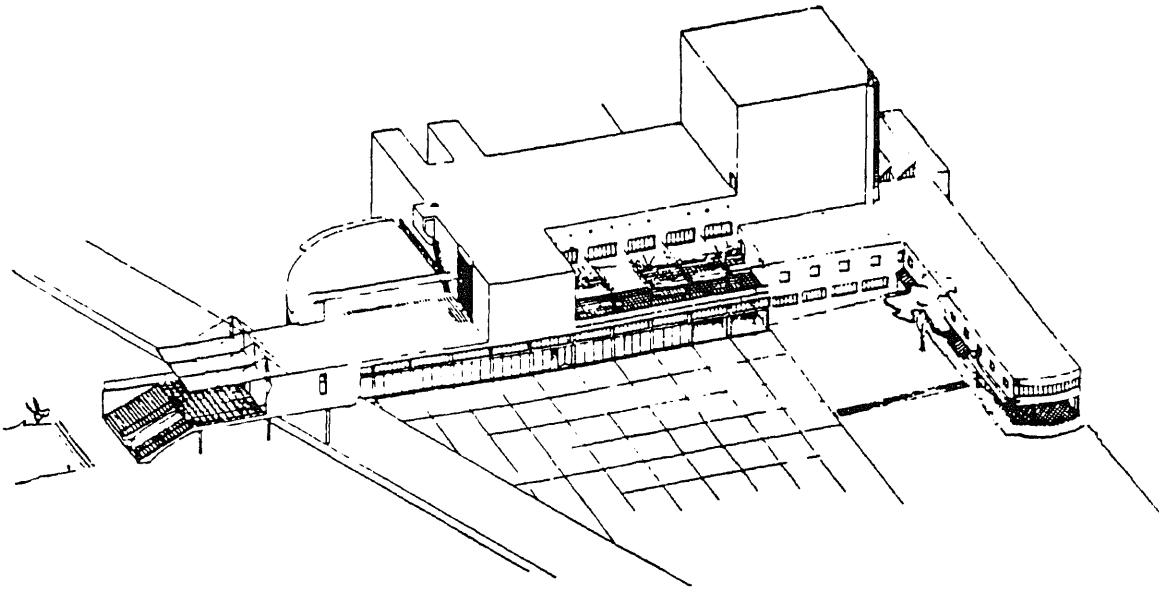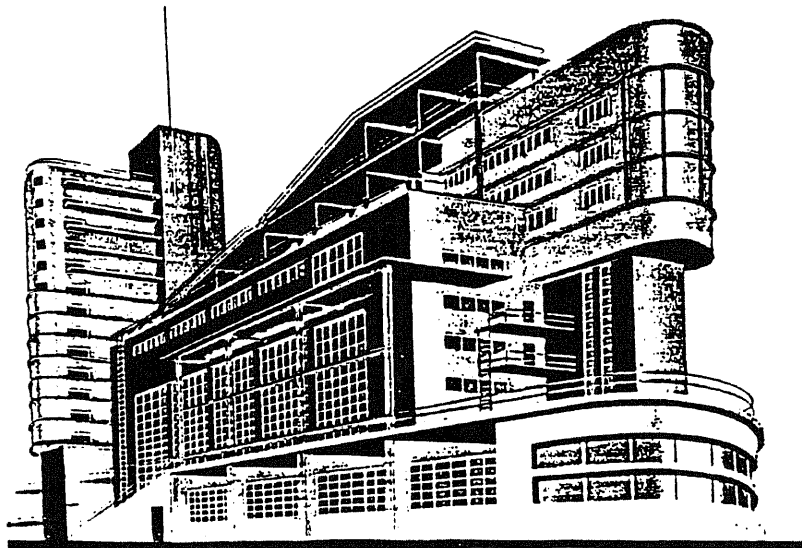
Figure 4.5: Rectilinear Elements
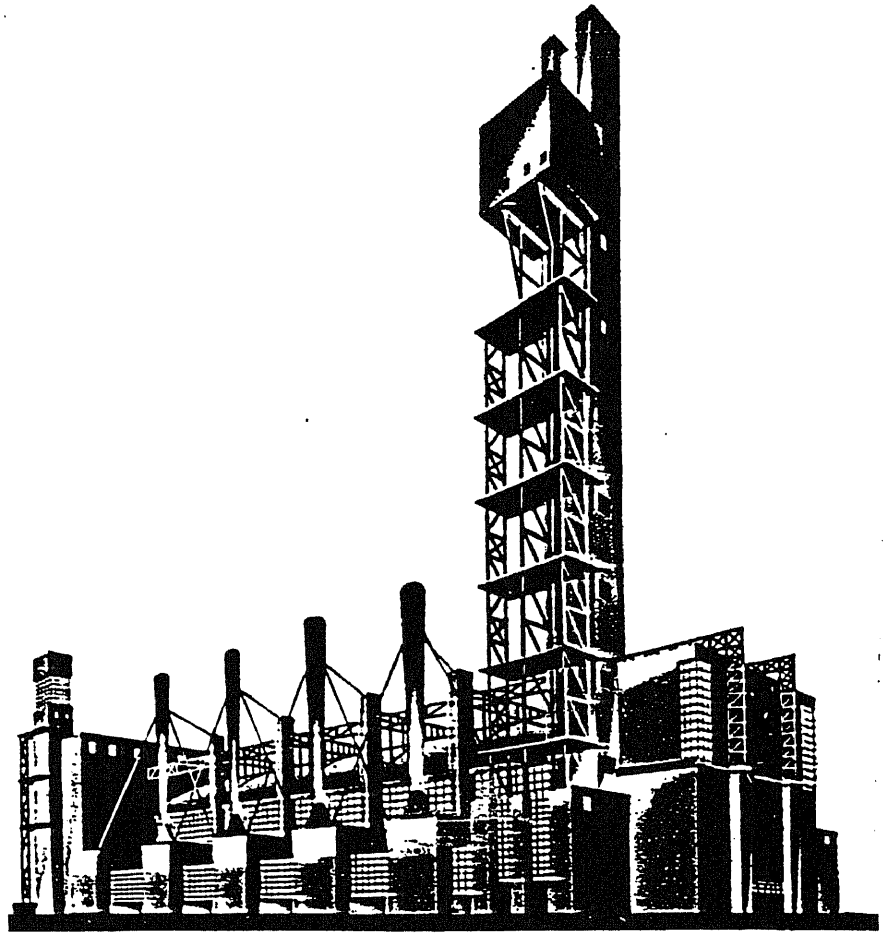
Figure 4.6: Planes

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Figure 4.7: Volumes

Figure 4.8: Combinations of Elements
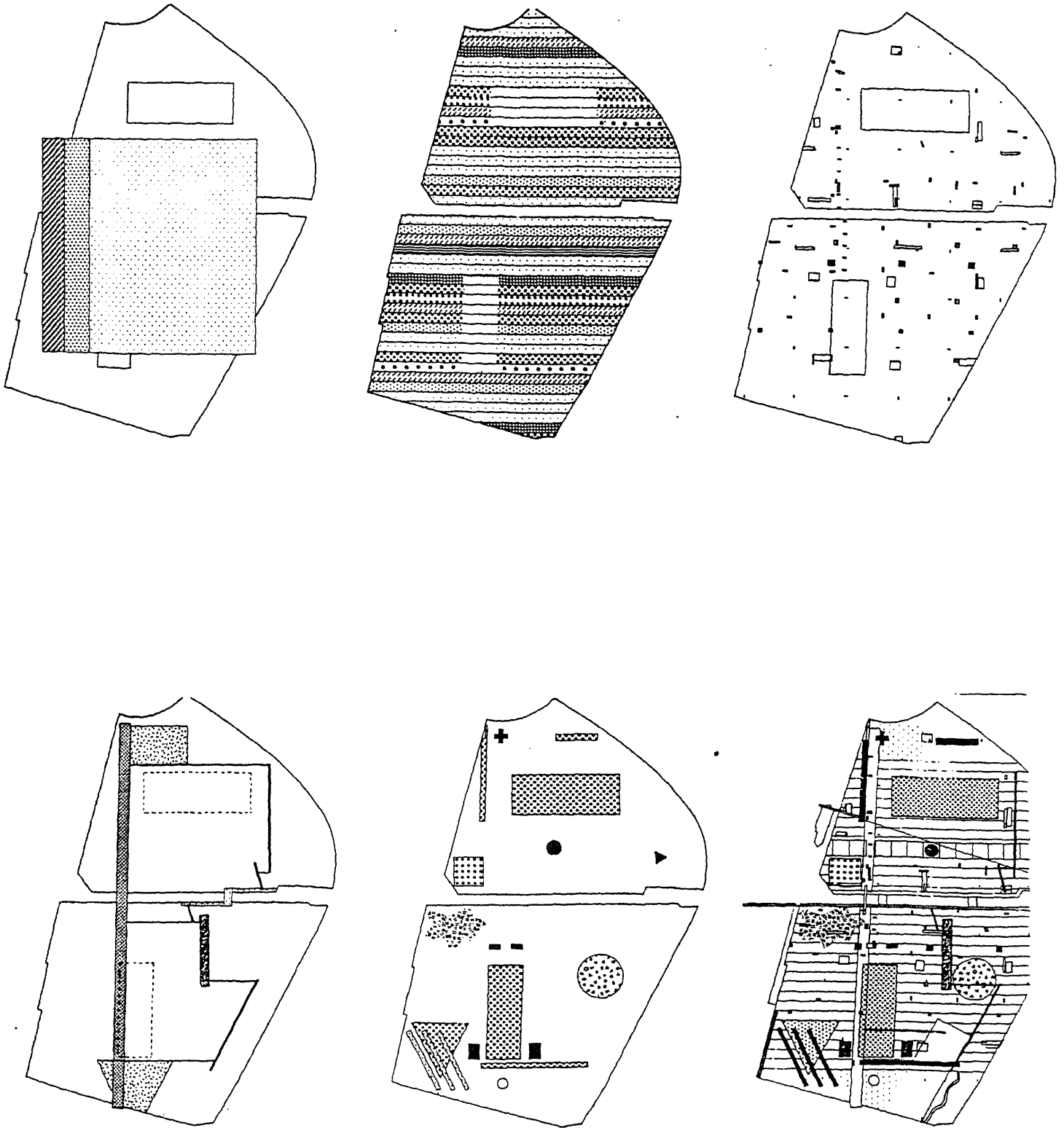
Figure 4.9: Layering of Elements, Parc de la Villette, OMA, 1982-83.
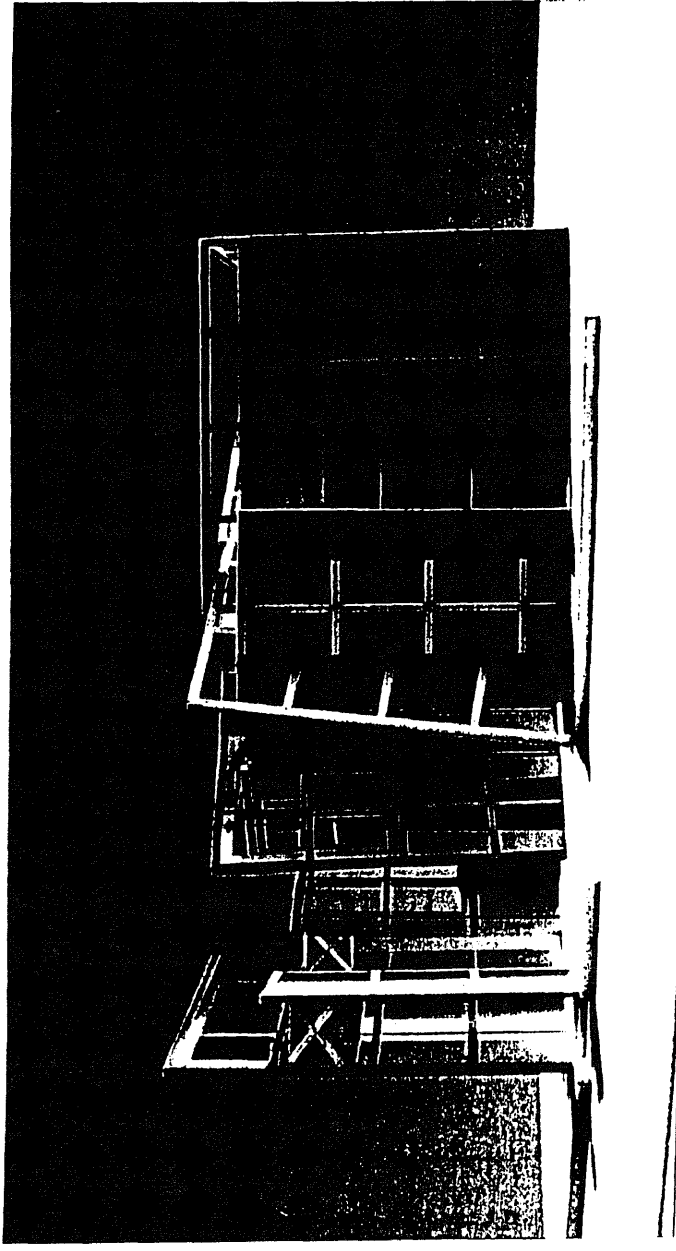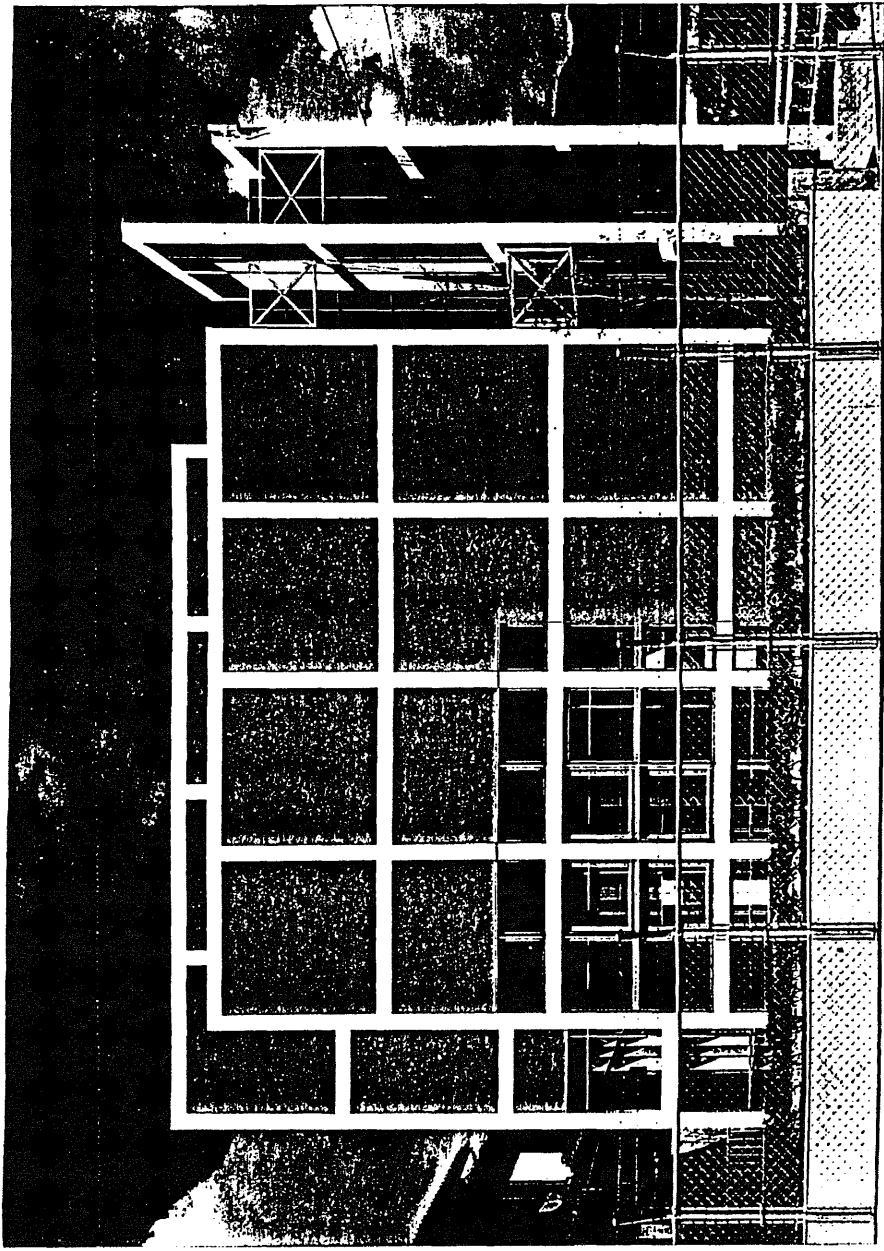
Figure 4.10: Mizoe I and II, Hiromi Fujii

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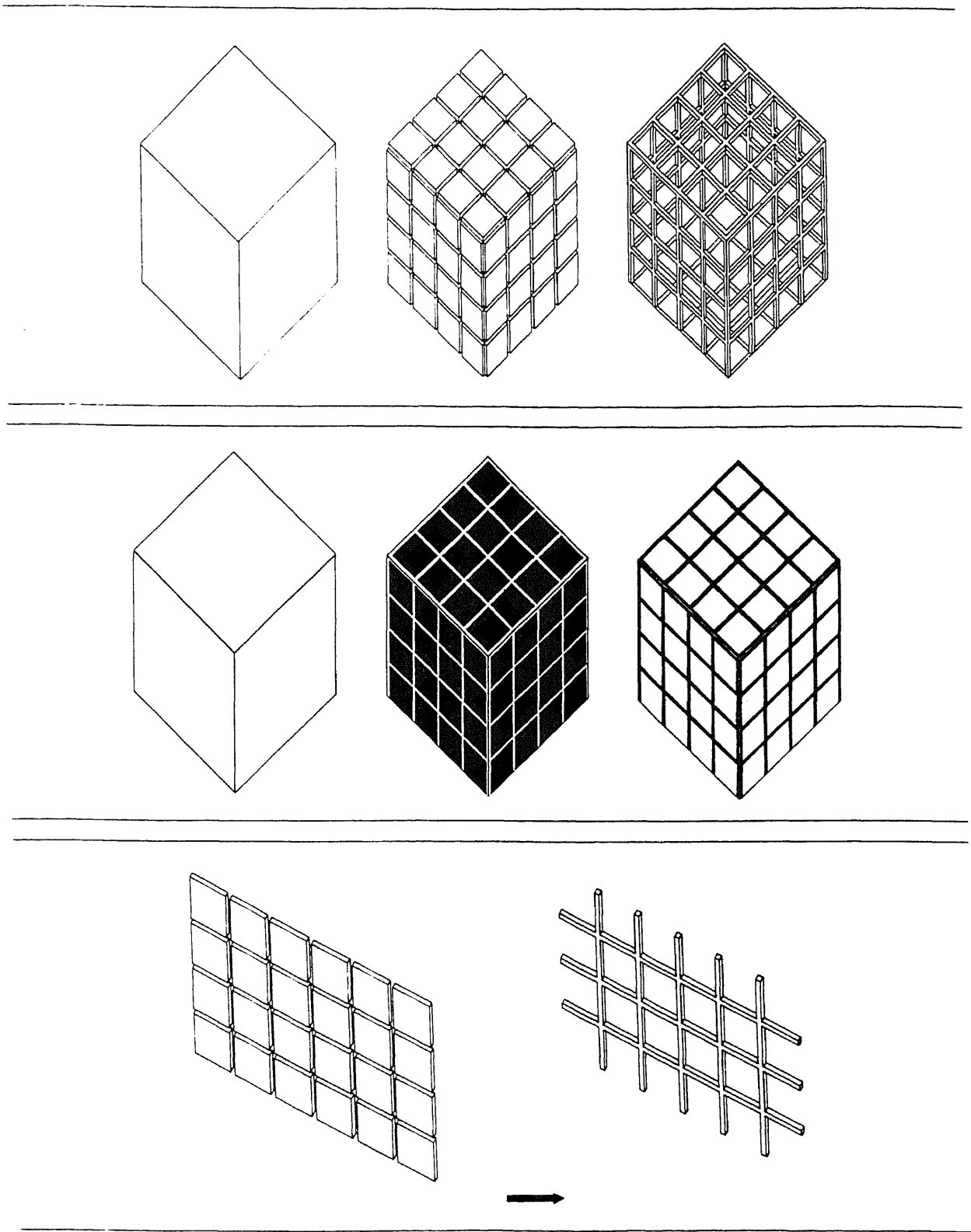
Figure 4.11: Solid Mass, Result, and Gridded Frame

