

VISUAL CONCEPTUALIZING

IN NOTE REVIEW

by

BENJAMIN SILLIMAN

B.A., Colorado State University, 1975  
M.Div., Princeton Theological Seminary, 1978

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

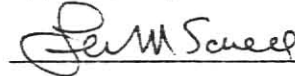
COLLEGE OF EDUCATION  
Department of Curriculum and Instruction

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1981

Approved by:

\_\_\_\_\_

**THIS BOOK  
CONTAINS  
NUMEROUS PAGES  
WITH THE ORIGINAL  
PRINTING BEING  
SKEWED  
DIFFERENTLY FROM  
THE TOP OF THE  
PAGE TO THE  
BOTTOM.**

**THIS IS AS RECEIVED  
FROM THE  
CUSTOMER.**

SPEC  
COLL  
LD  
2668  
.T4  
1981  
S58  
C 2

### Acknowledgements

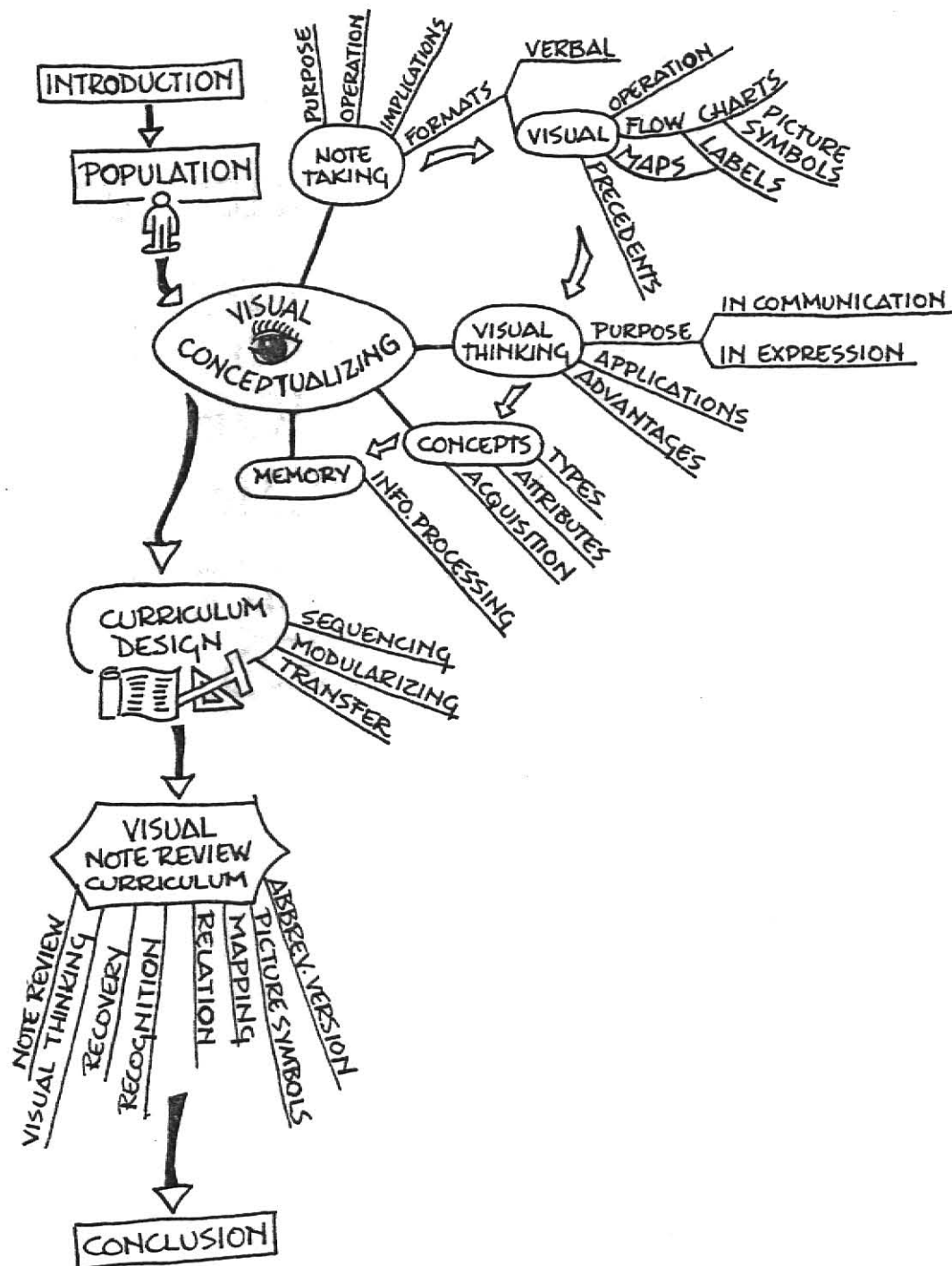
In completing this work of research and creative endeavor, a reflective pause calls to mind those whose inspiration and guidance enhanced and directed its development. A special thanks is due my advisor Dr. Leo Schell, Kansas State University, College of Education, for his artful exercise of freedom and critical judgement. These complementary modes of critique served to lend perspective without restricting personal inquiry. Also, Dr. Richard Harris, a personal friend and Associate Professor in the Kansas State University Psychology Department, provided encouragement and expertise concerning Information Processing Theory.

## TABLE OF CONTENTS

<u>Topics</u>	<u>Page</u>
Introduction	1
Population	4
Note Taking	6
Visual Formats for Note Review	15
Visual Thinking	24
Concepts and Concept Development	33
Memory	40
Curriculum Design	46
Visual Note Review Curriculum	51
Abbreviated Version	86
Conclusion	91
Appendix	94
Abstract (follows Appendix)	



# Visual Conceptualizing in Note Review



## INTRODUCTION

Visual conceptualizing for note review represents an effort to apply the thought and language of design to academic inquiry. The discussion and related curriculum project which follow emerge from the author's own experimentation with visual modes of processing information. Additionally, the desire to supply undergraduates with simple and creative means for interpreting and managing ideas arises from teaching experiences. A sample of related topics, including a survey of the population, note taking process, visual formats for note review, visual thinking, concept development, memory, curriculum design introduces the curriculum itself. These discussions furnish a context in which to briefly review relevant literature and propound the goals and rationale of visual conceptualizing in note review. The curriculum project, presented in simple and complex versions, offers requisite skills for two levels of initial competence. The project and topic interpretations at this writing suggest a model for understanding and teaching visual conceptualizing. Expansion of the bibliography, adaptation of curriculum to student needs, and related research promise abundant returns for further investigation.

Visual conceptualizing involves the whole range of mental and graphic manipulation of real or symbolic images in spatial frameworks. This perception and related drawing skills flourishes in architectural, interior design, and engineering disciplines which deal with spatial tasks (both concrete shaping and correlated abstract interpretive elements). Business and science fields engage visual representation to

conceptualize invisible principles (patterns of production, genetic charts). Social sciences and humanities employ visual-spatial formats to a lesser degree. Rarely are students in non-design majors schooled in the methods and potential of using visual images and patterns to define and relate the content of lectures. This thesis presents a curriculum with related discussion to introduce the concept of visual representation. As a preface to full-scale design skills, the project emphasizes arrangement of lecture points in a variety of discrete relationships. This more limited definition of visual conceptualizing, facilitated with flow charts, maps, and picture-symbols, adequately describes the present endeavor.

The introduction of visual-spatial formats into note review originated, for this writer, in the need to visualize and restructure large amounts of information in a simple and memorable way. Such efforts inevitably led to personal questions about the nature and function of points represented. This type of involvement and interaction is encouraged in the review strategy proposed. Creative exploration of crucial points and interrelationships carries with it the possibility of anticipating test questions. More significant, however, is the direct contact of students structuring data to suit individual patterns of association. This strategy is frequently the missing link in understanding for students who merely recopy lecture notes for study. Finally, the sample curriculum proposed provides an entertaining format for personal expression. Drawing promises a measure of personalization and play not normally associated with reviewing notes for exams.

Discussion topics have been selected for their relevance to the thesis project. The process of note taking and effective review is a crucial issue for college students. Visual formats have been proposed in several forms to facilitate memory and independent thinking. However, few visual-spatial models are presented in explicit skill-building steps. Fewer, if any, demonstrate how specific visual representation skills might enhance the critical reviewing phase of study. Visual thinking presents a perspective on the creative process as well as an unique approach to viewing information. Visual thinking offers a way of structuring reality which might expand the student's communicative and expressive capacity beyond the limits of verbal media.

Concept development and memory are significant to the development of learning tools. These topics focus on the complex nature of the learner's task and means by which associations can be retained. The curriculum has been designed with simple modules in sequence building to greater complexity to apply principles of concept acquisition and memory.

The curriculum project offers a sample of skills with explanations, examples, and exercises. After introductory sections on note review and visual thinking, recovery of missing notes, recognition of main points and detail groups, and relating of points in a visual-spatial framework describe the general thrust of teaching exercises. Reading of descriptive sections may be enhanced by referring to the project frequently. Also, an appendix of illustrations, equally supportive of the text, follows the concluding comments.

## POPULATION

The thesis curriculum project is designed to meet the needs of college freshmen and sophomores. Since this group represents a diversity of skill levels and study needs, two versions of the project have been developed. Both versions anticipate a formal operational level of intellectual development (Piaget, 1970a), although imaging (developing picture-symbols) and charting supply concrete aids to understanding abstract information. The curriculum's emphasis on independent learning and personalizing lecture material attempts to foster growth in emotional maturity as well. Students are encouraged to move beyond the predictable, completely structured confines of classroom learning to more self-reliant patterns of learning. Most important, however, is the project's contribution to students' practical needs. The immediate and developing needs to prepare for exams and create an information base demand an efficient system, useable in many circumstances.

### Practical Needs

College freshmen and sophomores frequently face intellectual and emotional challenges in coping with the rapid and extensive flow of information. These problems are multiplied for students with deficiencies in reading, listening, and note review. College learning places more intense demands on students. Maxwell (1980, p. 2) states, "In contrast to high school, where attendance is required, college courses give students greater freedom, for professors assume that they have the self-direction and self-discipline to study and learn on their own.

Furthermore, college students are expected to develop new and higher-level skills." Butcofsky (1970) found half the freshmen in his study had problems related to note taking habits. This data is suggestive of the need for structure: a means to systematize information processing. Rindone and Tixier y Vigil (1977) conclude, on summary of several studies of teacher expectations, that "more emphasis is being placed on content methodology than on process methodology." As a result, students are left largely to their own resources in developing consistent patterns for analysis and concept-association.

This thesis project addresses this need for structure, applying generalizeable skills (locating, sorting, and relating points) to content-related materials. A systematic approach stressing gradual recognition and personalized structuring of points attempts to supply and/or suggest process methods for note review. Inasmuch as academic or emotional self-confidence benefits from a person's ability to visualize and manipulate information, the explanations and exercises of the thesis project facilitate self-reliance. Emphasis on definition, function, and relationships identifies the critical dimensions of complex concept-building. This ability to determine component parts, their interaction, and the rules by which they combine to become complex concepts is crucial to college learning and independent thinking generally. Finally, visual conceptualizing involves an element of fun. The process of "playing with ideas" and drawing, instead of writing out points and patterns can make note review more enjoyable as well as academically rewarding.

## Intellectual and Emotional Development

The college years have been viewed traditionally as a unique time of growth intellectually and emotionally. Generally, the intellectual environment demands greater degrees of complex thinking and independence with the passage from introductory to specialized courses. Greater abstraction characterizes learning tasks. At the same time, students are expected to assume more responsibility for independent learning efforts (Perry, 1970). In order to successfully adapt to the demands of higher-level learning, students must develop means of structuring information. The note review project proposed in this thesis seeks to introduce visual media appropriate to this need. Processes by which students may interpret and manipulate data would seem conducive to a student's ability to analyze and use complex ideas. Astin (1977, p. 225) found a positive correlation between academic performance and self esteem. This relationship is that, inasmuch as a personalized system for note review contributes to better grades, students adopting the system would improve their satisfaction with themselves. Inasmuch as a personally-controlled strategy for learning helps students achieve a measure of control over their environment, the note review project ought to build confidence as well as academic competence. These hypotheses about the thesis project remain to be tested empirically.

## NOTE TAKING

### The Note Taking Process

Note taking represents a major learning task in college education. The lecture approach which predominates among teaching methods in

higher education necessitates careful attention to the note taking process. Efficient listening, recording, and review of oral presentations provides a valuable complement to reading and laboratory practice. In addition to its introductory and interpretive functions for general comprehension, note taking holds practical value for the student. One study (Palkovitz and Lore, 1980), indicates that a high percentage of test questions are drawn from lecture material. Thus, focus on the multi-staged process of listening, recording, and review seems a fitting task for improving study skills. Within this context, attention will focus on reasons for note taking, stages of the note review process, its relation to learning, and the styles or schemes developed for effective information gathering and review.

#### Purpose

Note taking comprises the axis of whatever dialogue exists within the lecture teaching system. Its immediate purpose rests in the usefulness of an organized body of specialized terminology, with illustrations, to provide a clear, coherent message which the learner comprehends and interprets in examinations. Often, interpretation and application is, in fact, less important than verbatim recall. In either case, however, location of relevant terms and simple relationships between them remains a crucial role of the note taking process. Beyond preparation for examinations, note taking supplies an information-base for general knowledge, practical application, and professional expertise. A more complete record and more thorough rehearsal builds a stronger reference source for these later needs. In both immediate and ultimate purposes, taking



and reviewing notes acts as a guard against forgetting (Pauk, 1974, citing Spitzer and Sones) and an external memory device (Palkovitz and Lore, 1980).

### Operation

The note taking process describes a complex of cognitive operations by which information is written down, interpreted, rehearsed, and preserved. These stages, whose structure resembles the framework of Information-Processing Theory (Atkinson and Shiffrin, 1968: figure a)<sup>1</sup>, comprise distinct but (or, complementary) mutually dependent learning tasks. Gathering of information (input from the environment) leads to restructuring and rehearsal (encoding) providing the basis for later recall (retrieval). Each of these processing stages subsumes specific skills which produce a network of meaning for the learner.

Information-gathering describes the initial phase of note taking. Pauk (1974, citing McClendon) notes that recording of information can create a memory base without decreasing listening competence. Recording of oral input generally occurs through verbatim transcription, paraphrase (one word or a sentence), or brief summary of points and relationships (as suggested by Pauk, 1974, p. 130-133). One would suspect that the style and completeness of recorded notes would vary with the instructor's manner, the learner's competence with both content and process, and the purpose for which notes are recorded. The message experienced and coded in this initial phase involves noting facts, drawing relationships, noting context and significance. Inclusion of examples anchors factual material in a memorable application.

<sup>1</sup>Illustrations of figures a-p can be found in the Appendix, pp. 94-100.

The sorting stage of note taking begins during lecture, gaining perspective from oral and written (on the board) clues such as outlines, diagrams, intonation, repetition, introductory phrases, inherent sequence. Inventory of specialized technical jargon relating to content meaning and methodology comprises the major work of the sorting process. Generally, the learner who engages in silent questioning during the lecture phase will be able to add details of personal relevance to definitions of terms. These observations may serve to clarify, illustrate, or indicate the significance of terms which appear together. The formal post-lecture sorting stage usually precedes with verbal description of concepts, identification of main points, grouping of supporting details, and interpretation or application of points to real-life contexts. Through this stage the learner establishes a clear understanding of individual points which forms the basis for drawing relationships and rehearsing the subsequent structure.

Relating points synthesizes the operations of the first two stages. The sorting of points into main and detailed, object, idea, and process categories initiates arrangement into hierarchies, sequences, and common groups. In practice, relating terms occurs simultaneously with sorting. Idea and process terms can easily be understood as connections between objects or ideas and the introduction of these as well as unstated connections weaves a network of meaning between points. Major points themselves can be refined by relating them to a variety of details (parts, types, characteristics, functions, and stages). These points might be related to each other in a scheme which makes the learner more conscious

of the overall organization (as well as individual relationships) of study material.

Sorting and relating produce a list and/or outline of points conducive to rehearsal. This final stage of the note taking process serves to repeat and reconsider previous discoveries in order to build memory. Viewing and repeating definitions and patterns until they can be recalled without clues and can be illustrated with novel cases reflects the discipline of committing information to memory. Without the prior stages, rehearsal might be incomplete and unorganized. Without rehearsal, sorting and relating could easily remain elaborate notes rather than conscious knowledge.

Much of the note taking process occurs when the student is alone, except for the aid of a textbook or occasional study-partner. The note review curriculum project contained herein attempts to address the sorting and relating stages of this process. The project approach emphasizes active exploration, enabling learners to structure and personalize lecture information. Active sorting and relating on one's own promotes a feeling of control over information and thus facilitates motivation. In fact, the note review process has been found more facilitative of memory than the accuracy of the notes themselves (as measured by test performance after four seventy-five minute lectures followed by review: Palkovitz and Lore, 1980). Interaction with the text in reading by clarifying terms, establishing a structure, questioning premises, establishing relationships, and applying ideas to new cases is a recognized contributor to verbal memory (Ausubel, 1963). Intent to learn and learning for a purpose characterize descriptions of productive

learning in several texts (Pauk, 1974, pp. 64-65; Adams, 1972, pp. 38-43; McWhorter, 1980, pp. 127-129). Locating information, defining, categorizing, and relating points are taught in the project in the context of processing content materials. These tasks require and, within a normal difficulty range, encourage active involvement with new information. DiVesta and Gray (1962), Howe (1970), and Carter and VanMetre (1975) emphasize the role of note review in personalizing information. This practical exercise of putting words and structure in one's own terms closely parallels Piaget's concepts of assimilation and accommodation (Flavell, 1963, pp. 58-61). These processes are characterized by active, personalized learning, involving structuring and restructuring throughout.

#### Implications

The note taking process described in the project carries broad implications beyond academic functions. Learning of and competence in verbal and visual languages equips learners for flexible expression of ideas. The linking of these media to thinking processes furnishes resources for sorting and relating new ideas and perspectives. In brief, the note taking process can become a discipline fostering growth in linguistic variety and competence and the higher-order thinking skills. Thus, conscious attention to improvement of note taking skills would seem appropriate in academic courses.

#### Note Taking Formats

The process of recording, sorting, and relating can take place in a variety of styles. Appropriate models for note taking will vary with

the learner, content, and conditions available for learning. Assuming that time and conditions conform to normal classroom schedules, personal organizing and reasoning skills nevertheless exhibit a variety of patterns of arrangement and review. Differences in instructors' styles of organizing lecture information (Day, 1980) suggest broad patterns of arrangement for students' notes. Day, using over 150 examples of college lecture notes, identifies seven general formats used to present lecture material (Figure b). Models range from tightly-structured, word-for-word modes of verbatim written and oral presentations to more loosely-structured, open-ended, non-verbatim approaches. Each format, the article notes, bears its own set of advantages and pitfalls. Generally, instructors' schemes evolve over time and come to reflect a balance of concentrated content material (complete with elaborate phrases, technical jargon, and complex diagrams) and learner needs (simplicity, illustration, sequence, and repetition).

Day's observations might prove valuable for analyzing inherent organization or emphasis on methodology available to college learners. Each student must absorb new and often complex strands of information in a relatively short period. Both immediate recall for testing and long-term familiarity for recognition, interpretation, and application are desirable results of note taking. Technical definition and paraphrase perform different but necessary roles in explaining classroom topics. Review of notes requires sufficient detail to grasp the meaning and significance of concepts but also sufficient simplicity to grasp the inherent, essential scheme of things within a given body of information. In many ways, the demands on students exceed demands on instructors. Ironically,

the former group possesses much less preparation and enjoys fewer resources for improving both content knowledge and methods of arrangement. Thus, familiarizing students with instructors' paradigms would seem a wise procedure for enhancing students' note taking and review. Formats suggested by Day are summarized as follows:

Verbatim recording: the written style employs a word-for-word script of information. Oral schemes increase the redundancy, increase the complexity of written formats.

Non-verbatim recording: a linguistic emphasis characterizes outline and major points styles. Outline formats allow for flexibility and instructor involvement in material while maintaining a relatively tight structure. Major points focuses on key ideas, emphasized within a loose structure.

A spatial emphasis produces tree diagrams, pictorial, and graphic formats characterized by symbols and visible structures. Tree diagrams feature open spaces between chunks of data. Flow of ideas is illustrated by lines drawn between chunks. Pictorial styles include fewer words and use symbols to interpret relationships in the same open presentation. Graphic presentations help condense information and allow for a variety of topics to be discussed within a larger context.

Hybrid formats: combinations of two or more styles, adapted to individual needs, are suggested as the most frequently used and most useful formats.

Since students rarely write out lectures verbatim, non-verbatim means of note taking and review offer the most logical schemes available to the student. These schemes are not nearly as cumbersome and offer more occasions for thought-provoking questions than verbatim transcripts. However, their very symbolic elements and simplified structure suggest greater complexity of thought than copied notes. These thought patterns have taken shape in specific verbal-linear and visual-spatial modes in content textbooks and study skills texts. Both approaches are designed to accentuate major points and relate bits of fact for clear and concise understanding. Of the linear approaches,

the Cornell Method (Palmatier, 1973; Pauk, 1974) is probably the best-known and most frequently used format for college study skills. Its record-reduce-recite-reflect-review procedure can be utilized with any style of note review. The unique aspect of the Cornell Method remains the use of numbered and lettered outlines using words, phrases, or sentences. Pauk applies this format to various approaches: "Definitions and Terms, Ideas and Concepts, Topics and Supporting Ideas, Topics and Paragraphs" (Figure c). The variety of verbal expression as well as its economy, simplicity, and ease of identification for terms recommends the Cornell Method. Nevertheless, the linear format tends to fragment information, making relationships between equally-important points less obvious than are the details of each term. While the compact structure gathers all information into one place, notes thereby become less visible-at-a-glance.

Visual formats, while generally providing more space for presenting information, tend, by the novelty of their metaphors and organization, to confuse the learner more used to linear formats. Once familiar with the spatial structure, a note-reviewer might find the more visible context easier to scan and to relate points across categories. Likewise, development of picture symbols to represent points within the scheme permits the kind of personalizing related previously to improved learning. Nonetheless, some learners may experience difficulty generating and remembering their own symbols and schemes, resulting in confusion and ambiguity in communication.

Advantages of verbal-linear and visual-spatial formats might offer the most flexible model for the review stages of note taking. Spatial

arrangement of points develops an open format where all points are easily viewed and associated while verbal labels specify the meaning of points and relationships. Since both elements bear some similarity to known patterns in textbooks and lecture illustration, the visual Flow Chart format (Figure d) represents the most easily taught system of verbal-visual note taking. Inclusion of visual metaphors supplies a more complex stage of visual note review. The former approach is presented in this project alongside a similar technique, Mapping. The latter, more advanced method is included with them in the curriculum project proposal. All three are discussed in this project subsequently under the heading "Visual Formats for Note Review."

#### VISUAL FORMATS FOR NOTE REVIEW

Organization of information through visually-oriented charts, maps, and symbols represents a major departure from traditional linear modes for note review. These visual models arrange and represent points spatially with minimal or no reliance on words and phrases to carry meaning. Circles with labels, picture-symbols, and connecting lines display points across broad, open areas creating an arrangement which is immediately visible, although not always easily discernible, to the viewer. Several types of visual/spatial representation processes have been applied to reading, writing, design, and management.