Figure 4.12: Walls

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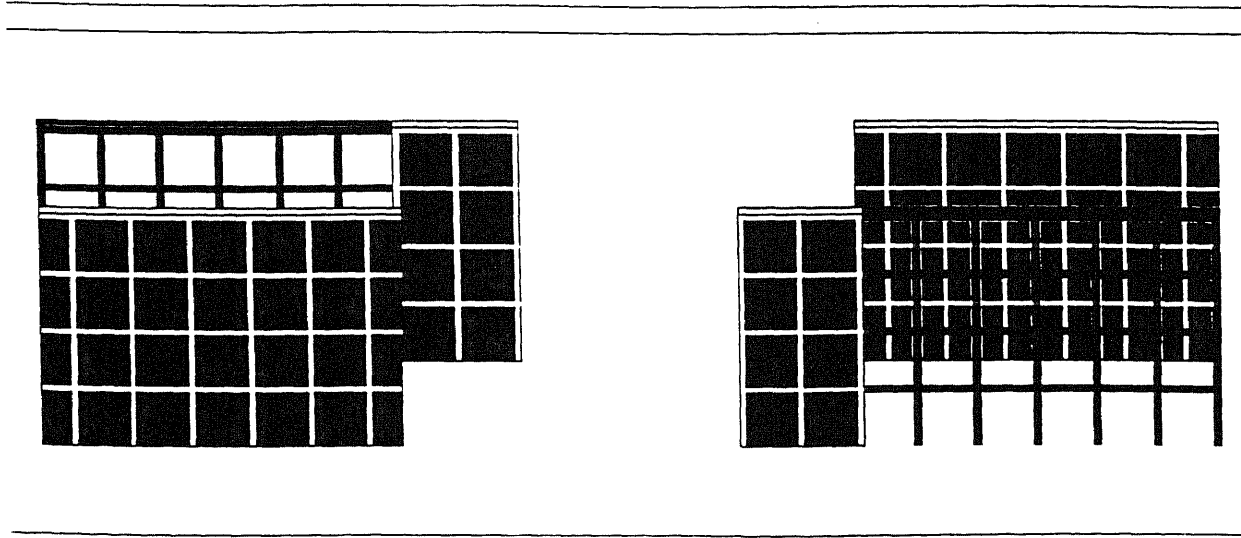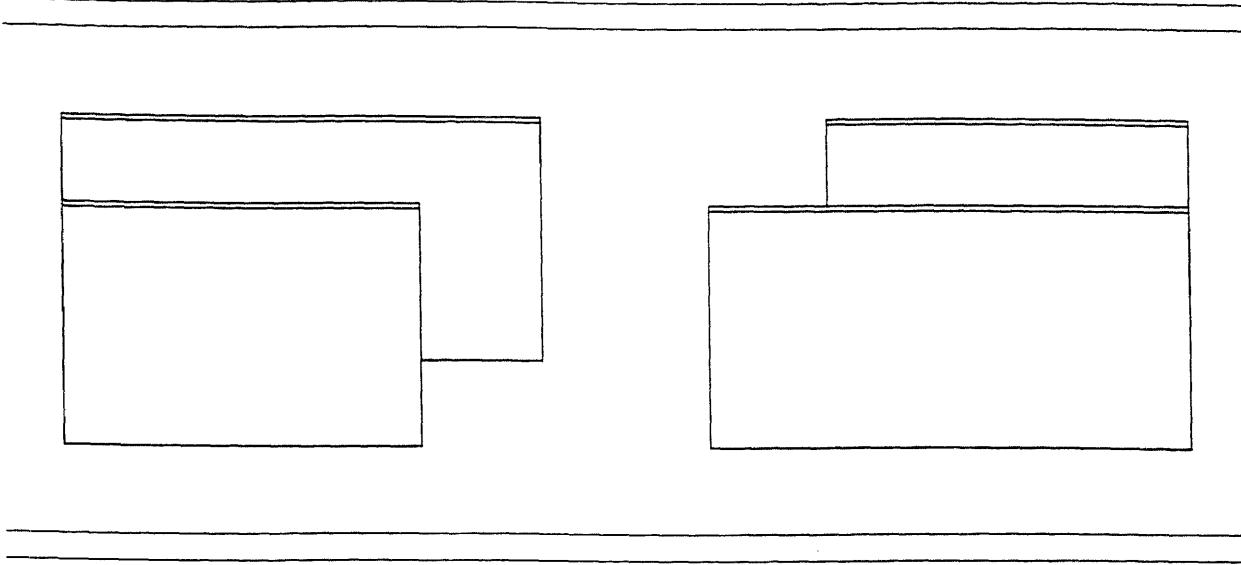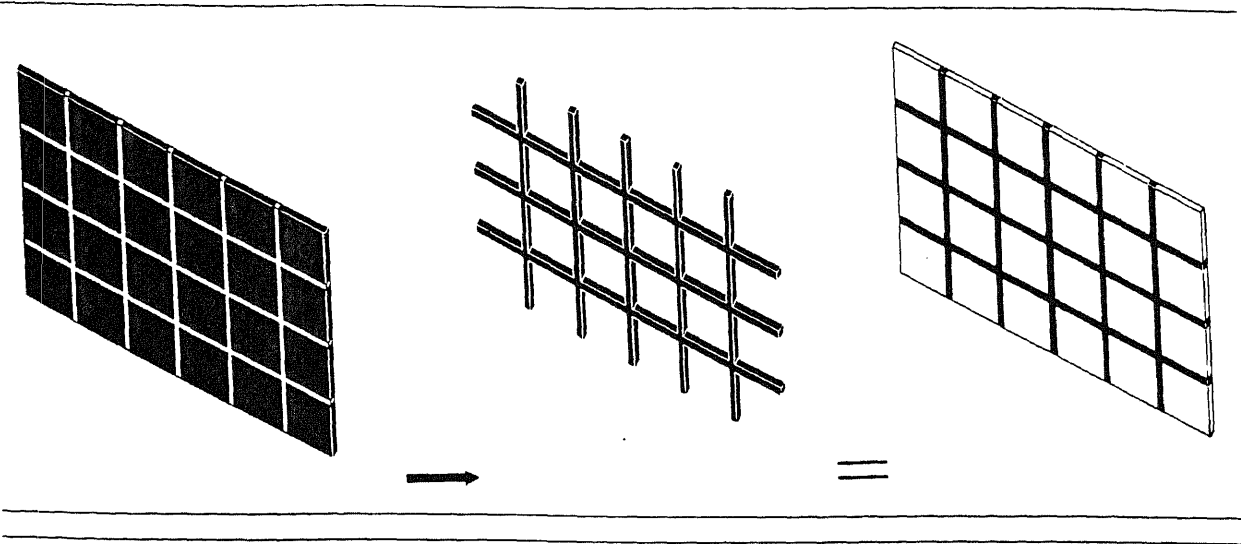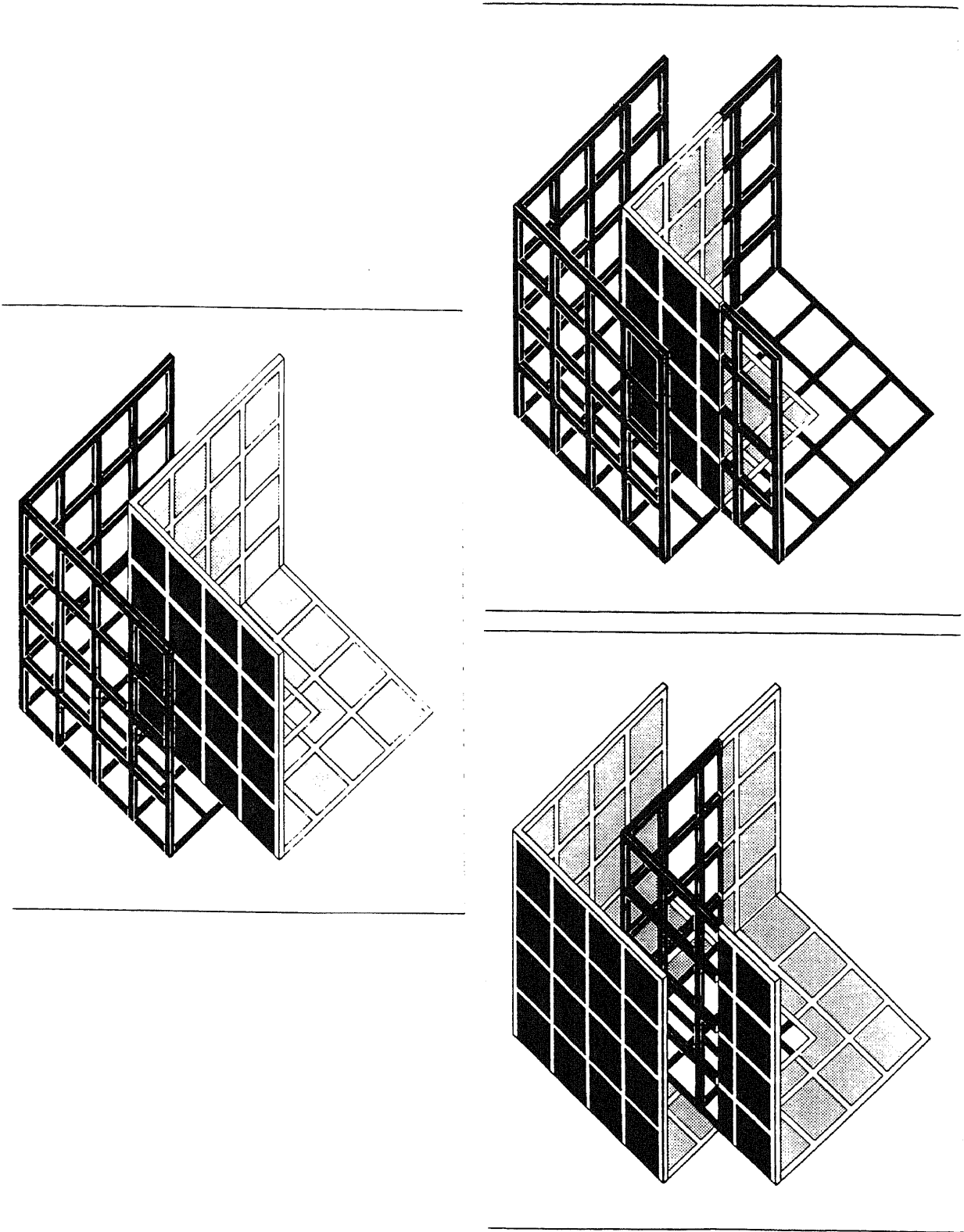
Figure 4.13: Multi-Layered Spaces
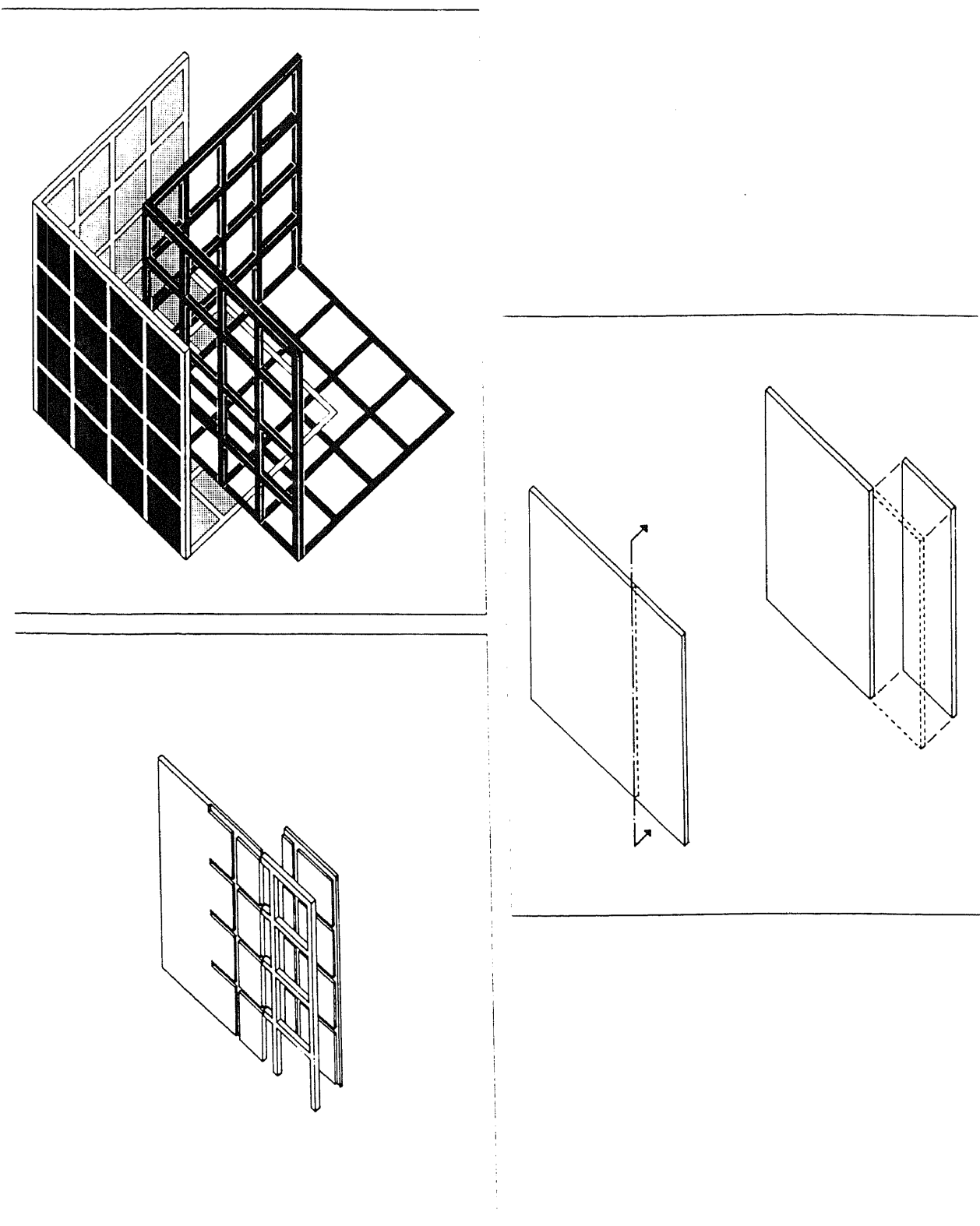
Figure 4.14: Deficiency and Displacement
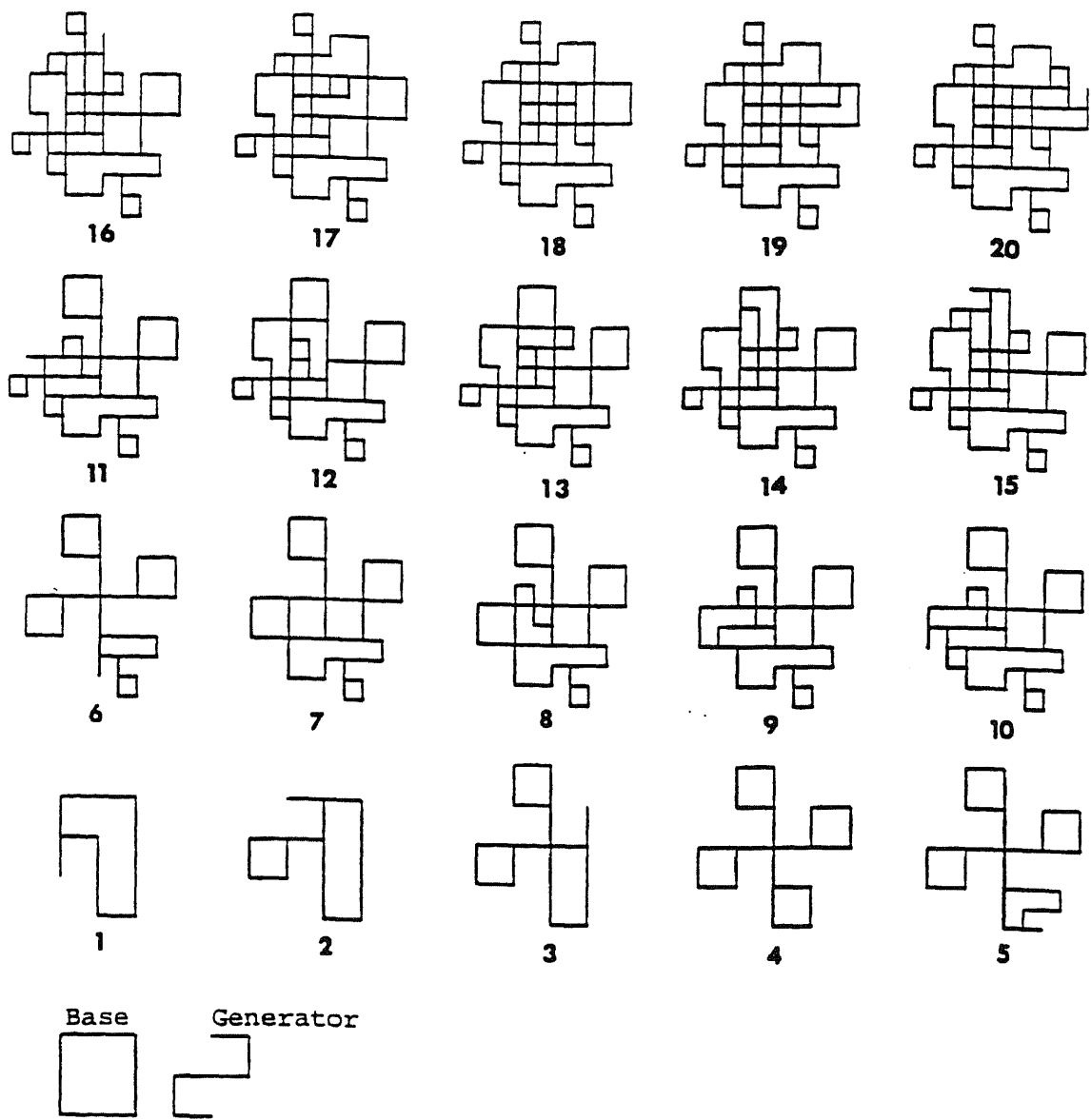
Figure 4.15: The Fractal Process
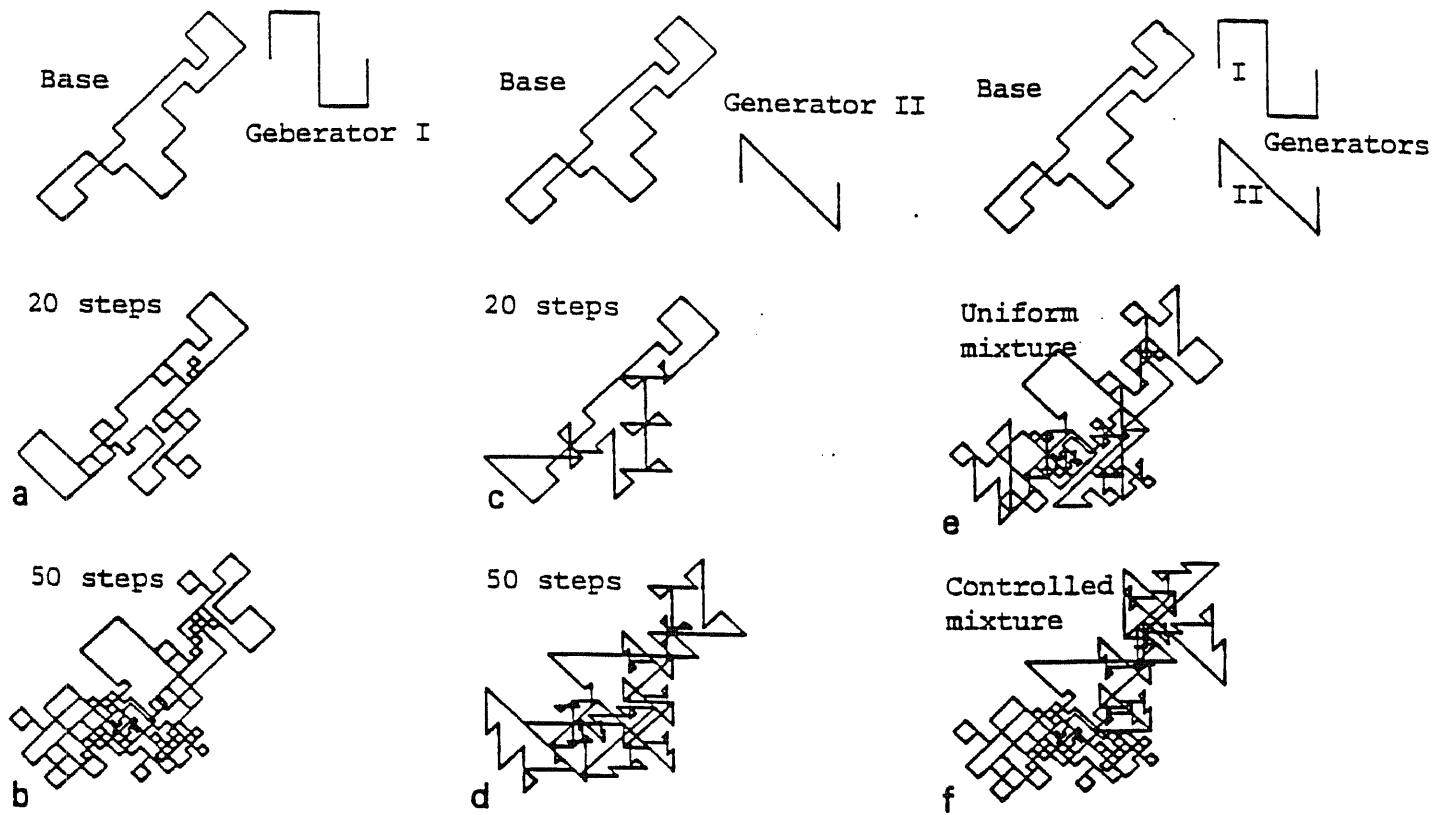
Figure 4.16: Applying two Generators, One at a Time & Mixed

Base &
Generator
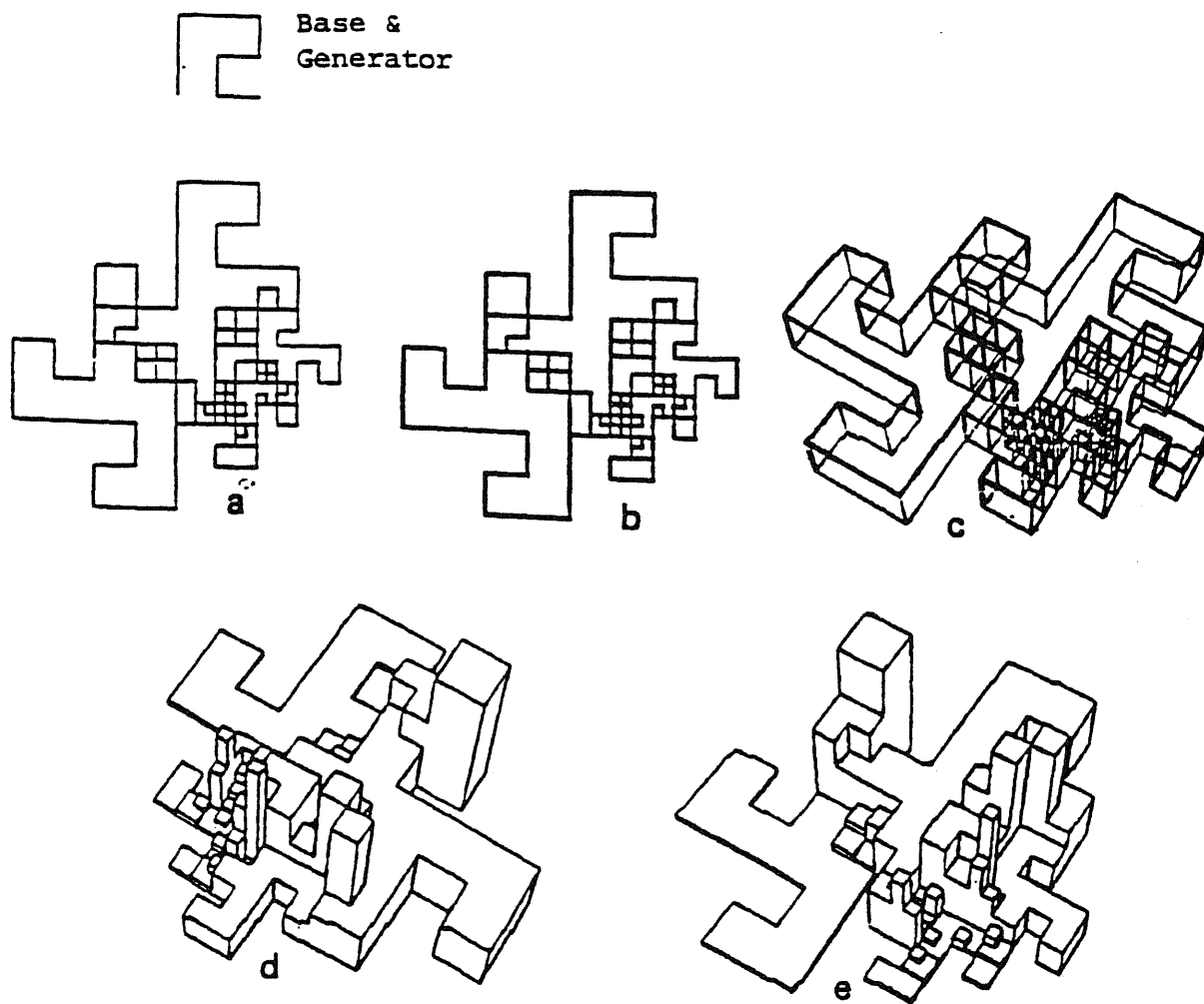
Figure 4.17: Fractal Designs in two and three Dimensions

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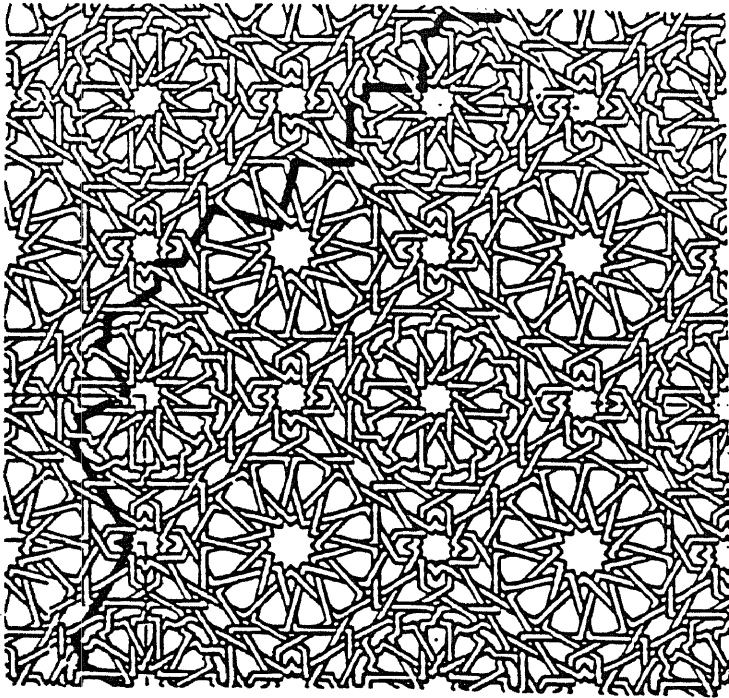
A typical arabesque pattern.

(a) Interlacing.   (b) Relacing.
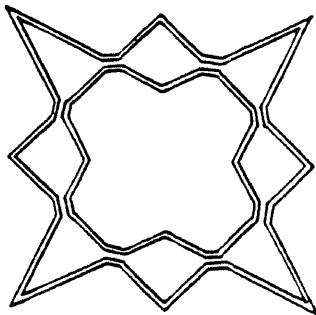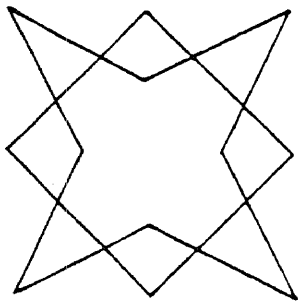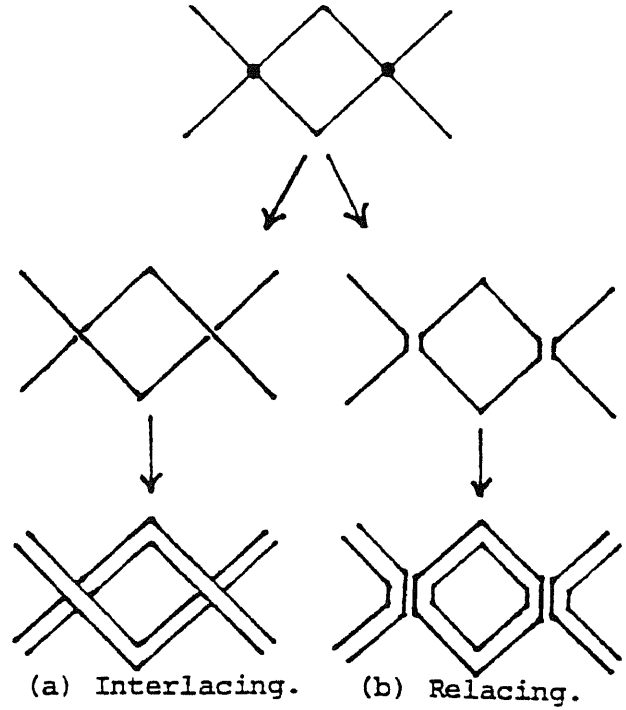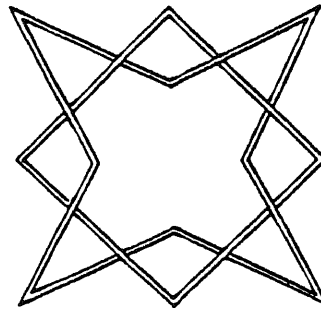
(a) Relacing only.   (b) Interlacing only.   (c) Relacing & Interlacing.
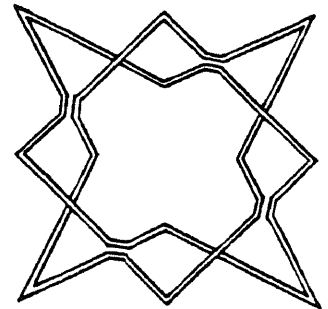
Figure 4.18: From Top Clock wise: Arabesque Pattern, Interlacing and Relacing, Relacing and Interlacing, Interlacing Only, Relacing Only, Generators
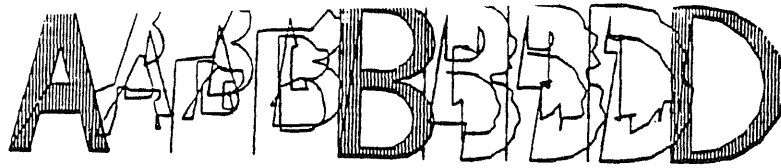
(a) From A to B to D.
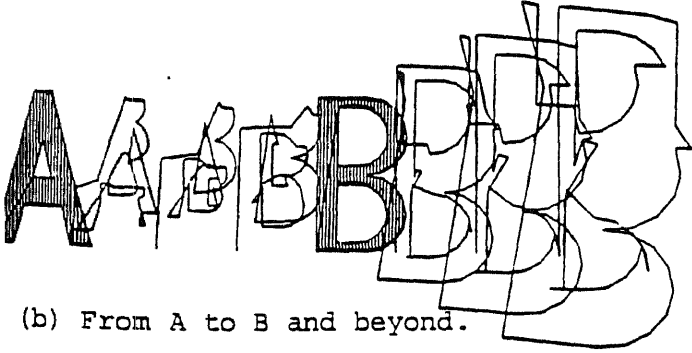
(b) From A to B and beyond.
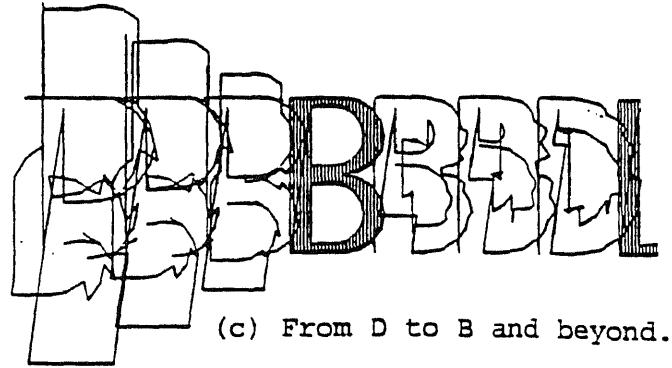
(c) From D to B and beyond.