#### Operation

Visual formats represent a process of organization of symbols, sometimes accompanied by verbal clues, and explicit or implied connections between points. The resulting network of object, idea, and process



concepts (Figure e) composes a contextual framework enhancing the meaning of individual components. Visual formats generally simplify complex structures while remaining flexible for increasing complexity (Figure f). Nevertheless, this distillation of meaning in abbreviated structures depends upon a solid understanding of the critical details and definitions involved in content learning. Lack of a basic comprehension of definitions, shown to be a key to reading comprehension (Anderson and Freebody, 1979), would seem to severely limit the effectiveness of visual symbols and spatial schemes as well. Provided such a background of preparation is present, visual picture-symbols could be expected to provide an additional and complementary information coding process for more effective retention (Paivio, 1971). Visual-spatial designs might likewise synthesize and extend discoveries on a basic, definitional level and provide an effective rehearsal format (Buzan, 1976; Driskell, 1977). The variety and novelty of the medium might also inspire some students, particularly those more creative, to experiment with both ideas and representations. However, new rules for structuring and viewing points and relationships could create some difficulty in using visual formats.

#### Precedents for Visual Formats

Both learner need and operational success recommend the introduction of visual formats into academic contexts. In addition to the previously-mentioned advantage of variety in study media, three further benefits to visual approaches might be cited. The open-endedness of flow charts and maps (Figure f) in which several new points or levels

of detail can be added to a 'completed' set of notes distinguishes them from traditional outlines and summary paragraphs with few spaces for adding new information. The visual-spatial method of note review therefore offers maximal flexibility, not requiring the complete rewriting of structure to incorporate additional data. Several studies (National Assessment of Educational Progress, 1976; Maxwell, 1980, pp. 2-3) suggest a decrease in reading and writing competence for college students of the past 5-10 years. This fact suggests a third area in which visual note review might prove useful. While visual strategies for exploring and encoding cannot entirely replace verbal skills, it might be reasonable to suppose that non-word or non-sentence schemes would ease the burden for poor readers. This argument finds some support in the observations of some researchers (Witkin, 1973; Messick, 1970; Kagan, 1971, cited by Cross, 1977, pp. 111-133) that students demonstrate particular learning styles. Spatial thinking abilities have, in fact, characterized such poor readers as Albert Einstein (Patten, 1973). While no conclusive evidence has been presented on the effects of particular learning styles and poor readers cannot be assumed to be Einsteins, some alternative to a difficult medium would seem a welcomed opportunity for unimpeded learning to some students.

The success of visual formats as means of communication and expression is well established in reading and writing programs, graphic design, and corporate research and planning. Hanf (1971) offers one of several visual-spatial formats employing a central idea/radial details model for analyzing essays. Several study skills textbooks (Pauk, 1974, p. 164; Shepherd, 1979, pp. 132, 188-199; McWhorter, 1980, pp. 250-252)

suggest the use of textbook or personal charts and maps to interpret reading passages or lectures. Buzan (1976) details a more extensive mapping technique for note taking and writing. However, like the study skills texts cited, Buzan's system seems to assume a spontaneous and intuitive understanding of the method's use. Spatial relationships comprise a major element in graphic design. Thus, it is not surprising that designers are leading practitioners and advocates of visual formats for thinking. McKim (1977, pp. 135-137, Figure g) and Hanks and Belliston (1977, pp. 172-173, Figure h) propose schemes for arranging information (in words or symbols) developed not only for design-planning but for general note taking and idea exploration. These charts have already found success among their predictably visually oriented design curriculum clientele. Visual-spatial formats have enjoyed popular use in corporate flow charts (Dale, 1967, Figure i) of production or responsibility relationships. Graphs and diagrams serve as auxiliary communicators in meeting and report contexts. Presently, a slightly different approach has been developed for the General Motors Institute by Max Chernoff (Tubbs and Koske, 1973). Chernoff's scheme uses faces whose changing characteristics illustrate a variety of information about the market. G. M.'s effort reflects the diversity and broad-based potential of teaching visual modes of representation. The multi-faceted approaches available for guiding visual thinking will be reduced to two methods for portraying individual points and two schemes for spatial deployment of those points in this thesis project.

Of the several types of visual formats generated for communication and expression, flow charts and maps using word or symbol labels are

probably the most easily taught and widely used. These methods can be used to relate verbal labels and/or symbols in spatial networks (Figure j). An in-depth discussion of the models follows.

### Flow Charts

Flow charts represent a common method for presenting information in textbooks and lectures. Charts originate from shapes (squares, circles, and triangles) which signify different functions, stages, or levels of importance. The language of charts identifies categories and isolates key points in distinctive units. This categorizing process may have two distinct advantages: 1) A significant meaning-unit can be placed in a spatial context with other units and appreciated for its place in the larger scheme of meaning, and 2) The main point-symbolizing shape can be further divided into its component parts or stages (Figure k). The latter benefit allows the learner to explore and build larger concepts gradually through gathering together information and picturing it in units. Essentially, this building from component parts parallels the process of verbal note review. However, more conscious attention to definition and function of points in the selection of shapes and of relationships in drawing and labeling connecting lines may contribute to deeper and more lasting memory. The advantage of placing units in a spatial context is enhanced by use of these connective lines and arrows. These connectors indicate sequences, part/whole relationships, similar features, reciprocity, direct, and indirect associations between points. Process points featured in lecture may be represented by these bridges. Relationships not mentioned explicitly can be ascertained and named by

the learner in the exploring and building process. Thickness of lines, use of dotted lines for indirect, solid for direct relationships, and the directions of arrows provide key clues concerning meaning associations and sequences in flow charts. The overall chart establishes a context in which individual units can be seen in relation and in proportion to each other. Size, shape, proximity to the center in part/whole schemes, to beginning or end in sequence charts, to other units in distinctions between an object or idea's nature and function contribute to the development of meaning in flow charts. The number of delineated or associated sub-parts (parts, types, characteristics, functions, or stages) and of static (line) or dynamic (arrow) relationships likewise shape meaning (Figure 1).

The flow chart model exhibits several advantages as a medium of thought. Primarily, the chart offers a visible link between points and an overall picture of the topic unavailable through print. The structure of shapes and lines furnishes a skeleton of a whole topic available to the memory. If verbal clues supplement the visual model, the learner possesses not only an abbreviated code but reminders of verbal definitions and details. Moreover, the visual-verbal code is one which could be constructed by the learner him/herself.

The manipulation of object, idea, and process concepts through flow charts places the learner in close contact and controlling interaction with the content material. Flow charting serves as an experimental tool for building and testing relationships within data. Flow chart formats adapt to whatever number and complexity of units is necessary for the learning task. This flexibility shows itself in the ease

with which new units may be attached or parts detached for closer scrutiny. The spatial structure enables both deductive and inductive relationship patterns to be traced. Both simple and complex representations are accommodated by the overall format.

### Maps

Visual-spatial maps offer another mode by which information can be arranged and related. Mapping techniques, which can illustrate overall concepts or particular points, begin with a central thought, easily pictured by placing a word in a circle. Supporting details are attached to this center as arms or rays. Points of greater detail extend from these rays. Thus, the location of any given line with its verbal label indicates the degree of detail, the relationship to other points (by proximity and logical progression), and its place in the overall scheme (Figure m). The network can grow to greater specificity as new details are added. Portions of the map may be broken off and developed in greater particularity when the overall map becomes too crowded. Several maps may be required to chart a complex overall idea. Common features (part-relationships, functions, etc.), by their connection to the same point, imply shared characteristics. The spoke-like effect of extending arms can be varied by the use of geometric structures (squares, circles, triangles). These shapes also demonstrate relevant interrelationships between sub-points. Arrows within and between network parts serve to show relationships not clarified by context.

Maps aid note review in several ways. First, they can, by their open-endedness, generate new levels of detail to more adequately describe

points. The rehearsal of details and relationships from such a map provides a method of testing comprehension similar to reviewing flow charts. Origination of a map from a list of terms or items in memory provides an imagination exercise demanding careful and deep thought. Creativity and critical thinking involved in constructing and reviewing maps require more involvement and more complete comprehension of both process and content than simple repetition of lecture notes. These procedures would doubtless prepare students for interpretative test questions. However, arranging and relating of complex relationships via maps necessitates intensive and deliberate practice. Familiarity with the process could form the basis for its spontaneous use in recording notes as suggested by Buzan (1976).

A few disadvantages to the mapping model described qualify its use. As conceptualized, visual maps best illustrate part (or function) to whole relationships. Sequences might be represented by clockwise or counter-clockwise placement of rays in order (Figure m). Use of rays and subrays to freely associate points of equal significance makes an excellent exercise in creative imagination but the resulting map would demonstrate inconsistencies with generalization/detail rules. Because maps generally operate without the use of arrows or relationship lines, these crucial connections are not included except by modifying rehearsal strategy. Such an omission creates a significant deficiency in the strategy's flexibility and overall use. Nevertheless, visual maps remain viable means for condensing and rehearsing information from lecture notes.

## Picture Symbols

Picture symbols compose an alternative means of representing individual points. Generally, verbal labels will be the most convenient and familiar to students. However, the occasion for variety, need for greater concreteness, or lack of a concise verbal statement may recommend use of symbols with, or instead of, words to illustrate points. Although by no means photographic copies (this is not intended since such symbols are not pictures or images), these devices suggest slightly more concreteness and visual specificity than the abstract shapes used with word-labels. Introduction of picture-symbol media into flow chart and mapping formats might facilitate interest and variety in expression. Some common picture-mediators such as human figures, houses, skull-and-crossbones, beakers (in chemistry), plants, scales (for weighing two arguments), cannons (for a history lesson on war) could be introduced as types to initiate student experimentation (see Figure n). Instructions on generating one's own symbols and developing interactive symbols could follow the opening set of basic communication symbols. The former could reflect an in-depth analysis and personalizing of facts. The latter task of developing interactive symbols parallels Bower's (1970, 1972) work on the positive effect of interactive imagery on memory. In addition, arrows or lines between figures identify relationships and verbal labels could be added when necessary to enhance or clarify meaning.

Picture-symbols aid the presentation of concrete objects or concrete representation of ideas and processes. Points can be represented in a manner closer to their actual appearance, adding more interest and



distinctiveness to them in the diagram. Abstract terms can be captured by picturing their interactive function (Figure o) which is not adequately visualized through labeling. Processes involving complex ideas and relationships (Figure p) may be abbreviated by the use of one symbol which indicates that the process is understood. This action permits the learner to focus on new or more complex concepts which require their own elaboration.

Several advantages of picture symbols have been mentioned in the description of their function. The critical analysis of objects, ideas, and processes necessary to produce a personalized symbol generally cannot be pursued without improving understanding and memory. However, this level of information processing as well as the acquisition of picture-symbolizing skills cannot be accomplished quickly and easily. Use of some standard symbols can bridge the cognitive and design gaps through initial stages of learning. Emphasis on simplicity and clarity of symbols must be maintained to avoid ambiguous or easily forgotten interpretations. Joint use of symbols and verbal clues aids description but threatens the simplicity of charts and maps. Thus, carefully-demonstrated models and gradually acquired complexity compose the key to mastery of picture-symbolizing ability.

#### VISUAL THINKING

Visual thinking, the ability to mentally conceive and graphically represent experience and information in images and charts, forms the groundwork of visual conceptualizing in note review. Observations about visual formats included in the previous section have a basis in the

understanding and manipulation of symbols and/or spatial patterns. Further clarification of the nature and operation of visual thinking, its potential for note taking, and some historical and contemporary uses of visual skills defines the purpose of this discussion. Distinctions between individual symbols and network patterns clarify the context of visual understanding. Communicative and expressive functions of visual information-processing identify differences in both purpose and competence of visual skills. Communication and expression through visual metaphors and organization has received attention in the past several years under the title of visual literacy. Implications of this new dimension to language teaching for note review focus discussion of visual communication and expression. Finally, historical and contemporary contexts for the use of visual thinking skills will be considered as examples of uses and continuing potential for their use.

#### Purpose

Visual thinking describes the capacity to visualize ideas and manipulate spatial images and frameworks. Manipulation may involve operations such as determining concrete dimensions, rotation of figures or rearrangement of schemes for new perspective or projecting consequences, and evaluation of contextual relationships in spatial patterns. Several of these operations are incorporated into the thesis project and have been explained further in the Visual Formats section. Emphasis on spatial and symbolic media is often contrasted to linear and verbal means of encompassing ideas. Robert McKim (1977, p. 124) emphasizes the complementary nature of verbal and visual media. McKim recommends multi-

modal language development to avoid a "language rut," a too-consistent pattern of expression which blocks imagination. Additionally, he suggests that several types of graphic languages available for communication and expression enhance the potential for flexibility and variety in multi-modal (visual-verbal) thinking.

### Visual Thinking and Communication

As a non-verbal means of communication, visual symbol language is but one of three media. Body language and object language compose the first two categories of visual language forms identified by Ruesch and Kees (1956). Symbols, including visually-mediated words and pictures, complete this catalogue of media. However, in spite of similarities in the purpose for mediation, significant differences in actual operation commend a separate consideration of symbolic languages. In general, observations made by Clayback, Goforth, and Spillman (1980) offer an angle on visual language which enhances understanding of symbolic charts, maps, and pictures. The authors note that "94 percent of the stimuli to which individuals respond are visual or auditory, and the majority of these are visual" (Nelson, 1975). The article cites a review of related literature in the visual language field revealing:

- 1) The arts, graphic arts, and technology are important visual modes, but only a part of the total field of visual communication.
- 2) Learning one language (visual) often supports the learning of another (verbal). Each language must be taught in combination with the other.
- 3) Individuals must be given opportunities to communicate using each language, thus enabling them to communicate with others through the appropriate verbal, visual, and auditory modes.
- 4) By teaching both languages systematically, the school will be cultivating a total literacy.

While the note review project in this thesis does not embrace a comprehensive interpretation of the findings stated above, the spirit of these educational goals remains a guiding force in its development. Moreover, these conclusions reaffirm McKim's convictions about the complementary relationship of visual and verbal media.

Another observation cited by Clayback, Goforth, and Spillman (1980) is John Debes' "goals of a visual communication program": "to help the individual grow in the capacity to visualize ideas, to organize those ideas, to conceive of ways to express those ideas visually, and to encode those ideas in effective, sequential, visual metaphors that are precise, full of feelings, and as eloquent as the medium of his or her choice can be" (Debes, 1974). These goals reflect the broader scope of the thesis project which provides an introduction, with practical exercises, of at least two types of visual communication.

General goals of visual communication teaching fail to identify specifically how ideas might be visualized and organized. Visual communication depends on relatively standardized symbols and patterns for clarity. Simplicity, including the use of only a few lines or shapes, and close correlation of referent and symbol is a critical criterion of interpersonal messages. Specificity of symbolic meaning is important for picture-symbols but, of course, already apparent for verbal labels. Abstract points can often be symbolized through analysis of functions or shape. A metaphor which is drawn from a different, but more concrete context, can be developed to emphasize the function or meaning of the abstract idea or process. For example, discussion of Freud's

defense mechanisms might use a cannon or fort; of the parts of the personality: Id might feature an animal with teeth bared (aggressive instinct) and tongue hanging from mouth (sex instinct); Ego could be pictured as a scale, balancing instincts and external reality; and Superego may be well represented by tablets (Ten Commandments) or an authority figure like a parent or judge. Ideas and processes might as easily be portrayed through stick-figure drawings of situations where those principles or events occur (Figure n). This style draws on inherent relationships of the points rather than metaphoric devices.

The process of verbally defining and/or selecting symbols for individual points creates an excellent prerequisite to patterning. Generally, some inherent sequence and sets of individual relationships are included in the lecture notes. This structure guides the distribution of points with two qualifications: 1) Points on the same level of importance or specificity are more often related to each other than to the other's sub-points, and 2) Suggested relationships (for instance, those between major points in close proximity in the notes and between points and their details) are identified and charted prior to exploring the information base for unmentioned connections. The charts and maps which result must, like picture-symbols, be simple enough (clearly labeled, uncluttered) to be understood and used for another's practice.

Both symbols and patterns of organization serve as vehicles of visual thought for communication and expression. Although the two purposes are in practice intertwined, the emphasis on communication is generalized use and understanding of standard symbols and patterns. Expression suggests greater creativity and flexibility introduced into

the reviewing and encoding process. Individual needs rather than common idiom allows for more variety and complexity of expression. The thesis project aims to promote sufficient visual literacy to enable communication and adequate experimental guidelines to allow personalized expression.

### Visual Thinking and Expression

Creative expression of visual thought takes place through the externalization of mental processes in a physical object (McKim, 1977, p. 40). In contrast to communicative uses, expression demands imaginative, primary creativity (Maslow, in Parnes and Harding, 1962) to create metaphors and patterns within a body of information. The principles of good visual communication, given personalized attention, allow the learner to create unique symbols and structures suited to personal needs. Analysis of points or patterns as described in the Communication section involves "active operating on structure, not only to see what is inside, but also to manipulate the component parts of structure in relation to each other" (McKim, 1977, p. 104). Structuring rules presented in the thesis project offer learners a kind of visual grammar by which parts are related to each other and to the central idea. Mental and graphic manipulation proceed through rearrangement of pattern interrelationships. McKim (1977, p. 116) suggests three characteristics of successful visual thinkers which may enable good communicators to develop creativity: 1) "fluency and flexibility of expression" entailing practice with several graphic languages from which new applications might be drawn; 2) "deferred judgment" in which spontaneous creation

of visual metaphors and organization supercedes perfect accuracy of representation, at least for opening stages of review; 3) "unhesitating response," or natural exercise of imagination utilizing intuitive interpretations of points and relationships. The project presents a variety of media (charts and maps, labels and picture-symbols) in small segments to encourage these creative behaviors. Experimentation with these media is an essential part of adapting the strategy to particular content lecture notes. Experience with more predictable visual communication tasks permits familiarizing and confidence-building by learners. Experience with more flexible, quickly drawn expressive assignments allows the learner to perceive note review as a series of rapid structuring and restructuring steps. Opportunity to extend visual thought and expression to greater detail, divide topics into smaller portions, or view an entire discussion on one page reflect creative capacities fostered by the note review project. These skills for interpreting and manipulating information can be applied to many tasks beyond note review.

#### Applications of Visual Thinking

Evidence of the creative potential of visual thinking abounds in all fields. Artists, scientists, and educators using visual metaphors and patterns to guide and develop thought processes have made and continue to make a significant impression the shape of knowledge. Rudolph Arnheim's comment on the works of Leonardo daVinci notes that the artist/scientist's use of visualizing enabled him to perceive essential functions of objects and anatomy. Leonardo's drawings thus allowed him

to extend temporary and limited capabilities of mental observations (McKim, 1977, p. 36, 163). This capacity to simplify discussion with a concrete example or create metaphors and patterns to represent abstract concepts describes the basis of painting, drawing, and design. The immediate visible context in which separate points appear establishes an overall impression and helps clarify specific meanings. Since the artistic use of visual thinking carries interpretive ambiguity as well as richness, the explicit use of lines, shapes, verbal labels, and intentional picture-symbols contributes more easily understood elements of meaning to the note review process.

Visual thinking characterizes some of the outstanding discoveries as well as the daily exercise of both pure and applied science. Einstein's natural ability to mentally manipulate visual images and structures, enhancing learning and invention, have been previously mentioned. The German scientist Fredrich von Kekule experienced a more unusual type of visual insight, imagining the structure of the benzene molecule in a dream (A. Koestler, 1964, p. 118). James D. Watson, the discoverer of DNA structure, "writes that one important idea 'came while I was drawing the fused rings of adenine on paper'" (McKim, 1977, p. 11-12, citing Watson, 1968). McKim observes that "as in Watson's experience, drawing and thinking are frequently so simultaneous that the graphic image appears almost an organic extension of mental processes." Watson's experience is perhaps the closest example of the type of experimental arrangement and rearrangement proposed in this thesis.

Blueprints, often accompanied by verbal clues, and mechanical drawings characterize visual manipulation of ideas in applied science.



The farmer who mentally projects the distribution of crops in particular fields or the social worker who imagines the effect of a new human dynamic on interaction patterns of a family each employ visual thinking techniques. These techniques involve not only imagining the appearance of elements but manipulating patterns of relationship between them.

The field of education has produced several programs applying visual thinking principles. One of the most extensive discussions has been presented by Tony Buzan in Use Both Sides of Your Brain (1976). Buzan outlines a mapping format identifying the central idea of a book or personal idea and literally "branching out" into greater detail in all directions. Corporate educators have long used flow charts of varying complexity to communicate patterns of production, distribution, consumption, authority and responsibility. Textbooks and instructional manuals using charts, graphs, and maps represent a tradition in visual thinking patterns involved in communication. Sadly, students are not taught skills to express themselves in these media to make information more dynamic.

#### Advantages of Visual Thinking

Visual thinking offers several advantages for both visual-spatial representation and creative thought. As demonstrated above, the medium offers a variety of languages by which information can be mentally and graphically arranged and reconstructed. Metaphoric and organizational schemes for abstract as well as concrete referents help integrate mutually dependent thought and language processes. Spatial models,

especially for the more artistic student, present a simple and more memorable format for study than endless lines of print.

Visual thinking departs from the stereotype for both communication and expression. While familiarity with the vocabulary (lines, circles, etc.) and grammar (arrows, networks) builds understanding of others' communication media, practice with metaphor and spatial patterns may open new perspectives for both content field and study process. A few simple directions can allow students unfamiliar with visual-spatial media to add graphic tools to their thinking structures. This fluency can begin on a simple level and evolve, according to student needs, into complex formats in which relationships are immediately apparent. Possibly only the extremely verbal (word and paragraph-centered) person would not derive some benefit from the visual thinking discipline.

#### CONCEPTS AND CONCEPT DEVELOPMENT

Concepts represent basic and pivotal units for learning. A concept unit may be defined as a class of objects or relationship patterns with common characteristics. Concepts are composed of numerous attributes governed by often-complex rules. Intuitively, learners acquire the ability to discriminate aspects within, types of, and appropriate rules for forming and using concepts. The gradual development of these sophisticated cognitive skills can be facilitated by explicit training in recognizing the components, nature, and operation of concepts. The labeling or symbolic picturing of concept categories represents a major step in the child's ability to learn and reason. Description of objects, ideas, and processes in abstract, yet simple and meaningful

units accessible to thought without referents, permits great freedom for thinking about them. This purpose of the thesis note review project establishes the basis for the discussion which follows. Types of concepts, their characteristics, acquisition, and detail-parts are considered as significant elements in the overall understanding of concepts and their development.

### Types of Concepts

Distinction of concrete and defined concepts (Gagne, 1977) presents one of several means of identifying concept-traits. The contrast of concrete, experience-based, and abstract, extra-experiential dimensions illustrates several points related to concepts. First, while abstract concept grouping represents a higher-level skill, classifying of concrete, visible-referent objects begins during early childhood (Flavell, 1977). Defined concepts, through the use of 'near synonyms' (Gagne, 1977, p. 130-131) and classifying rules, extend class formation to abstract ideas and processes. These groups are most easily learned and recognized through definitions built upon known or assumed concrete concepts. In the thesis project, verbal labels or visual symbols serve as mediating links between referent or abstract concept and mental processes. This role of reducing complex descriptions to simple names greatly enhances the learning and efficient handling of concepts.

### Attributes of Concepts

Mussen, Conger, and Kagan (1974, p. 271-276) propose a four-attribute picture of concept definition including not only abstraction but

also complexity, differentiation, and centrality of dimensions. This description provides a broader perspective on the nature of concept units. Concept complexity consists of the number of dimensions or simpler concepts needed to define a given concept. For example, stimulus represents a relatively simple concept consisting of "a provoking event from the environment." In this case, the provoking event, environment, and the implied inclusion of some receiving organism form the three keys to understanding the concept. In contrast, concepts like aggression and socialization depend on a complex combination of objects, ideas, and processes. The attribute of complexity is incorporated in the thesis project by the tasks of locating main points and delineating detail groups. Students can recognize the amount of complexity by the number of terms from which a main point is selected or group is formed. Emphasis on recognizing levels of complexity (detail, main point, overall point) further illustrates this attribute.

Differentiation, or the number of similar attributes represented by a concept, describes yet another descriptor of concept differences. Maturation is a concept involving several distinctly different aspects (physical, emotional, spiritual, social, and intellectual growth). In contrast, an equally complex concept such as intelligence rests on relatively similar or closely related dimensions (capacities to observe, recognize patterns and details, associate and reason, and solve problems). Differentiation is built into the thesis curriculum project through the inductive and deductive sorting and grouping of main points and details. Formal interrelating of points and details causes learners to recognize similarities and differences between components of

the same concept.

The centrality of dimensions characterizing a concept describes the fourth distinction among attributes. The number of concept aspects critical to the definition of the concept determines the centrality of dimensions. Freud's reality principle rests on two basic attributes (conformity and environment) while the concept of neurosis depends on the presence of several dimensions (anxiety, impaired behavior, frequent or chronic disturbance). Centrality of dimensions is not a crucial attribute within the curriculum project but does apply to distinctions made between levels of information in note review. Generally, more complex levels involve more dimensions critical to concept definition.

#### Rules for Concept Formation

The rules by which concepts are formed present a dimension of concept learning equal in importance to concept attributes. Mussen, et al. (1974, pp. 302-304) observe that the concept-forming potential of children changes through their development. Generally, these changes reflect a movement from classifying by analytic categories (similarities in concrete dimensions) to classifying by superordinate categories (similarities in abstract dimensions). The latter potential for recognizing abstract qualities is incorporated in object, idea, and process distinctions made in the thesis project. Since many new terms and structures encountered in college learning involve abstract ideas and processes, emphasis on superordinate categories in concept formation seems a valuable guide to sorting and relating lecture material.

Distinctions of parts, types, characteristics, functions, and stages between details in the thesis project serve to structure categories and enhance appreciation of concept complexity. Details (relatively minor concepts or concept attributes) must be identified as objects, ideas, or processes and then further clarified by their relationship to broader categories. Such concept-sorting offers the learner greater conscious exposure to definitions and connections than simple repetition of notes as they were given. Additionally, the recognition of both abstract and concrete dimensions and several types of details in a main point concept serves to demonstrate the complexity available in concept description. The thesis note review project provides explanations and exercises by which the simple elements and dimensions of concepts can be understood and manipulated by the learner to increasing levels of complexity. Complex concepts representing several objects, ideas, and processes can then be used to simplify the overall description of a topic.

#### Acquisition of Concepts

Concept acquisition is a complex process, completing the fusion of small associations. Gagne (1977) traces the evolution of these associations from simple signal and stimulus/response learning through chains of association, verbal association, and discriminations to concepts (concrete and defined). Each stage acts as a prerequisite learning task for the next. Thus, the mastery of lower-order skills and the rules by which they can be associated leads toward induction of higher-order learning tasks. The same rules, used to deduce component parts

of main points, can aid more complete understanding of concepts. The thesis project stresses acquisition of concept-sorting and defining processes by which students can determine and manipulate concept categories. Conscious attention to these skills is intended to replace the assumed or intuitive method on which students usually have to rely.

Concept acquisition, as presented in the curriculum project of this thesis, involves identifying types, general attributes, and relative importance of points presented in lecture. Main points, details, and overall points describe various levels of concepts or concept attributes within a given body of information. These distinctions are facilitated by the introduction of categorizing rules (i.e., main points reflect broader, more general patterns of thought than surrounding information). Types of concepts are identified by rules concerning objects, ideas, and processes. Objects refer to concrete concepts, terms with visual referents. Ideas refer to abstract concepts in which relationships are relatively static, with low-interaction. Examples include abstract labels like psychology, emphasizing descriptive rather than active process relationships, or like Freud's id, ego, and super-ego concepts which compose portions of an overall process. Personality dynamics, which are process concepts are also abstract concepts, describing relationships. In this thesis, a distinction is made between ideas and more active relationship process concepts. This distinction allows learners to identify more active relationships which require closer, more explicit attention. Process concepts such as Freud's stages of development and defense mechanisms may be defined so as to emphasize

the breadth of relationships involved and to stress functions over static patterns.

Each main point concept can be induced from or used to deduce a variety of supporting details. These dimensions used in the thesis curriculum project are meant to group details and allow for more complete description. Descriptors of concept details include parts (of a whole), types (of an overall paradigm), characteristics (of a main point), functions (of a concept), or stages (of a process). These supporting details can express comparisons, contrasts, cause and effect, order and sequence, structure, building blocks, descriptive aspects, and conditions of broader concepts. Knowledge of these elements enables learners to construct and relate definitions of concepts at several levels of complexity. Awareness of the potential for dissecting and associating concept elements can make students more confident about and competent in understanding concepts for themselves. Increasing ways of relating and combining information would seem to positively influence a learner's capacity to handle interpretative questions in test situations.

#### Implications of Concept Learning

The development and manipulation of concepts, particularly of ideas and relationships, requires the application of formal operational skills (Piaget, 1970a). The ability to deal with information without a visual referent characterizes abstract, high-level intellectual skills. These capacities are virtually assumed of college-level students. However, complex and abstract thinking continues to grow in



proportion to the learner's experience and consciousness of its operation. Sophisticated processes of abstraction, hypothesis, deduction, and imagination typical of formal operations are explained and exercised in specific location, grouping, and relating skills in the thesis project.

Formal operations and effective concept learning represent the principle basis for expanding knowledge at the adult level. Hudgins (1977) contends that concept development may be regarded as a measure of cognitive maturity. If so, enabling students to recognize, relate, and manipulate concepts ought to enhance cognitive development. Program emphasis on the status, or precision of concept use, and accessibility, or availability of the concept for thinking will tend to sharpen concept use further. Thus, tasks of definition, clarification of dimensions, grouping of details, and relation of points in a network of many levels of complexity help clarify concepts and create a memorable review strategy.

#### MEMORY

The review of lecture notes is essentially a memory task. In note review, information gathered and clarified by details and definitions is organized into categories and relationship patterns. These classes and their schemes establish a basis for association of points in the notes. These associations bear the kernel of meaning by which knowledge is stored and later retrieved. Repetition of separate point and network scheme associations permits students to recall not only information itself but the context in which it appears. Memory of lecture notes is

significant for test preparation and growth beyond acquired concepts. The process by which information is encoded and committed to memory and the implications of these processes of visual note review create a basis for this thesis.

### The Information Processing Model

The information processing theory of cognitive psychology (Atkinson and Shiffrin, 1968, 1971) contributes a significant model for understanding memory. One diagram interpreting the memory process appears in Figure a. Information processing attempts to represent operations of cognition. Therefore, terms such as sensory memory, short-term memory, and long-term memory should be understood as functional descriptions rather than physiologically observable parts of the brain. Information processing in memory entails the flow of environmental stimuli through human perceptual, coding, and retrieval systems. This process begins as a person attends to information on a sensory level. Words and images perceived by the senses remain in the memory only long enough to be recognized (2-3 seconds) or until another stimulus replaces them.

The short-term memory, capable of maintaining information for less than half a minute (Klatzky, 1975), represents the first level of retention. Rehearsal of words and images can maintain memory for as many seconds. Generally, however, the lack of a code or organized scheme for associating and discriminating between bits of information results in forgetting in all but the most immediate recall circumstances. Encoding thus creates the basis of permanent memory. A code or pattern

of association creates a dividing line between potentially remembered and easily forgotten information because it rests on an organized, conscious process of relating to that data. Since long-term memory depends directly on the identification and assimilation of data into an associational network (Brown and McNeill, 1966), coding of ideas for permanent storage and flexible retrieval (through several association-clues) would seem an appropriate skill in note review. This thesis, therefore, attends to discoveries about encoding information for storage and later retrieval. Unfortunately, much of the research in memory for terms and patterns of association deals with coding and retrieval of words and sentences. Where verbal labels are included in visual note review, limited direct application of such research can be made. However, indirect relationships must be drawn in the case of visual metaphors and/or visual schemes. Continued research on the memory-mediating qualities of visual metaphors and visual-spatial formats is necessary to validate observations made herein.

The processes of perception, encoding, and retrieval that compose the information processing model of memory occur at various levels. Craik and Lockhart (1972) propose two levels of processing theory contending that information is remembered in relation to its depth or amount of elaboration (association, complexity). The association of new information in a personalized context has been cited as an important factor in effective note review (Palkovitz and Lore, 1980). Such associations, based on questions and analyses of available data, are the products of the thesis curriculum project. Depth is established through a regular pattern of definition, identification of importance and

function, and relation of points to each other and to an overall context. Practice in exploring and restructuring relationships fosters retention and flexible use of lecture material.

### Encoding of Images

Encoding, the process of packaging memories, applies to both separate terms and the patterns by which they are organized. Semantic, word-processing, information has been well researched in both respects. Visual-spatial images have been explored in several experiments (Paivio, 1969, 1971, 1975; Bower, 1971). Much of this research appears applicable to picture symbols and concept shapes used in the curriculum project of this thesis. Bower (1971) observes that images pictured in dynamic interaction are more memorable than isolated images. Emphasis on relationships in flow charting and on sequences of association in mapping facilitate discovery of interactive elements. A dual-coding theory advocating the simultaneous use of verbal and visual codes is proposed by Paivio (1971) as the most effective encoding technique. More specifically, Paivio found visual codes most productive with concrete information but verbal language most successful for abstract concepts. Use of verbal labels in the note review project to identify abstract terms applies Paivio's findings directly. Development of visual metaphors to provide concrete referents for abstract terms indirectly adapts the dual coding hypothesis. The latter strategy reflects Gagne's theory of instructional media (1977, p. 308) that such devices "simplify the complex interactions of verbal communications and their non-verbal accompaniments." Thus, images as well as words can be

effectively used as thinking tools.

### Encoding of Schemes

Verbal encoding and memory for words and sentences predominates in memory research. However, in the field of mnemonics, the visual memory aid known as the method of loci has been found an effective spatial context for enhancing memory (Groninger, 1971). The system operates by learners using a familiar scene (a block of houses in their neighborhood) within which images or words can be placed in a sequence used consistently. The method of loci is not developed in this thesis. Nevertheless, a similar principle is employed in teaching flow chart and mapping networks using an established sequence and context to plot main points and details.

The dimension of flexible development and manipulation of structure emphasized in the thesis note review project seems critical to development of a memorable pattern. Both the personalizing of information and creation of data-specific schemes would seem appropriate prerequisites to memory. Many visual-spatial memory tasks (i.e., assembling mechanical parts, relocating an office or item in a place, completing picture-puzzles) rely on memory of spatial context. Creation of new structures (i.e., buildings, organizational charts, road maps) extends the encoding process into new dimensions of memory. Mental rotation of structures has been found to be an important skill in visual memory and recall (Shepherd and Metzler, 1971). This ability to approach information from several viewpoints expands its potential for association. Such skills are indirectly presented through relating and

rearranging components of the note review project. Additional cognitive skills may be enhanced by developing memory for visual formats. Visual projection of choices and consequences used by chess players (de Groot, 1965, 1966) may, in fact, apply to visual schemes for note review. Further clues by which present states of relationship are analyzed or future states hypothesized might be located, tested, and more explicitly taught as aids to encoding. These skills, although related to the visual note review project, extend somewhat beyond the present scope of the thesis.

#### Other Considerations in Memory Research

Several key aspects of semantic encoding bear mention as relevant to memory building in note review. Words are more easily remembered when paired, associated with a preceding or succeeding term in a list or placed in a meaningful context (Anderson and Bower, 1972, 1973). Emphasis on relating of terms and placing them in patterns serves this purpose in the project. In a list, Miller (1956) found that chunks of information between five and nine items were most memorable. However, substantial relationship building and in-depth understanding of parts and functions of lecture points requires that memory surpass rote recall of word lists. Nevertheless, grouping of points or details in small chunks within a visual format and providing clues by which those points can be more easily recalled can apply the principle of Miller's research to practical learning tasks. In addition, students are encouraged to notice inherent clues to the instructor's placement of main points to augment association patterns of their own.

Familiarity with terms and relationships offers a network of association to incorporate new facts. The capacity to quickly arrange basic data can suggest important points which establish some central knowledge for new content. Thus, a visual conceptualizing strategy may support more rapid expansion of and memory for lecture information. This effect of visual note review might also be topics for additional research.

Memory evolves from a complex chain of processes, the most critical of which is encoding. Research, although sparse in areas of visual-spatial devices and formats, reveals some major observations. The use of inherent or subjective organization clues and categories provides a catalyst to associating and recalling points (Tulving, 1962; Ausubel, 1963). Visual-spatial schemes with verbal labels or visual metaphors facilitate dual coding (Paivio, 1971) of both concrete and abstract terms. Interaction or emphasis on relationships builds memorable symbols and patterns. Chunking and associating of information bits helps develop memory even for large amounts of data. These discoveries guide the portrayal of lecture information in visual formats through instruction offered in the thesis project.

#### CURRICULUM DESIGN

The design of curriculum for visual note review derives from the need for an organized plan by which visual language skills can be taught. The thesis project represents a model of skills and methods which interpret the tasks of locating, sorting, and relating lecture points visually. Two models, in fact, are proposed for teaching the integrated skills of

visual thinking and note review. A simplified model assumes that students bring some background knowledge and/or interpretative ability to the required learning tasks. A complex model describes in explicit detail each step necessary for learning regardless of prior knowledge. Lecture notes from an introductory psychology class have been inserted into the lessons to illustrate and facilitate transfer of training. Dividing tasks into modular units which can be arranged in a sequence of simple to complex explanations and exercises allows for deliberate practice which can individualize learning. Practice exercises allow students to familiarize themselves with ideas explained. The design of this visual note taking curriculum has been guided by considerations of effective explanation and practice, maximum transfer of training to a similar task, and potential for individualized teaching. Explanation of these dimensions follows.

### Task Analysis

Education by intent reflects a conscious purpose to the teaching of subskills and the overall task. Analysis of requisite skills in visual note review reveals three types of tasks: 1) note review operations like locating main points, grouping details, and relating points at all levels to each other; 2) visual thinking tasks like utilizing or creating symbol-metaphors and designing charts or maps which reflect content materials; and 3) coordinating the thinking and representing processes inherent to note review and visual thinking in a simple and complementary manner. Each task includes explanation and exercise units. Filling gaps, definition, and teaching of context clues supports note



review skills for less experienced students. Fewer tasks are presented in the simplified version of the project. This approach might be introduced first and the more detailed and tedious alternative presented only if the student experiences difficulty applying the first approach.

Analysis of the tasks involved in teaching visual note review reveals the relevance of note taking, visual thinking, concept development, and memory. A summary of previous observations illustrates how each contributes to the process of visual conceptualizing. Background on the import and procedures of reviewing notes conveys the significance of research cited. Stages of completing notes, recognizing main points, and restructuring address learning needs more directly. Visual thinking enjoys a similar preface designed to initiate openness for the more explicit instructions which follow. Despite the creative potential of the medium, learning and practice remain at a minimum to allow students to become familiar with the language and rules of visual formats and symbols. Although many visual-spatial languages could be useful for note review, flow charts and maps were selected for their simplicity and adaptability to many content areas. Each is presented in small parts, gradually consolidated into an integrated skill. Main points and details at different levels must be selected and grouped according to concept-attribute rules. Structuring and restructuring requires classification skills applied to formal, functional, and sequential characteristics. Although many of these capacities are assumed, emphasis on definition, object/idea/process identification, part/type/characteristic/function/ stage distinctions reinforce concept development skills. Memory is, of course, the ultimate purpose of note review. Although no

experimental evidence of visual formats as memory-builders for lecture notes has been produced, parallels to similar tasks show enhanced memorability. Further, the slow and deliberate attention to lecture points and relationships and instructions to rehearse structures thoroughly stress association and repetition, the two keys to memory building.

### Transfer of Training

Design of curriculum materials attempts to maximize transfer of training. Psychology notes, gathered from a videotape, and recovery of missing information simulate the actual tasks of note taking and review. As such, the method could be applied to another discipline and presented independently or magnified in extent and used with a supplemental content course. Note review and related techniques of questioning and reading could compose a basis for students to create their own workbook for a course. Since materials used in the project resemble those familiar to the college population, a high degree of transfer might be anticipated.

Transfer of generalizeable skills such as recognizing and relating points and visual formats forms a second dimension of transfer of training. These skills are carefully outlined and gradually integrated to facilitate their use with different content materials. These thinking skills, exercised in note review, might facilitate independent thinking more generally by suggesting both skills and methods for interpreting information.

### Modularizing and Sequencing

The thesis project presents explanations and exercises in discrete subskill units. This approach allows learners to become familiar with small modules of information rather than absorb an entire process in one lesson. Recognition abilities, for instance, are subdivided into listing, defining, locating, classifying, context clues, grouping details, and identifying levels.

Sequencing is the complementary aspect to modularizing in curriculum design. The units created as modules are arranged in an order conducive to gradual acquisition of overall skills. Appropriate order of use and relative complexity of units determine their place in the sequence. Points must be listed and defined, for example, before they can be classified and related. Similarly, understanding of consolidated units practiced together depends on acquisition of each step. In some cases, steps can be combined and the composite understood. This process has been applied to the simplified curriculum project. The combination of modules and a regular sequence provides learners tasks by which to analyze content and a model to follow for interpreting information.

# Visual Note Review<sup>51</sup>

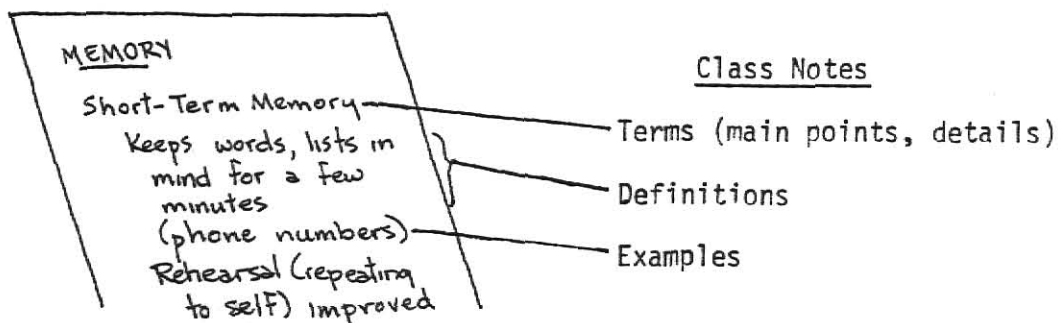
The explanations, examples, and exercises which appear on pages 52 to 85 are designed to be a sample of a complete Visual Note Review curriculum.

# VISUAL NOTE REVIEW

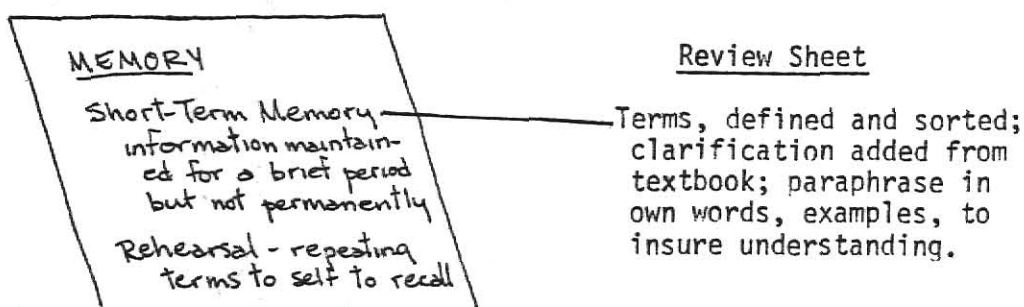
Skillful note taking provides many advantages for learning from classroom lectures. Common sense, however, suggests that the most complete list of points, sub-points, and examples may be worth little without review.

Review for a test or general knowledge accomplishes several goals:

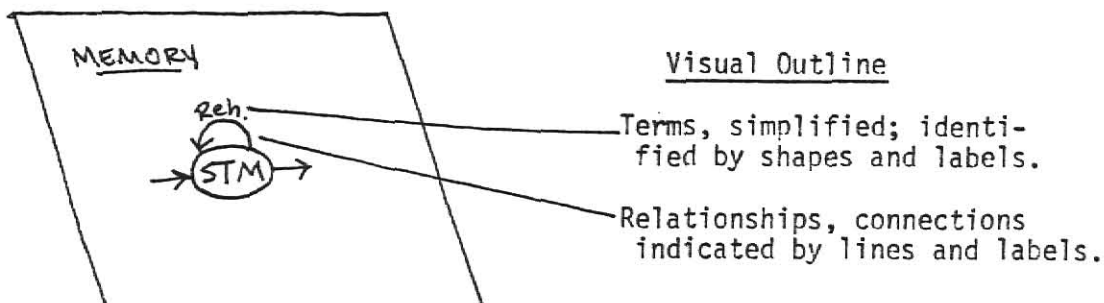
- 1) RECOVERY OF INFORMATION fills in the gaps where parts of a lecture were missed or some detail, definition, or example was not covered sufficiently. In this unit, the Lecture Note Checklist and Definition sections fulfill this function.



- 2) RECOGNITION of main points, sub-points, details, and examples allows for organizing objects, ideas, or processes into categories for clear and logical order. In this unit, Locating Main Points and Grouping Details sections focus on recognition.



- 3) RELATION of objects, ideas, and processes creates a network of meaning on several levels relating points to each other. Connections between points clarify the points themselves and operation of the overall structure. In this unit, Relating Points discussion and exercises aids organization of information for note review.

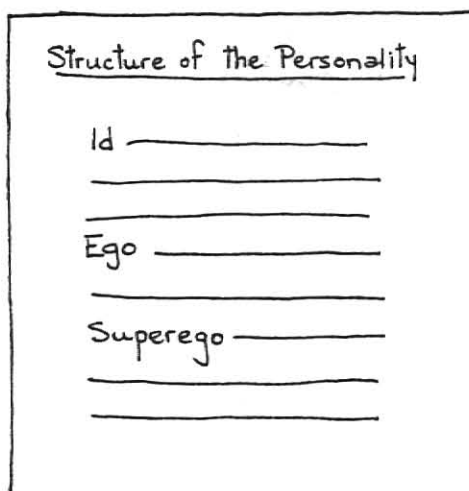


Recovery, recognition, and relation of notes opens an opportunity for deeper understanding. Examining, redefining, applying, and reorganizing ideas requires thinking through points rather than copying or memorizing. The units which follow guide and encourage personal exploration for learning from note review.

### A Point With No Name

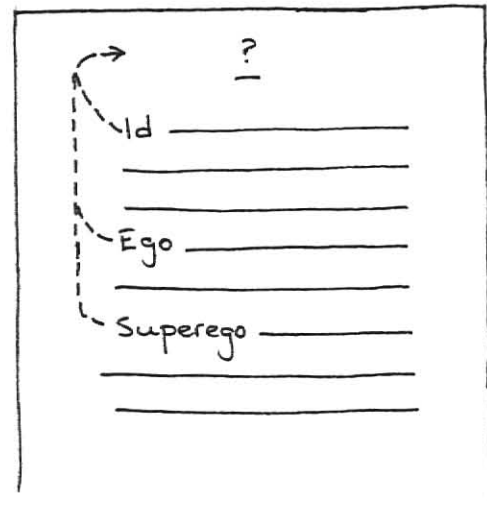
In most cases, main points, sub-points, and details will be mentioned directly by the lecturer. If not, they may be found later in the textbook. However, some points are described but not named and thus require careful attention to identify. For example:

An explicit approach presents material in a straightforward way, clearly describing and/or defining every point.



Main point stated directly

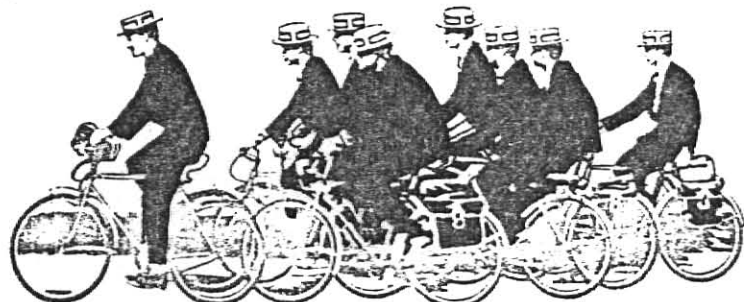
An implicit approach does not state the point directly but only between the lines. A general pattern between points can suggest an appropriate name for the point.