Figure 4.19: Transitions
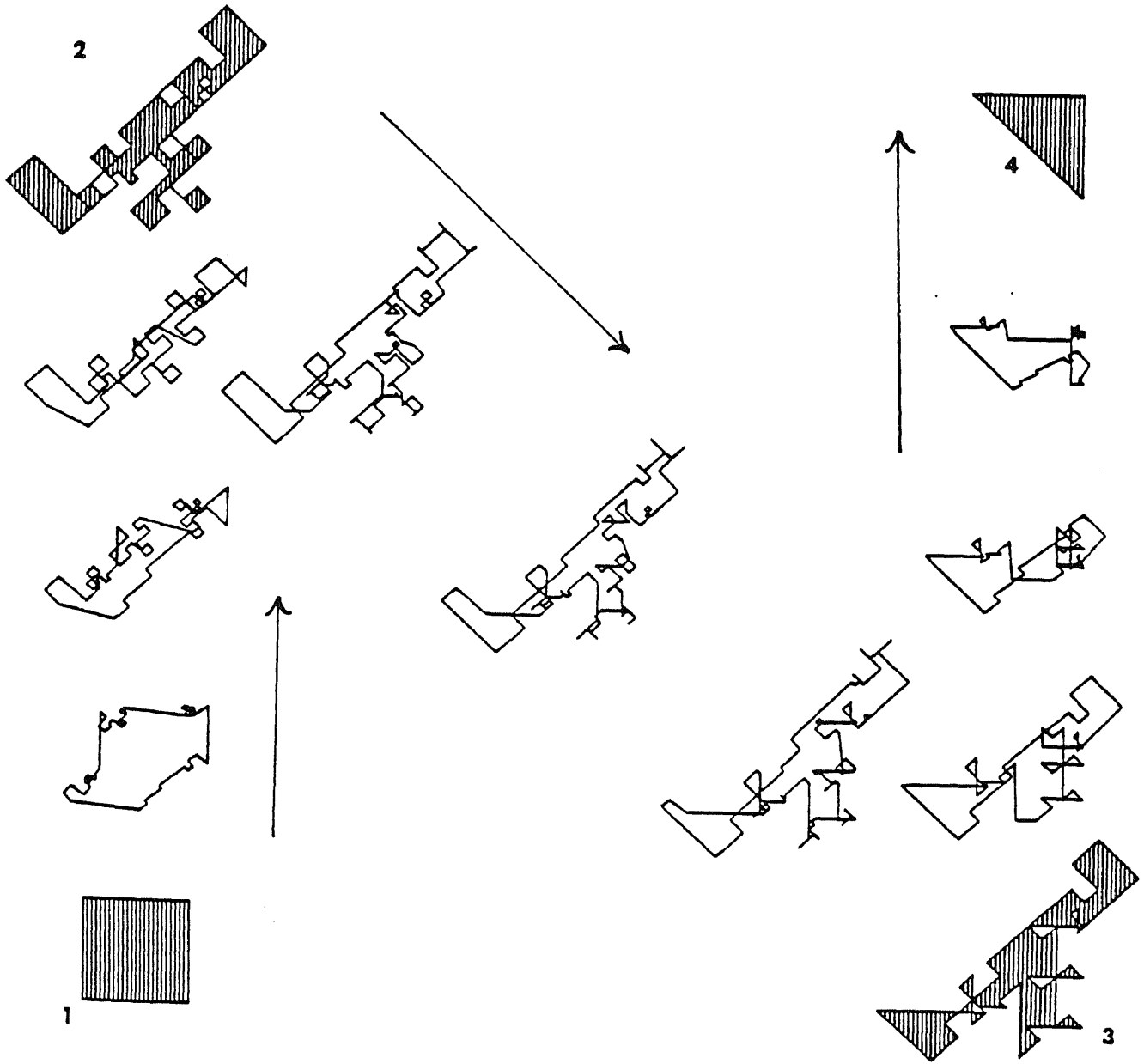
Figure 4.20: From Square 1 to fractal 2 to fractal 3 to triangle 4
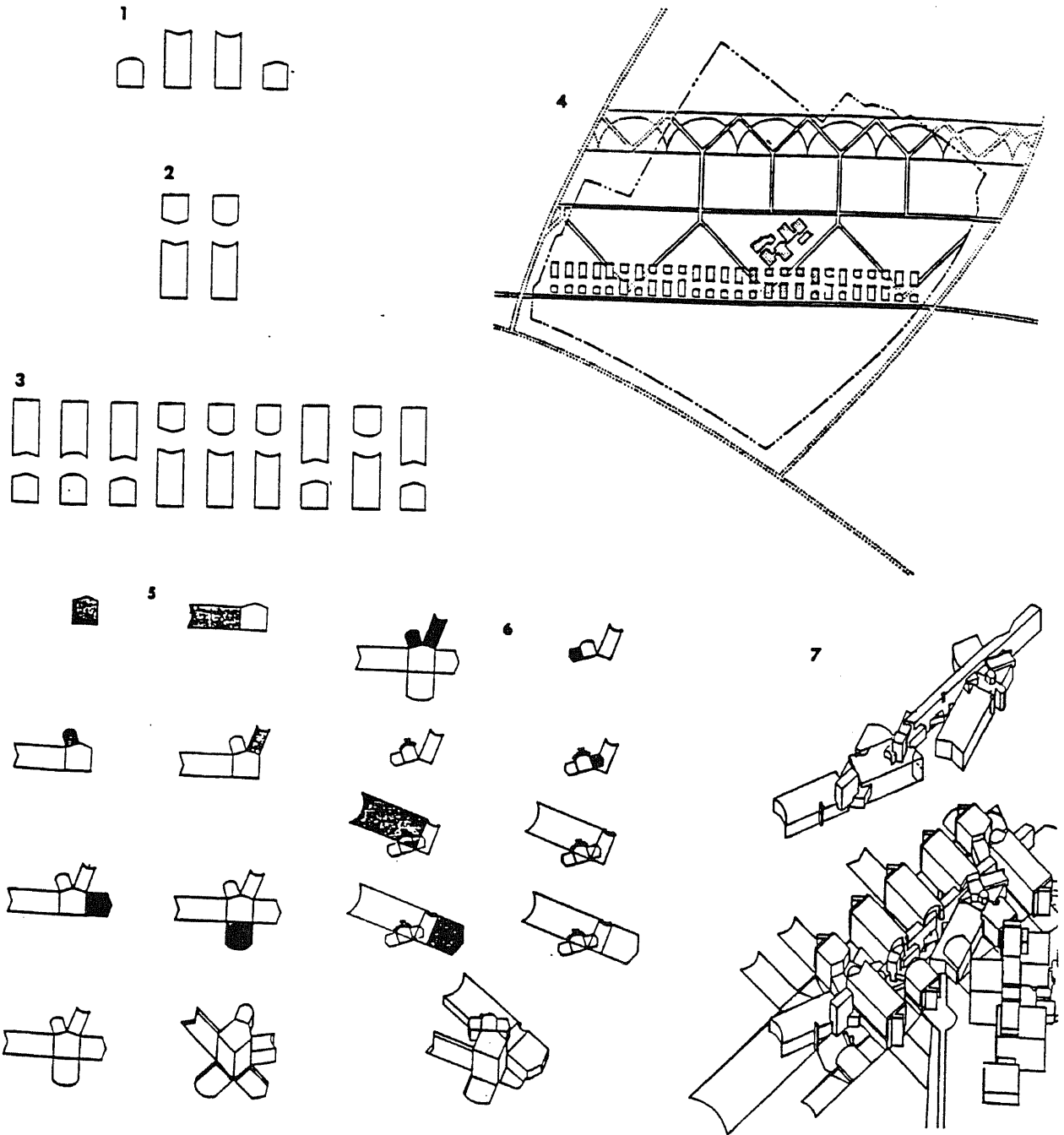
Figure 4.21: Fractal and DNA/RNA based design explorations
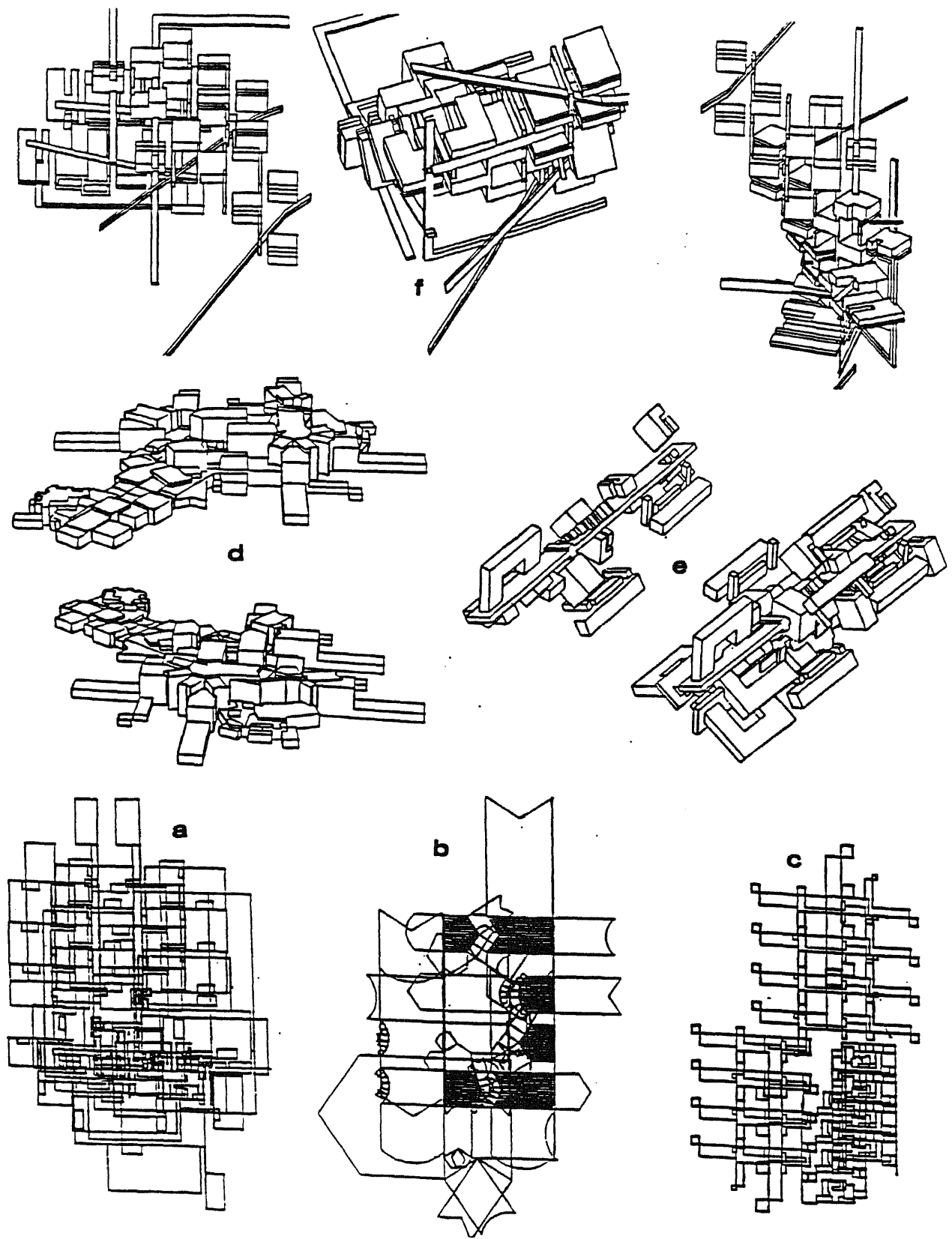
Figure 4.22: Highlights of the final design and how it derived through fractals & DNA
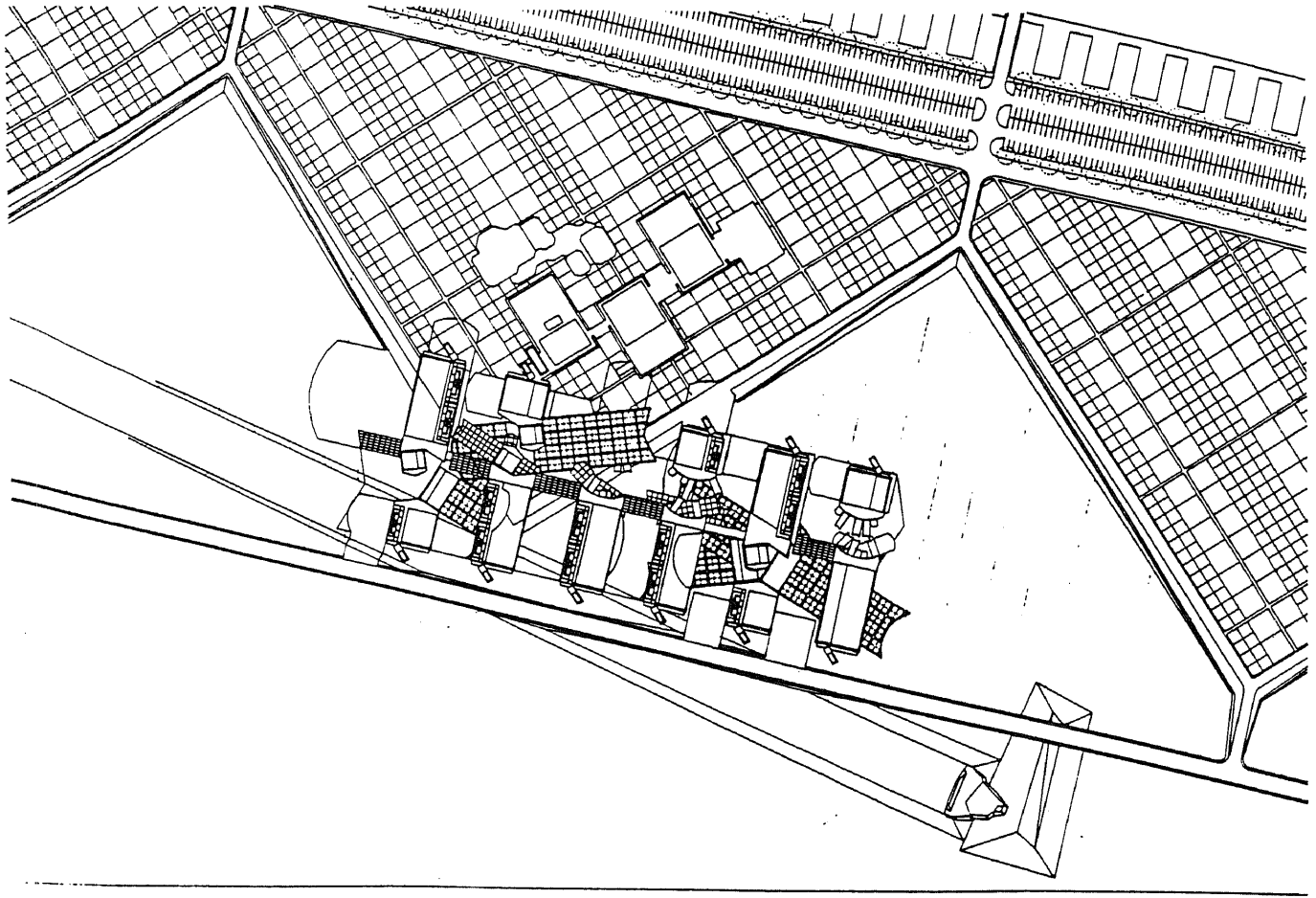
Figure 4.23: Bio-Center, Site Plan
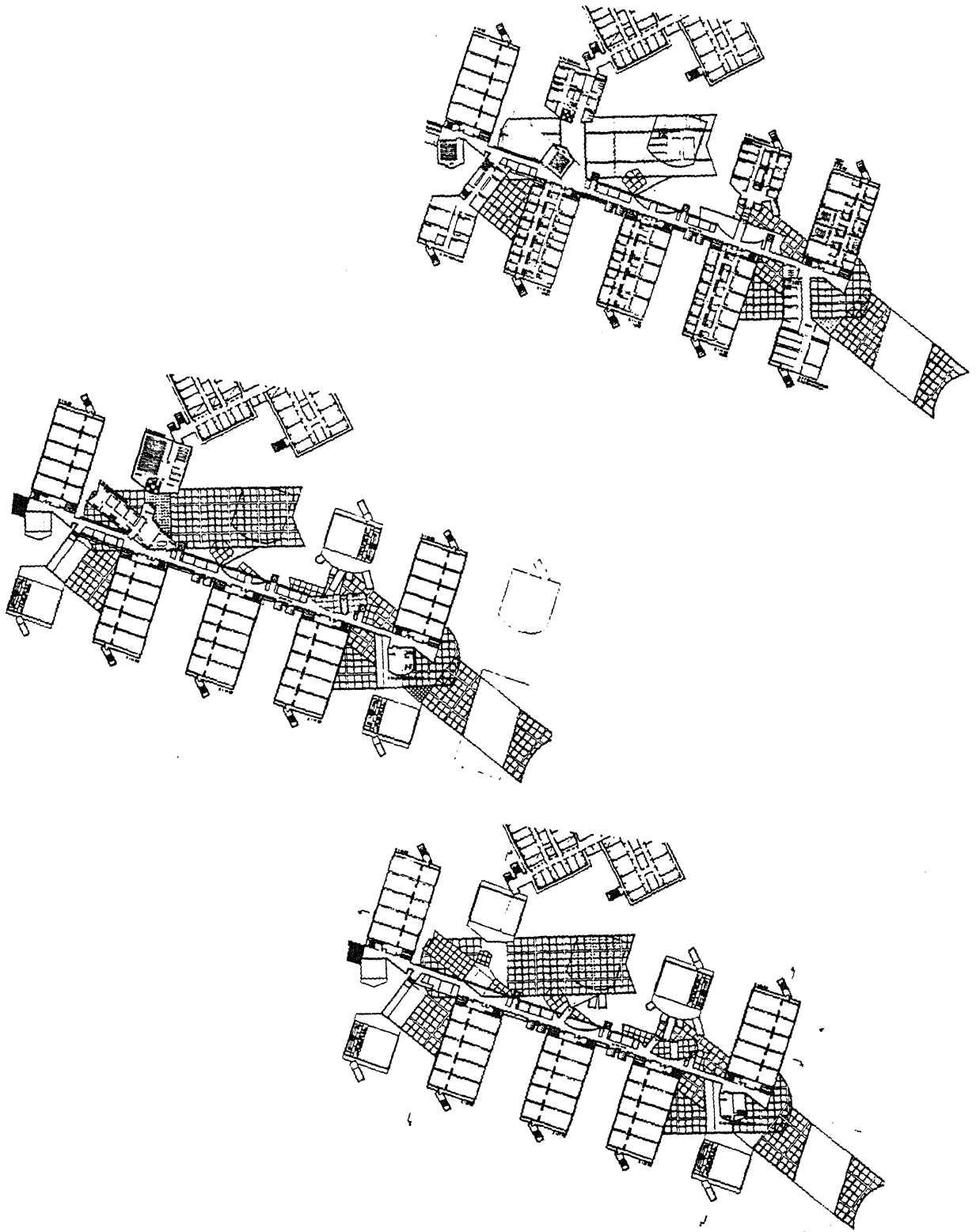
Figure 4.24: Plan Configuration, Levels 1, 2, and 3
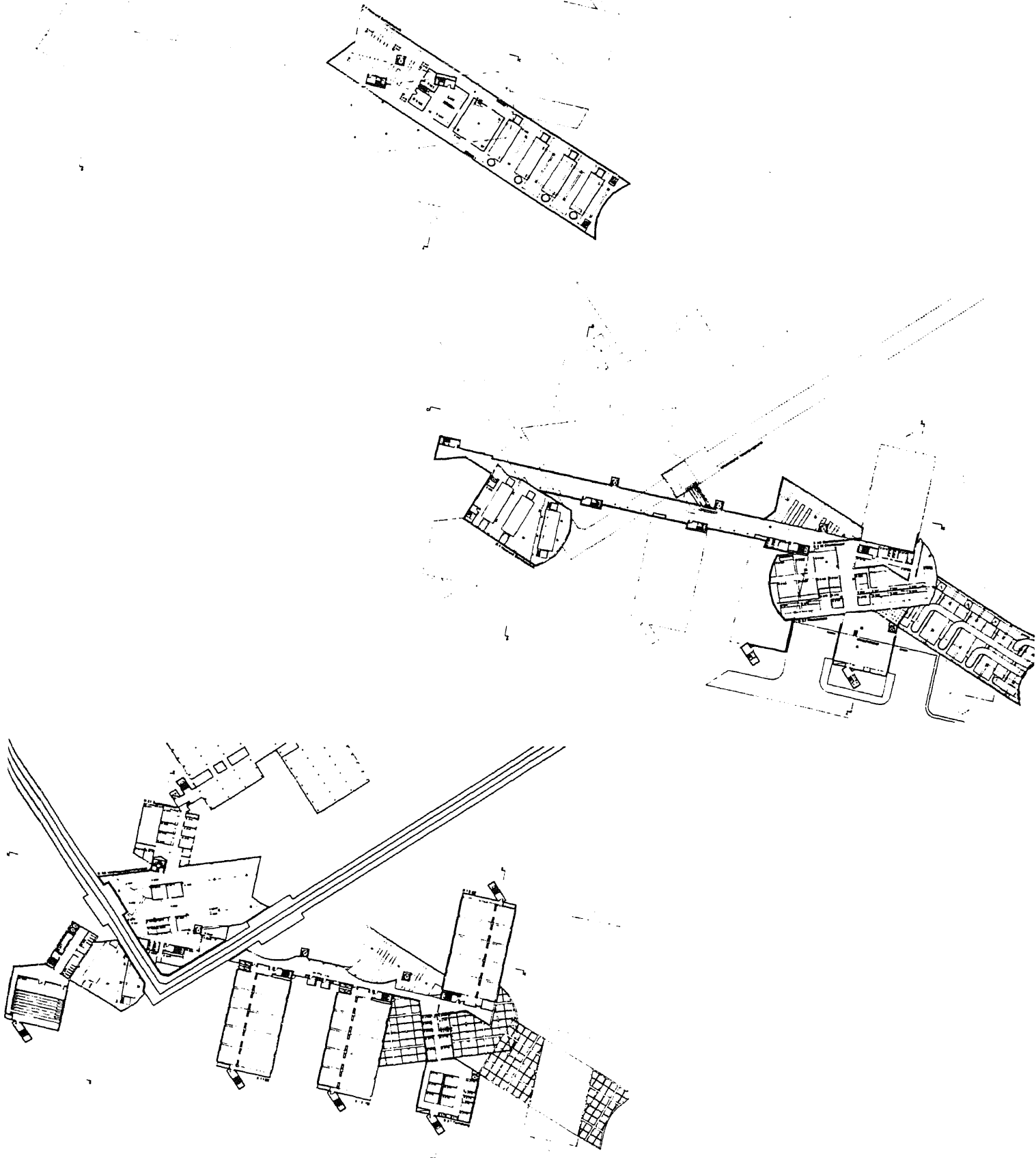
Figure 4.25: Plan Configuration, Levels 3, 2, and 1

# Chapter 5

# Alzheimer's Disease: An Introduction

As described in section 4.3, the philosophy of a non-traditional architecture can be achieved through functional, historical, or site related reasons. It is also possible that one of these criteria becomes the dominant influence for a project. For example, the user need may be extreme, as it is the case of an Alzheimer's patient.

At this point, it is important to give an overview of the problem of an Alzheimer's patient and his/her environment. Today, there are several leading causes of death in the United States, such as heart disease, cancer, stroke, etc.. One of the most devastating illness as is Alzheimer's Disease, ranging fourth. Alzheimer's Disease is a disorder that is irreversible in its affection of the brain and is also known under the names Senile Dementia - Alzheimer's Type or primary degenerative dementia. It mainly occurs after the age of 65, but has also effected people in their late 20s, although seldom. The illness lasts approximately between 7 to 20 years. The cause of the disease is currently unknown and only an autopsy can proof that the patient had Alzheimer's. However, through thorough examinations it is possible to diagnose up to 90 % if somebody is affected. Cause as well as cure is not known until today. It is extremely difficult to tell if a person has Alzheimer's Disease, since the first stage of the illness does not really identify the person as irreversibly sick. Confusion and forgetfulness, two of the symptoms that occur at the beginning, could as well be caused by side effects

of medications or depression, etc.. Therefore, an extensive examination and the ruling-out of other conditions are of greatest importance. Today, certain facts about the illness are known, for example the patient is affected by a loss of brain cells, as well as that some key chemical messengers (neurotransmitters) cease to function. The resulting symptoms and signs are: memory loss, language problems, confusion, problems with abstract reasoning and calculating, problems with learning and understanding new things, disability to walk, talk, feed, toileting, suspiciousness, irritability, restlessness, depression, and anxiety, etc.. It became common to differentiate between three main stages of Alzheimer's Disease, the early, the middle, and the late stage.

Through literature research and interviews with caregivers of Alzheimer's patients it is possible to determine certain aspects and modifications of a home environment that would positively influence its functional quality. These aspects are as follows:

- the way finding/orientation problem

- the simplification of tasks and reinforcing of abilities

- the safety problem

- the memorizing and recognizing of familiar events, people, etc.

- the wandering problem

- the shadowing problem, where the patient has the need of constant direct visual contact to the caregiver

- light/glare/shadows

- change of environments

- physical instability

The programmatic requirements for the design determine the architectural outcome. In the case of a disabled user such as an Alzheimer's patient for example the design project would have to fulfill specific user needs that vary from other projects such as easy wayfinding. This could be achieved through simplicity, visual access, and/or linear layouts without backtracking.

The way finding problem is directly related to its general impact on a human being. To specify the problem, it is necessary to explain it in more detail. The research of environmental cognition shows that the physical environment influences the user psychologically. This research emerged from the three different fields of planning, geography, and psychology. It was found that human beings loose their way in different kinds of building types and that they use different kinds of way finding strategies. These possibilities are direct visual access, blind orientation, memorizing where specific places are, taking shortcuts or alternate routes. All these examples show that the existing physical environment has to be known completely. This knowledge is based on memorizing the environment and its different connections. The person creates a so called "cognitive map".

Kevin Lynch discovered in the early sixties that a person can more efficiently function in an environment with clear images. Especially way finding would be positively influenced. A person stores information of the environment to build up a representation or a map of it. The process is called "cognitive mapping". The stronger the impression of the environment the easier the aggregation of information about it. That also leads to the demand that "...the better the cognitive map, the more efficient will be the spatial behavior of the individual..." (F. Ozel 1987). The four following aspects mainly influence the cognitive mapping of a human being:

- signage (signs, room numbers, maps, plans, etc.)

- visual access to other parts of a building

- architectural differentiation (visual, color, inferred, functional landmarks)

- plan configuration (simple layout)

Any environment should be therefore simple, clear, and comprehensible. There are particular factors to achieve simplicity in an architectural environment to be able to create a strong cognitive map. These factors are:

- symmetry

- regularity

- continuity

- continuous corridor layouts

- linear layouts without backtracking

- differentiated interiors

- stairs at central locations

- stairs at the end of corridor wings

- minimum of turns

- visual access, etc.

In the case of an Alzheimer's patient who is confronted with a gradual memory loss, the process of "cognitive mapping" becomes even more important. The more simple the plan layout the easier the creation of a "cognitive map". Every disorientation, every complication created through a sudden change of the environment, could mean aggravating of patient and caregiver, sometimes combined with aggression and assault from the patient's side. Therefore, due to the disease's development, and to make living as pleasant as possible for patient and caregiver, the goal of the design has to be flexiblity and simplicity.

## 5.1  Modifications for a Safe Home Environment

Through literature research, it became evident that there was a need to design a project that would, besides general modifications such as flexibility and visual accessibility, fulfill specific criteria such as:

a) To design one large common used space as a series of smaller spaces.

b) To subdivide it into closed off spaces, would create more disorientation for the Alzheimer's patient than making her/him feel more comfortable.

c) Sleeping and/or living areas would have to be redefined and modified during the development of the disease. For example, a bedroom, originally used by spouse and spouse, becomes a sleeping area for the patient and the healthy spouse moves to another room, that was used differently. A kitchen, originally designed as an open area, becomes too hazardous for the patient and has to be closed off with glazed partitions to make it inaccessible for the patient. The transparent material provides an indirect, because for the patient not obviously recognizable, change of the environment. This is important since it is known that every obvious change could be the reason for disorientation and therefore possible aggression of the patient.

The patient's bedroom needs to be located close to a bathroom since the problem of incontinence will occur with the progress of the disease. The shorter and directer the way between patient's bedroom and bathroom, the smaller the chance for uncomfortable and embarrassing situations especially for the patient. One main goal for the caregiver is to keep as much dignity for the patient as possible.

d) The careful use of contrasting colors combined with signs and pictures of rooms will help to identify certain areas. Bright yellow letters on a dark background, for example, make it easy for the patient to differentiate.

Handrails, which have to be added within the building, need to have a contrasting color to the wall in order to be identified by the patient.

e) Floor materials should be non-slippery and non-shiny without busy patterns to avoid the danger of falling and confusion of the patient.

f) At a certain state of the disease the patient should not have access to rooms such as office spaces or the private bedroom of the spouse to ascertain privacy for the healthy spouse.

g) Artificial and natural lighting play important roles in the design of a building for an Alzheimer's patient. Direct sunlight that creates glare will most probably be a source for aggravation of the patient, and therefore, has to be avoided. The provision of nightlights in hallways as well as to brighten lights at desired destinations can help to identify walkways.

h) Outdoor wandering spaces should be provided. The wandering routes should begin and end at the same point to avoid disorientation.

i) Landmarks, indoors and outdoors, will help to identify important locations such as kitchen or bathroom and orient the patient.

j) Simple activity areas will help to manage constant or agitated pacing in the home. These spaces could provide plant areas, fish tanks, etc..

k) The provision of a simple intercom/alarm system will help to design a more flexible plan layout and monitor the patient without the need of constant physical presence of the caregiver.

l) The finishes in the bathroom should be of the kind that reduces reflected noise and increases sound absorbency to avoid confusion.

**m)** For the building services an adjustable heating and ventilation system should be available since the needs of patient and caregiver will most probably differ from each other.

As a summary, since the patient undergoes different stages of the disease, a flexible design is recommended to accomodate the changing needs of the patient and the caregiver. For example, as the patient's memory starts to fade, architectural landmarks will help to identify different areas inside as well as outside the building. A more detailed list of possible modifications for a better home environment for an Alzheimer's patient can be found in the appendix.

## 5.2 A conceptual model for a design system

The current situation of Alzheimer's patients and their caregivers shows two existing scenarios where a spouse takes care of a spouse with Alzheimer's disease or a daughter, with or without family, takes care of a parent with Alzheimer's disease.

For the conceptual idea of the design the patient will be symbolically represented by a square with a circle. The caregiver, spouse or daughter, will be represented by a square. Possible existing relatives of the daughter such as husband or children, will be represented by different sized squares. (Figures 5.1 & 5.2)

## 5.3 application of Rules

The application of the following rules will clarify the relationships and changes of the patient, the caregiver, and the relatives throughout the disease.