Main point might be identified by seeing connections of details

Throughout this unit, only explicit points will be covered. However, some unmentioned relationships between points will be named to make connections clear.

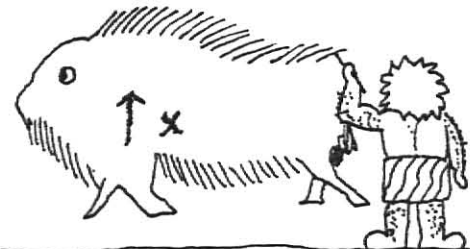
Move on  
to  
Visual  
Thinking



An old expression says, "A picture is worth a thousand words." Drawing is an art and pleasure lost to many persons in youth and considered only a hobby by most adults. However, the capacity to represent ideas in images, symbols, and idea networks remains within most people in spite of their lack of practice. Applying these skills to reviewing lecture notes places several points in view on one page. Simplifying and condensing allow the imagination to relate and rearrange points. A short background on the history of visual thinking may provide some insights on this process.

#### A Short Background on Visual Thinking

Visual thinking refers to the mental or graphic (on paper) representation of objects, ideas, and processes in symbols or networks. Visual thinking is not limited to a standard set of letters along a line. Its symbols can be invented and freely rearranged in any format. The use of symbolic communication dates back to cave painting and the first written alphabets.



Cave man recording a great hunt

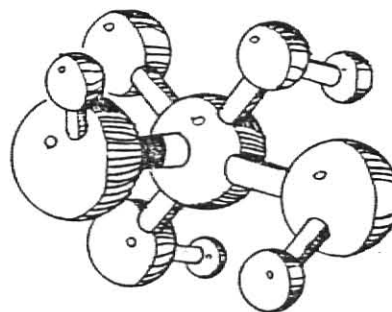


Egyptian hieroglyphics

Mental manipulation of objects and ideas led the world's great thinkers to momentous discoveries. Inventing new symbols, viewing from new angles, separating and reconstructing relationships is a continuous process of exploring the nature and function of objects, ideas, and processes. This approach of seeing and solving used by Leonardo daVinci to understand anatomy and Albert Einstein to study physics can help anyone work with information on his or her own.

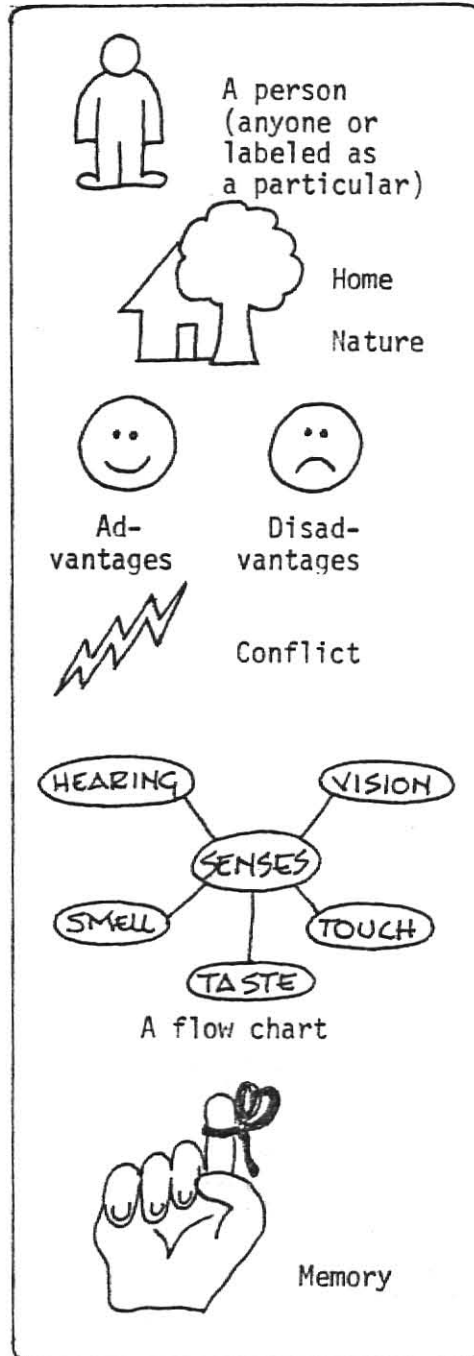


(Above) Leonardo's anatomical drawings followed the pattern of discerning the intended function of the original Creator in order to discover and recreate the order visible.

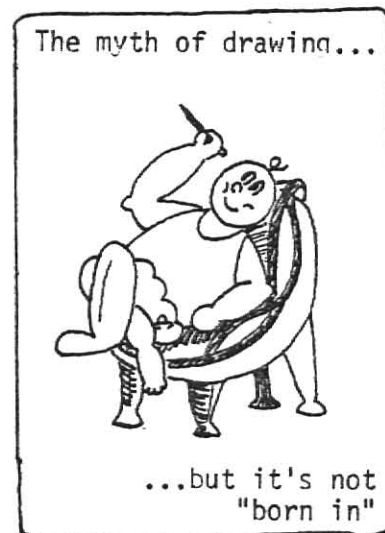


Visual Thinking is Imagination

Visual thinking, as applied to note review, involves the conscious, intentional use of charts, maps, and picture symbols to interpret and organize information. This practice goes beyond the everyday, unconscious process of relating to stop signs, floor plans, and build/fix-it guides. Visual thinking means interpreting data through drawing symbols and charts which describe them by oneself.



Visual thinking involves three key skills: seeing, imagining, and drawing. All of these skills can be acquired and improved upon by practice. No one is born with or automatically loses any one of them by lack of use. The ability to see demands careful attention and continuous refinement of observations. Imagination builds on a willingness to view an idea from several angles, recognizing patterns and parallels with other ideas, and searching out the meaning of points and relationships. Drawing ability need not exceed the skill required to make a roughly straight line or construct stick figures. Sometimes copying or the use of cut-out figures can support one's own ability.





Visual Thinking and Note Review

Listing and outlining line-by-line is the traditional method for sorting out main points and details. In this unit, these methods are used to explain some aspects of locating, grouping, and relating main points and details. For example:

Lecture notesFreudian Theory of Personality

- I. The Man Freud (1856-1939)
  - A. Son of a Moravian wool merchant
  - B. Educated in medicine in Vienna, specialty in neurology
  - C. Practiced medicine-realized important role of psychological disorders
    1. Recognized great role of unconscious motivation and processes
    2. Used psychoanalysis methods to treat neurotic patients in one to one counseling
    3. Tried to uncover unconscious motivations in clients' lives-used dream interp., free association
    4. Clinical cases as a basis for personality theory
  - D. Very prolific writer
    1. 24 volumes of collected work
    2. Relatively easy reading
    3. Personality theory, psychopathology, social psychology, religion, dream interpretation
  - E. Fled Nazis to England in 1938 (Jewish)

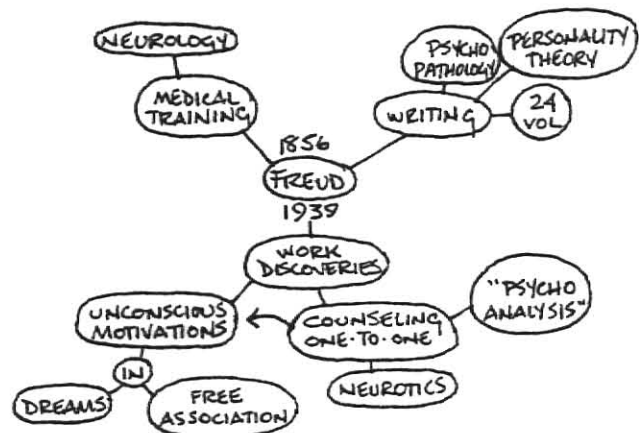
Outline for studyFreudian Theory

Freud (1856-1939)  
 medical background -  
 neurology  
 recog. psych. disorders  
 -unconscious motivation  
 developed psychoanalysis  
 -one-to-one counseling  
 of neurotics  
 -uncover uncon. motiv.-in  
 dreams, associations  
 -result of clinical work  
 writing (24 volumes)  
 -easy reading  
 -Topics: personality theory,  
 psychopathology....

Listing and outlining-by-number are not the only or even the best ways for organizing and remembering information. Visual organizing in charts, graphs, and pictures can act as a means for locating, grouping, and relating the same information more quickly and memorably. For example:

Linear outline

Freudian theory  
 Freud (1856-1939)  
 medical background-  
 neurology  
 recog. psych. disorders  
 -unconscious motivation  
 developed psychoanalysis  
 -one-to-one counseling  
 of neurotics  
 -uncover uncon. motiv.-in  
 dreams, associations  
 -result of clinical work  
 writing (24 volumes)  
 -easy reading  
 -Topics: personality theory,  
 psychopathology...

Visual outline

Sorting out and organizing points visually through charts, graphs, and pictures requires learning some new language symbols and patterns. These images and structures guide and organize thinking. Many of the symbols and patterns suggested in this unit may already be familiar since 94% of what people learn today comes through visual means (TV, observation, newspaper and magazine pictures, etc.)

## Recovery of Information: Listing and Defining

The processes of comparing notes with a textbook or classmate promotes effective note review. The certainty that information presented in lecture is complete contributes to thorough and self-confident study. Listing of points and definitions creates a basis for locating main points and their relationships to each other. In this unit, filling in terms and clarifying definitions takes place by comparing those notes with a master sheet of the instructor's notes.\* For example:

Master Sheet

## V. Evaluation of Freud

## A. Positive contributions

1. Importance of unconscious determinants of behavior—now generally accepted
2. Importance of identification in development—generally, but not completely accepted (ie.—Oedipus complex, etc.)
3. Stress on continuity of development—Adult behavior as product of childhood
4. Psychotherapy—method of psychoanalysis
5. Idea of many complex determinants of a given behavior
6. Introduced a great number of theoretical constructs (ie.—defense mechanisms)
7. Opened up study of sexuality

## B. Criticisms

1. Too much emphasis on sex & aggression, too few ref. to social and cultural
2. Terms vague, hard to test empirically
3. Data base bias
  - a) Theory from clinical observations of neurotic adults; retrospective method

## 2/15 Class Notes

## Freud—evaluation

## POSITIVE

unconscious...?  
identification in development  
(Oedipus not accepted)

continuity

psychotherapy

complex behavior

theory construct (defense mech.)  
opened study of sexuality

## NEGATIVE

too much sex and violence  
Not enough social, etc. ...

For practice: Using class notes and the master sheet at left, construct a complete sheet with as many full definitions as possible.

Master Sheet

## II. Structure of the Personality - 3 parts

Psychodynamic theory—parts of personality in conflict with each other.

## A. Id (term derived from Nietzsche, Latin "it")

1. Present at birth, seat of biological instincts
2. Psychic energy (libido)—takes form of unconscious instincts—ultimate sources of behavior—drive the person—not biological

Two basic instincts:

Eros (life, esp. sex)—emphasized after WWI  
Thanatos (death, aggression)—in later Freud

3. Operates according to pleasure principle—seeks immediate gratification regardless of external reality, moral prescriptions, etc.

## B. Ego

1. Emerges from id to mediate between id instincts and external reality (reality principle)—"executive of the personality"
2. May deny or allow satisfaction of id impulses depending on external reality (ie.—O.K. to beat up someone smaller than you, not someone bigger)
3. May change libido into socially acceptable behavior (ie.—aggression to play football)
4. Seat of conscious cognitive processes and intelligence but may also work unconsciously

## C. Superego—moral rules and ideals (conscience)

1. Develops out of assimilation of standards of parents and society about what is right and wrong—internalization of parental authority
2. Like id, makes demands—job of ego to balance id and superego in light of external reality
3. Violation of superego—guilt, anxiety, source of many neuroses, self punishment for doing something wrong (ie.—punitive authority of parents)
4. Personality problems if superego either too weak or too strong

## 2/17 Class Notes

## Structure of the Personality

Psychodynamic Theory—personality parts in conflict

ID—at birth, instinct  
—libido (not biological?)

? Eros (life, sex)  
? Thanatos (death, aggression)

## Pleasure principle—

external reality—

EGO—from id; between instincts and ext. real.

—"executive" (HOW?)

—deny impulses

—change libido to acceptable (Foot)

SUPEREGO—moral rules and ideals

—conscience

makes demands

ego balances

violation = guilt, anxiety

\*Note: all copies of instructor's notes are reduced to 65% of original.

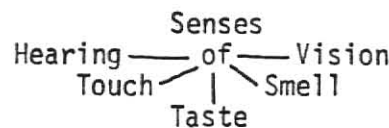
### Recognizing Main Points and Details

Recognizing main points and details extends the work of recovering information. Rules for determining the importance and relationships of points listed and defined help guide the sorting process. These guidelines are explained in further detail below.

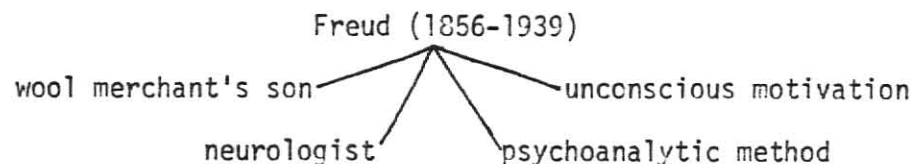
### Locating Main Points

Locating main points is a crucial step in sorting out class notes and understanding any subject. Main points are general terms or broader patterns which gather more detailed information into a common class. For example:

<u>List</u>	<u>Definition</u>	<u>Location</u>
Hearing	Ability to discern sounds	<div style="border: 1px solid black; padding: 5px;"> <p>This main point describes an idea that all details hold in common, yet which has a meaning beyond any one.</p> </div>
Touch	Ability to distinguish texture	
Senses	Abilities to perceive from environment	
Taste	Ability to know flavor	
Smell	Ability to recognize odors	
Vision	Ability to see	



<u>List</u>	<u>Definition</u>	<u>Location</u>
wool merchant's son	Freud's family background	<div style="border: 1px solid black; padding: 5px;"> <p>This main point describes a person to whom all details relate; one who, in this case, gives an overall meaning and connection to terms.</p> </div>
neurologist	Freud's profession, training	
Sigmund Freud	famous Austrian psychiatrist	
unconscious motivation	hidden sources of behavior identified by Freud	
psychoanalytic method	Freud's counseling method based on looking at childhood	



For practice: For the notes below, list and define terms and identify one main point for each section. Use a separate sheet of paper.

Freudian Theory of Personality

- I. The man Freud (1856-1939)
  - A. Son of a Moravian wool merchant
  - B. Educated in medicine in Vienna, specialty in neurology
  - C. Practiced medicine-realized important role of psychological disorders
    1. Recognized great role of **unconscious motivation** & processes
    2. Used **psychoanalysis** methods to treat neurotic patients -1:1 counseling
    3. Tried to uncover unconscious motivations in clients' lives-used dream interp., free association
    4. Clinical cases as basis for his personality theory
  - D. Very prolific writer
    1. 24 volumes of collected work
    2. Relatively easy reading
    3. **Personality theory**, psychopathology, social psychology, religion, dream interpretation
  - E. Fled Nazis to England 1938 (Jewish)
    - d. 1939 in London of cancer-active until death
  - F. Profoundly influential in psychology but also in literature, art, philosophy, sociology, anthropology  
Other vilified for stressing irrational (esp. sexual & aggressive) aspects of man

For practice: Check the decisions made above by examining why points are more general, gathering together or guiding the common characteristics of more specific points. (Warning: There may be more than one level of main points represented).

1. Main point \_\_\_\_\_  
What more detailed points does this point combine or guide?  
\_\_\_\_\_  
\_\_\_\_\_  
What common characteristics are represented by this main point?  
\_\_\_\_\_  
\_\_\_\_\_

2, 3, 4...Continue answering questions as with Main Point #1.

Final question: How do definitions aid discovery of main points?

\_\_\_\_\_

Objects, Ideas, and Processes

Main points describe objects, ideas, and processes. For example:

OBJECTS are things, concrete items with physical properties.

Human Brain  
Left lobe  
Right lobe  
Corpus callosum  
Cortex

IDEAS are abstract thoughts which stand for a set of relationships understood by the user of the ideas.

Psychology  
Personality  
Learning and Memory  
Social Psychology  
Abnormal Psychology

PROCESSES are ideas in action, relationships involving progress or effects of special interest to the reviewer.

Intellectual Development  
Motor Skills  
Pre-operational skills  
Concrete operations  
Formal operations

Probably the easiest way to begin using visual symbols is through drawing flow charts. Familiarizing oneself with a few basic forms makes many figures possible. Once a point is located,

use a square to represent objects,



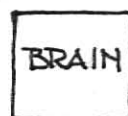
use a circle to represent ideas,



use a triangle to represent processes.



For instance, the points listed above might be represented as follows:



For practice: Define the following terms and explain briefly how each main point illustrates it.

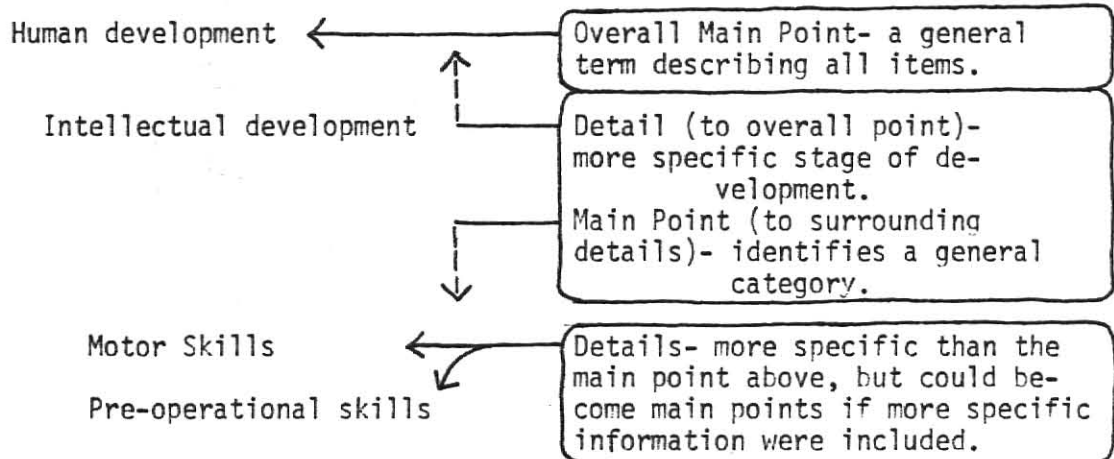
1. Object \_\_\_\_\_  
Human brain \_\_\_\_\_
2. Idea \_\_\_\_\_  
Psychology \_\_\_\_\_
3. Processes \_\_\_\_\_  
Intellectual development \_\_\_\_\_

For practice: Using the following lists, identify the main point, define it as an object, idea, or process, draw and label the point. Finally, explain below the list why the main point is most important.

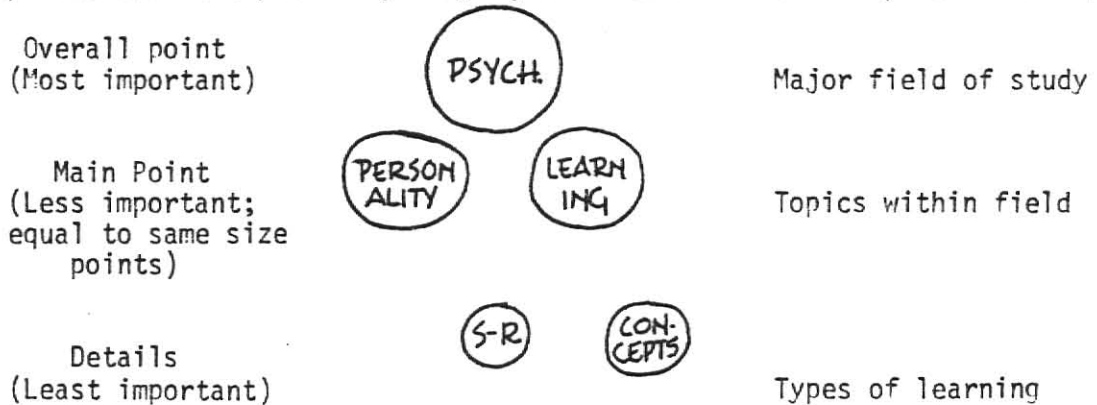
<u>List</u>	<u>Main Point</u>	<u>O/I/P?</u>	<u>Draw!</u>
1. Intellectual development Human development Emotional development Physical development			
Explain _____			
2. Human body Arms Trunk Head Legs			
Explain _____			

Levels of Importance

Main points must be considered relative ideas. Main points are broader than details surrounding them. However, in different circumstances, the same point may be more specific than some overall point. For example:



In order to represent information at several levels, the importance of points can be captured by varying the sizes of their shapes. For example



# **ILLEGIBLE DOCUMENT**

**THE FOLLOWING  
DOCUMENT(S) IS OF  
POOR LEGIBILITY IN  
THE ORIGINAL**

**THIS IS THE BEST  
COPY AVAILABLE**

The number and specificity of levels may vary with each topic. The visual format can be used as a way to test decisions on main points and relationships.

For practice: Identify levels of importance and draw object (square), idea (circle), or process (triangle) figures in different sizes to represent them.

<u>List</u>	<u>Overall, Main Pt., Detail?</u>	<u>O/I/P?</u>	<u>Draw!</u>
1. Arms Elbows Stomach Toes Wrists Brain Human body Forearms Toenails Feet			
2. (See notes below) Structure of the personality Ego Id Libido Superego Pleasure principle			

## II. Structure of the personality - 3 parts

Psychodynamic theory - parts of personality in conflict with each other

### A. Id (term derived from Nietzsche Latin it)

1. Present at birth - seat of basic biological instincts
2. Psychic energy (libido) - takes form of unconscious instincts-  
ultimate sources of behavior-drive the person-not biological
3. Operates according to pleasure principle - seeks immediate  
gratification regardless of external reality, moral proscriptions

### B. Ego

1. Emerges from id to mediate between id instincts & external  
reality (reality principle) "executive of the personality"
2. May deny or allow satisfaction of id impulses depending on  
external reality e.g., ok to beat up someone smaller than you  
but not bigger

### C. Superego - moral rules & ideals - conscience

1. Develops out of assimilation of standards of parents & society  
about what is right & wrong - internalization of parental authority
2. Like id, makes demands - job of ego to balance id and superego



For practice: Analyze choices about level of importance made in the previous two exercises by using these questions.

1. Overall main point \_\_\_\_\_  
How does this point gather together more detailed information?

What common characteristics or pattern is represented by the overall point? \_\_\_\_\_

2. Main points (a) \_\_\_\_\_ (b) \_\_\_\_\_  
(c) \_\_\_\_\_ (d) \_\_\_\_\_

What details do these points combine or guide?

(a) \_\_\_\_\_ (b) \_\_\_\_\_

(c) \_\_\_\_\_ (d) \_\_\_\_\_

What common characteristics or patterns are represented by each point?

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(c) \_\_\_\_\_

(d) \_\_\_\_\_

How are main points more general than details, less general than overall points?

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(c) \_\_\_\_\_

(d) \_\_\_\_\_

3. How do definitions aid discovery of main points?

\_\_\_\_\_

### Context Clues

Locating main points can be aided by awareness of clues during lecture or while reviewing the note sheet. For example, statements like

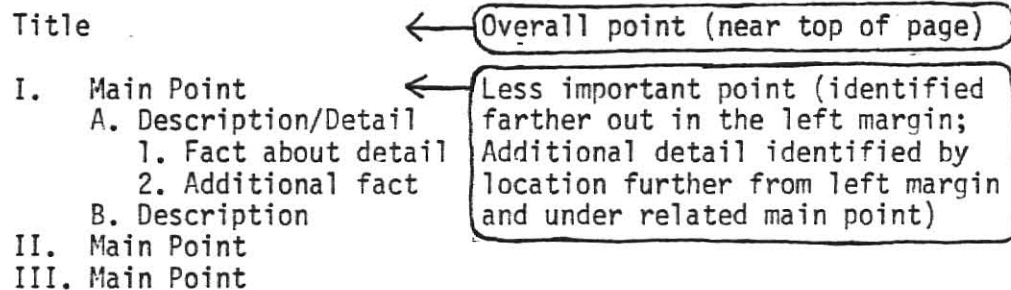
the importance of  
advantages of  
disadvantages of  
problems of  
causes of  
results of  
criticism of  
evaluation of

summary  
conclusion  
description of  
types of  
characteristics of  
differences between  
contrast between  
similarities between

comparison between  
parts of  
history of  
purposes of  
functions of  
steps of  
methods of  
how to

The words and phrases identified on the previous page as context clues provide indications of significant points or relationships between points. Memorize at least ten of the clues for a quiz later in this unit. Also, keep them in mind while listening to lectures.

Another Context Clue example: Class outlines placed on the blackboard or printed handout sheets often contain indications of the importance of points. Note the sample below:



Another Context Clue example: Terms repeated in lecture or listed as headings or in bold faced type in textbooks tend to be main points.

For practice: Name ten words or phrases which, as context clues, might identify main points or indicate details. How might each function in a lecture?

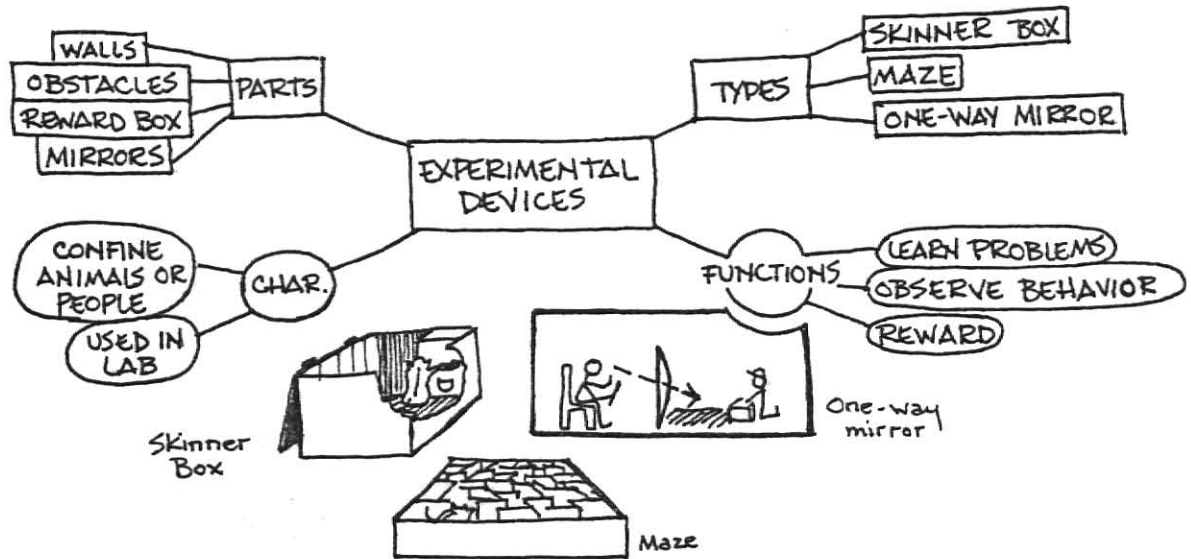
- |           |            |
|-----------|------------|
| 1. _____  | How? _____ |
| 2. _____  | How? _____ |
| 3. _____  | How? _____ |
| 4. _____  | How? _____ |
| 5. _____  | How? _____ |
| 6. _____  | How? _____ |
| 7. _____  | How? _____ |
| 8. _____  | How? _____ |
| 9. _____  | How? _____ |
| 10. _____ | How? _____ |

Answer the following questions relating to types of context clues.

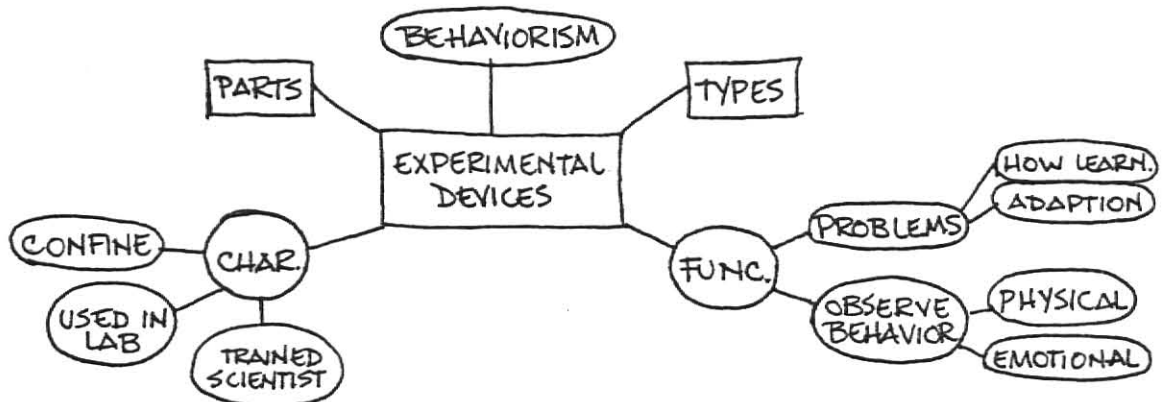
11. How are in-class outlines helpful in determining importance of points?
12. If a term is repeated in class, what action might be appropriate?

### Grouping Details

Grouping details offers a way to define specific points, place them in common categories, and relate their meaning to main points and to each other. Details are more specific terms than main points. They describe parts, types, characteristics, functions, and stages of main points. The more complete the description, the more particular the details. For example:

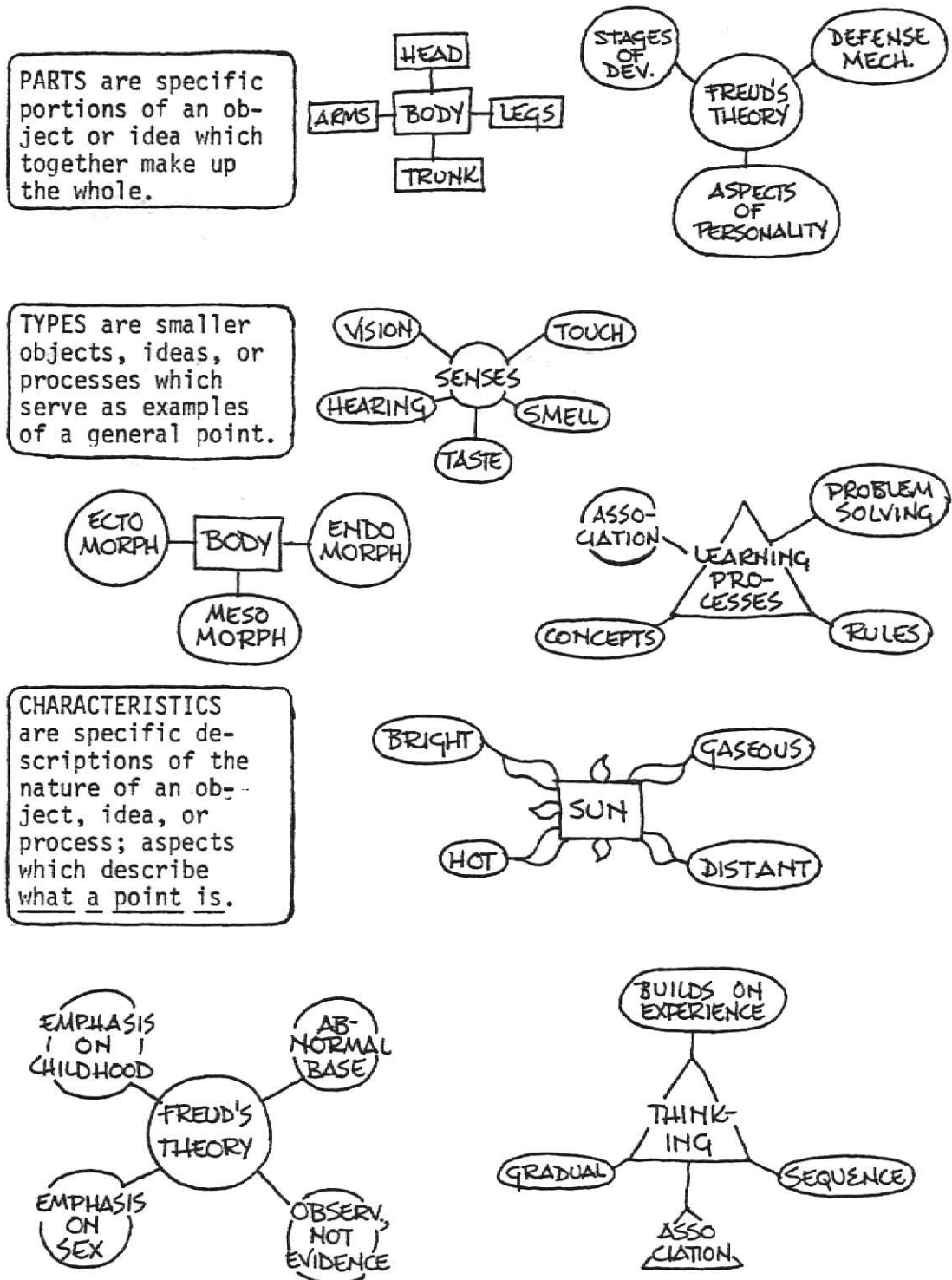


New levels of importance can be added to the flow chart in order to expand description of main point or a particular detail. The chart is open to additions to inner or outer circles to more clearly represent points of discussion. For example:

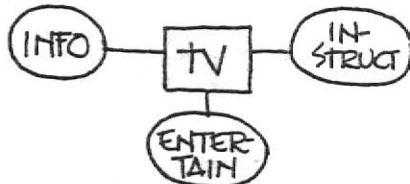


# Identifying Groups

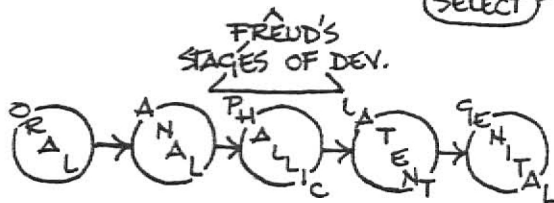
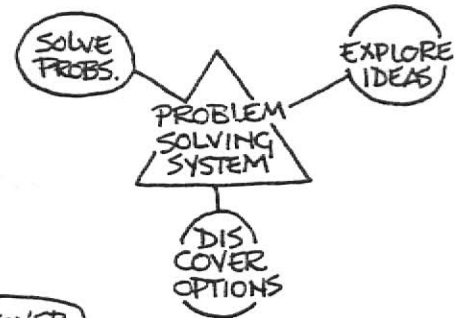
Although other categories for groups might work as well, almost any point can be described by its parts, types, characteristics, functions, or stages.



**FUNCTIONS** are specific purposes which describe the way objects, ideas, or processes go into action or relate to other points.



**STAGES** are specific steps in the development of a process.



For practice: Define Part \_\_\_\_\_

Type \_\_\_\_\_

Characteristic \_\_\_\_\_

Function \_\_\_\_\_

Stage \_\_\_\_\_

For practice: Using the notes below (continued onto the next page) identify detail parts, types, characteristics, functions, and stages.

### III. Psychosexual stages of development

#### A. Invariant sequence of stages

1. Important to adult personality - how child passes through each stage
2. Each stage has its own erogenous zone of body - region where physical stimulation is esp. satisfying each zone association with satisfaction of a vital need
3. Traumatic time in given stage - fixation strong effect on adult

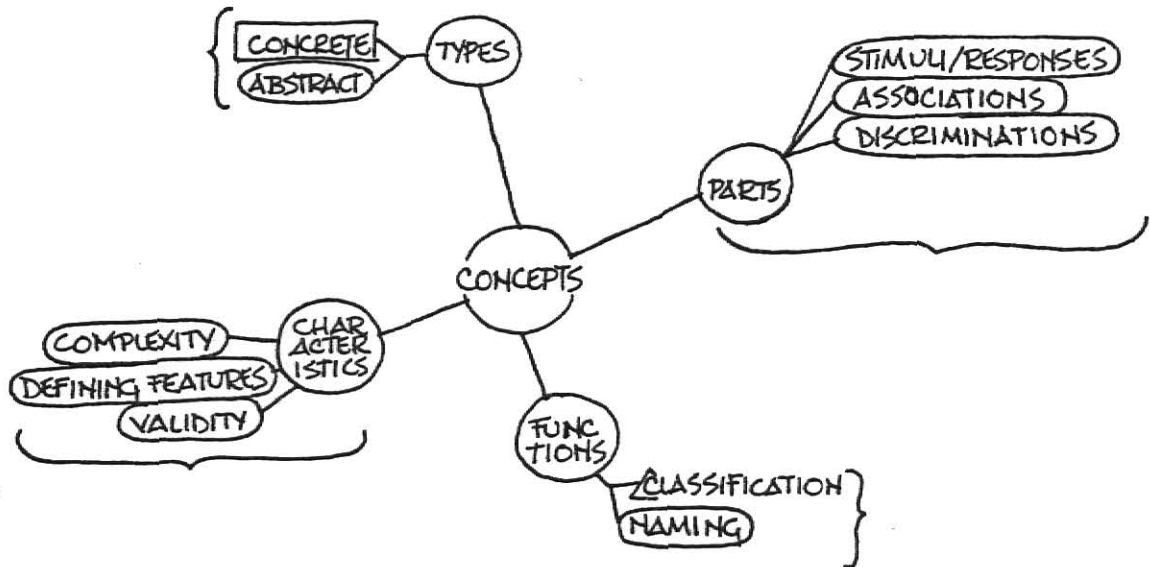
- B. Oral stage
  - 1. Mouth as erog zone - needs stimulation thumb, pacifier, nursing, bottle, etc.
  - 2. Fixation (from anxiety, inadequate stimulation, etc.)
    - excessive dependence, passivity, acquisitiveness
- C. Anal stage c. 2 years old
  - 1. Importance of toilet training
  - 2. Fixation if parents too punitive or lenient
    - May be either 1) messy, stubborn, defiant
    - or 2) very generous, compliant, clean
- D. Phallic stage - sex organs as erogenous zone (masturbation) c. 3-6 yrs
  - 1. Male
    - a. Seeks physical love of mother - sees father as rival (Oedipus complex)
    - b. Resolved by repression of feelings for mother & identification with father. Evolves due to lack of possibility for gratification & fear of castration by father & maturation
  - 2. Female
    - a. Normal identification with mother turns too identification to compete for father's affection (Electra complex)
- E. Latent stage (c. 6-12 yrs) - sexually quiet stage. Continuation of identification with same-sexed parent
  - Poor identification with same-sexed parent - poor sex-role identity or homosexuality
- F. Genital stage - adolescence
  - 1. Physical maturity & socialization as adult
  - 2. End to narcissism (self-love, self as object of sexual gratification) Heterosexual relationships



Sigmund Freud (1856-1939)  
"Father of Psychoanalysis"

Groups as Objects, Ideas, or Processes

Identification of detail groups as objects, ideas, or processes can provide more precise description. For example:



For practice: Identify detail groups (parts, types, characteristics, functions, or stages) as objects, ideas, or processes by including shapes in the charting of the previous exercise.

For practice: Using the notes below, identify main point and as many detail groups as possible. Use shapes to clarify details.

## V. Evaluation of Freud

### A. Positive contributions

1. Importance of unconscious determinants of behavior - now generally accepted
2. Importance of Identification in development Generally accepted (though not specifics of Oedipus/Electra complexes)
3. Stress on continuity of development Adult behavior as product of childhood experiences
4. Psychotherapy - method of psychoanalysis
5. Idea of many complex determinants of a given behavior
6. Introduced great no. of theoretical constructs e.g., defense mechanisms
7. Opened up study of sexuality

### B. Criticisms

1. Too much emphasis on sex & aggression too little emphasis on social & cultural influences Changed by several neo-Freudians
2. Terms vague - hard to test empirically (but has generated much research)
3. Data base bias
  - a. Theory built up from clinical observations of neurotic adults retrospective method
  - b. Did not observe children or normal adults directly
  - c. Clinical interviews - not controlled observations
4. Dogmatic cultish
  - a. Bitter quarrels with students who later disagreed with some of his theory
  - b. Analyzed dissenters in terms of his theory (dirty science)

For practice: Check the logic of choices in the exercise above by explaining which details are

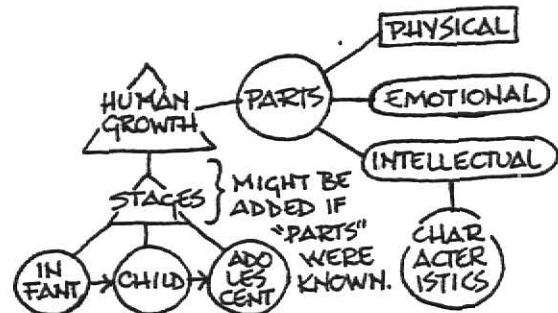
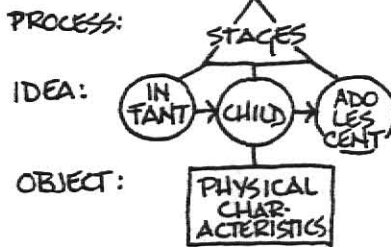
Parts _____	Why? _____
Types _____	Why? _____
Characteristics _____	Why? _____
Functions _____	Why? _____



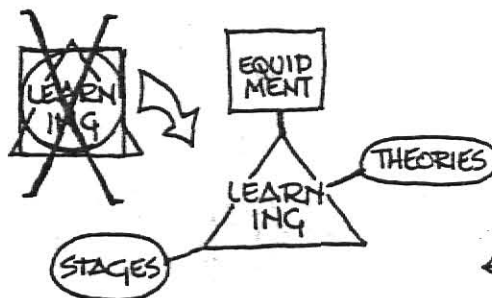
# Recognizing and Charting Points: Closing Observations

Locating main points and grouping details for visual note review is a complex skill. Several steps such as determining broad definitions, object, idea, or process categories, levels of importance, context clues, and grouping details all fit together in the process of describing information. Because these simple steps have been presented separately, some more general observations about the process have been omitted. These comments might improve use of the review/charting system.

The general categories of part, type, characteristic, function, and stage allow the reviewer, using imagination, to add details. This extends the information in notes as well as anticipating critical questions which might appear on an examination. →

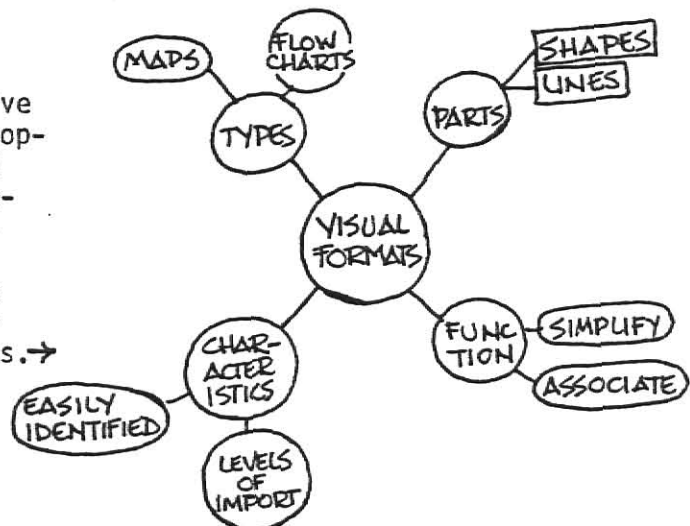


Main points outlined at the left are composed of a variety of details (objects, ideas, and processes). The reviewer should remember that details are not necessarily the same kind of information as their main points. ←



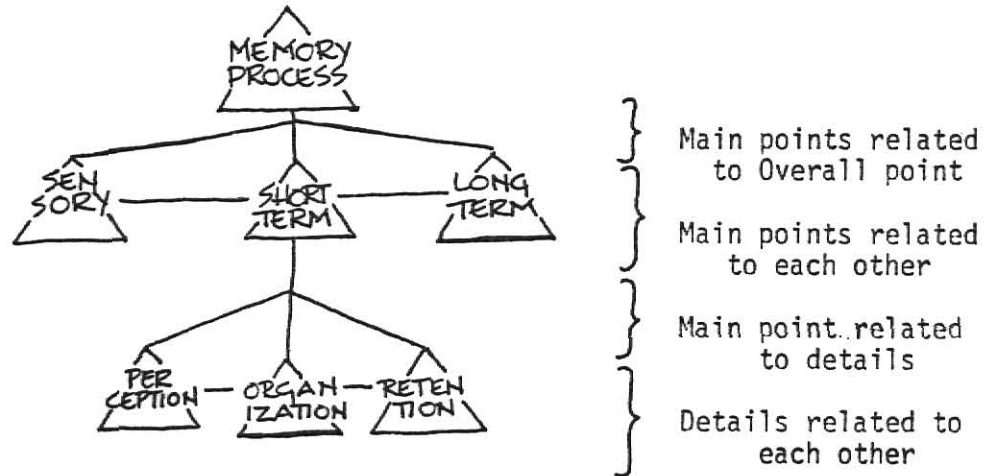
Despite the diversity of details which make up a main point, identification of the more important term as an object, idea, or process (rather than two or three kinds) keeps description simple. ←

As stated earlier, main points and details are relative concepts. However, overall topics and their main points and details have been used to demonstrate the levels of importance and detail group concepts. These might appear at several more levels or in any number of other configurations. →



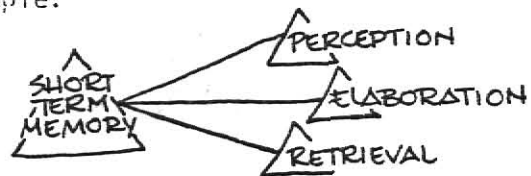
Relating Points: Patterns of Meaning

Relating main points to each other, details to details, and main points to details creates a total picture of the information to be learned. Many of these relationships emerge as points are located and grouped. However, these connections tend to be limited. Once points are defined clearly, drawing of relationships can complete and tie together all parts into one pattern. For example:



The shapes used to identify types of points are a kind of vocabulary for visual thinking language. The rules governing the use of this vocabulary are much easier to learn than written language. Flow charts, created by lines and/or arrows drawn between shapes, illustrate relationships between points. For example:

Straight lines indicate direct relationships.



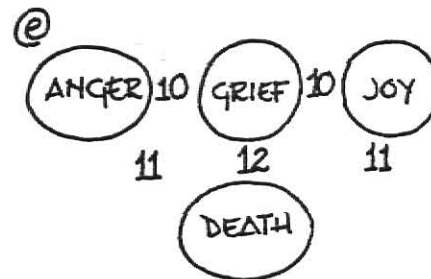
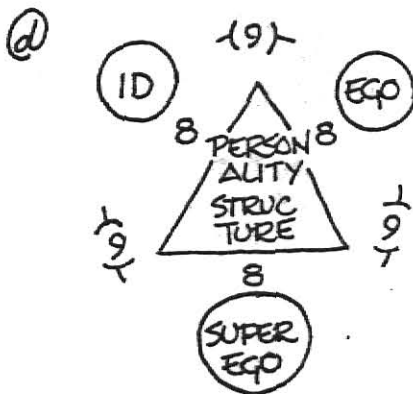
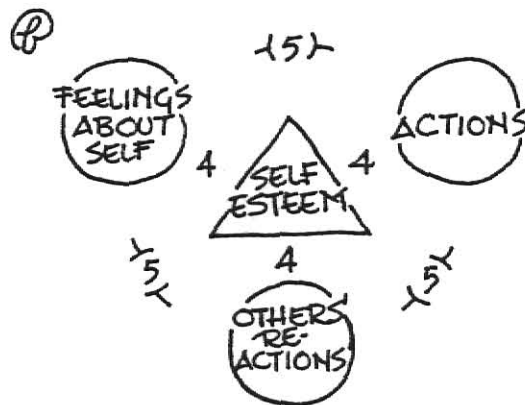
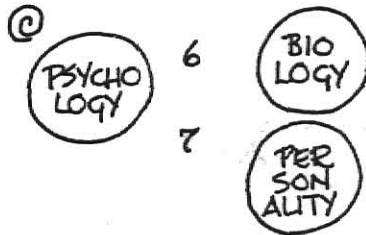
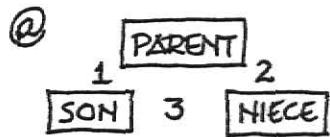
Dotted lines indicate indirect relationships.