Phase I

The relationship of patient and caregiver and relatives will be reflected through overlays of the squares. (Figures 5.3 & 5.4)

Phase II & III

The deterioration of the patient throughout the disease is reflected through the destruction of the square that represents the patient. At the same time, to emphasize the growing burden on the caregiver, the subtracted section of the patient's square is added to the caregiver's square. (Figures 5.5-8)

Phase IV

Since the caregiver's life centers more and more around the patient, the original circle of the patient's square shifts to the center of the overlapping areas. (Figures 5.9 & 5.10)

Phase V

The caregiver's need for privacy and independence from the patient grows with the development of the disease. Outdoor activities proved to be helpful to the patient. Both are represented by the use of additional separating walls.(Figures 5.11-16)
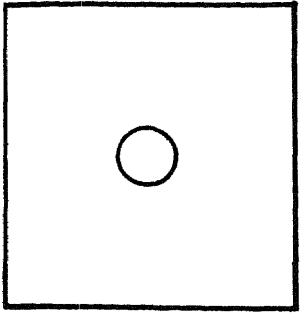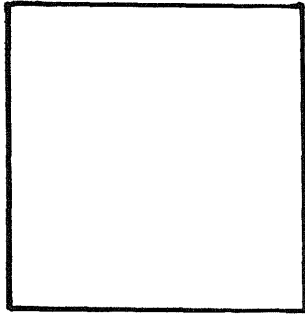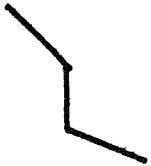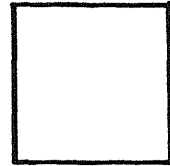
Figure 5.1: Representation I

71
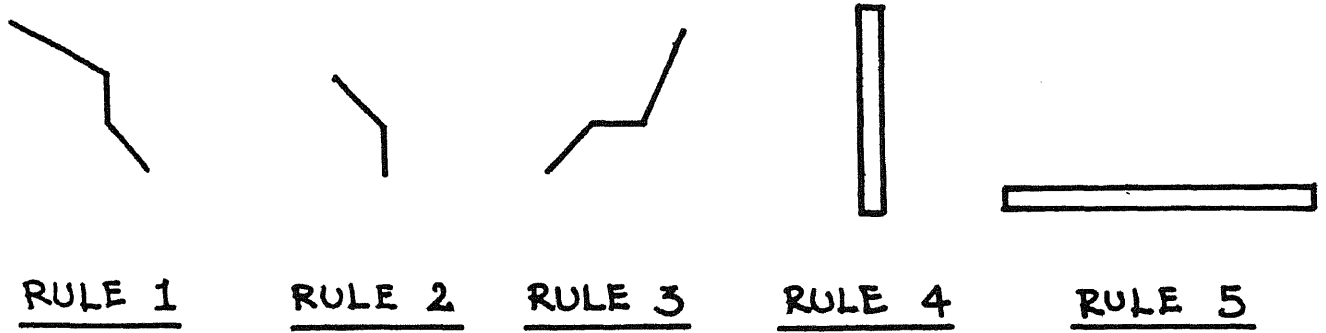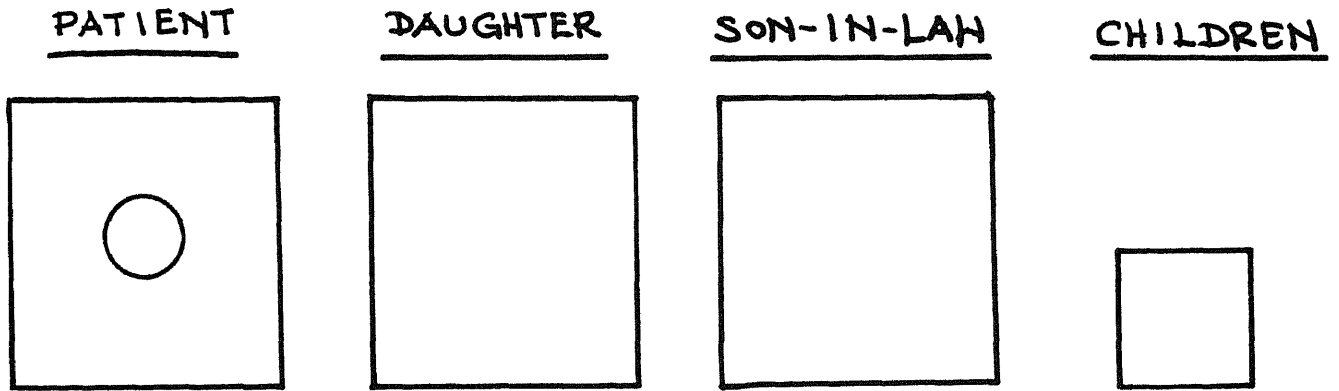
Figure 5.2: Representation II
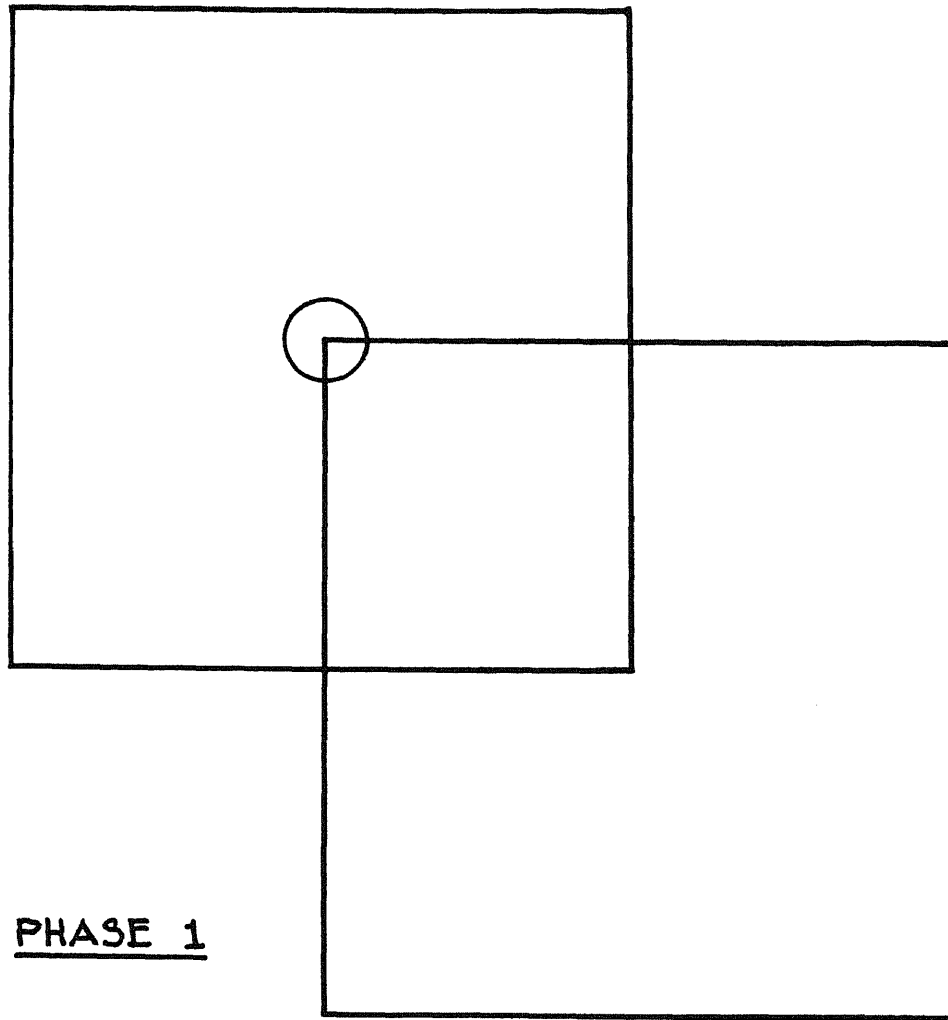
**PHASE 1**

Figure 5.3: Relationship Between Patient and Caregiver I
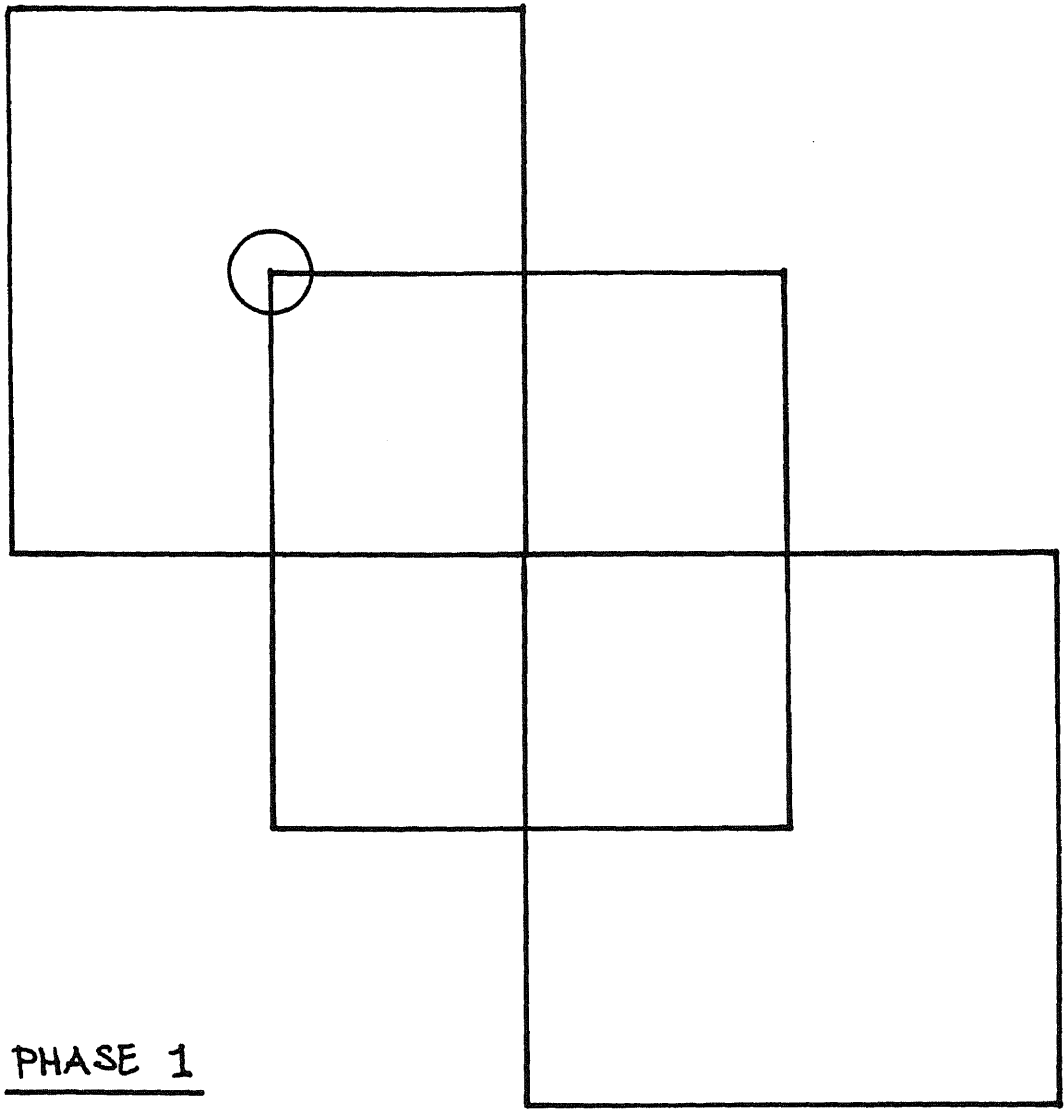
PHASE 1

Figure 5.4: Relationship Between Patient and Caregiver II
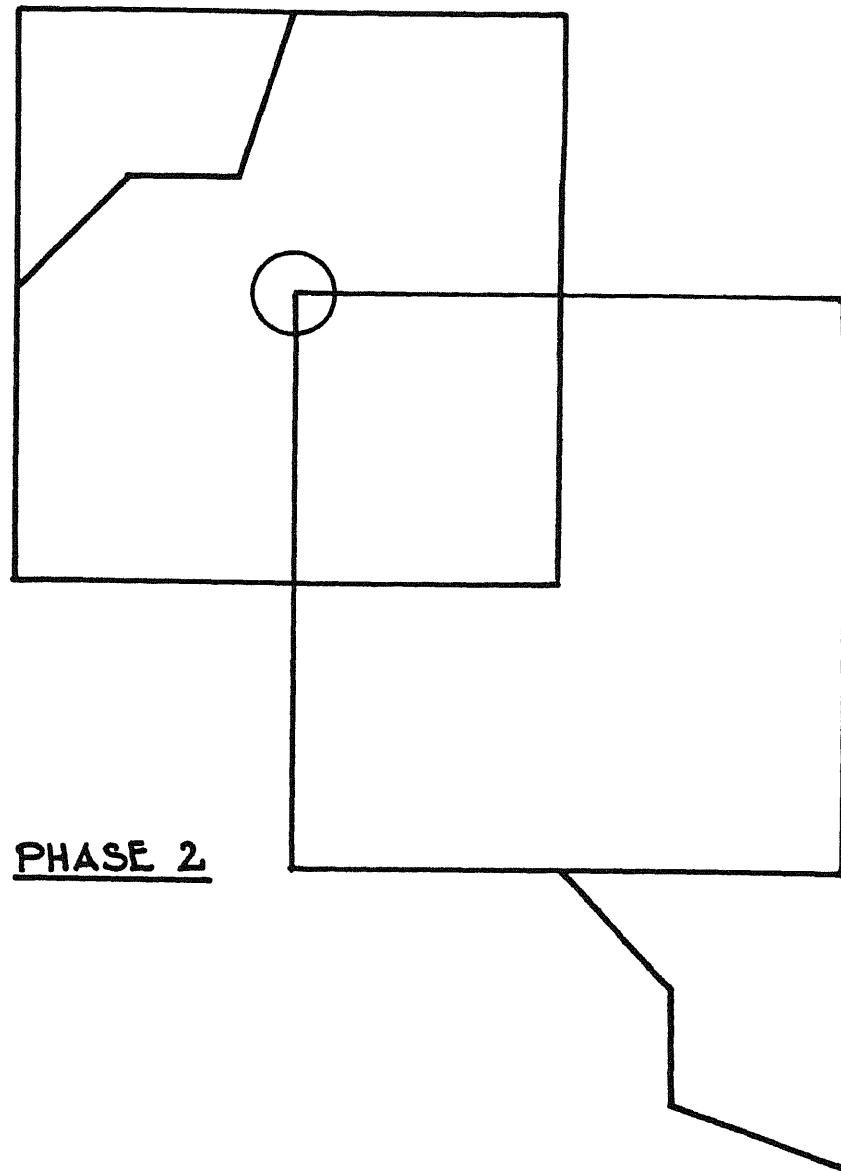
PHASE 2

Figure 5.5: Patients Deterioration and Caregivers Burden I
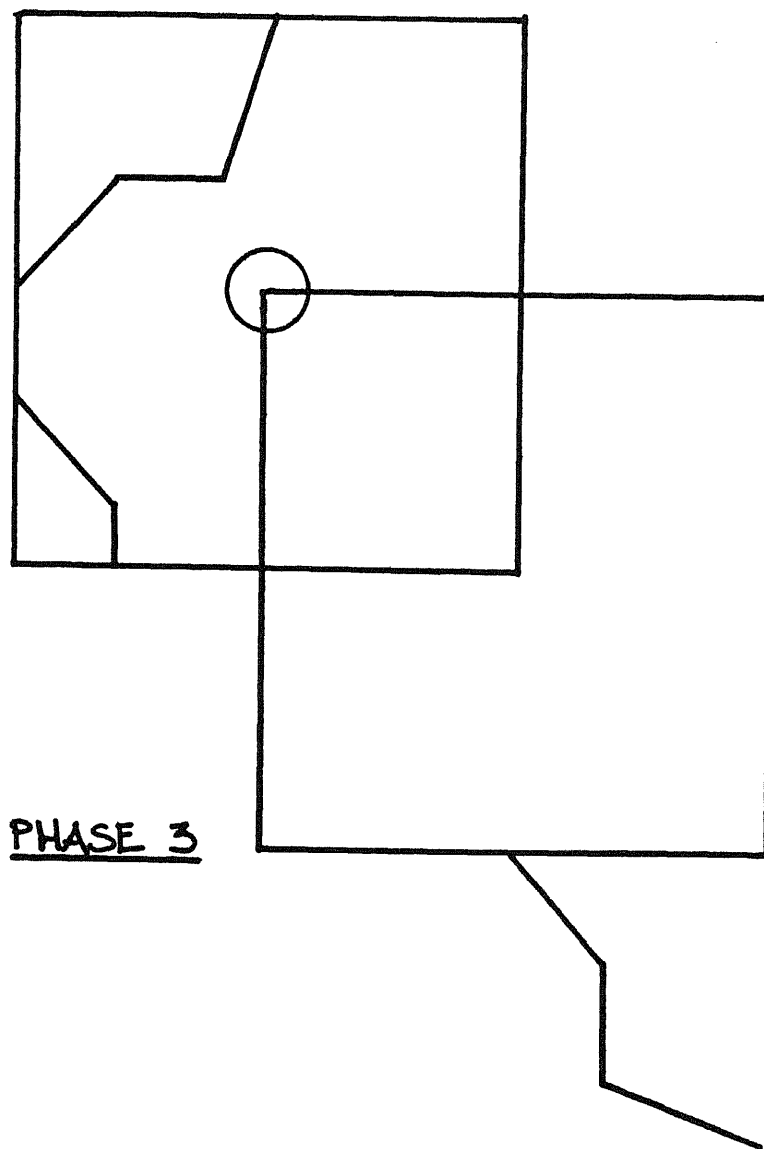
PHASE 3

Figure 5.6: Patients Deterioration and Caregivers Burden I
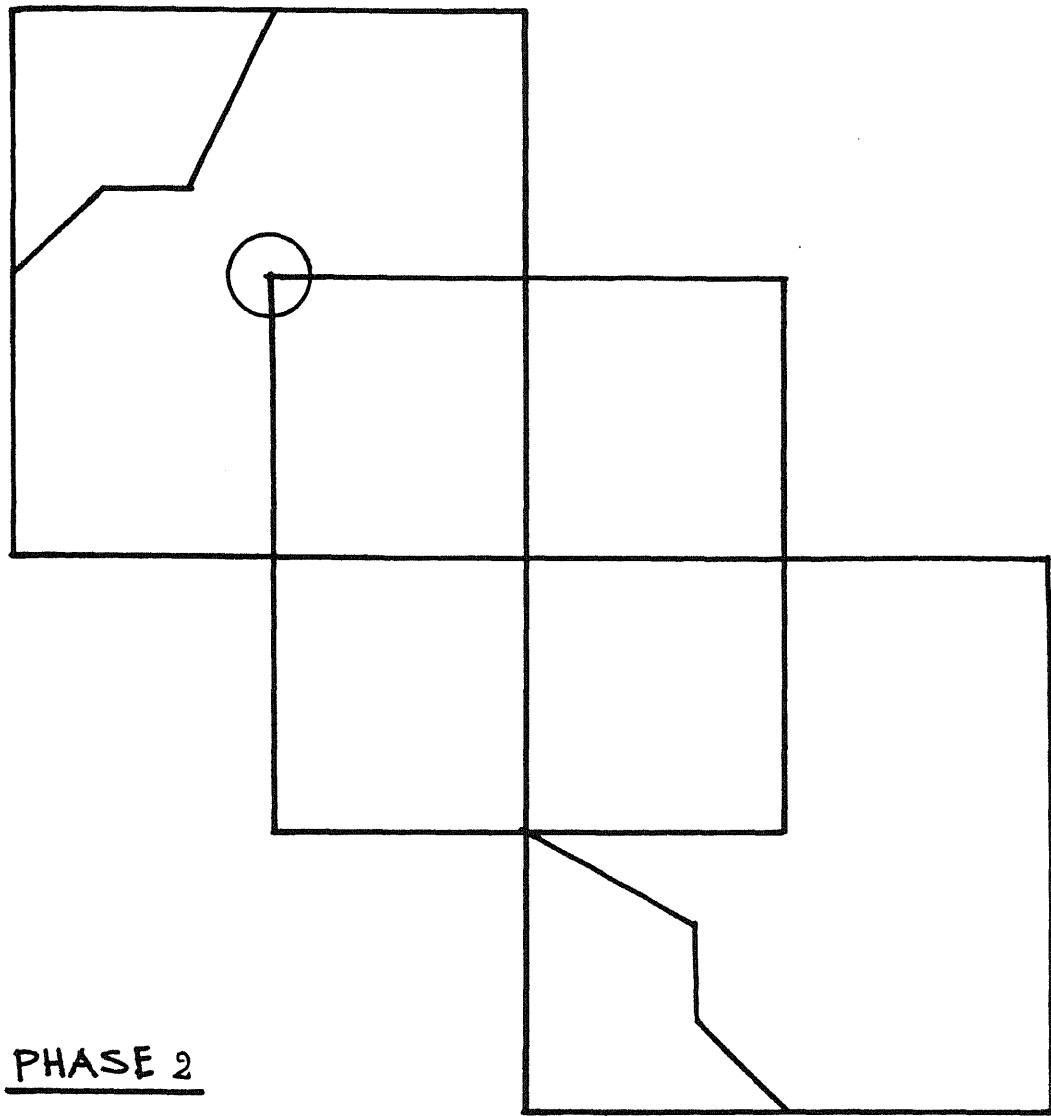
PHASE 2

Figure 5.7: Patients Deterioration and Caregivers Burden II
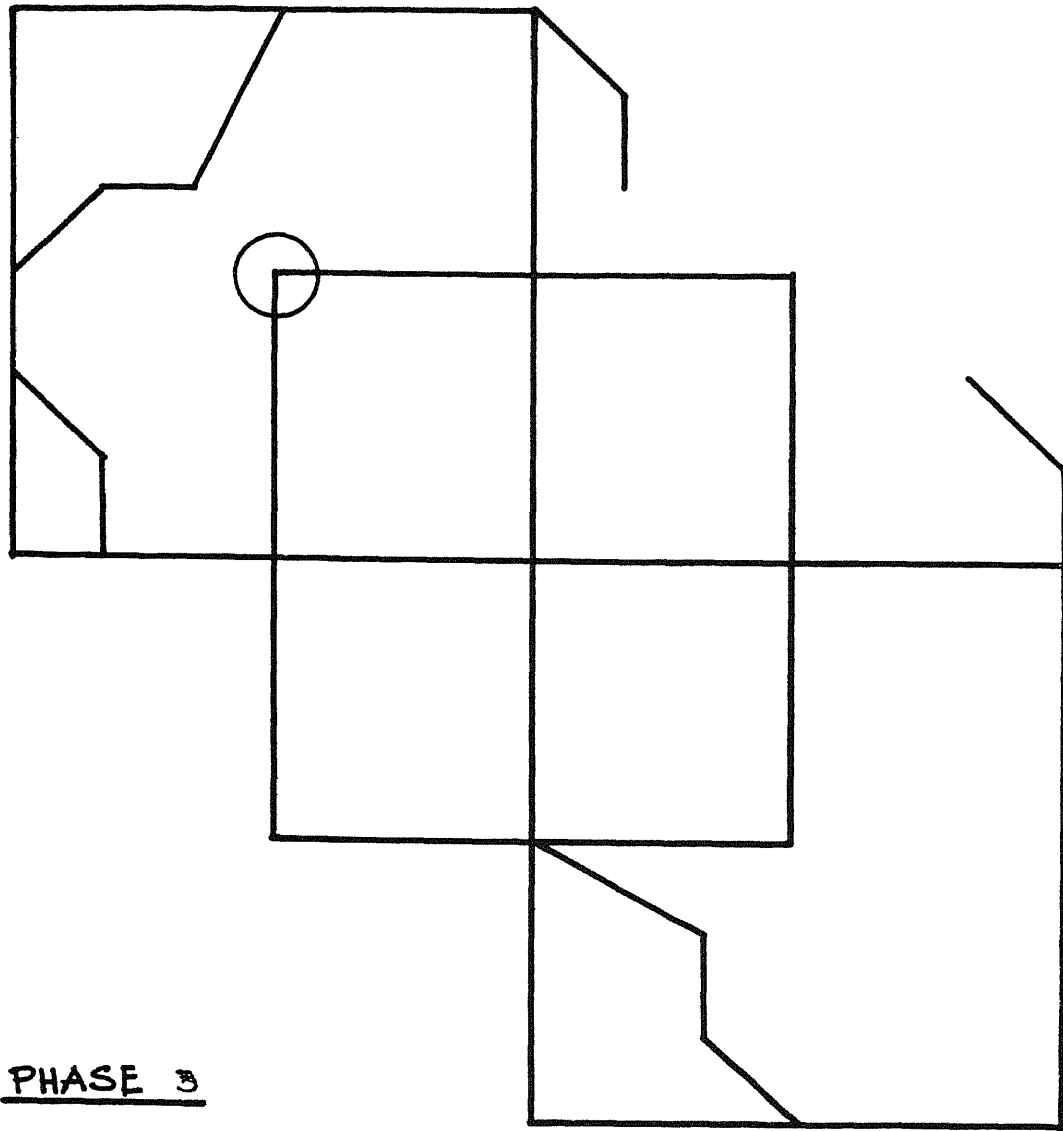
**PHASE 3**

Figure 5.8: Patients Deterioration and Caregivers Burden II

PHASE 4
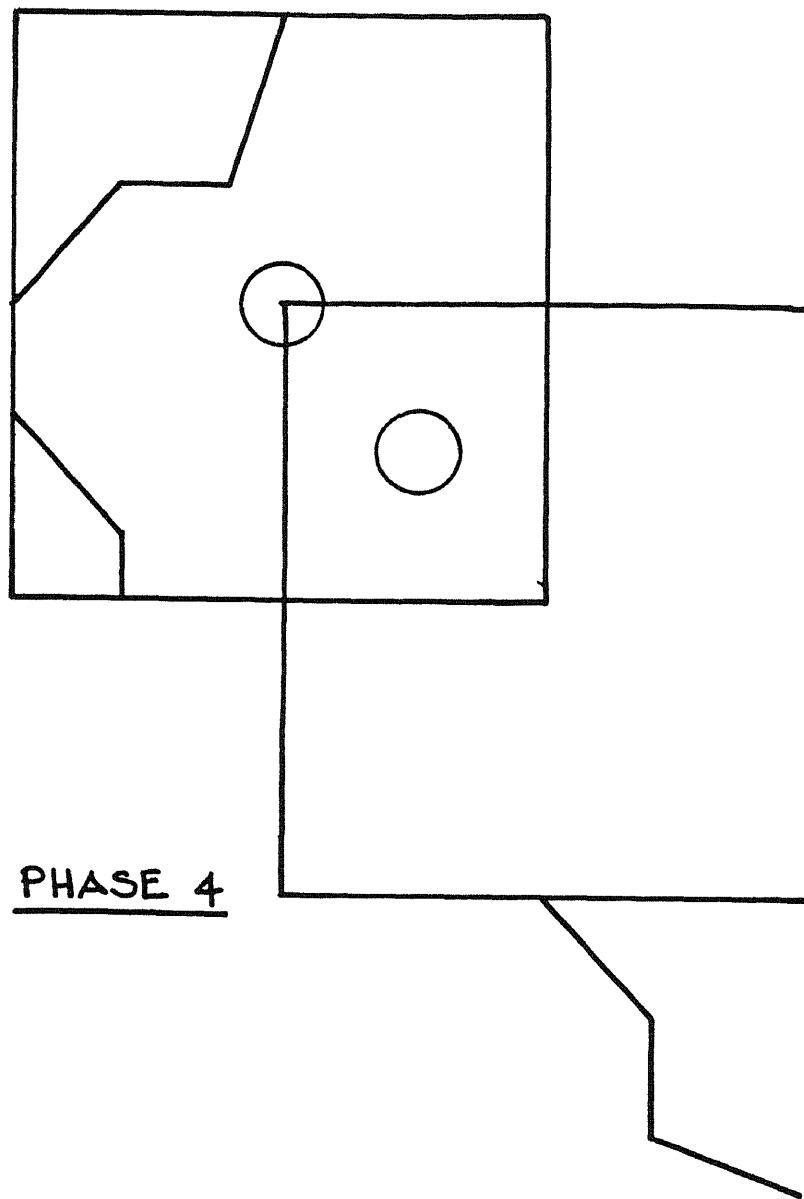
Figure 5.9: Caregiver's Life centers arround the patient I

PHASE 4
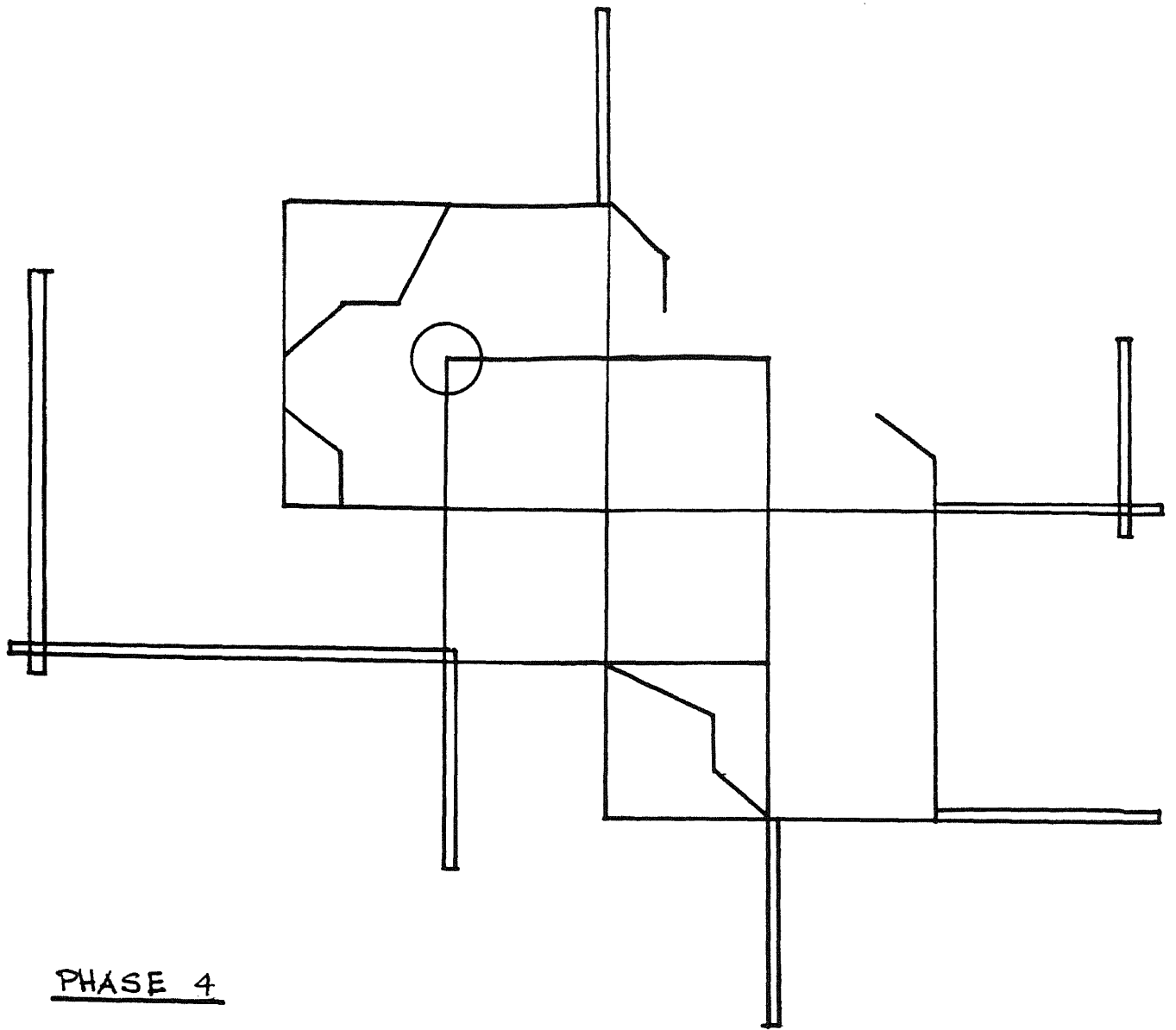
Figure 5.10: Caregiver's Life centers arround the patient II