Arrows indicate sequence (of time, influence, process)



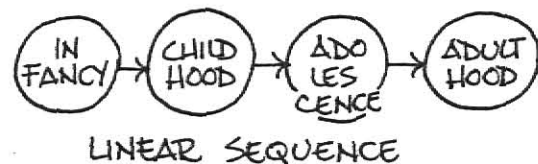
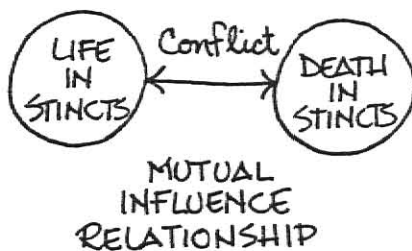
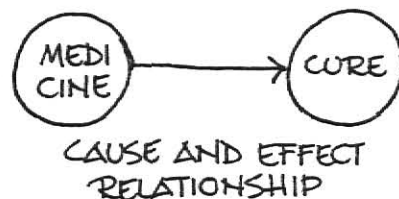
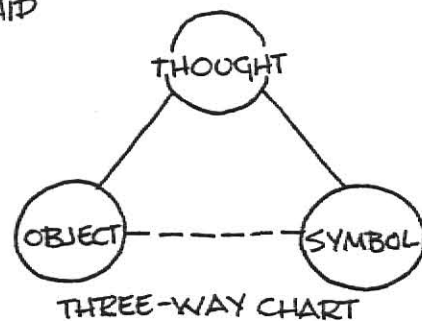
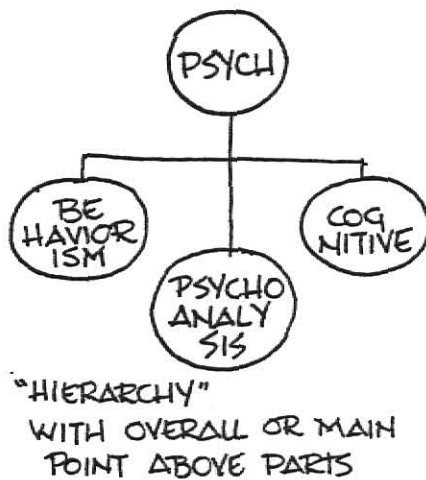
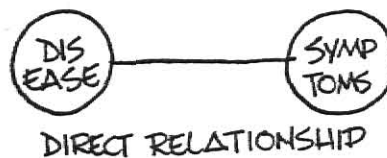
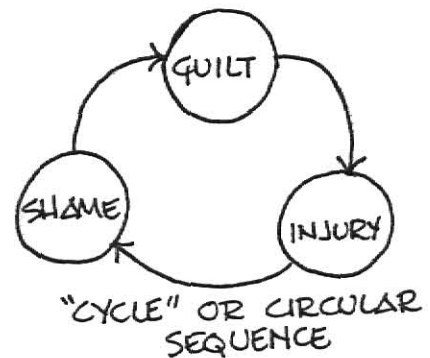
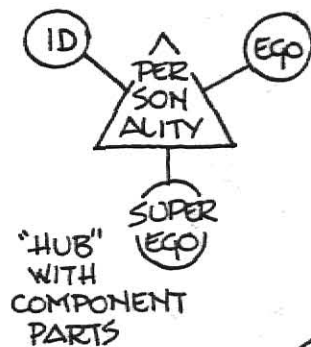
For practice: Using the points identified below, draw direct (straight line), indirect (dotted line), or sequence (line/arrow) relationships. Name each numbered relationship between points and indicate why it should be considered direct, indirect, or sequential.



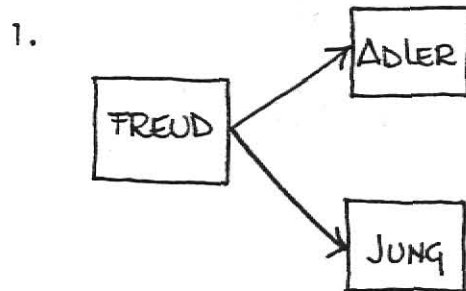
1. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
2. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
3. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
4. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
5. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
6. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
7. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
8. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
9. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
10. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
11. Relationship \_\_\_\_\_ Why? \_\_\_\_\_
12. Relationship \_\_\_\_\_ Why? \_\_\_\_\_

Larger Patterns

Several types of flow chart patterns serve as examples of direct, indirect, and sequence relationships. Awareness of common combinations of shapes and lines makes visual thinking easier to begin. Using the basic elements and these suggestive patterns, some experimentation can produce a system adapted to personal needs. For example:



For practice: Identify the types of points and relationships indicated by lines below. Briefly comment on their meaning.

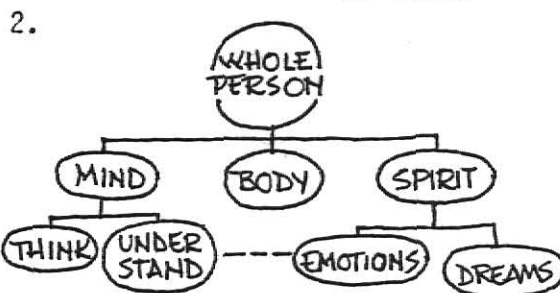


Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_

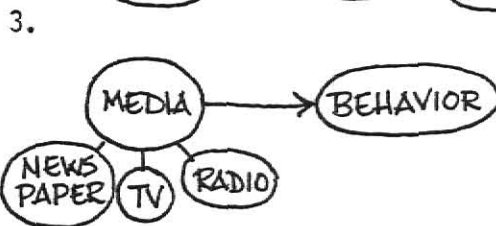


Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationships \_\_\_\_\_

Meaning \_\_\_\_\_

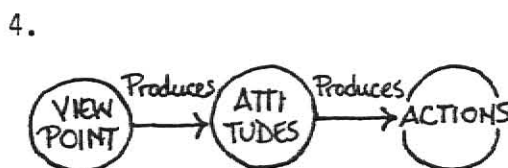


Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationships \_\_\_\_\_

Meaning \_\_\_\_\_

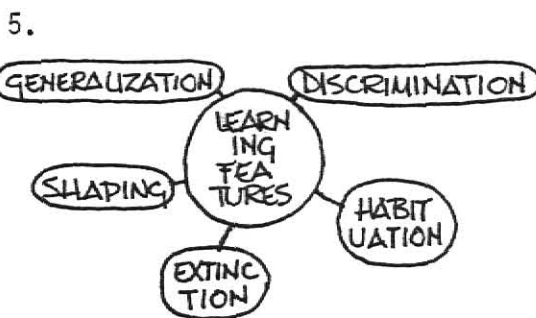


Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_



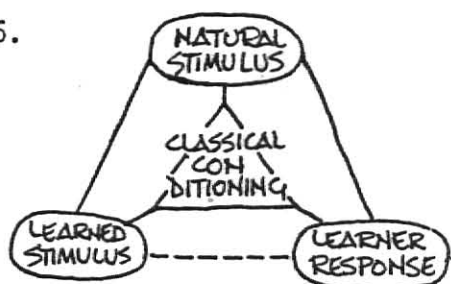
Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_

6.



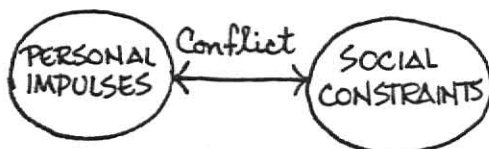
Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationships \_\_\_\_\_

Meaning \_\_\_\_\_

7.



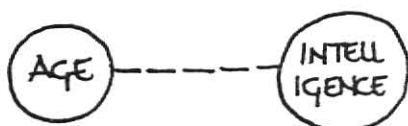
Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_

8.



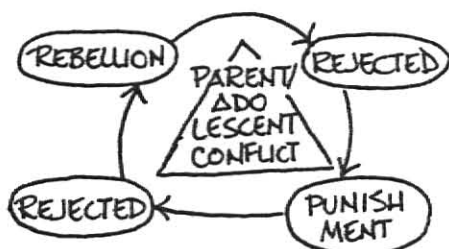
Main point \_\_\_\_\_

Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_

9.



Main point \_\_\_\_\_

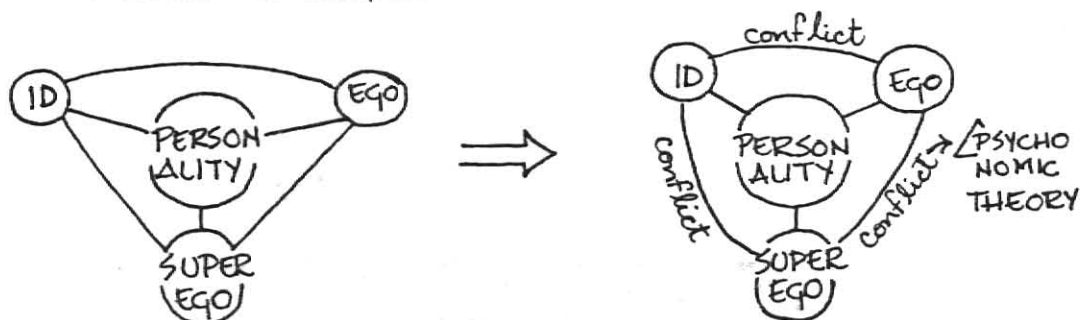
Details \_\_\_\_\_

Relationship \_\_\_\_\_

Meaning \_\_\_\_\_

### Labeling

The meaning of connections between points is often enhanced by labeling the line and/or arrows which represent them. In fact, idea and process points may be charted more accurately as relationship lines in some cases. For example:



For practice: Using the notes below, identify and draw points and their relationships. Label relationships to indicate the connections.

IV. Defense mechanisms - techniques used by ego to cope with anxiety & maintain self-esteem (defined text p. 415)

A. Intro

1. One of most generally accepted parts of Freud's theory - even part of popular thought & vocabulary
2. Normal to use some occasionally to cope - problems if one used too often or rigidly
3. Channel unacceptable libido into socially acceptable behavior but may lead to serious distortions of reality.

B. Repression - pushing impulses from consciousness

1. Person not aware of impulses or his pushing them out can cause tension (cf. boiling pot with lid on)
2. Psychoanalysis tries to lift repression and bring libidinal impulses to awareness
3. May come out in disguised form
  - a. Dreams - symbolic Cohen SS 17 p. 28
  - b. Freudian slips

Shakespeare - "Thy wish, Harry, is father to the thought"

"Barbara Ann for the best in bread"  
(breast } } bed)

- c. Déjà vu - illusion of familiarity with new situation

C. Denial - anxiety-provoking objects/events denied or ignored -

seriously distorts reality e.g., ignoring illness, a person

D. Regression - reversion to earlier pattern of behavior e.g., pre-schooler's behavior when sibling born adult throwing tantrum under pressure

E. Rationalization - justify anxiety by claiming we acted rationally e.g., anxiety from parents - claim they don't understand me

F. Reaction formation - behavior exactly opposite to what impulse would predict - attempt to keep impulse from consciousness - may seriously distort relationships, e.g. hostile mother overly affectionate to child, highly sex-aroused person prudish  
Shakespeare "Methinks the lady doth protest too much"

G. Projection - anxiety-arousing characteristics in self attributed to others, e.g. someone afraid of own aggression attributes aggression to others

H. Sublimation good form-idealization (cf. infatuation) - impulse satisfied in some socially accepted substitute manner, e.g., aggression expressed in sports, drama, literature  
important in taming eros & thanatos - can improve good of society too

I. Displacement - discharging impulses on objects other than those arousing emotion

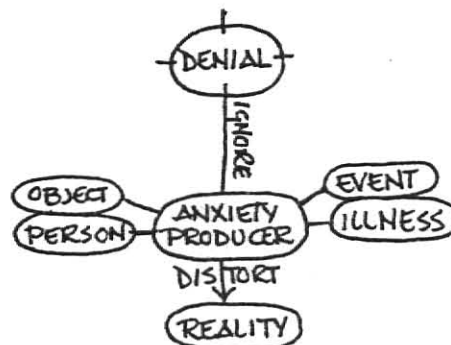
Check-up: A sample of flow chart relationships and labels for the previous exercise appears below. Survey it for an assessment of the practice exercise just completed and as preparation for the practice to come.

 Types of  
Defense  
Mechanisms

Below is a chart of the entire sheet:



Or, to encompass more detail, separate charts might be set up like the one below:





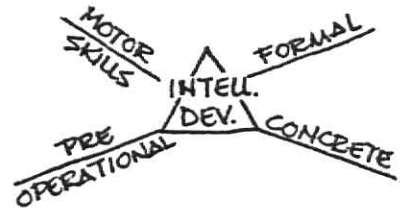
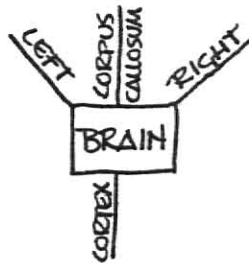
Mapping: Another Approach to Visual Thinking

Maps, like flow charts, are visual ways of representing lecture notes. The principle of their operation is the same as that of flow charts, but symbols are somewhat different.

A map begins with a circle to represent the main point. The circle is labeled. If more precision is desired, the flow chart symbols (squares, circles, and triangles) may be used. For example:



Maps include detail points by adding branches. The names of details or related points are written on each branch. For example:

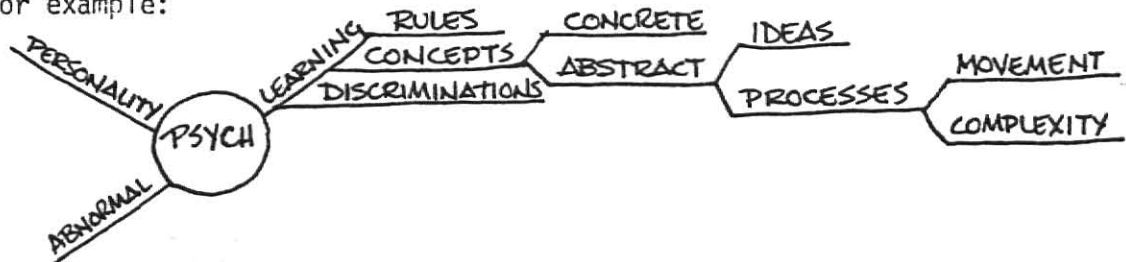


For practice: Using the following lists, identify the main point and use it as the central focus. Map out details as branches of the main point.

1. Touch  
Vision  
Senses  
Hearing  
Taste  
Smell
2. Skinner box  
Experimental devices  
Maze  
One-way mirror

### Branches; Patterns of Association

Map branches represent points associated with the main point. Further branches can be added to the first set to extend the association. Generally, points increase in detail as the map expands from the center. For example:

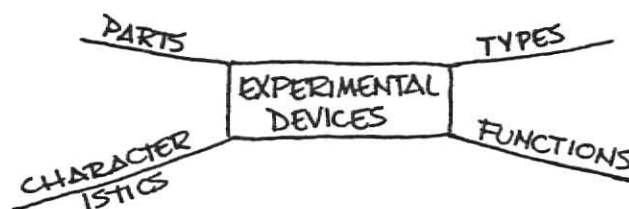


For practice: Using the following lists, draw maps in detail.

1. Purposes of TV
  - Information
  - News, documentary
  - Entertainment
  - Shows, sports
  - Instruction
  - Demonstrations, classes
  
2. Problem solving steps
  - Discover
  - (locate problem)
  - Define
  - (describe problem)
  - Analyze
  - (careful assessment)
  - Experiment
  - (examine alternatives)
  - Select a solution
  - (decide on the best)
  - Implement
  - (apply solution)

### Labeling Branches Specifically

Since any kind of association might be drawn in the branches, organizing information in detail groups (part, type, characteristic, function, and state) may reduce confusion in understanding maps. Grouping separate lines adapts the mapping format to the flow chart system. Thus relationships are clearly marked, not forgotten or assumed. For example:



For practice: Using the notes below, identify main point, detail groups, and appropriate labels for each. Map out their relationships.

## II. Structure of the personality - 3 parts

Psychodynamic theory - parts of personality in conflict with each other

### A. Id (term derived from Nietzsche Latin id)

1. Present at birth - seat of basic biological instincts
2. Psychic energy (libido) - takes form of unconscious instincts-ultimate sources of behavior-drive the person-not biological  
2 basic instincts  
Eros (life, esp. sex) (after WWI)  
Thanatos (death, aggression) - emphasized more in later Freud
3. Operates according to pleasure principle - seeks immediate gratification regardless of external reality, moral proscriptions

### B. Ego

1. Emerges from id to mediate between id instincts & external reality (reality principle) "executive of the personality"
2. May deny or allow satisfaction of id impulses depending on external reality e.g., ok to beat up someone smaller than you but not bigger
3. May channel libido into socially acceptable behavior  
e.g. aggression - football
4. Seat of conscious cognitive processes & intelligence but may also work unconsciously

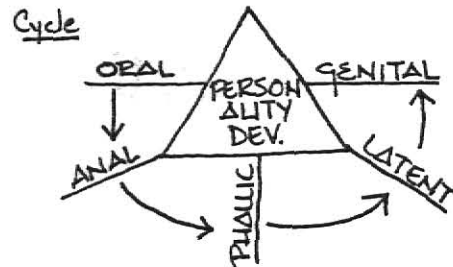
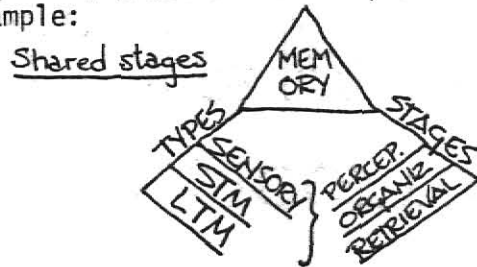
### C. Superego - moral rules & ideals - conscience

1. Develops out of assimilation of standards of parents & society about what is right & wrong - internalization of parental authority
2. Like id, makes demands - job of ego to balance id and superego in light of external reality
3. Violation of superego - guilt, anxiety, source of many neuroses self-punishment for doing something wrong (cf. punitive authority of parents)
4. Personality problems if superego either too weak or too strong

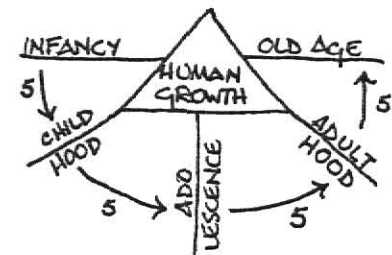
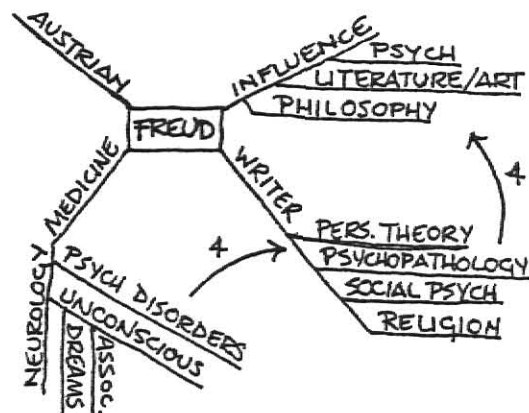
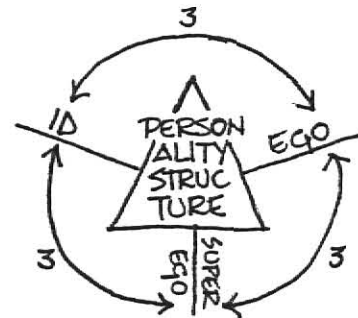
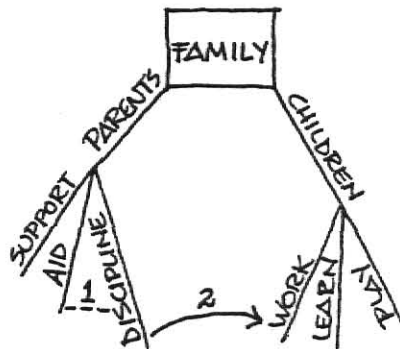


Simplify your study:  
Map it out!

More sophisticated relationships (connections between groups, sequence, cause and effect) can be drawn with lines and arrows. For example:



For practice: Name the kinds of relationships numbered and briefly explain their meaning.



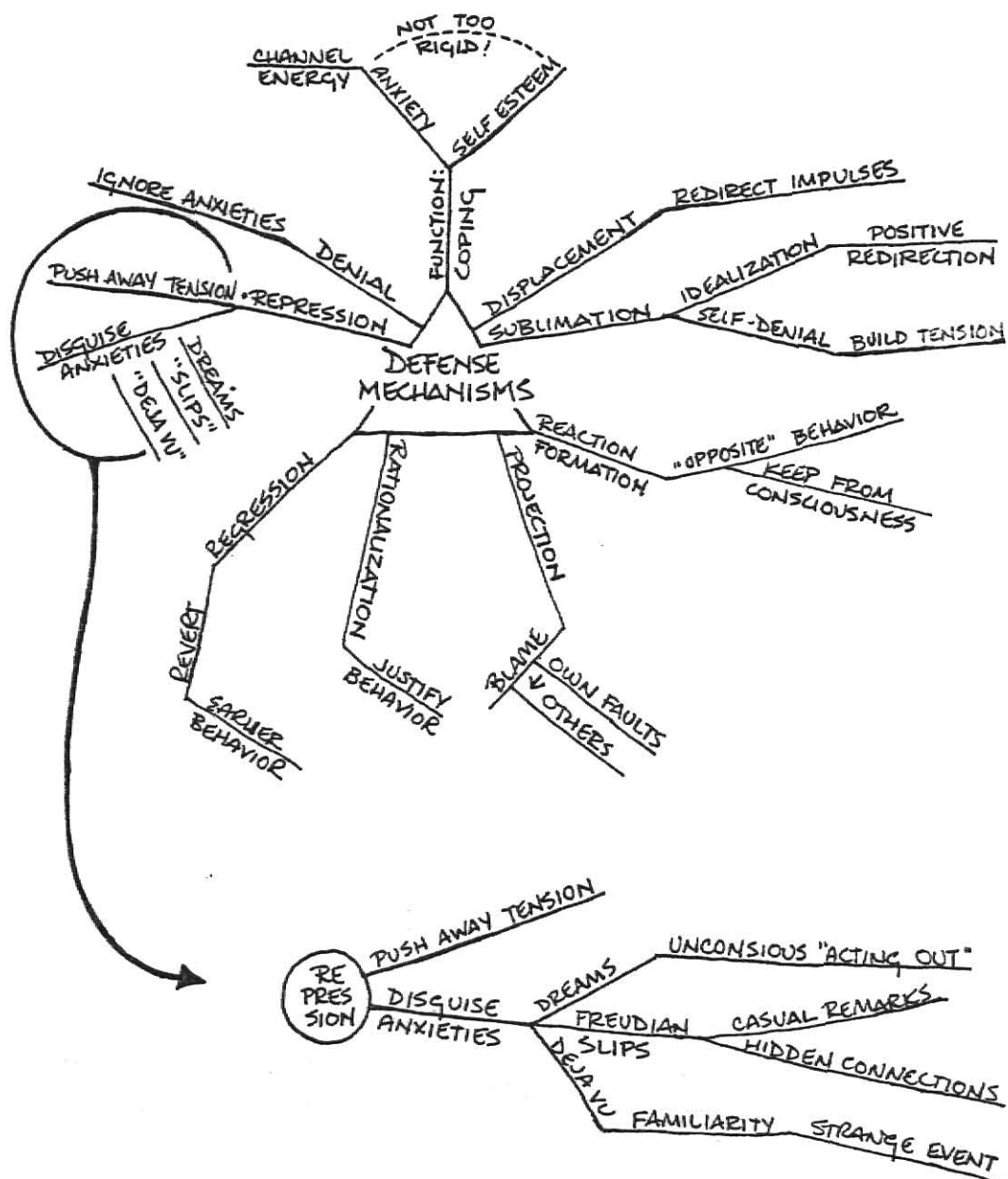
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

# Mapping: A key to creative thinking

Since map branches can be drawn quickly and require less analysis than flow charts, mapping offers an excellent opportunity for creative thinking. This can begin by drawing branches from a central idea. Then, more branches can spring from the first set as new associations are brought in. Associations should continue, working rapidly, until the store of ideas is exhausted. Then attention may be focused on the next branch.