80

PHASE 5
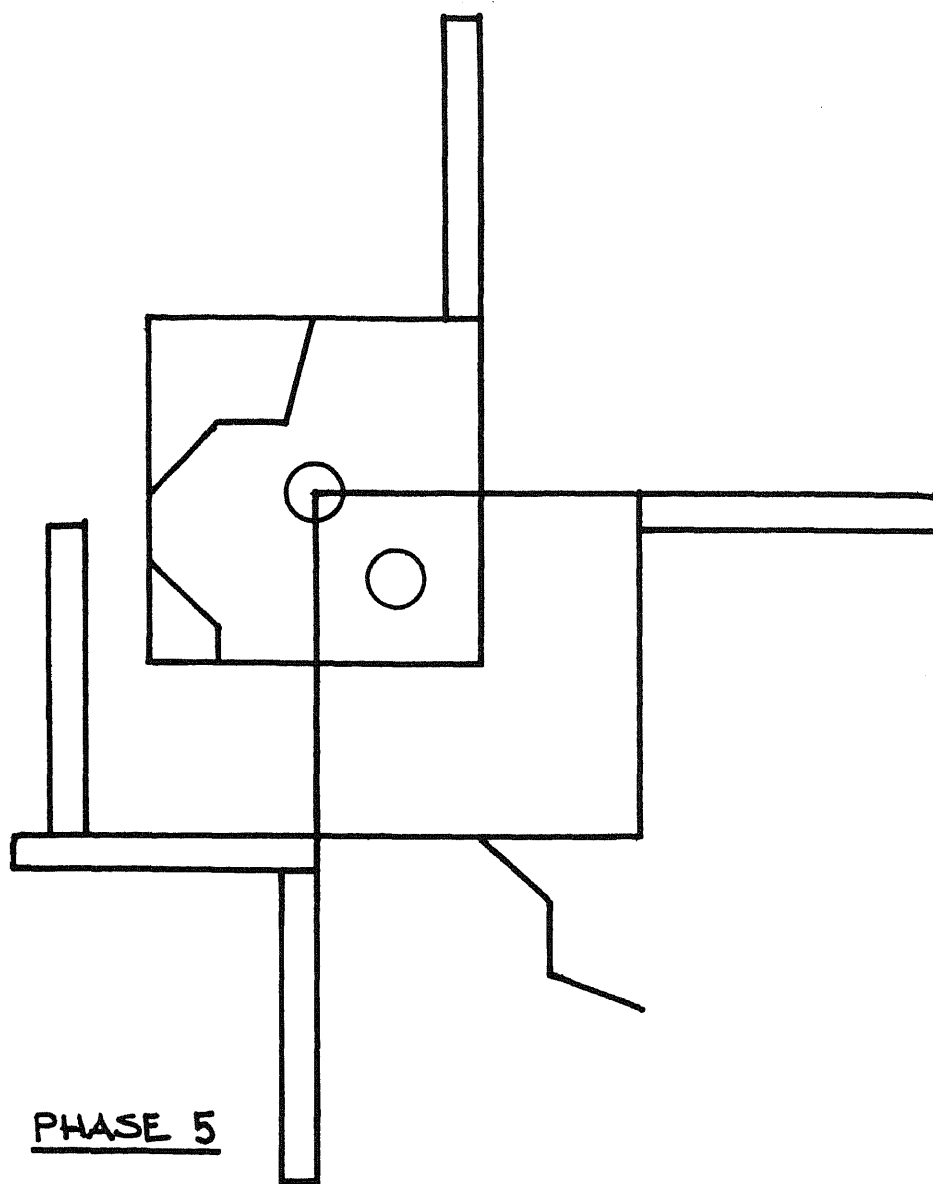
Figure 5.11: Privacy and Independence I

PHASE 6
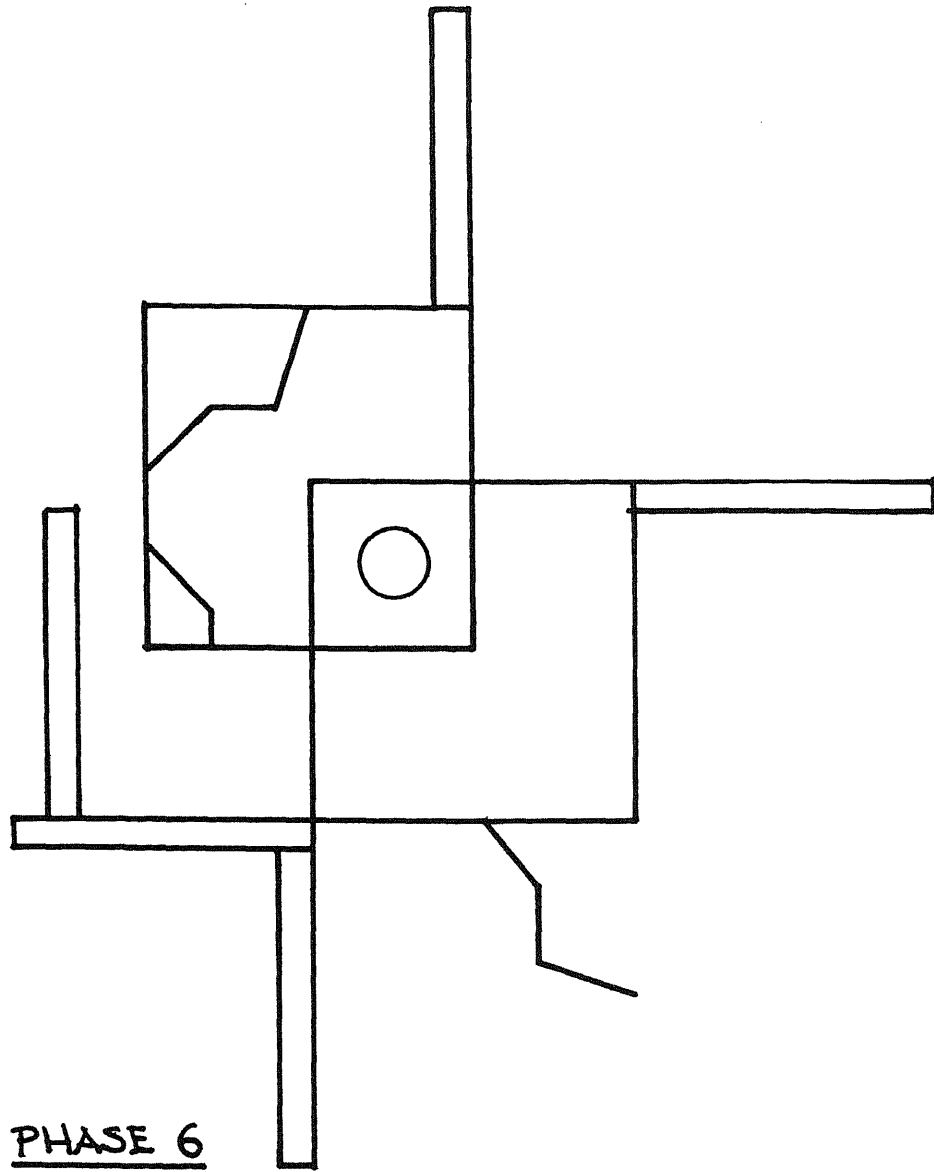
Figure 5.12: Privacy and Independence I
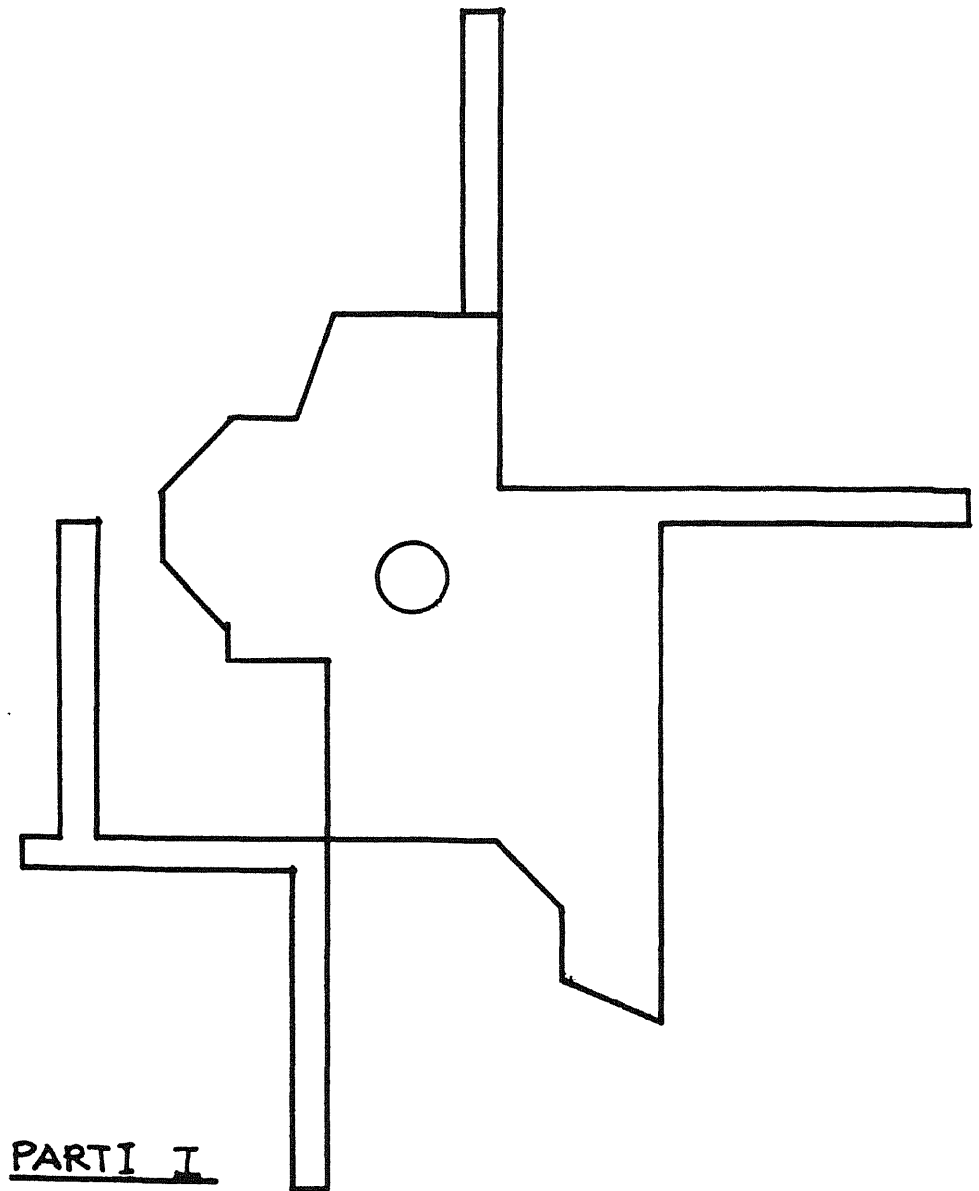
PARTI I

Figure 5.13: Building Parti I

83

PHASE 5
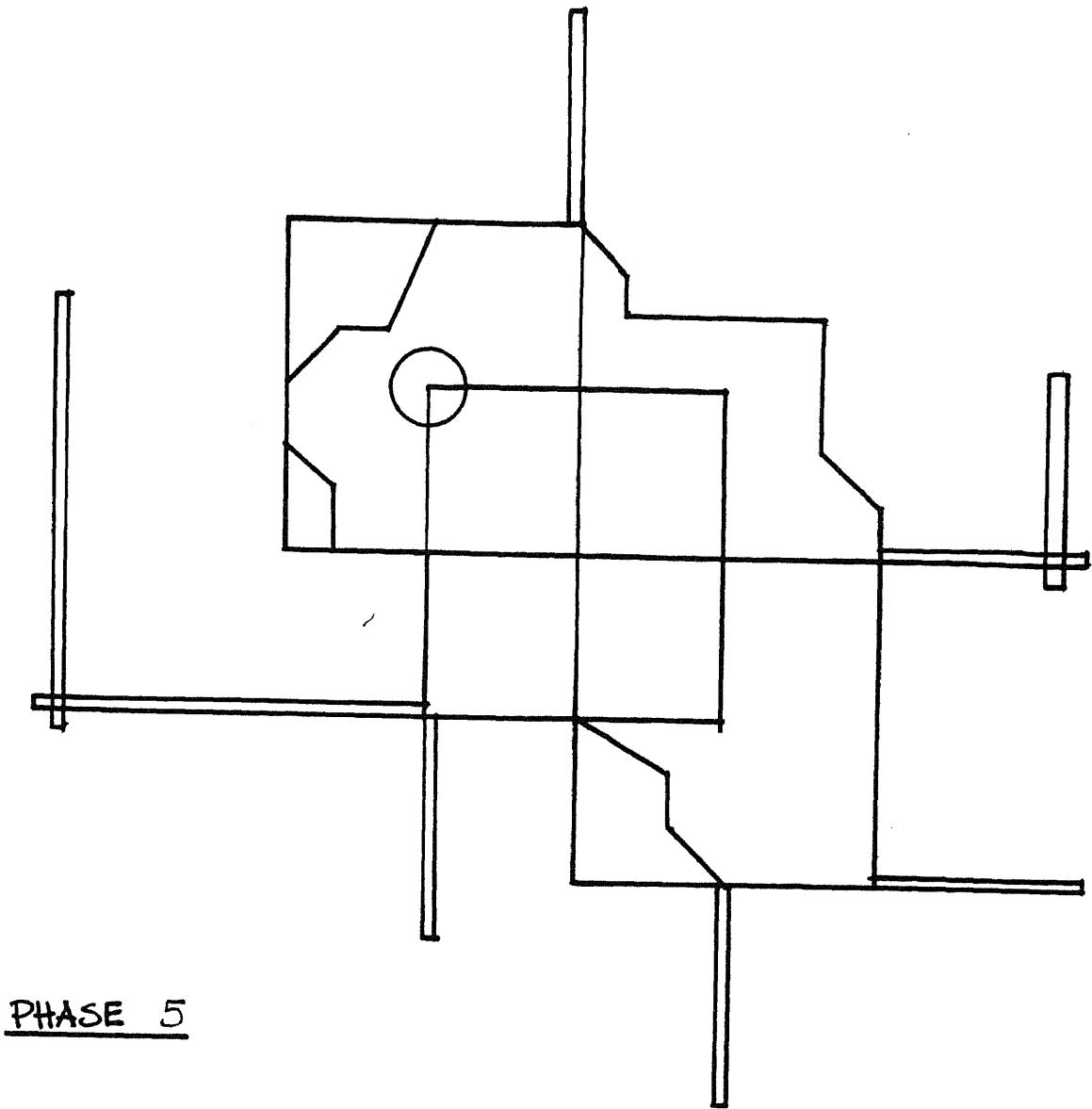
Figure 5.14: Privacy and Independence II

84

PHASE 6
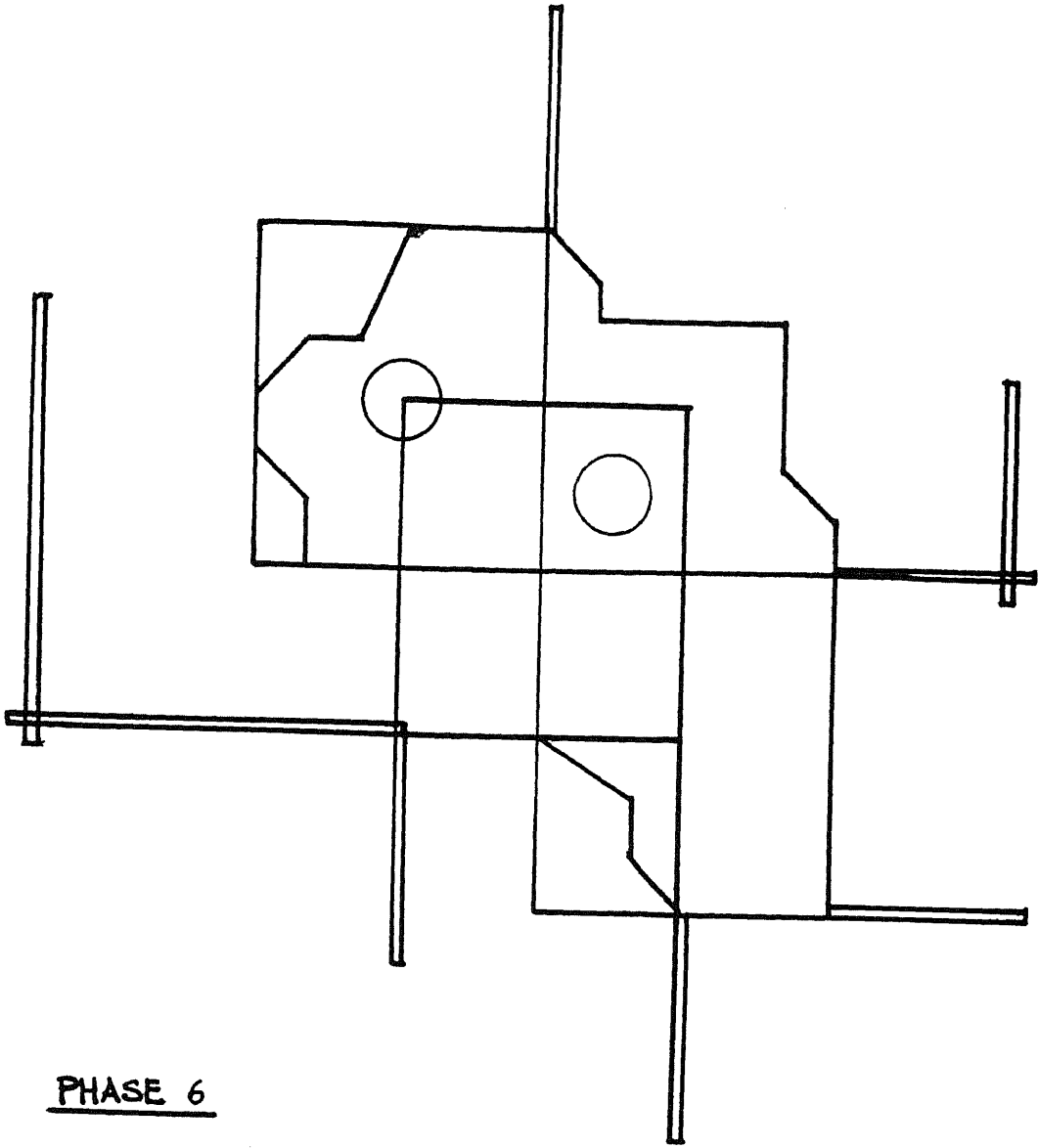
Figure 5.15: Privacy and Independence II
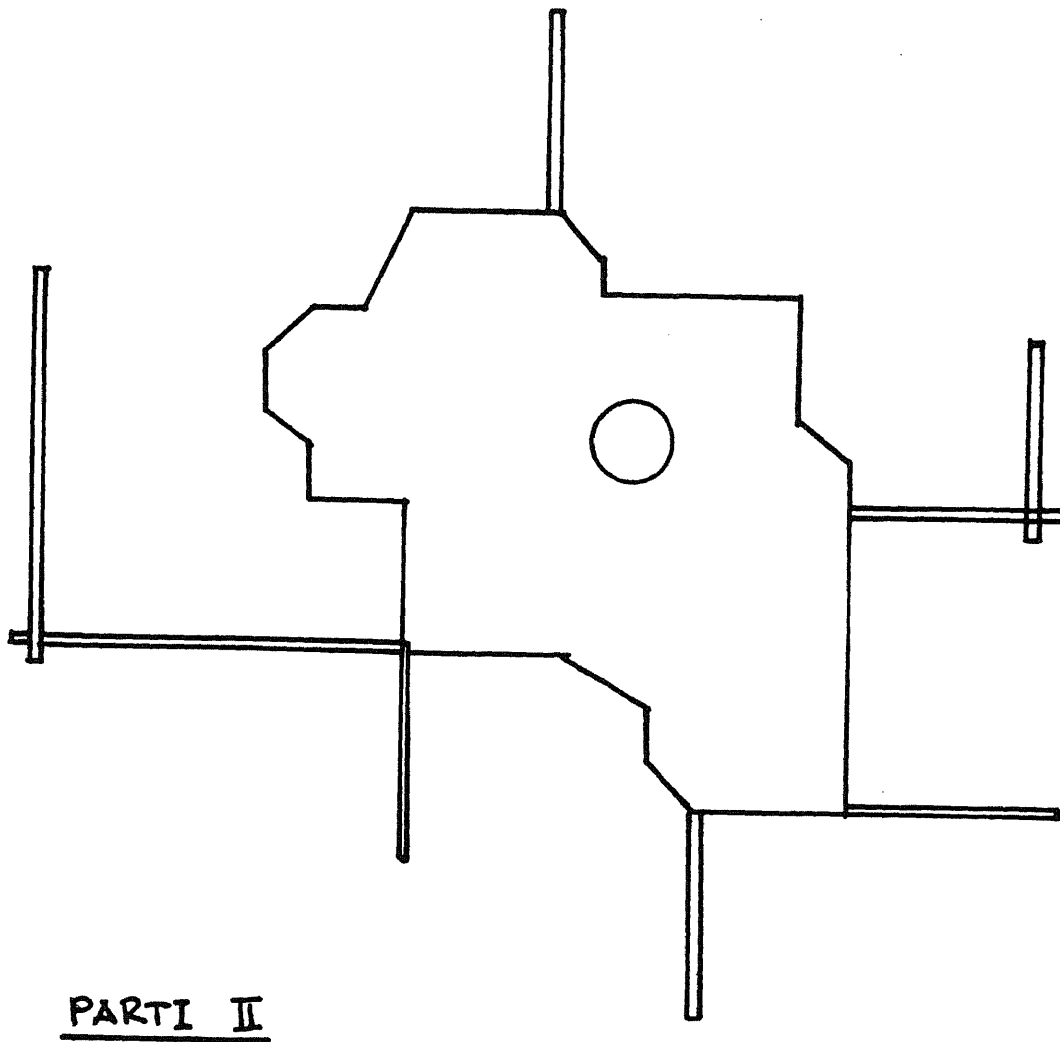
PARTI II

Figure 5.16: Building Parti II

# Chapter 6

# A Housing Project

This chapter is an application of the conceptual idea and rules that were developed earlier in chapter five. A detailed description of the design of a housing project for an Alzheimer's patient and his/her family is presented. Two schemes for the earlier discussed scenarios are developed. The first scheme deals with a spouse/spouse, the second scheme with a parent/daughter relationship.

## 6.1 Design I

Based on the knowledge discussed in chapter 5, and through an application of the rules mentioned in section 5.3, a building parti was developed. It consists of the core of the buiding with extending walls. The extending walls define certain areas that are used as the base for additional spaces, depending on the user need. The core implies all commonly used public and semi-private activities such as kitchen, living and dining area. It is treated as one space, separated into smaller spaces through furniture arrangements. This provides the best possible visual accessibility of the common area. On the other hand, additional spacing is used for private use, such as bedrooms, bathrooms, laundry-room, and office. At the beginning of the disease the couple usually shares a common bedroom. W: development of the disease it becomes neccessary that the caregiving spouse private bedroom. Some caregivers prefer the location of their bedroom as

the patient's. Others prefer the opposite. In the first case a bathroom separates a bedroom and an office space. The office could be converted into a bedroom when neccessary. In the second situation, the office space is placed away from the bedroom. Therefore, when converted, the office serves as a separated private bedroom for the caregiver away from the patient. In this case an intercom system prooved valuable.

## 6.2   Design II

At the beginning of the disease the patient is still capable of using his/her own separate living arrangement. With the progress of the disease it becomes more and more necessary to share common spaces such as kitchen, living, and dining area. In most cases the daughter, being married and having the additional responsibility of an own family, prefers to have the masterbedroom away from the patient. Here, the patient's bedroom plus bathroom are treated as an individual unit, independent from masterbedroom plus bath. In the later stages of the disease the living arrangements followed along the same lines as in Design I, where the spouse wants to be far from the patient.

However, in some cases a closer location of patient's and daughter's bedrooms is preferred. Two bathrooms are located next to each other. There is the possibility of direct access to the patient's bedroom from the daughter's masterbedroom by adding doors to both bathrooms. In this case both parties have still their own private areas, but yet are able to meet as fast as possible.

To ascertain as much privacy and dignity as possible for the patient, it is important to keep as much individuality as possible as long as possible. Therefore, the variation of scheme Design II suggests, that the patient's unit could be easily used as a unit with own bedroom, living area, and kitchenette, which is individually used by the patient as long as p⟨

During the late stage of the disease, when the patient becomes a permanent

his/her unit could be rented or used by an adult child. At the same time

child could be converted into the patient's bedroom to assure a necessary closer supervision by the caregiver.

Some families prefer an additional story for additional guest rooms, living areas, etc.. With the development of the disease and changes of living arrangements within the families, the upper rooms could be converted into 1 or 2 bedroom apartments and easily rented.

## 6.3   Discussion and Conclusion

The above mentioned designs make use of the theories and knowledge developed in chapter 5. The design process was generated according to the rules discussed in section 5.3. The designs' versatility is apparent in the different schemes that are presented in sections 6.1 and 6.2. The housing project also presents a solution for an unusual user need based on a specific design knowledge. This is one example where knowledge-based system design helped greatly simplify the design process. The design criteria and needs of the patient defined the axioms from which facts derived using the rules developed in section 5.3. This process led to the solutions presented in sections 6.1 and 6.2. These solutions also represent designs, where the application of derived rules resulted in a non-traditional vocabulary. This process is similar to that used by some deconstructionist architects.

# Appendix A

# Project Drawings and Model
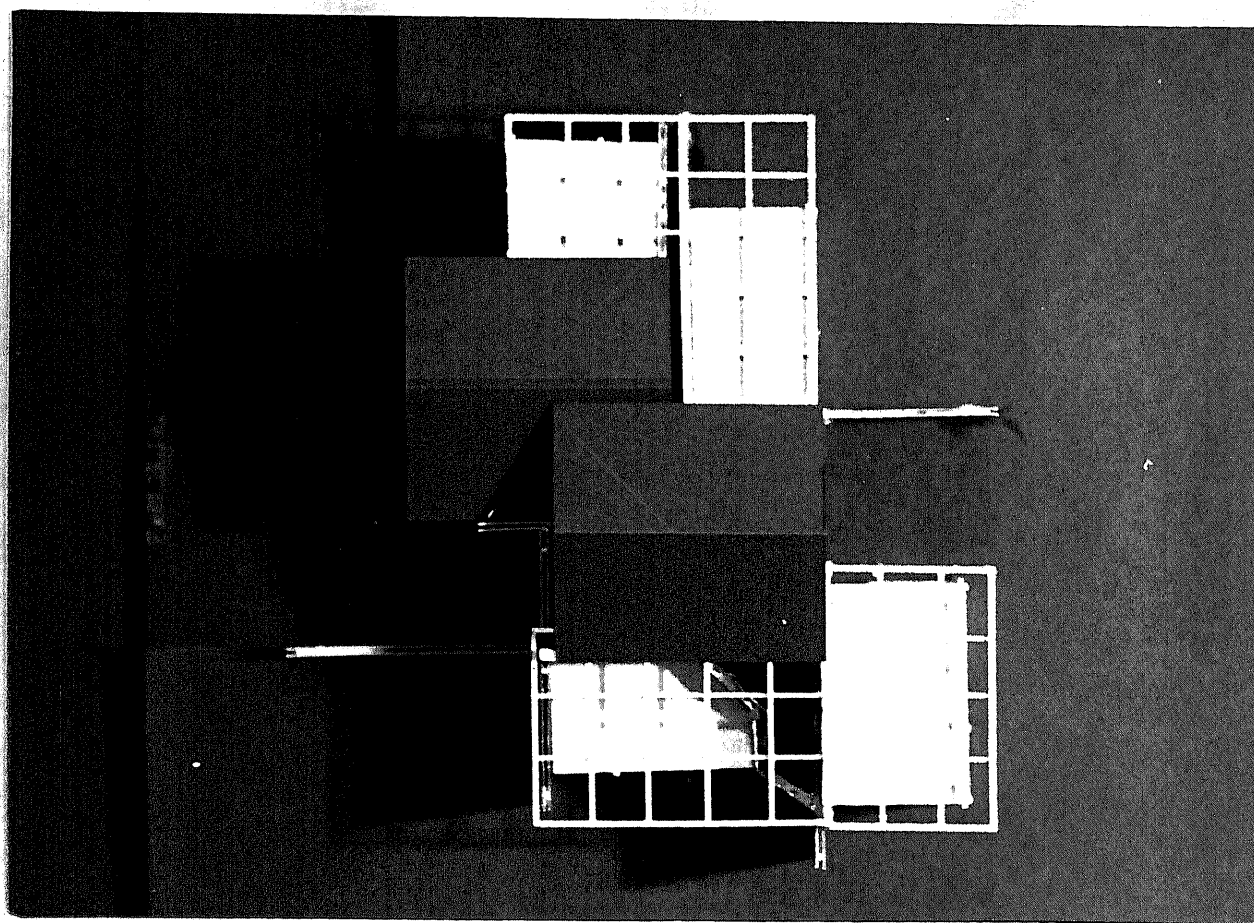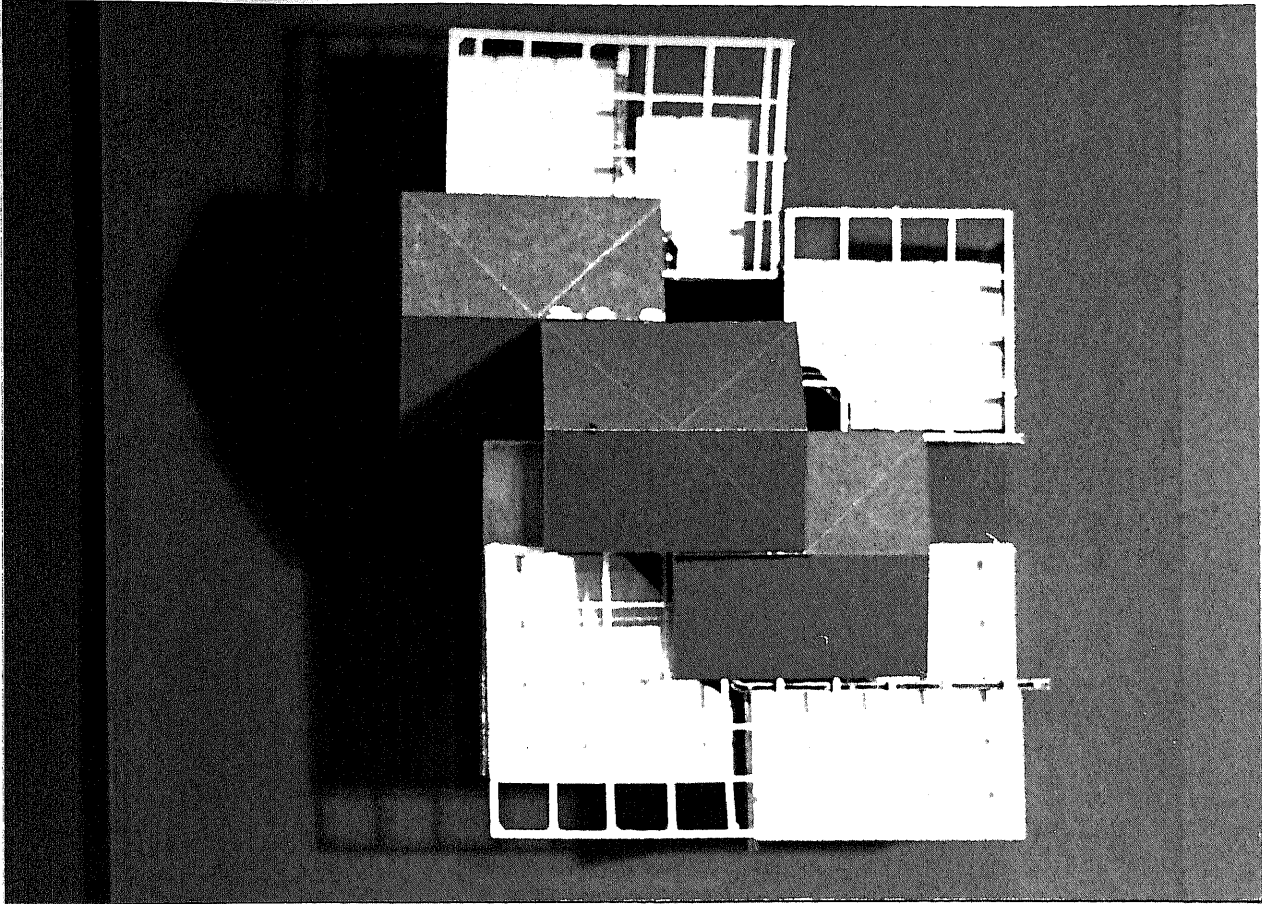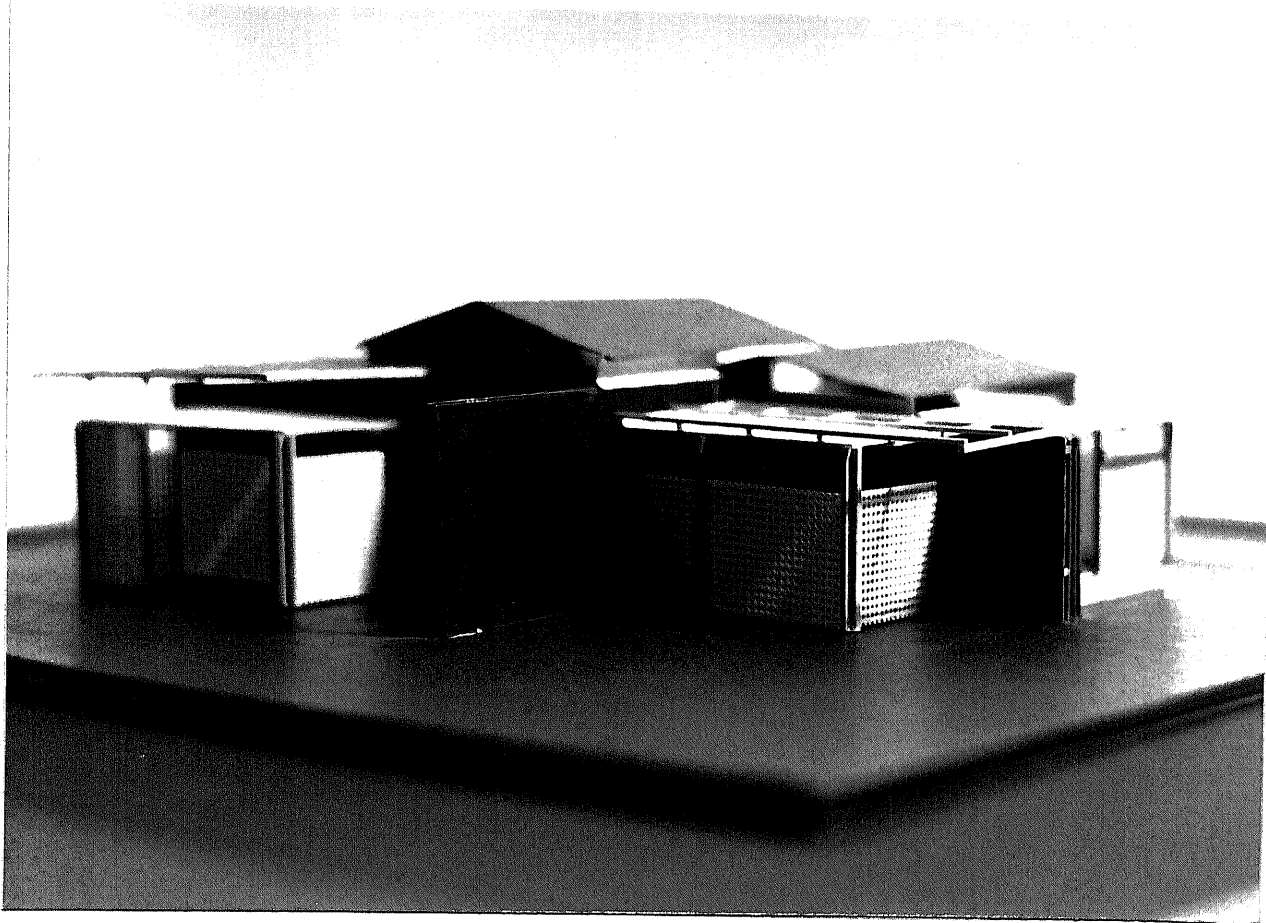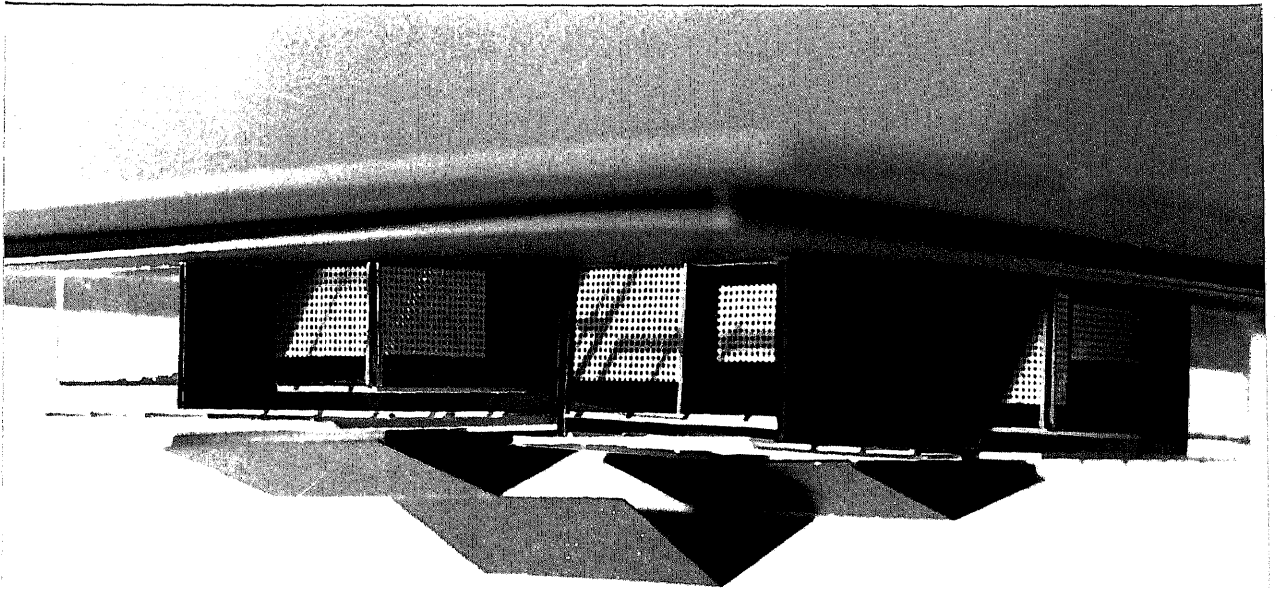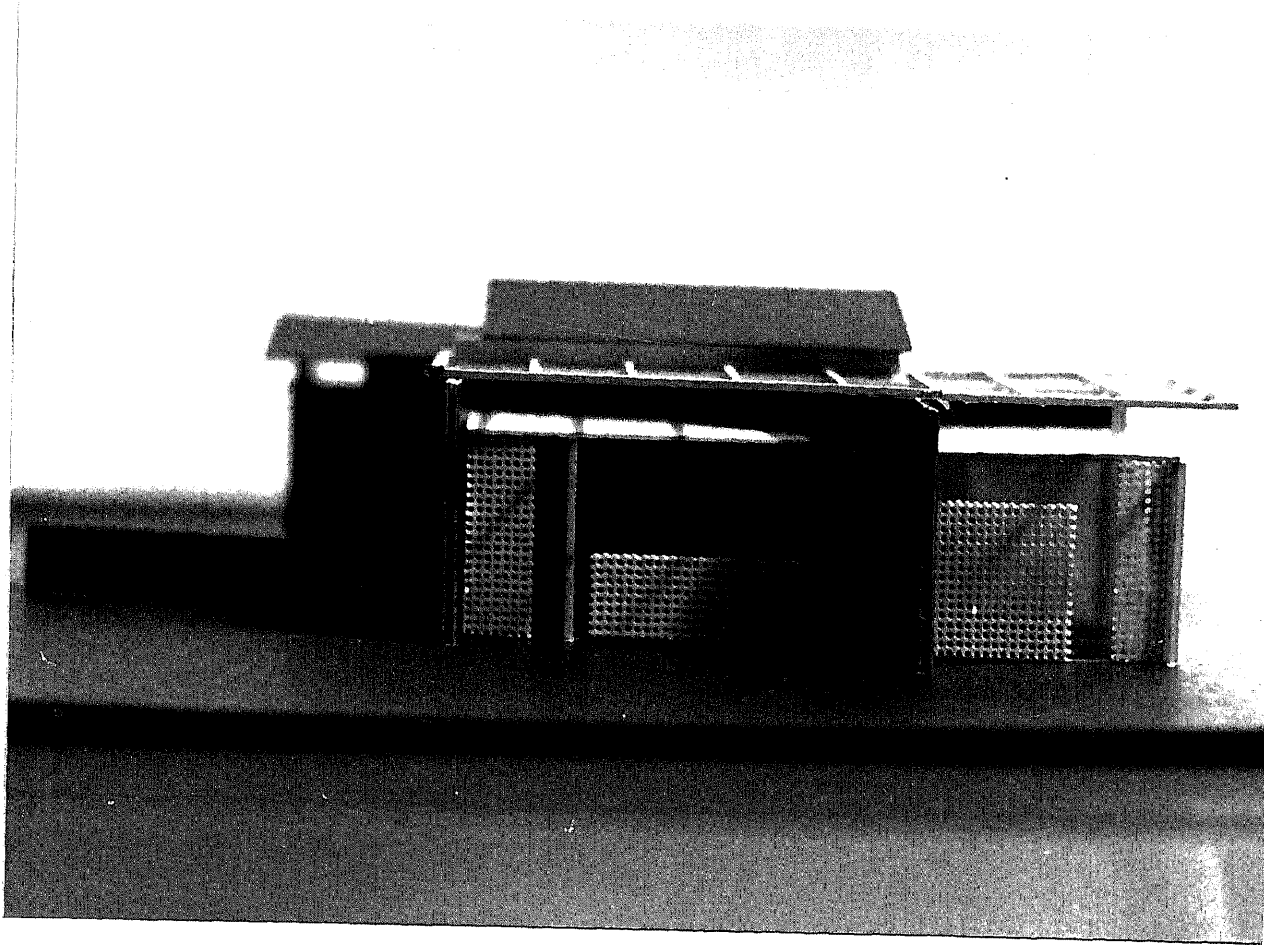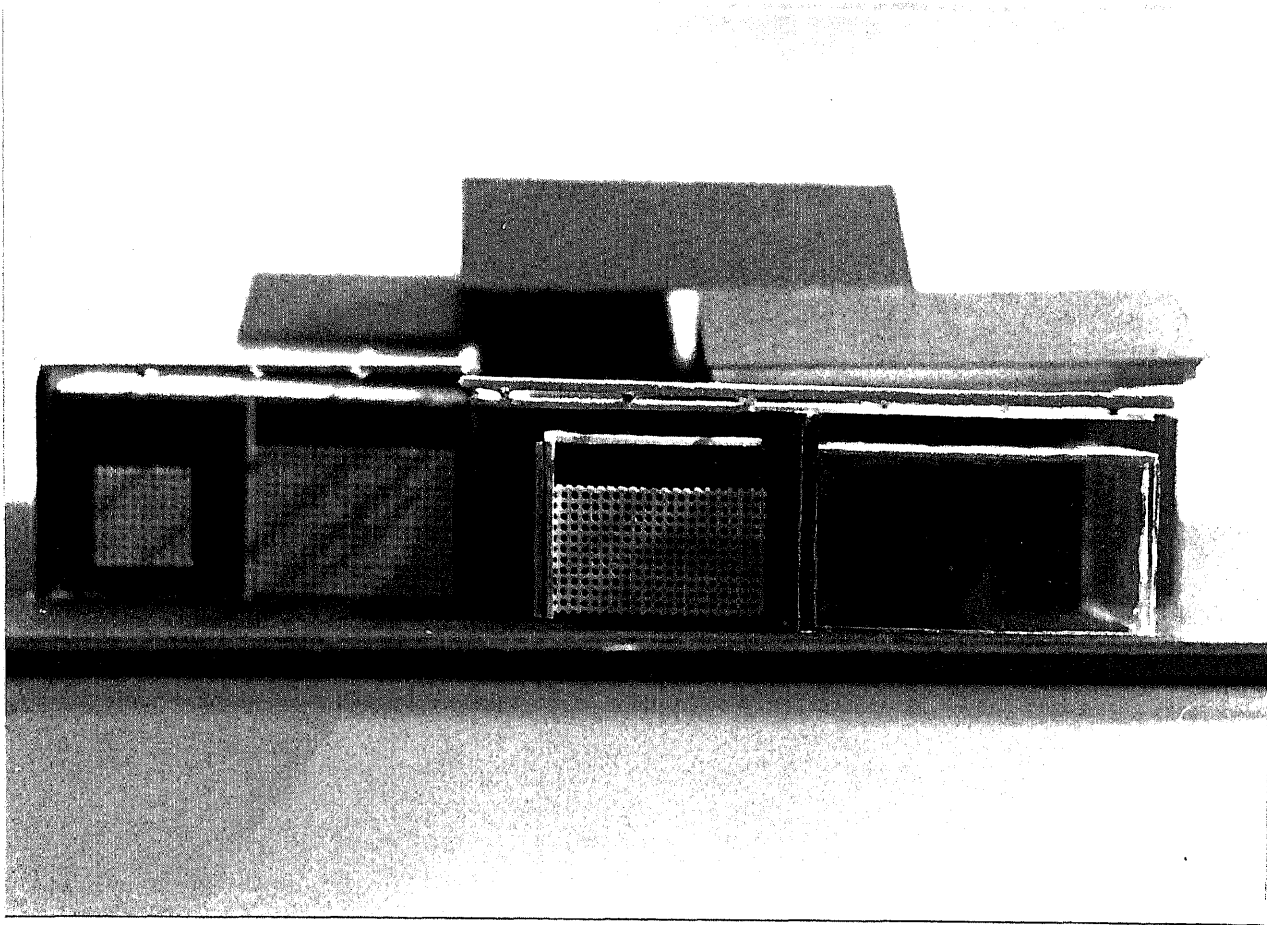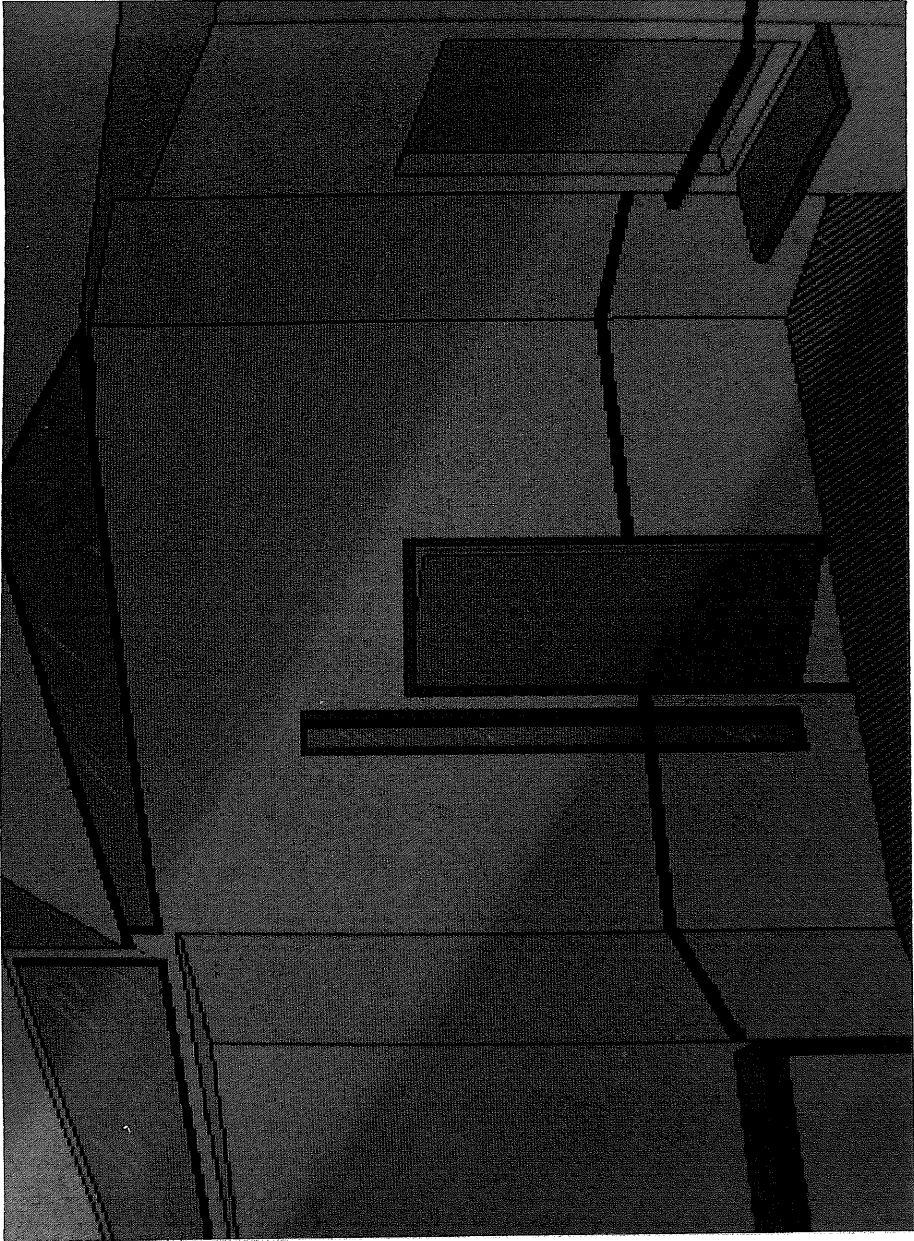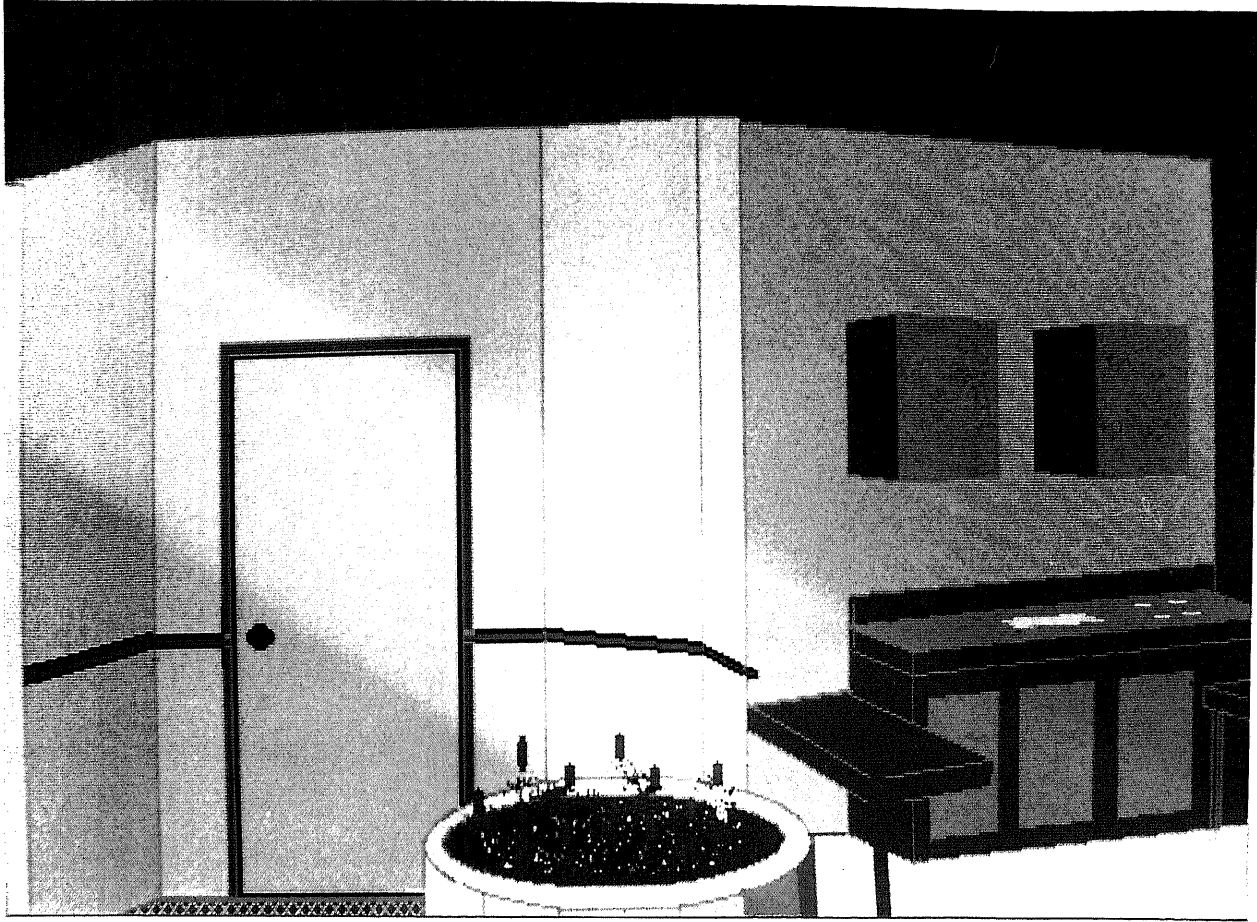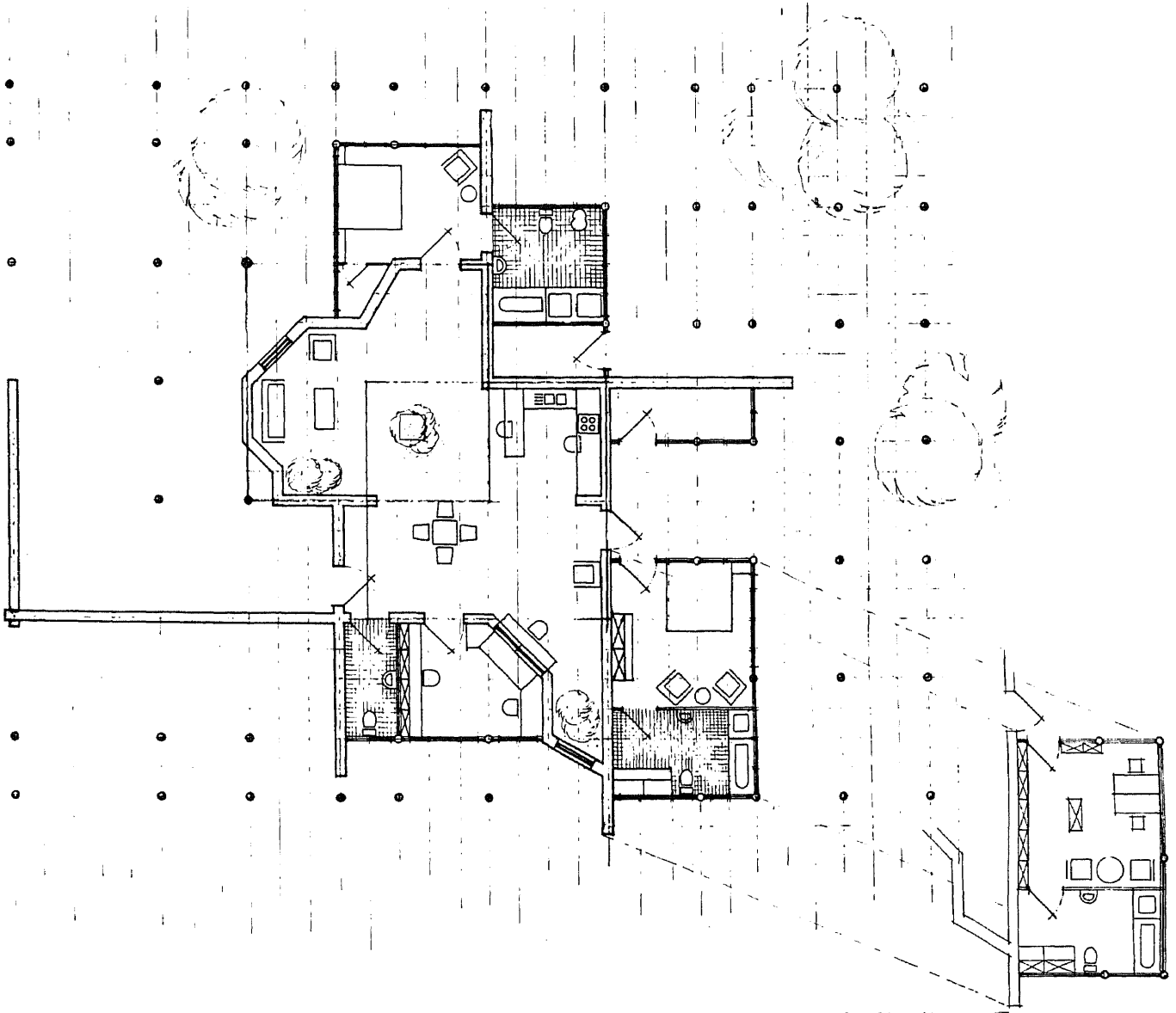
FLOOR - PLAN    [SPOUSE & PATIENT]
SCALE  1/8": 1'-0"