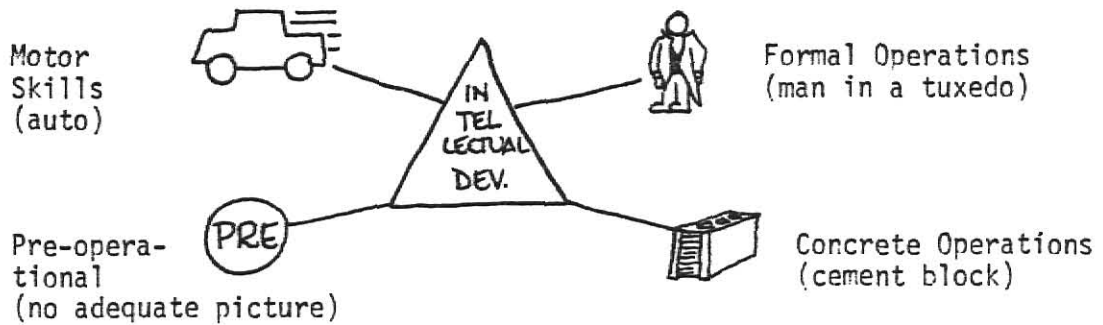
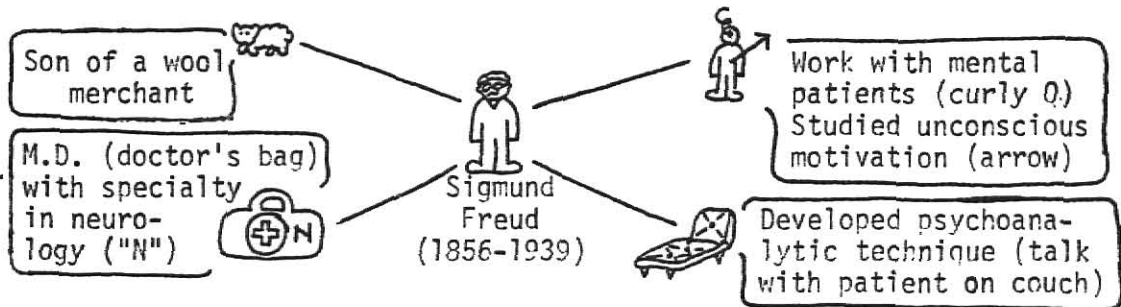
Once the total map is completed, it can be analysed to test the validity of associations. During this time some good observations not mentioned in class (but perhaps waiting on an exam) may also be made.

Finally, maps possess a flexibility similar to flow charts. When the map becomes too complex to understand, parts can be separated and detailed for easier viewing. For example:



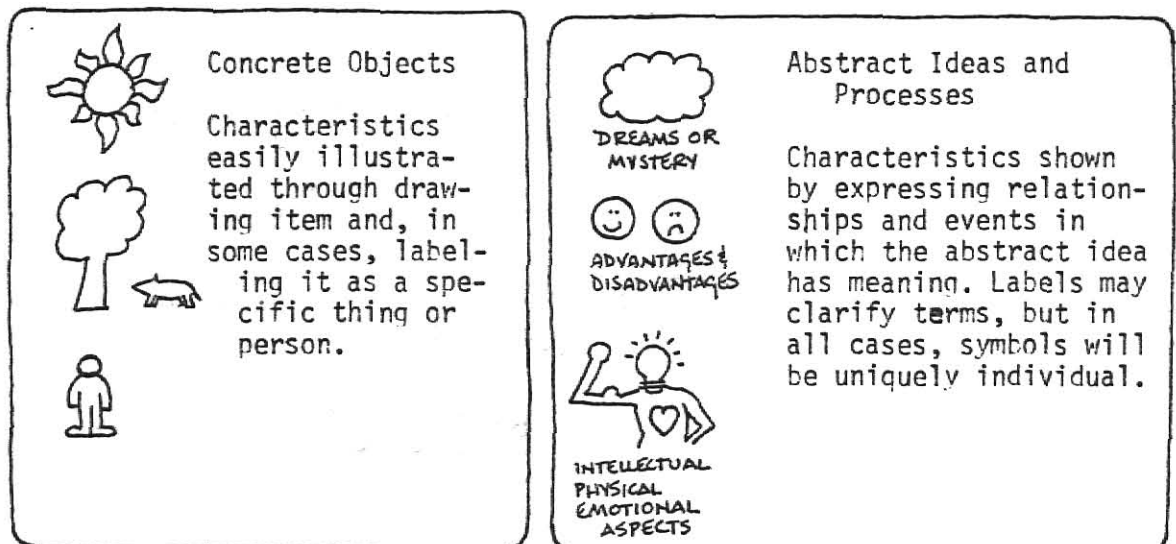
### A Picture is Worth a Thousand Words

Picture symbols provide a visual alternative to verbal labels in flow charts. Standard symbols (human figures for persons, trees for nature, smiling faces indicating advantages) represent many frequently used concepts. Other figures can be created to suit the occasion. For example:

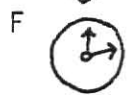


### Developing Picture Symbols

Not all points can be illustrated through picture symbols. Objects have the most easily-pictured features but more abstract ideas and processes can be captured in events associated with them. Below are some general possibilities.



For practice: Match the samples below with the labels provided.



1. Ego \_\_\_\_\_
2. Rehearsal \_\_\_\_\_
3. Defense Mechanisms \_\_\_\_\_
4. Id \_\_\_\_\_
5. Conflict \_\_\_\_\_
6. Personality structure \_\_\_\_\_
7. Short-term memory \_\_\_\_\_
8. Perception \_\_\_\_\_
9. Death instincts \_\_\_\_\_
10. Superego \_\_\_\_\_
11. Organization \_\_\_\_\_
12. Life instincts \_\_\_\_\_



G



H



I



J

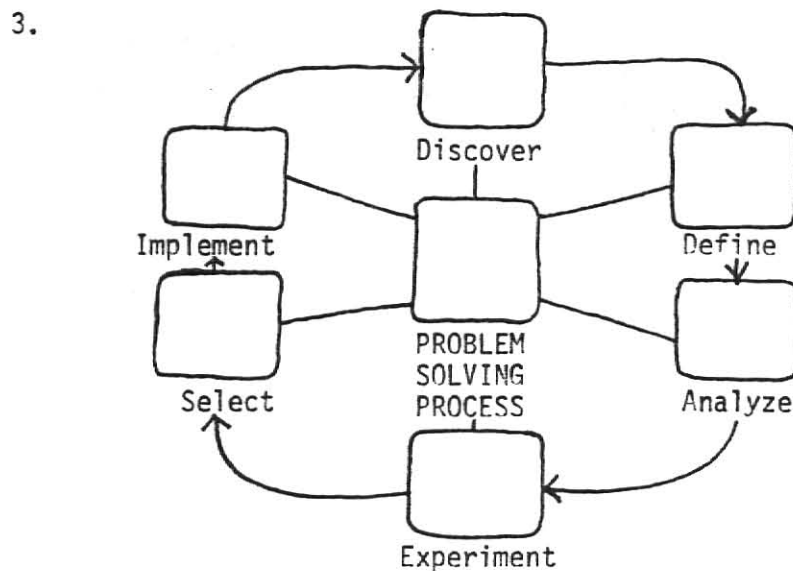
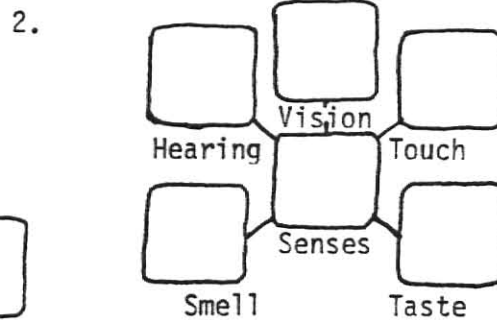
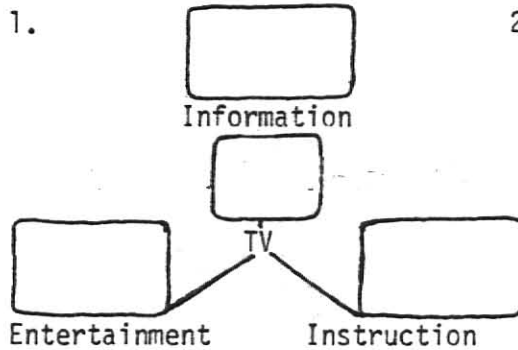


K



L

For practice: Invent symbols to describe the points charted below.



# Visual Note Review

## ABBREVIATED VERSION

The abbreviated version of the Visual Note Review curriculum is designed for more advanced students who require less explanation. Exercises from the more lengthy version might be included to promote learning. Locating Main Points may use exercises on page 62; Detail Groups may use exercises on pages 67-68; Relation Patterns may use exercises on page 75-76, with summary practice on page 77.



### The Note Review Process

Recovery, recognition, and relation of notes opens an opportunity for deeper understanding. Examining, redefining, applying, and reorganizing ideas requires thinking through rather than copying or memorizing. The unit which follows guides and encourages this personal exploration for learning from note review. This program deals with only those points mentioned in lecture and stated directly in notes. Statements between-the-lines will not be analyzed.

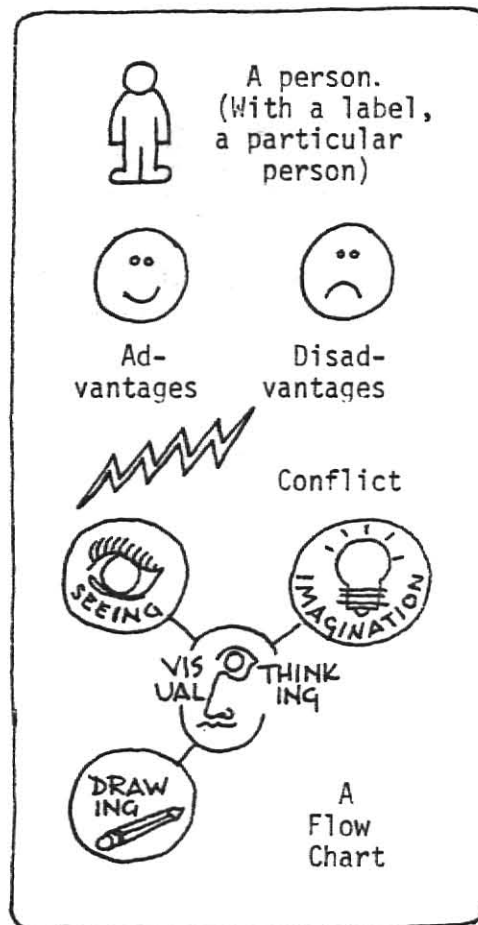
### Visual Thinking and Note Review

Visual thinking is the process of representing objects, ideas, and processes in charts, maps, and picture symbols. These tools help a person see relationships between terms or express the form and function of those terms. Shapes, lines, and symbols compose the simple elements of visual thinking. These can be combined and rearranged in countless patterns. Such flexibility and concreteness of expression allows for creative interpretation of information.

Visual thinking is a unique and novel approach to language for most people. However, visual symbols and patterns suggested in this unit may already be familiar since 94% of what people learn today comes through visual means (TV, observation, newspaper and magazine pictures, etc.).

Three key skills are involved in visual thinking: seeing, imagining, and drawing. All are acquired not by birth but by practice. Seeing demands careful attention to patterns and details. Imagination is the willingness to view things from different angles and search out the meanings of points and relationships. Drawing ability need not exceed rough lines and stick figures.

Flow charts, maps, and symbols function as a vocabulary for expressing terms and a grammar of relationships presented in lectures or textbooks. Visual language provides a way to analyze and classify concepts. Concrete symbols and outlines create a permanent, easily visible format for further study. Visualizing and rehearsing patterns offers a way to improve memory as well.



Locating Main Points

Reviewing lecture notes begins with locating main points. These key points enable the learner to simplify a large amount of information and focus on it. Main points are broad or general terms. They describe the various categories of information studied.

Of course, a good step in determining main points is to first list all points which seem significant (technical terms, words repeated or defined in class, etc.). Then, for each term, find a definition. This step will insure a basic understanding of all points which is crucial to organizing and relating them later on. This format might be useful for setting up such an exercise:

<u>List</u>	<u>Definition</u>	
Organization	Gathering and associating terms	Main point which identifies the broadest term; over all others.
Memory processes	The stages of creating a memory	
Rehearsal	Practicing a pattern for memory	
Perception	Noticing patterns and details	

Main points are more general than surrounding material. Usually these points form categories. Thus, they pull together or guide the meaning of more detailed information. Main points can be objects, ideas, or processes. For example:

OBJECTS are things, concrete items with physical properties.

Human Brain

Left lobe	Corpus callosum
Right lobe	Cortex

IDEAS are abstract thoughts which stand for a set of relationships understood by the user of the ideas.

Psychology

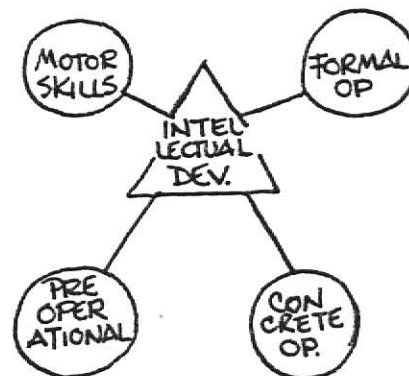
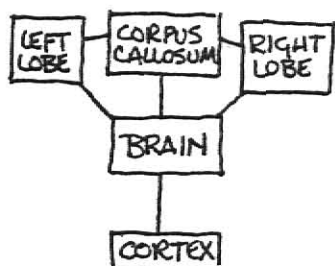
Personality	Learning
Social psych.	Abnormal psych.

PROCESSES are ideas in action, relationships involving progress or effects, of special interest to the reviewer.

Intellectual Development

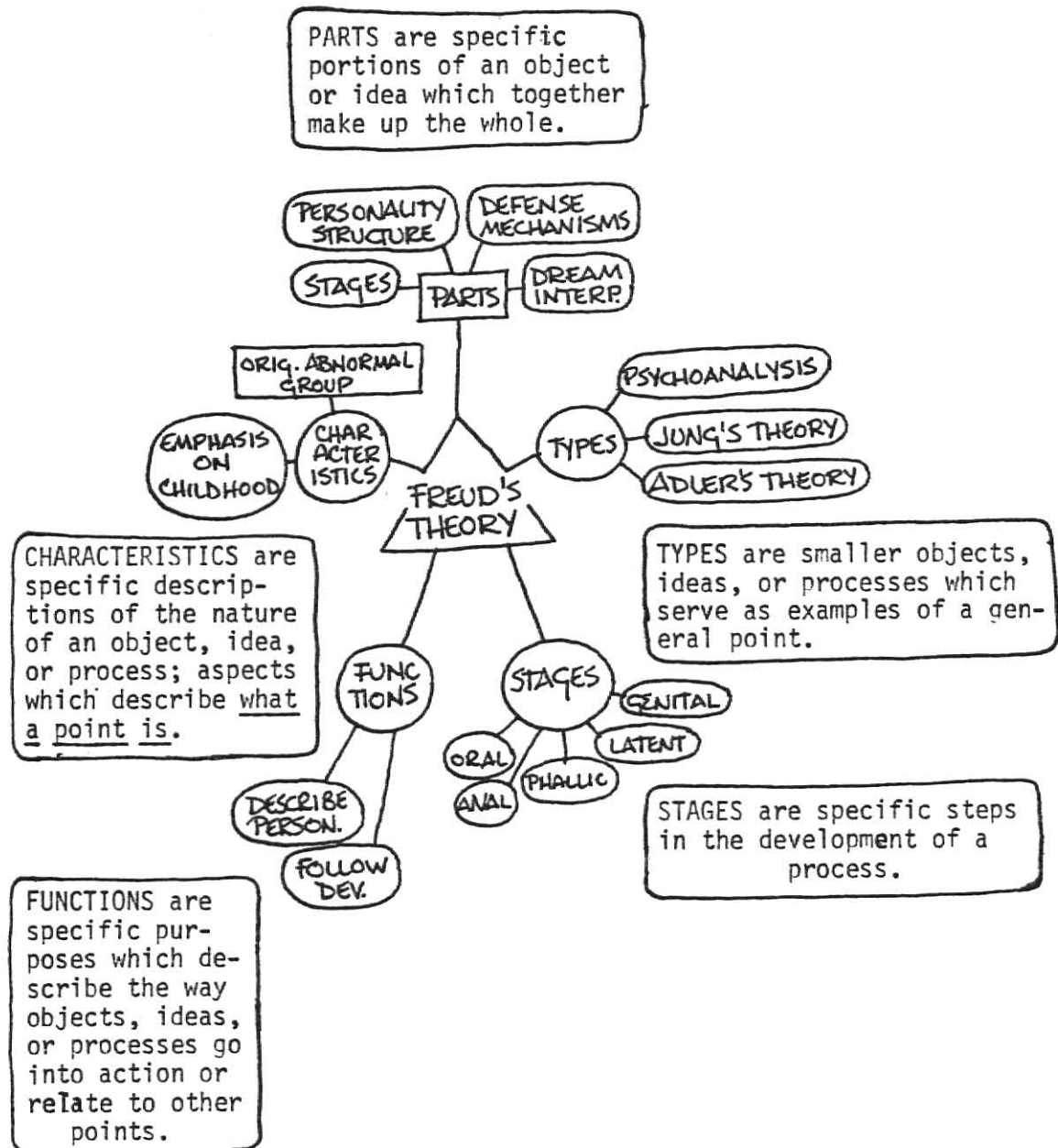
Motor skills  
Pre-operational skills  
Concrete operations  
Formal operations

Using simple shapes to represent the various types of main points, the lists above might be drawn as the figures below:



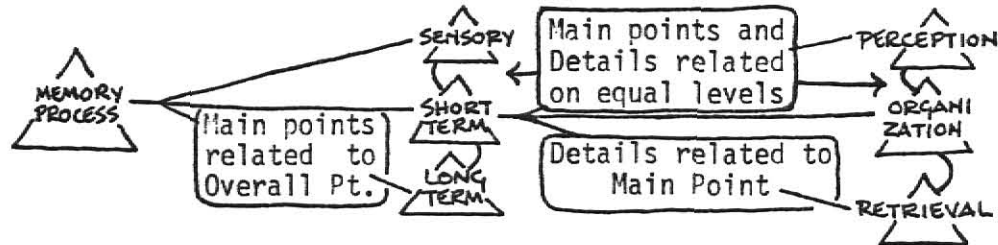
Detail groups

Details are more specific, less important points which describe aspects of main points. Some categories useful for describing detail groups are parts, types, characteristics, functions, and stages.

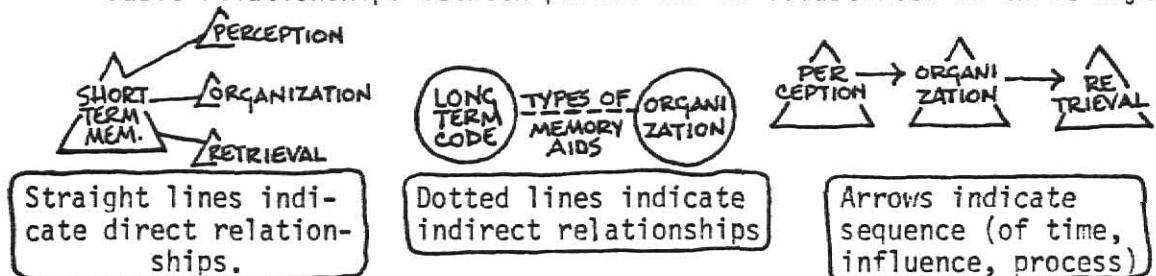


Relating points in flow charts

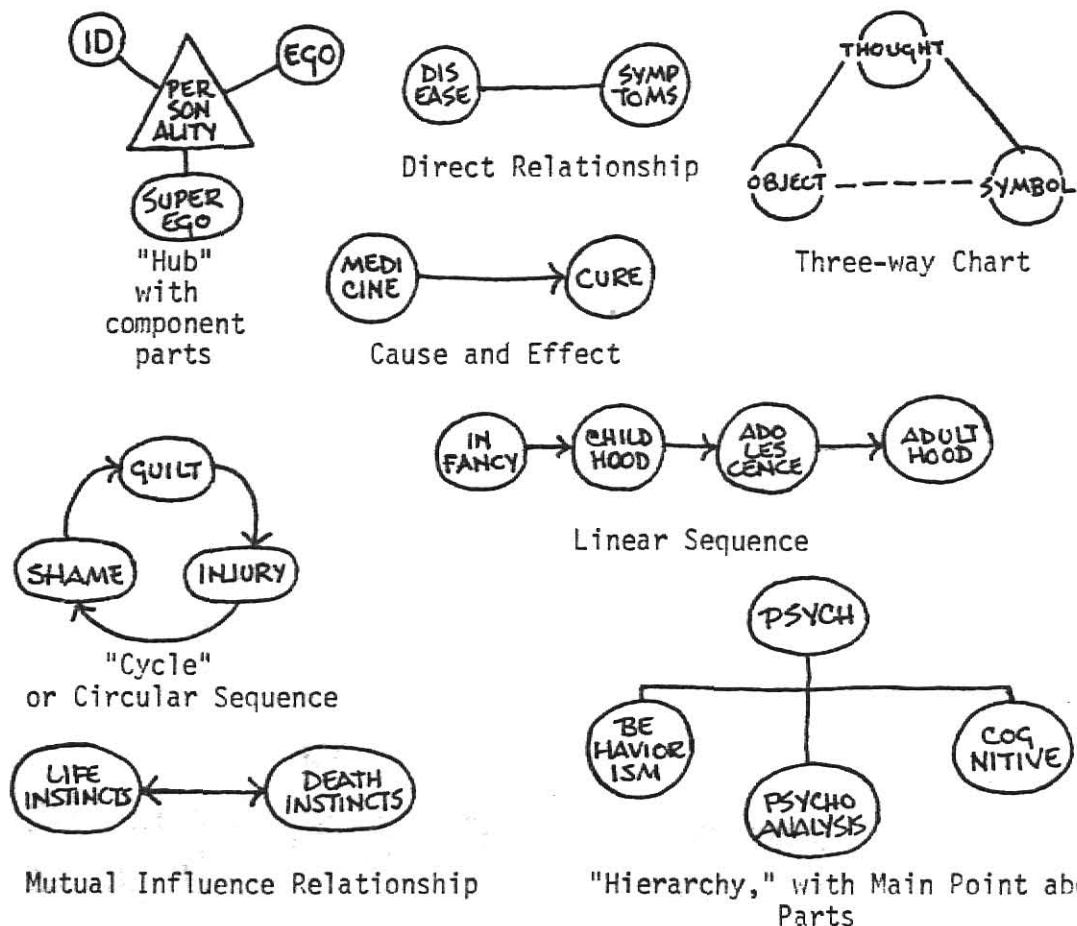
Relating points to each other at the same and different levels joins parts into a complete pattern. Lines and arrows illustrate connections which provide keys to understanding information in depth. Points at several levels of specificity can be related. For example:



Basic relationships between points can be illustrated in three ways:



From the basic patterns, larger patterns can develop.