98
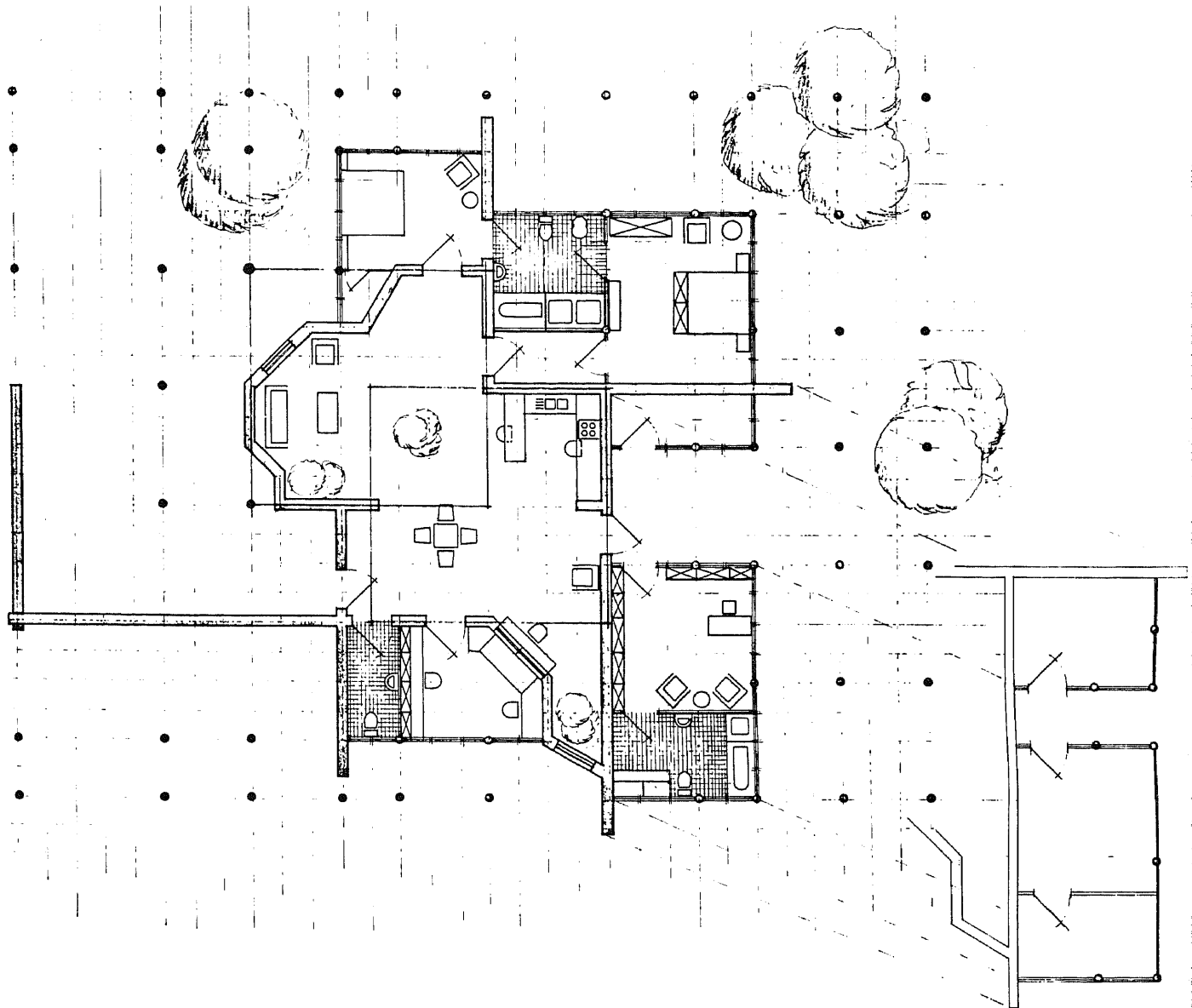
FLOOR - PLAN    [SPOUSE & PATIENT /VARIATION]
SCALE : 1/8" = 1'-0"
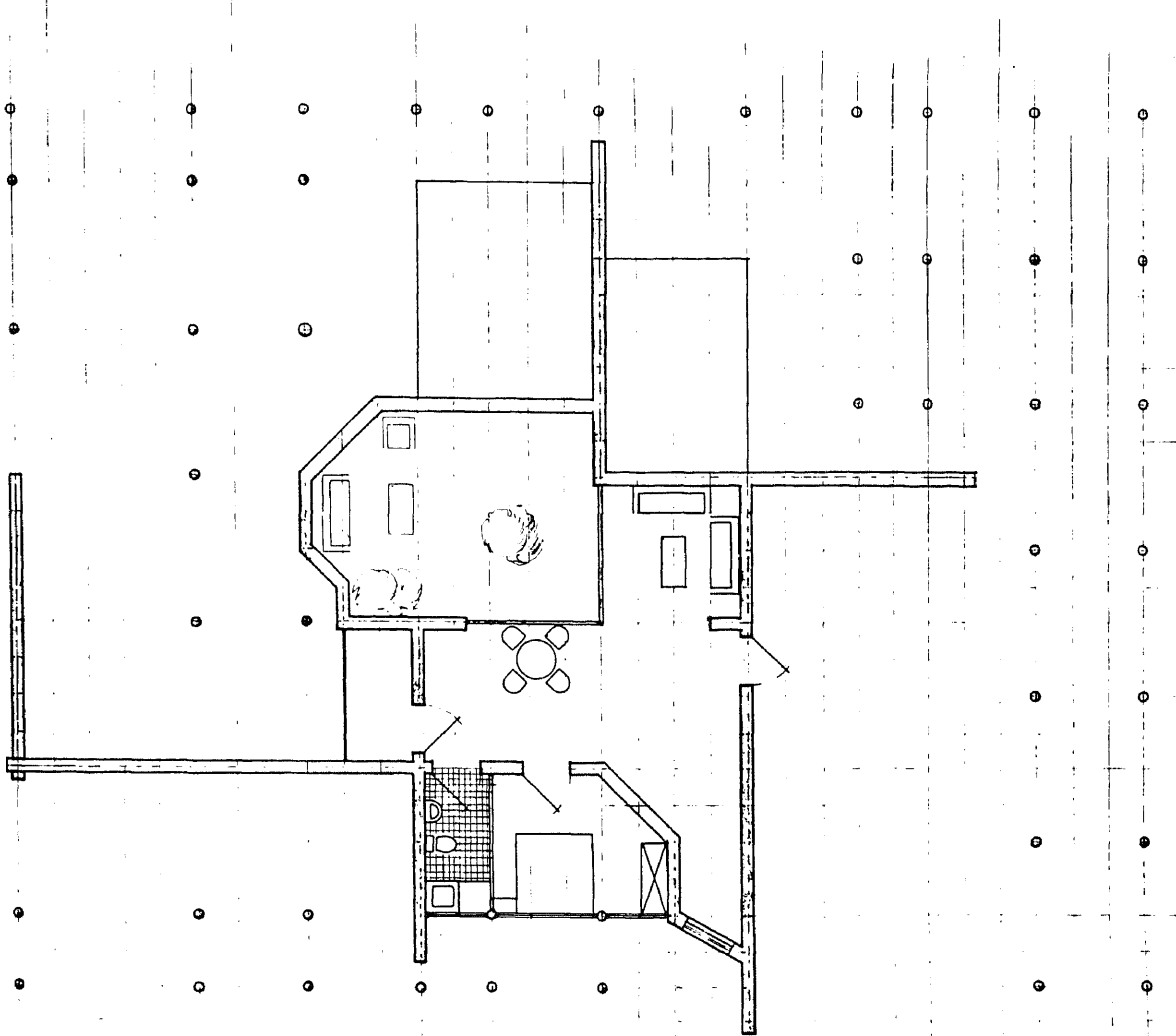
FLOOR – PLAN   [SPOUSE & PATIENT & GUEST]
SCALE : ⅛" = 1'-0"                    2ⁿᵈ STORY
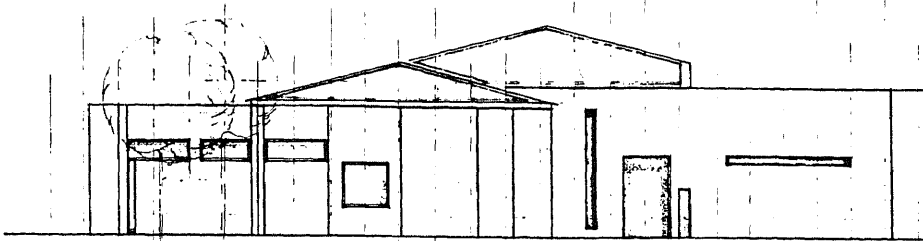
FRONT - FACADE  N/W
SCALE 1/8" = 1'-0"
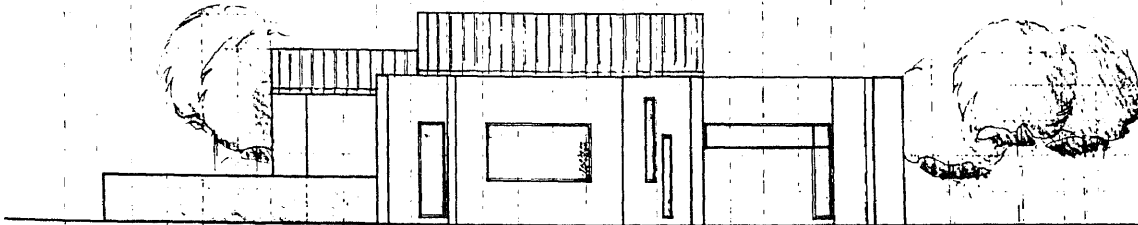
SIDE - FACADE  S/W
SCALE 1/8" = 1'-0"

101
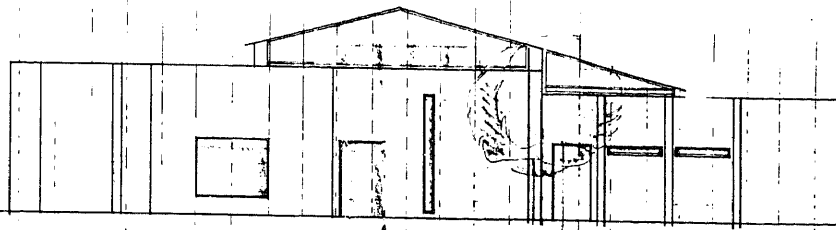
BACK FACADE S/E
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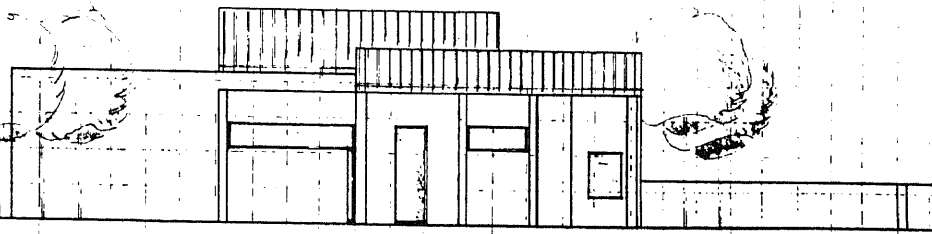
SIDE FACADE N/E
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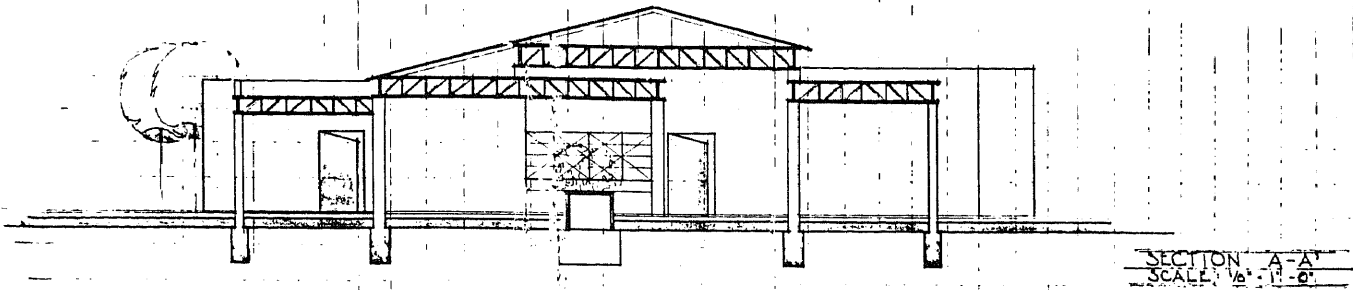
SECTION A-A
SCALE 1/8" = 1'-0"

SECTION B-B
SCALE 1/8" = 1'-0"

103
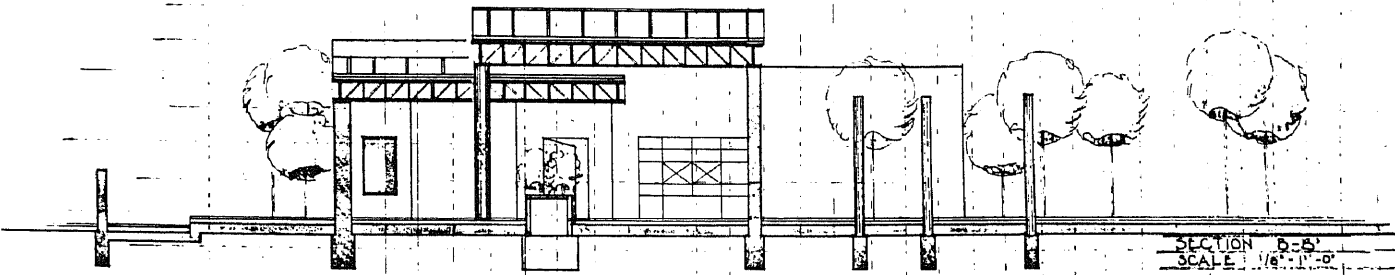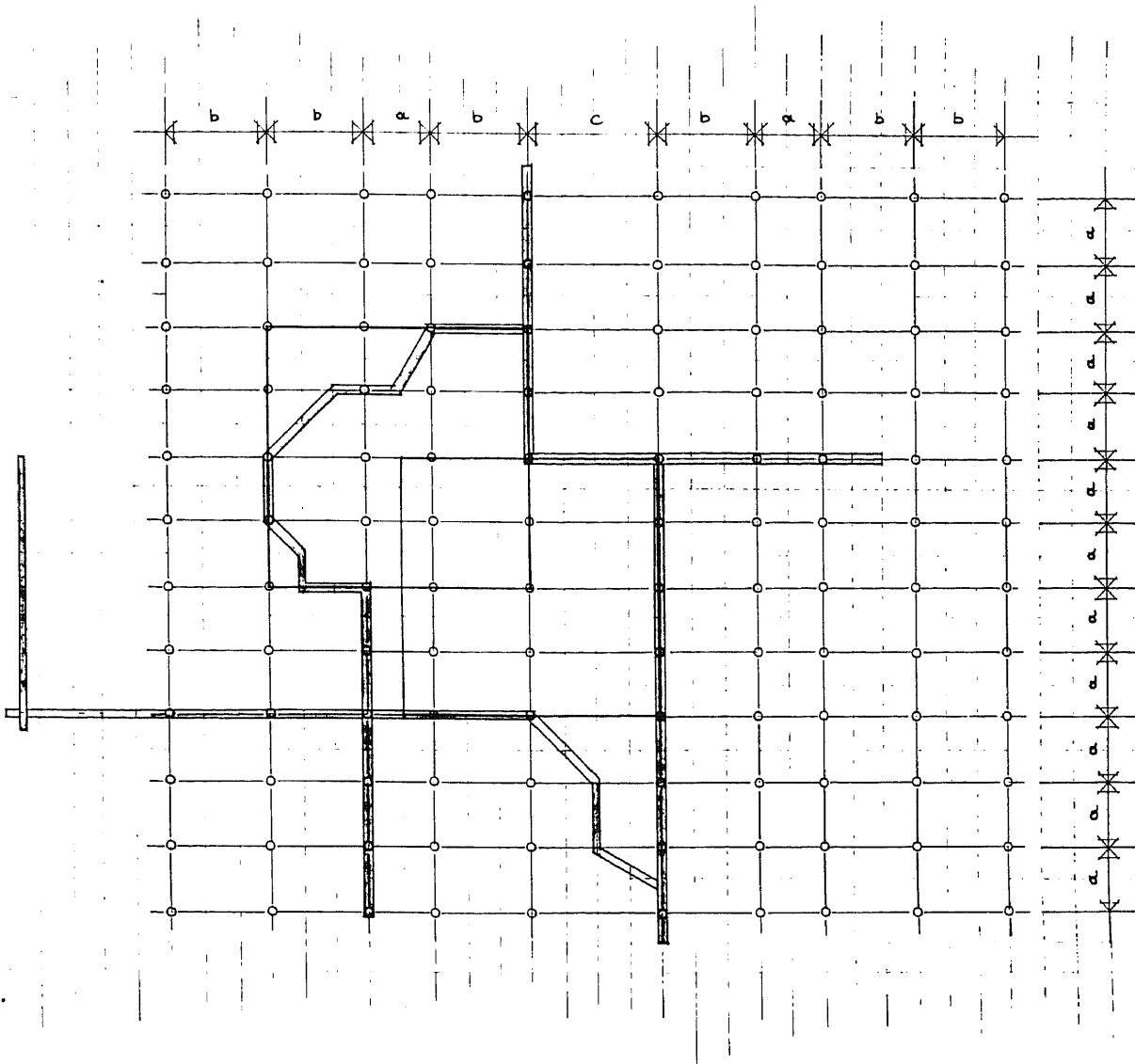
STRUCTURAL LAYOUT    [SPOUSE & PATIENT]
SCALE : 1/8" = 1'-0"
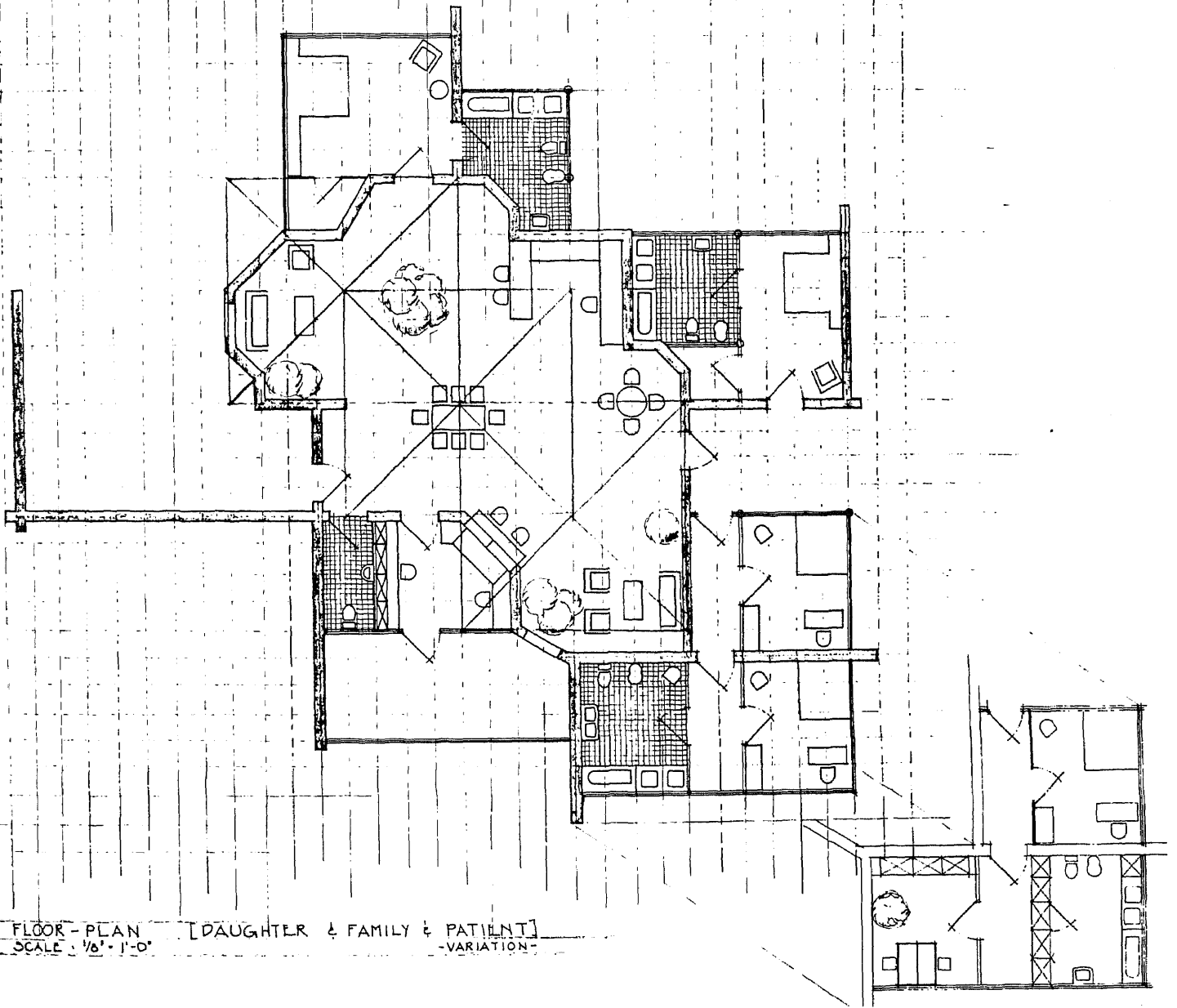
FLOOR-PLAN [DAUGHTER & FAMILY & PATIENT]
SCALE : 1/8" = 1'-0"                    -VARIATION-

DR / LR    BATH    BATH    M-BR

HALL    OFFICE

LR    BR

BATH    KI.

LR    BATH & KIT.

BR

KITCHENETTE

LR    BATH

BR
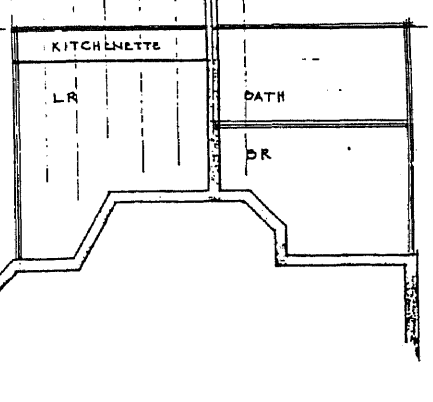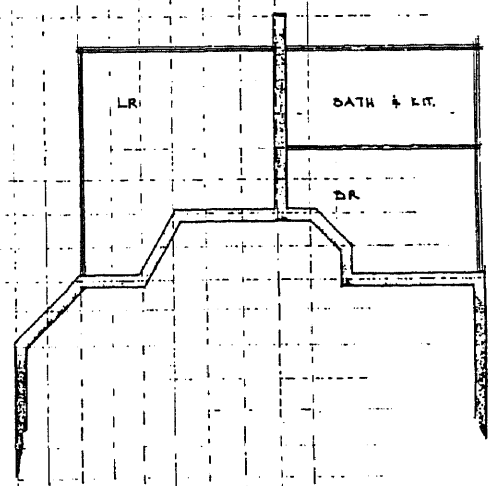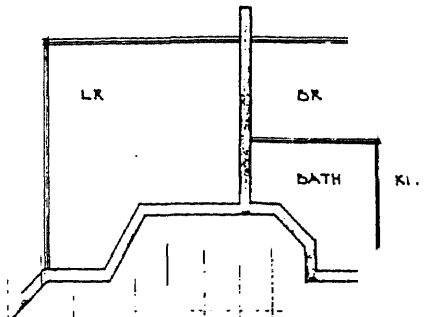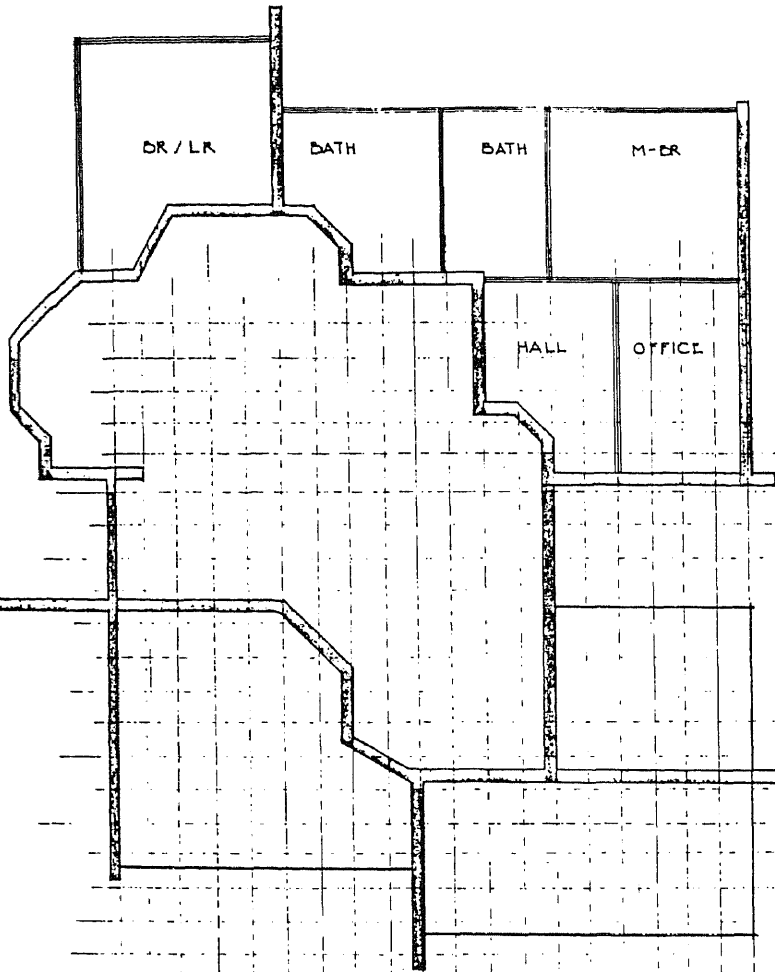
FLOOR - PLAN - VARIATIONS    [DAUGHTER & FAMILY & PATIENT
SCALE: 1/8" = 1'-0"

# Appendix B

# Modifications Manual

| MODIFICATION | EXAMPLE | BEHAVIOR/PROBLEM | SOURCE |
|---|---|---|---|
| GENERAL MODIFICATIONS<br>*to remove objects 33,37,43 | *sharp objects 1,26,37,43<br>*poisonous materials 1,9,11, 13,26,28,33,41<br>plants 1,9,28<br>flowers 1<br>*trailing wires or cords 1,9,11 ,26<br>*loose mats 1,26<br>*unsteady/unnecessary furniture 1,10,12,26,38<br>*hazards 13,43<br>*medications 1,9,10,11,26,28,37,43<br>*large areas of breakable glass (china cabinets, sliding doors)1<br><br>*weapons 10,1<br>*knives 1,9,13,28,33<br>*carving knives 33<br>*guns 1,2,9,13,26<br>*knobs off stove 1,7,9,17,28,32,43<br>*fuse 1,2<br>*small pins and buttons/objects 1,33<br>*sewing machine 1,9,28<br>*iron 1,9,10,28<br>*valuable items 1,7,13<br>*matches and cigarettes 1,2,9, 10,11,32 | *do not cut<br>*do not eat<br><br><br>*do not trip<br><br>*do not fall<br>*do not get confused<br>*do not overreact<br><br>*do not swallow<br><br>*do not fall into<br>*do not destroy<br><br>*do not hurt<br><br><br><br>*do not use<br><br>*do not burn<br>*do not swallow<br><br>*do not hurt<br>*do not burn<br>*do not destroy<br>*do not swallow/hurt | 1. "The Caring Home Booklet: Environmental coping Strategies for Alzheimer's Caregivers", Pynoos, J.,PhD, Cohen, E. MA, Lucas, C., MSG, Long Term Care National Resource Center at UCLA/USC University of Southern California Los Angeles, CA, 1988.<br><br>2. "Home Modifications: Responding to Dementia", developed and produced by The Center of the Corinne Dolan Alzheimer Center at Heather Hill, February 1990.<br><br>3. "Modifying Wandering Behavior: A CASE Study", Donat, D.C., PhD, Shenandoah Geriatric Treatment Center, Staunton, Virginia.<br><br>4. "Nocturnal wandering is one of the most trying problems for Alzheimer's victims and their families", Muir-Nash, J., BSN, RNC, Ninos,M., MS, RNC, Young, S.H., RNC, Journal of Gerontological Nursing, Volume 14. |

| | | | |
|---|---|---|---|
| *to remove negative sensory stimulation 1,12,20,21,22,28,33,38 | *remove person to quiet room 1<br>*to play soothing music 1,28,33<br>*to give new views 1,42<br>*provide fish tank, bird cage 1<br>*audio or video tape with familiar person's voice 13 | *do not feel agitated<br>*do not feel bored<br>*do not feel restless | Shaw, S., C.S.W., A Publication of the New York City Alzheimer's Resource Centre, 280 Broadway, New York,N.Y. 10007. |
| *reduce sensory stimulation 21,33 | *traffic noise 21<br>*parking 21<br>*drop-off zones 21<br>*background noise 42<br>*street traffic 21<br>*playgrounds 21<br>*background music 21<br>*air conditioning 21<br>*water fountains 21<br>*wind chimes 21<br>*plants 21 | | 10. " Caring for Alzheimer's Patients, Caregivers Practical Help", New York State Office of the Aging, 2 Empire State Plaza, Albany, N.Y. 12223-0001.<br><br>11. "Alzheimer's Desease Handbook. Volume 1", Lindeman, David A., Aging Health Policy Center, University of California, San Francisco, CA 94143, April 1984. |
| *to provide things to play with 1 10 | *coins for former cashier 1<br>*puzzle 10 | *do not be angry<br>*do not be annoyed<br>*do not be bored | 12."Practical approach to managing behavioral problems in dementia patients", Knopman, D., MS, Sawyer-De Maris, S., BSN, MS, Geriatrics, Vol. 45, No.4 April 1990.<br><br>13. "Understanding and Caring for the person with Alzheimer's Disease. A practical guide prepared by the Atlanta area chapter Alzheimer's Disease and Related Disorders Association, Inc.,1985. |
| *to use sensory stimulation and | | | |

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| cues 1,10,8,26,20,21,23, 27,28,29,38,41 | | | 14. "The Milieu Standard for Care of Dementia in a Nursing Home", Grossman, H. D., MS, Weiner, A.S., MPH, Salomon, M. J., PhD, Burros, CSW, 1986 by The Haworth, Inc. |
|---|---|---|---|
| | *cooking smells 1,10,8,26 | *do not miss | |
| | *contrasting colours 41 | | |
| | *photo albums of family 1,26 | *do not feel insecure | |
| | *pictures of familiar scenes on walls 1,26,20 | *do not feel lonely | 15. "Alzheimer's Disease and Related Disorders: Assessment and Intervention", Toseland, R.W. Derico, A., Owen, M.L. National Association of Social Workers, Inc., 1984. |
| | *flowers 1 | *do not be aware | |
| | *texture of favourite fabric 1 ,26 | *do not locate | |
| | *textures such as macrames, quilts etc. 42 | | |
| | *colour 1,26,27,3 8 | | |
| | (intense, bright colours: yellow, red, green 27 | | |
| | modified whites, tinted with yellow or peach 27) | | 16. "Rekindling the joy of life for ALzheimer's patients and their caregivers", Witte, K., MS, CCC, SpL-A, The American Journal of Alzheimer's Care and Related Disorders and Research, July/ August 1989. |
| | *familiar objects 2 8 | | |
| | *signs 1,10,26,20,38 | | |
| | *objects 3 8 | | |
| | *picture of room 1,26 | *do not recognize | |
| | *concerts 2 1 | | |
| | *picnics 2 1 | | 17. "Family-Centered Detection and Management of Alzheimer's Disease", Wetle, T., PhD. et al..., |
| | *barbeques 2 1 | | |
| | *tea parties 2 1 | | |
| | *sound of telephone with light 27 | | 18. "A Self-Care Project. The Use of Landmarks", Bertram, M. , BS, RNC, Journal of Gerontological Nursing, Vol.15, No. 2. |
| | *background music 42 | | |
| *match cover of thermostat with wall color 7 | | *do not use | |
| *lock off radiators 9 | | | 19. "Designing to Orient the |

110

*provide several sets of keys **1,
1 3**


*provide locks with recessed
tumblers **8**
*provide lever action handles
**8,43**
*provide pressure plate light
controls **8**
*remove keys **13,43**
*abstract wall hangings **12**

<u>TO RESTRICT AREA</u>
*to close off room **1**
*to lock room **1,28,29,32,39**
*to fence off swimming pool **1
,2 6**
*to install safety gate at top of
stairs **1,13,26**
*provide complicated locks **1,33**
*provide gate across top of
staircase **1**
*deny access to some rooms**10**
*child-proof cabinet latches
**2 8,43**
*lock doors **28,29**
*place gate across doorways **28**
*fence off backyard **33**
*lock doors **41,43**

*do not loose


*to guide key into tumbler **8**


*do not harm

*do not fall into
*do not drown
*do not go down

User", Weisman, G. Architecture,
October 1989.

**20.** "Designing environments for
individuals with Alzheimer's
disease: Some general principles"
Schiff, M. R., PhD, The American
Journal of Alzheimer's Care and
Related Disorders & Research,
May/June 1990.

**21.** "Alzheimer's disease and
outdoor space: Issues in
environmental design", Lovering,
M.J., DipPT, BLA, The American
Journal of Alzheimer's Care and
Related Disorders & Research,
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**22.** "Victims of Alzheimer's
Disease and the Environment",
Roberts, B. L., PhD, ALgase, D.
L., MSN, Nursing Clinics of North
America, Vol. 23, No. 1, March
1988.

**23.** "Effects of Environmental
Changes on Elderly Residents'
Behavior", Bakos, M. et al...,
Hospital & Community
Psychiatry, Volume 31, Number
10, October 1980.

| | | | |
|---|---|---|---|
| TO CHANGE AREA<br>*to change/create different living and sleeping area 1,7,26 29 | | *do not interfere with sleeping patterns 1,7<br>*do maintain family integrity and support system 7<br>*do safeguard other family members 7<br>*do support a variety of other lifestyles of caregiver 7 | 24. "Care of the Patient with Alzheimer's Desease Living at Home", Hall, G.R., RN, BS, Nursing Clinics of America, Volume 23, No.1, March 1988. |
| *design one space as a series of smaller spaces 20,21,38 | *4-6 seatings<br>*semi-private seatings with 1-2 2 1<br>*flexible furnishings 2 1<br>*seatings should be angled at less than 180 degrees to each other 2 1 | | 25. "The Effects of Pet Therapy on the Social Behavior of Institutionalized Alzheimer's Clients", Garlock Kongable, L., et al..., Archives of Psychiatric Nursing, Vol. III, No. 4 (August), 1989: pp.191-198. |
| *add glazed storage cabinet with built-in light 2 3<br>*rearrange furniture 2 3<br>*construct modular units 2 3<br>*add kitchenette<br>*add wire-glass openings to enclosed areas 2 3<br>*add raised areas 2 3<br>*put patient's room close to bathroom 2 7 | | | 26. "Environmental coping strategies for Alzheimer's caregivers", Pynoos, J., PhD, et al..., The American Journal of ALzheimer's Care and Related Disorders & Research, November/December 1989. |
| TO SIMPLIFY TASKS AND REINFORCE ABILITIES | | | 27. "Alzheimer's disease and the institution: Issues in environmental design", Cluff, P.J. FRAIC, FRIBA, The American Journal of Alzheimer's Care and Related Disorders & Research, May/June 1990. |
| | *automatic doors 2 1<br>*to arrange clothing in sequence 1,10,13,26 | *do not forget<br><br>*do not get confused | 28. "Environmental Adaptations Which Compensate for Dementia", Skolaski-Pellitteri, T., OTR, |

*scale down amount of clothes10

1,15,28,43
*label drawers with pictures &
words 43
*use plastic tablecloth or
placemat for easier clean up 1
43
*use different colours for dishes
and tablecloth 1
*use eating utensils with built-up
handles 1
*use eating utensils with weight
43
*use plates with suction cups
1,28,43
*use dycem 43
*use plates with dividers
 1,40,43
*use controlled flow drinking
cups 1
*use clip-on straw holders 1
*use bendable straws 13,43
*use curved spoons 13
*use sectioned plates 13,43

*to leave out only necessary
items in bath and kitchen 1


*two-piece outfits 10,1
*loose fitting clothing 28
*slip-on shoes 28
*velcro fasteners 28

*do not be anxious

*do not have difficulties
*do not be frustrated
*do not be perplex




*to distinguish 1

*easier to manipulate 1

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Stewart-Dedmon, M., PhD, RN,
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Times , April 27, Vol 84, No
17, 1988.

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Home Care of Alzheimer's Disease
Patients and Implications for
Support", Phelps Stevenson, J.
RN, BSN, Journal of Neuroscience
Nursing, June, 1990, Vol 22, No
3.

31. "Slow Death. Life With
Alzheimer's Is Often the Hardest
On Families of the Sick", Bowers,
B., The Wall Street Journal,
Wednesday, May 2, 1990.

32. "The Impact of Dementia on
the Family", Rabins, P. V. et al...,
JAMA, July 16, 1982-Vol 248,
No.3.

33. "The Impact of Alzheimer's
Disease on Family Caregivers",
Gabow, C. , RN, CSW, Home

*use plates without design
13,33,43
*use "plate guards" 43
*use "scoop dish" 43
*use plastic dishes 43

*uncluttered homes 21
*seats with backs and arm rests
21
*provide lever handled hardware

and grab rails 27,43
*provide only one eating utensil
31
*provide reacher 43

SAFETY
*identify dangerous glass
use of mobiles or 1
decals on sliding doors 1,2
*child-proof covers over
electrical outlets 1
*masking tape on cupboards or
drawers 1
*child-proof locks 1,2
*keep home simple and
uncluttered
9,10,1,13,26,28,43
*secure windows 1
*place lock at window top 1,10
*give person items to destroy 1

do not run into


*do not hurt


*do not get into


*do not open
*do not get confused



*do not open
*do not leave
*do not get aggressive

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34. "Visual Acuity and Contrast
Sensitivity in Relation to Falls in
an Elderly Population", Lord, S. R.
,et al..., Age and Ageing 1991;
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Psychobiological Approach to
Lighting", Hughes, P.
,Environmental Photobiology,
Duro-Test Corporation, North
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Harvard Medical School, Boston,
Massachusetts, @ 1981, The
Human Factors Society, Inc.

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Patients", ALzheimer's
Association, Alzheimer's Disease
and Related Disorders Asociation,
Inc., 70 E. Lake St., Chicago, Il.,
60601-5997.

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the effectiveness of home
modifications for community
living adults with dementia",
Calkins, M. P., M Arch, Namazi,
K. H., PhD, The American Journal
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*smoke detectors in ha
1,7
*use locks at bottoms o
13
*child proof door knobs 13
*screens in front of door 13
*use bumper guards 1
* place reflector tape on
furniture corners 9
*disconnect dangerous appliances
7,43
*provide electric kettles 7
*provide steam iron w/electric
shut-off 7
*replace unsafe hand-holds with
grab-bars 7,1,15,13,26
*remove slippery throw rugs 7,
9,8,1,17,28,43
*provide nonskid surfaces
28,43
*provide more light fixtures
7,8,9,1,13,41,42
*avoid shiny floors with busy
patterns
9,10,1,27,35,42,43
*cover radiators with radiator
guards 9
*cover exposed water pipes 9
*make stove and furnace
safe10,28
*keep car from starting10
*use plastic cutlery 10,1
*provide ramps 8,43

*unsteady furniture 1

*fasten rugs securely 1

*night lights 13

*do get warned

*do not bruise

*do limit amount of danger

*do improve orientation

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settings for persons with
Alzheimer's disease:
Environmental design training for
staff", Cohen, E., MA, et al...,
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ALzheimer's Care and Related
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Alzheimer's disease", Morgan, M.
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In-Home Interventions for
ALzheimer's Disease Patients and
their Caregivers", Pynoos, J.,
PhD, Ohta, R.J., PhD,.

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Nissenboim, S., ACSW, Vroman,
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| | | | |
|---|---|---|---|
| *provide handrails<br>**8,12,26,33,43**<br>*use deep ashtrays 1 | *contrasti | | **43.** "Copin<br>Tips<br>for Caregivers of the Elderly", |
| *provide devices that provide signals **1** | *light signal when door bell rings, telephone rings, or smoke detector goes off **1** | | King, M. P., Deily, J., O.T.R., Jefferson Area Board for Aging |
| *put up double-view mirrors **1 4** | | *allow better control **1 4** | and Northwestern Virginia Health Systems Agency, Charlottesville, |
| *use stable chairs **1,43** | *chairs with high backs, not too deep or low, with arms that extend beyond the edge of the seat **1** | | Virginia, 1987. |
| *remove or secure wire and cords **1,43**<br>*provide non-electric shaver **4 0** | | | |
| *check for uneven ground, craked pavement, holes in the lawn, fallen branches, thorny bushes, low clotheslines, etc. **1**<br>*place special locks at doors high up **1 7**<br>*fence off walking area in backyard **2 1**<br>*handrails on stairs and ramps **2 1,2 8,4 0**<br>*smooth non-slip hard surface walkways **2 1**<br>*wide walkways **2 1**<br>*remove knickknacks **2 8**<br>*remove fuses **2 8** | | | |

water temperature on
**28,43**
*remove thresholds **43**
*provide ramps **43**

*put brass balls or casters onto
bottom of chairs **43**
*provide old hairdresser's chair
**43**
*mask doors **43**
*pad sharp furniture corners **43**
*remove car keys **43**
*tack down carpets **43**
*secure rugs permanently **43**
*paint baseboards on sides of
stairs with contrasting color **43**
*install lift/elevators **43**
*provide rubber treads for stairs
**43**
provide "stove guard" **43**
*provide safety alarm on
medicine cabinet **43**


MODIFICATION FOR ORIENTATION
*dimming light in corridors **7,1
22,27**
*avoid glare **43**

*32" width  & bumper strips
along both sides **43**

| | | | |
|---|---|---|---|
| *provide night lights with sensor to shut off automatically **4 3** | | | |
| *brighten light at desired destinations **7,1** | | | |
| *identify a regular place to keep things **17,20** | *box for wallets, keys, etc. **1 7** | | |
| *provide colored tape around bathtub **7** | *pictures **20,43** | *do identify shade and depth | |
| *provide colored tape around bathroom door **18** | | | |
| *label doors and objects in the home **7,8** | | | |
| *paste written instructions and reminders **7,9,1,17,15,12,18,19,22, 2 7** | *use large printing **1** | | |
| | *large bulletin board **12,18** | | |
| | *color contrast **2 2** | | |
| | *simple, brief, clear **22,27** | | |
| | *pictograms **2 7** | | |
| | *picture and sign mounted directly beside the door, not on door **2 7** | | |
| *provide different carpet color **8** | | *define particular area **8** | |
| *use shades, blinds **1** | | | |
| *provide overhead protection outdoors **1** | | | |
| *use reflector tape on handrails, stairs, doorways, corners **1** | | | |
| *use decals on patio doors **1** | | | |
| *paint porch or deck steps **1** | *use bright colors **1** | | |
| *attach outdoor non-skid tape to the stairs' edges **1** | | | |
| *use "reminders" from earlier life to locate room **1 3** | | | |

Jing **21,43**

*put up personal mementos **14**
*provide perceptual access **19**    *plants, grandfather clock **19**
*provide simple plan    *L-shape, T-shape, I-shape
configuration **19**    **19,20**
*use landmarks **18,21**    *water fountains **18**
    *trees **21**
    *sculptures **21**
    *gazebos **21**
    *arbors **21**

*gates and doorways camouflaged
**21**
*use orientation checklist **18**
*design one space as a series of    *use screens, plants, dividers
    **27**
spaces **20,27**
*use continuous wandering route
with begin and end at same place
**21**
*identify rooms **21**    *name, objects **21**
*provide night lights **28,33**
*provide dimmer switches **28**
*provide strips of reflector tape
from bedroom to bathroom **28**

MODIFICATION FOR INCONTINENCE

*leave lights on **2,43**

*put up raised toilet seat **2,1,43**

*add commode in bedroom **2,1,43**

*put up signs pointing to bath **2,1**

*rearrange furniture **2**

*put up protection around toilet **2**

*put plastic on furniture **2,1,43**

*paint bathroom door **2**

MODIFICATION FOR USING A TELEPHONE

*attach direct dialing system to telephone with most needed numbers **1,33**

*put phone numbers next to telephone **1,10,43**

*provide written instructions next to telephone (early stage) **1**

*put large-numbered template on phone **1**

*use answering machine for incoming messages **1**

*provide dial phone instead of touch-tone model **7**

*use alert system **10**

*provide more legible push buttons **8**

*provide light with bell **27**

*emergency numbers **10**

stance

urinate in bed

*do find bathroom (early stage)

*do create direct path to bathroom

*do take care of spills and instances when missing toilet

*do clean up easier

*do not miss bathroom

*provide phone ı

**MODIFICATION TO RECOGNIZE**
**REMEMBER FAMILIAR EVENTS,**
**PEOPLE, TIME**

| | | | |
|---|---|---|---|
| *provide bold-faced calendar and clock 1,9,10,16,15,26,20,28,43 | *calendar should show month, day, time, year 10,20 | | |
| *mark off days as they pass 1,31,33 | | | |
| *pin up simple schedules of day activities with time 1,10,17,26,28,29,33 | | | |
| *provide repetitive schedule of dayly activities 41 | | | |
| *leave familiar objects in usual places 1,9,10, 8,26,20,29,33 | *magazines,26,1 *pictures,26,1,20 | | |
| *provide reality orientation board 40 | | | |
| *provide written reminders of chores or when caregiver will return 1,26,29,33 | | | |
| *display photographs of family and friends 1,7,10, 8,13,26,36 | | | |
| *have friends wear name tags 1 ,26 | | | |
| *provide analogue clock instead of digital one 7 | | *do not diminish skills | |
| *open seat in the bathroom | | *do not loose function *do not urinate in inappropriate | |

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| | | |
|---|---|---|
| instead of closed one **7** | | places |
| *provide sink in kitchen instead of dishwasher **7** | | *do not get confused |
| *provide signs **10,8,1,36** | *black on white or yellow **10** | |
| | *use signs sparingly (one or two per room)**10** | |
| *provide repetetive color coding **8** | *red for hot, blue for cold **8** | |
| *provide pictures **28** | | |
| *label drawers and closets **28** | | |
| *put pictures of items kept in cabinets on front of cabinet doors **33** | | |

## MODIFICATION TO MANAGE LOSING AND MISPLACING THINGS

| | | |
|---|---|---|
| *take away items and replace with non-valuable duplicates **1** | | |
| *provide person with special "security box" for items **1,40** | | |
| *provide small notebook **9** | | *do not forget |
| *provide signs **9,10** | *big black letters on white or yellow ("CLOSET") Do not use more than two signs per room **9,10** | *do find way |

## MODIFICATION TO MANAGE CONTINUAL REPETITION OF QUESTIONS

| | | |
|---|---|---|
| *display "reality board" to help orient **1,9** | *time, date, place, weather **1** | |

*introduce activity or simple
task **1,9,10**

MODIFICATION TO MANAGE
CONSTANT OR AGITATED PACIN
IN HOME (WANDERING)
*provide platform rocker **1,26**
*introduce activity, exercises **1,**
**9,10,8,16,15,14,13,26,20**
**21,22,23,28,29,31,33,35,**
**36,40,41,42,43**

*activity should be appropriate
to functioning level **1**
*activity should be based on past
interests and work **1**
*pencil and paper **5**

*folding napkins, newspapers,
towels, pillow cases, etc. **6,10,**
**8,13,33,43**
*provide stationary bicycle **7**
*provide rocking chair **1,7,13**
*provide trade mill **7**
*provide punch bags **7**
*cooking **8,1,16,43**
*sorting materials **40**
*sort different nuts in shells **16**
*sort flatware **16**
*dry flatware **16**
*sort onions and potatoes **16**
*wipe counters and refrigerators
**16**
*sweep floor **13,20,33,43**
*vacuum **33,43**
*water plants **33**
*craft activities **14**
*sewing **43**

*do not be bored
*do not feel disconnected
*do not feel useless

*do not get restless
*do get positive feedback from
joint and muscle movement

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*knitting 4 3

*children's to)

*simple exerci

*preparing foo

*pound dough

*washing vege ꜜies 8

*setting tables 8,1

*baking 8

*decorating cookies 8

*chopping food 8,43

*hand-mixing batter 8

*washing plates 8

*do dishes 8

*dig in garden 7

*dry dishes 1 0

*fold laundry 1 0,1 6

*dusting 1 6,3 3,4 3

*hoeing 4 3

*carrying in wood 4 3

*rake leaves 1 0

*making beds 2 0

*walk 1,1 6,1 5,1 3,2 6,3 1,3 6

*unison stretchexercises 1 6

*music therapy 2 2

*movement to music 1 6,3 1

*walk, work in garden 1 0, 8,1 3

(raised planting beds, water

features, outdoor alcoves 8)

*play games 1 0,8,3 1

*play with pets 8,2 6

*listen to music 1 0,1,1 4,1 3,

1 2,4 3

*play old favorites 1 6,3 1

ꜜnt strong emotions in a
socially acceptable manner

play seasonal and holiday mus..

as appropriate 16
*watch old movies 31
*sort pens and pencils 16
*sort large pieces of paper and
cancelled checks 16
*sort envelopes and magazines
16
*sort buttons and cards 12
*sort coins ,26
*counting & wrapping coins 43
*watch TV 10,13,43
*look at pictures in magazines 10
*look at colorful pictures 31
*look at photograph albums 15,
12,40
*assemble a puzzle (big pieces)
10
*dance (early stage) 10,1,13
*sand paintings 1
*word and informational games 1
*large paper and chalk 16,13
*adult coloring books 16
*sponge watercolors on paper 16
*use watercolors 13
*drawing 13
*use books, newspapers,
magazines, articles 13
*soft clay for holding 16
*putting cards in envelopes 43

*outdoor provisions

greenhouses 8
*bird feeders 21
*garden ornaments 21
*wather vanes 21
*flower gardens 21

*provide wandering space 21  *minimal changes in grade and no
cross slopes 21
*wall or fence 21
*trees 21
*garden structures 21
*gates and locks (hidden) 21

*provide frequent rest stops
along wandering path 21

*indoor provisions 8  *sun room 8
*plant area 8
*fish tank 8,26

| | | |
|---|---|---|
| *change environment 1,26 | *bring person to another room 1, 2 6 | |
| *regulate light 1,10,8,12,26, 27,43 | (seniors need 2x as much light as the average adult 27) *shades 1,8 *additional lights 1,26 *dimmer switches 8 *shade trees 21 *pergolas 21 *awnings and umbrellas 21 | *reduce shadows and glare ,26 |
| *fence off backyard 1,21 *provide music 1,9,10,13 | | |
| *provide "wandering areas" 3,9 8,26 | *outdoor paths equipped only with one entrance/exit door 8 *provide landmarks 8 | *do not get bored |
| *provide room with different views 3,26 | | *do not get aggressive |
| *provide room away from noisy machines 1 | | |
| *provide drapes, floor coverings, or fabric wall hangings 1 | | *absorb equipment noise 1 |

| | | |
|---|---|---|
| *arrange furniture at right angles without too much distance from each other 1 | | |
| *provide mirrors in room 3,1 | | *do not get restless |
| *bring in "modified white noise" 4 | *any low intensity, slow, continuous, rhythmic, monotonous sound 4,9<br>hum of AC 4<br>whirl of fan 4<br>auto-reverse tape player 4<br>"NO" radio, TV 4,9,8,1,13,12 | |
| *remove restraints/protective devices from patients 5 | | *do not be distressed<br>*do not be agitated<br>*do not loose dignity<br>*do not enter room |
| *put yellow strips across doorways 5 | | |
| *put up signs with large arrows pointing to patient's room 5,8 | | *do not get lost |
| *provide positioning pillows 5 | | *do not fall<br>*do not get agitated<br>*do not wake up too many times<br>*do not have pressure ulster<br>*do not be disrespected<br>*do not loose dignity |
| *place wandering ID bracelet on | *bracelet should say name, | *do not get lost |

6,9,
13

| | | |
|---|---|---|
| ...ts 7,1<br>provide simple intercom/alarm system 7,8,1,43<br>*provide monitor device 30 | | *do monitor patient |
| *put up complex locks obviously 7,9 | | *do slow down the attempts to go outside without getting frustrated |
| *place old lock in different place 9,13,43<br>*cover doorknobs 43 | | |
| *provide working night lights in hallway 9,10<br>*avoid waxed or highly polished floors 10,1,35<br>*provide dampening background noise 8 | | *do not agrevate 8 |
| *provide carpeting<br>*provide pets 25,21 | | *do not get agrevated |
| | *provide warm colours in rooms with northern or eastern exposures; southern and western with cool colour schemes 27 | |

rescent light 35

provide light in the red end of
the spectrum 35

KITCHEN
*provide automatic pilot for
stove 2
*use microwave 2
*install switch on stove 1,2,37
*turn circuit breaker to off 1,2
*tape burner knobs 2
*unplug appliances 2, 7,37

*purchase iron that shuts off
automatically 2
*put up warning signs (early
stage) 2,37
*put wheels on chairs 2
*rugs (remove/add) 2,10

*tie faucets 2
*provide sink instead of
dishwasher 7
*remove fuses at stove 7

*do not use

*do not recognize
*do not burn

*do not use
*do not operate them
unsupervised
*do not forget
*do not set fire
*do not burn yourself

*do not need to get up
*do not fall
*do not get cold

*do not turn on
*do not diminish skills

*do not use

| | | | |
|---|---|---|---|
| *make stove unusable **9,8,15** | *stove that turns itself off **8**<br>*inaccessible switch **8** | | |
| *provide electic coffee maker, that is thermostatically contr olled **15** | | | |
| *provide lockable cabinets, with open shelving with viewable contents **8** | | | |
| *provide adjustments in shelf height and depth **8** | | | |
| **BATHROOM** | | | |
| *paint bathroom door yellow **10** | | | |
| *put picture of toilet and identifying word "toilet" on bathroom door (early stage) **1,9, 8,13,12,33,36,43** | | *do not find or recognize bathroom | |
| *attach strips of reflect tape on wall from bedroom to bathroom **1,33** | | | |
| *attach reflective tape around bathroom door **13** | | | |
| *put up line at eye level from dining/living area to bathroom **8** | | | |
| *put night light in hallway between bedroom and bathroom **1 9** | | | |
| *paint door frame and bathroom door **8** | *bright, contrasting color **8** | *do recognize bathroom **8** | |

| | | |
|---|---|---|
| *put up three-dimensional marker **8** | | |
| *remove medicines **2,9,39,43** | | *do not get into drugs |
| *provide tub or shower chair **2 10,8,1,13,28,37,40,43** | | *do not get hurt during bathing |
| *put up grab bars in bathtub and and shower **2,9,10,8,1,15, 13,28,30,33,37,40,43** | | *do not fall |
| *provide grab bars around toilet **9,8,1,15,28,30,33,37,40, 43** | | *do hold onto |
| *provide non-skid tub mat or strips **2,9,8,1,13,12,28,37,43** | *colors of bathtub and mats should match **9** | *do not slip |
| *install wand-type shower head **2,30,37** | *detachable **30** | *do not need to get up from tub chair |
| *provide electric razors instead of others **2** | | *do not cut |
| | | *do not hurt |
| | | *do not get electric shock |
| *remove/add carpeting/rugs **2,9,1,28,43** | | *do not fall |
| *put up signs (early stage) **2,10,37** | | *do not forget to flush |
| *provide open seat instead of closed one **7** | | *do not urinate in inappropriate places |
| *provide elevated toilet seat **9,8 1,28,33,37,40,43** | | |
| *provide toilet frame **43** | | |
| *provide bidet **40** | | |
| *provide raised bathtub **8** | | |
| *provide night light **9,10,37,43** | | |
| *provide bathtub bench and a | | |

hand-held shower 9,1,13,40,43
*provide nonslippery floor
surfaces 8,1,43
*provide floor drain and positive
drainage angles 8
*purchase plasticized seat and
a lower hose 8
*provide plastic liner 40
*stick some contrasting colored
tape around edge of bathtub 8
*install nonskid flooring and tiles
that contrast with tub 8
*provide non-skid shoes 13

*use contrasting colors in bath-
room 8
*purchase deep soap dish 8
*purchase finishes and surfaces
that reduce reflected noise and
increase sound absorbency 8
*place simple sign with
instructions 1,17
*use colored, padded toilet seat 1
*remove toilet seat cover 1
*remove lock on bathroom door 1
13,43
*change lock 39,43

*install telescoping magnifying
mirror 1
*remove hairdryer and electric
razors 13

*can be opened from the outside
39

*do ensure that water will not
collect on floor 8
*to bathe seated person 8

*define edges and depth 8

*fixtures will stand out 8

*soap does not fall into tub 8
*do not get frightened and over-
stimulated 8

* make viewing easier 1

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| | | |
|---|---|---|
| *provide coral or peach coloured walls **27** | | |
| *make bathroom wheelchair accessible **27** | | |
| *add bedpan **33** | | |
| *add urinal **28,30,33** | | |
| *add shower hose attachment **28** | | |
| | | |
| **LIVING AND DINING ROOM** | | |
| *remove rugs **2,9** | | *do not trip |
| *provide carpet **2,9** | *carpet should have non-skid bottoms **9** | *do not fall |
| *rearrange furniture **2** | | *do not hinder |
| *remove cords **2** | | *do not trip |
| *put up night lights **2,9** | | *do not fall |
| | | *do not be afraid |
| | | *do not be confused |
| *put up heavy furniture **2** | | *do not trip |
| *remove furniture with sharp corners **2** | | *do not hurt |
| *cover thermostats **2,9** | | *do not change temperature |
| *use plastic cover for seats **1** | | |
| *design one space as a series of smaller spaces **20,27** | | |
| | | |
| **BEDROOM** | | |
| *rearrange furniture **2** | | *do not be afraid |
| | | *do not bump into furniture |
| *install bedrails **2,1,43** | | *do not fall out of bed |
| *add an intercom **2,43** | | *do monitor patient (night) |
| *provide portable commode **9,1, 13,28,33,36,37,43** | | |
| *provide disposable briefs, pads, | | |

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| | | | |
|---|---|---|---|
| etc. for chairs and beds **13** | | | |
| *provide night light **10,39,43** | | | |
| *provide heavy bedside lamp **10** | | | |
| *provide mirror if it is not disturbing **1** | | *person can view self **1** | |
| *remove destracting pictures and objects **24** | | *do not get scared **24** | |
| *provide reflecting tape along way between beroom & bathroom **43** | | | |
| *provide "alarm system" **43** | *bells at door **43** | | |
| *provide window in bedroom door **43** | | | |

## MODIFICATION TO RESTRAINT
### EXITING

| | | | |
|---|---|---|---|
| *dead-bolt lock on door **2,37** | | *do not leave house | |
| *curtain in front of door **2,1** | | *do not recognize door | |
| *chain lock **2** | | *do not open door | |
| *barrier in front of door **2** | | *do not reach door | |
| *locking screen door **2,37** | | *do not go outside | |
| *door stopper **2** | | | |
| *chimes on door **2** | | | |
| *electronic security system **2,8 1** | | | |
| *slide-bolt lock **2** | | | |
| *doorknob cover **2,8** | | | |
| *privacy lock cover **2** | | *do not lock door | |
| *remove doorknob **2** | | *do not use door | |
| *keep lights turned off **2** | | | |

*tie door shut 2
*put note on door 2
*paint door in the same color as
surrounding surface 8
*install lock that is difficult to
operate 1
*place lock at bottom or top of
door 1
*install child-proof door knob 1
*secure large windows 1
*put furniture in front of door 37

*do not leave house

## STAIRS
*close door to stairways 2
*put up railings 2,9,43
*put up gates 2,9
*put up gates with bells 2
*keep stairways dark 2
*put furniture in front of stairs
2
*put up gate across top of
staircase 7,9,10,1,13,43
*mark edges of stairs with
contrasting tape 7,28
*safety banisters 9
*reflector tape on top and bottom
of basement steps 28
*paint outdoor steps bright 28

*do not use
*do walk safely
*do not open
*do get warning
*do not get close
*do not recognize



*do identify depth


*do not fall

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