## CONCLUSION

This thesis has presented a summary of research relevant to review of lecture notes. In addition, a curriculum project was designed to teach interpretation and visual representation of main points and details. The curriculum model and its accompanying rationale provide a basis for instruction and research into effective methods for visual note review.

Topics related to visual note review included the note taking process, visual formats, visual thinking, concept development, and memory. Personalized note review was found the most effective form of memory enhancement. The critical processes by which lecture material is evaluated and understood in visual conceptualizing correspond to these student needs. The resulting simplified chart of points and relationships provides a quick and interesting tool for rehearsal before examination for later reference. Some aspect of visual conceptualizing and graphic communication is involved in almost all learning (pictures, graphs, symbols). Nevertheless, visual formats were found most popular in design professions. Little research was discovered on instructors' or students' formats for note taking and review. Several styles have been proposed but not explicitly interpreted or tested for effective memory. A system for teaching basic elements of symbolizing objects, ideas, and processes and relating these in networks represents a major contribution of the thesis project. Emphasis on use of visual formats for analyzing (i.e., details as parts, types, characteristics, functions, or stages) and creating networks of meaning builds on models of Robert McKim and Tony Buzan. These processes have been designed to reveal the components of concepts, thus making these units easier to acquire. Stress on

vocabulary as a means of thorough understanding of terms combined in visual formats forms a foundation for concept building. Vocabulary and defunctional strategies have been found to be important contributors to reading comprehension. The visual format is designed to further clarify definitions by furnishing a spatial context in which to understand terms. Symbols and patterns were presented as means to concretize abstract ideas and processes. This mnemonic memory aid might be viewed as a simplifying device to make complex concepts more accessible to the learner. Details have likewise been identified in accordance with interpretations of concept-attribute theories. Finally, the process of encoding, developing a pattern of association, was found to be the most critical source of memory improvement. The language of symbols and lines provides a code which is perhaps more memorable by its simplicity and explicit connections.

The topic of visual conceptualizing and the model curriculum offer open fields for research in learning. Several dimensions of the subject suggest themselves readily for investigation. The perfecting of curricula for teaching visual conceptualizing should be one of the chief goals of further research. Determination of the elements (modules) necessary for understanding the process might be a significant part of this research. Transfer of general skills for visual conceptualizing learned in one discipline to the service of another discipline may prove a worthy inquiry. The types of curricula and students adapted to visual note review will reveal its potential further.

Visual conceptualizing involves symbols and patterns. Research may be concentrated on the interpretative and memory-enhancing values

of shapes with labels or picture-symbols. The development of an individual symbol-system may be a key to successful use of visual formats. The facilitative effect of spatial organization for immediate and long-term retention of information may be a further topic for study. The effect of this type of patterning for organizing thought and aiding imagination may recommend it for tasks beyond note review.

Finally, the contrast of communicative and expressive purposes for which visual formats can be used suggests more areas for research. Standardized symbols or patterns may satisfy study needs and offer a simplified common language by which several students can study together. Individual systems of representation may extend and personalize visual note review. Research with a variety of learning and expressive tasks may clarify these questions further.

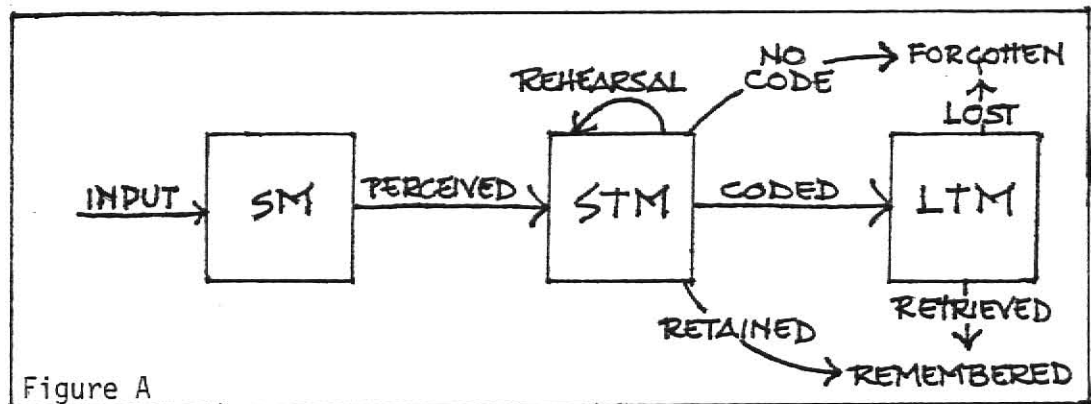
From the writer's perspective, visual conceptualizing shows outstanding potential for learning. The growth of visual media (television, computers, photography, graphics) and visual literacy movements is perhaps an indication of a trend toward blending of visual and verbal.

# Appendix

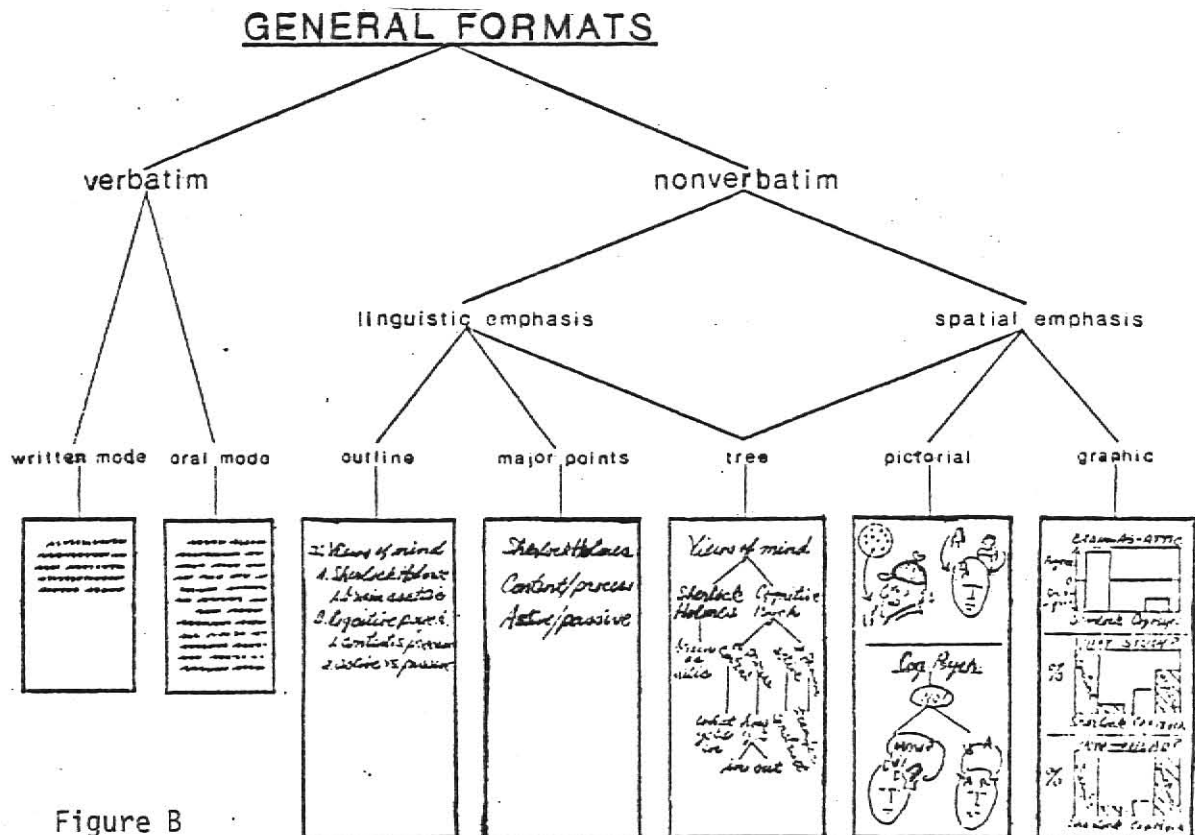


# Illustrations

95



Information Processing Model of Memory. Information of several types (verbal, visual, auditory, tactile) is input into the Sensory Memory (SM) where it might be remembered for milliseconds. Perception of recognizable features implants the data on the Short Term Memory (STM) which retains it for a few minutes. Regular rehearsal maintains STM for brief periods but coding (association with other knowledge) establishes a Long Term Memory (LTM) which can retrieve a bit of data at an extended time period.



R. Day's General Formats for lecture notes, drawn from patterns of college instructors.

October 10 (Mon) - Lec. 102 - Prof. Oxford

A. Animism

1. Object has supernatural power.
2. Belief object has mind - a power.
3. Animism associated with Polynesia.
4. Power called mana (not limited to objects)
  - a. Objects accumulate mana.
  - Ex. Good canoe has more mana than poor one
  - b. Objects can lose mana.
  - c. People collect objects with lots of mana.
  - d. Good person's objects collect mana.
  - e. People, animals, plants have mana too.
  - Ex. Expert canoe builder has mana - imparts mana to canoe.
  - f. Chief has lots of mana - too dangerous to get too close to chief - mana around head.
5. Tabu
  - a. Objects with powerful mana are tabu.
  - b. Chief can manipulate mana - If certain animal becoming scarce, can place tabu on animal for a while.

B. Magic

1. Science of primitive man - cause & effect.
2. Make mistake (cause); Then it rains (effect).
  - a. Don't know why it works, but when mistake made, rain comes.
3. Two kinds magic.
  - a. Sympathetic - make model or form of person from clay, etc., then stick pins into object to hurt symbolized person.
  - b. Contagious magic
    - (1) Used to possess an article belonging to another person.
    - (2) Ex. Fingerprint clippings. By doing harm to these objects, feel that harm can be thus transmitted.
  - c. All magic not necessarily evil - can be used for both good and evil.

Stick has mind-power.  
Power - mana

Can gain or lose mana

Good people have lots of mana

Too much mana = Tabu.

Use Tabu to regulate economy

Cause & Effect (mistake) (rain)

Sympathetic = clay model

Contagious = fingerprint clippings

Good or evil use.

Key Terms: apocalyptic millennium regenerate cataclysmic

Def. of Apocalypse

Origin of idea of apocalypse

Idea of apocalypse in theories of history:

2 Greek ideas:

1. —
2. —

Hebrew view —

2 peculiarities of Hebrew view:

Biblical

Modern idea - man taking over.

Romantic Masterworks - Abrams 9/30/74

Topic: Background for Reading Apocalyptic Literature

Assignment:

Read Genesis and Revelations before next class meeting.

I. Def. of apocalypse: a vision of a new world - the last days in which world is regenerate and (in New Testament) all time stops and we're back in infinity.

II. Idea of apocalypse a Hebrew invention. Greeks had nothing like it.

III. Various views of hist. & how apocalyptic idea figures in them.

A. First Greek view: the "cycle pattern" - everything repeats itself. "there's nothing new under the sun." Goes on w/o end.

good times. bad times.

B. 2nd Greek view: the "primitivists" - the best days were in the beginning of things going from bad to worse ever since.

Beginning

C. Hebrew view:

1. History has beginning of an end - this peculiar to them: In the beginning, a heaven & earth - in the end, a new heaven & earth.
2. Diagram of Hebrew view:
 

Garden of Eden 1000 years of restored earth then, end of earth

Fall of man Christ

but restoration delayed until "second coming"

After the end time stops and those deserving return to eternity - either to heaven or hell.
3. Two peculiarities
  - a. beginning and end - finite.
  - b. right angle - fall and restoration sudden not gradual. History changes at once.
4. Like second Greek view in that best was in beginning - but Hebrew fall is sudden rather than gradual.

In Pursuit of the Millennium (Sp?)

D. 17th Century idea (- up to modern times)

1. Gradual progress can be brought about by man's own efforts. Man can achieve return to felicity by getting rid of evil - man, by taking things in his own hands, can change environment and change it from bad to perfect. [Note: God left out of this scheme. Man, not God, affects change.]

Lecture Notes in the Cornell System. Two styles appear above, one using short phrases for definitions and terms; the other using sentences for ideas and concepts. Note how both include a left margin for summary notes. In both cases the date and class appear at the top of the page. (Figure c)

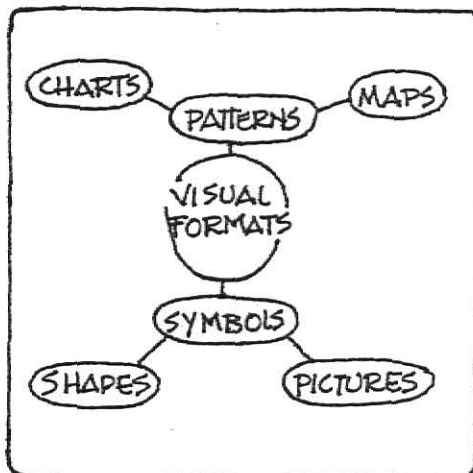


Figure d: A flow chart format with main point at center and details related to it at various distances.

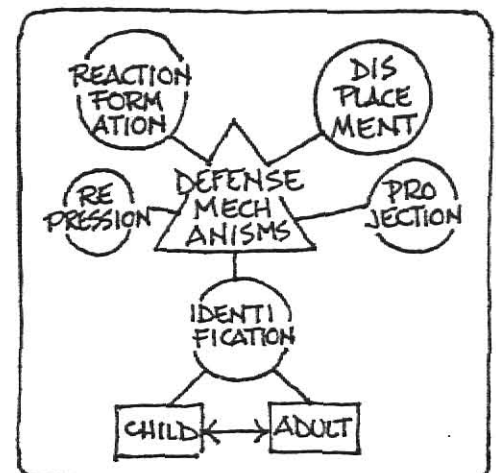


Figure e: The flow chart system as a contextual framework in which the relative proximity of items indicates relationships.

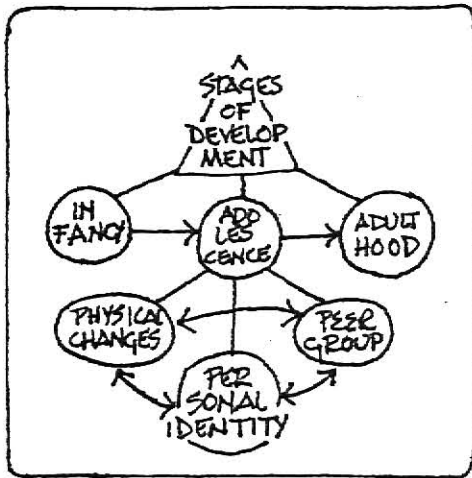


Figure f: Flexibility. The chart can not only expand at any point from the center but can add points if necessary. Once one area becomes too crowded, a new chart can be drawn.

Another abstract graphic-language form is the organization chart in Figure 21-13.

An organization chart can represent many things: a family tree, a management hierarchy, a system for making decisions, and so on. (A language can always encode a variety of contents.) The grammatical rules of this particular language are (1) the higher an item is on the page, the more important it is, (2) equal rank is positioned on the same horizontal level, (3) like functions are grouped together, and (4) lines represent connectedness (of genes, of power, of information). An organizational chart is an abstract language because it helps to describe the structure of an idea, not a thing.

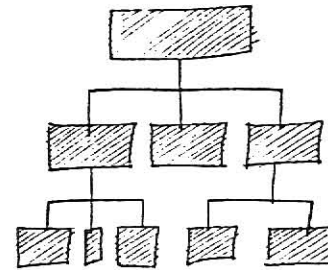
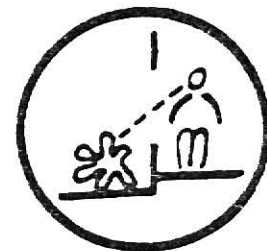
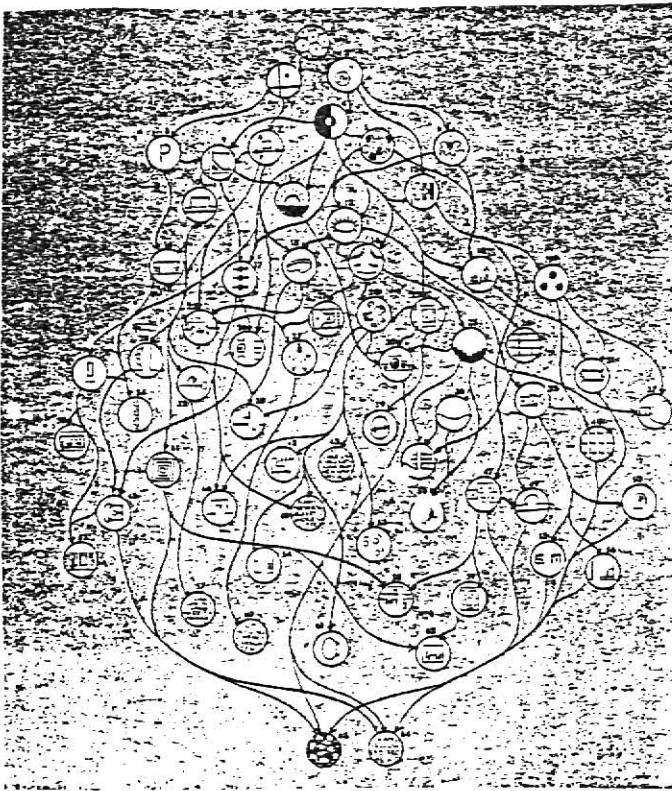


Figure 21-13

Figure g: The charts above and at left are McKim's illustrations of the variety of graphic languages available for representation. The hierarchical organization chart is explained above. Pattern language symbols (below) and charts (left) are used by designers to indicate relationships among components in a unit under construction.

The arrangement of elements has been altered to conform to the requirements of this page.



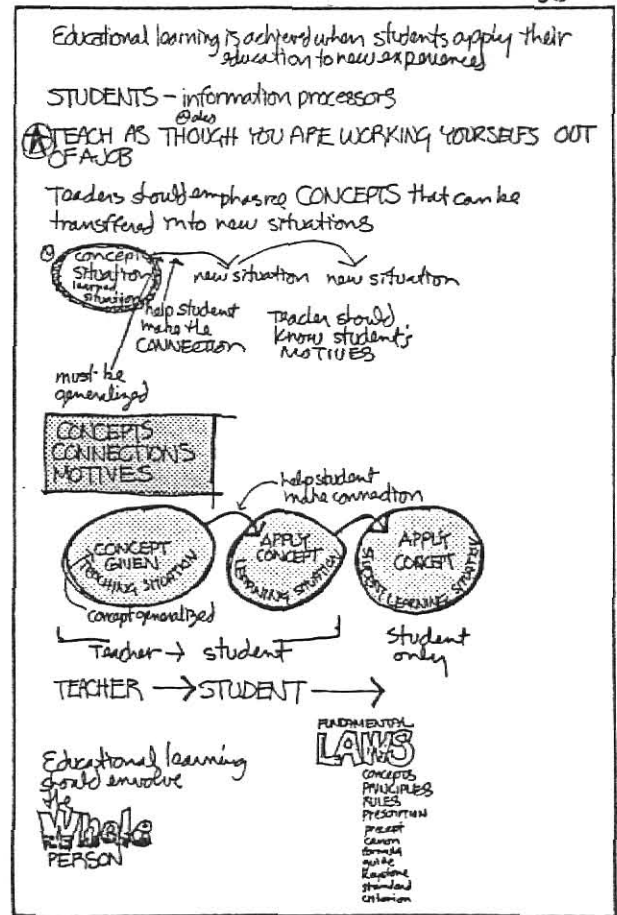
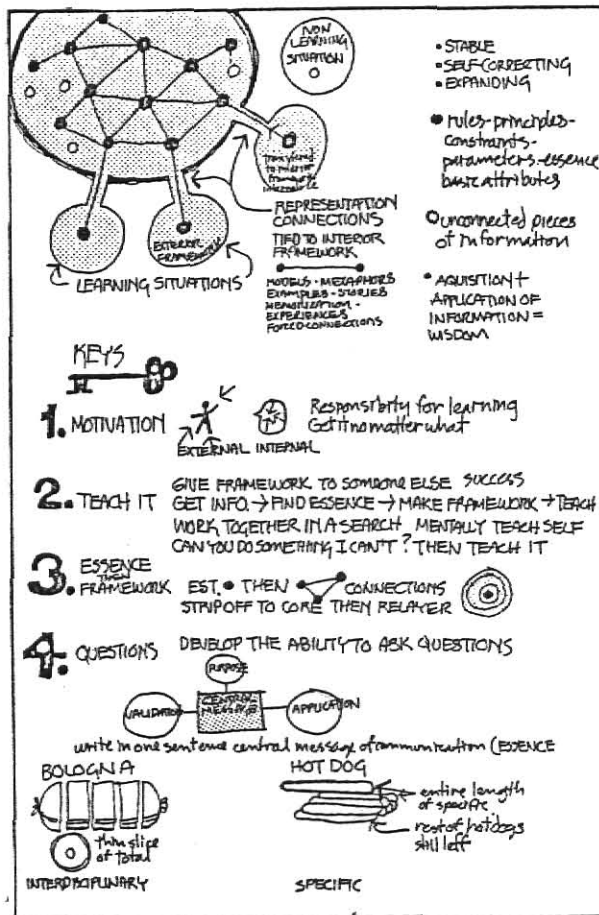
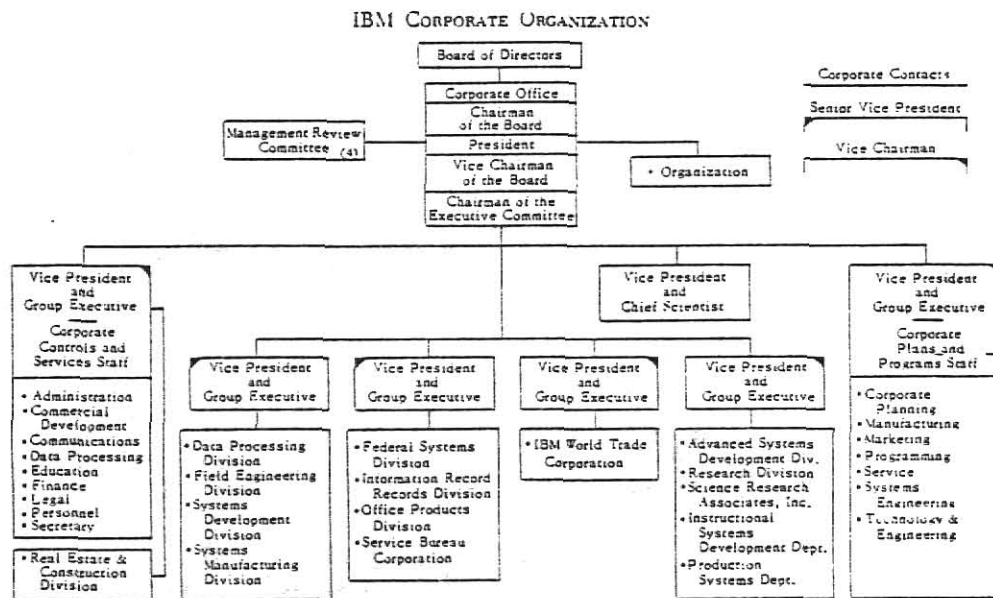


Figure h: Visual Note Taking. Hanks and Belliston's application of graphic design principles to the task of note taking. This is one of the few models presented in the field.

Figure i (below): Corporate hierarchy, as defined by an organization chart.



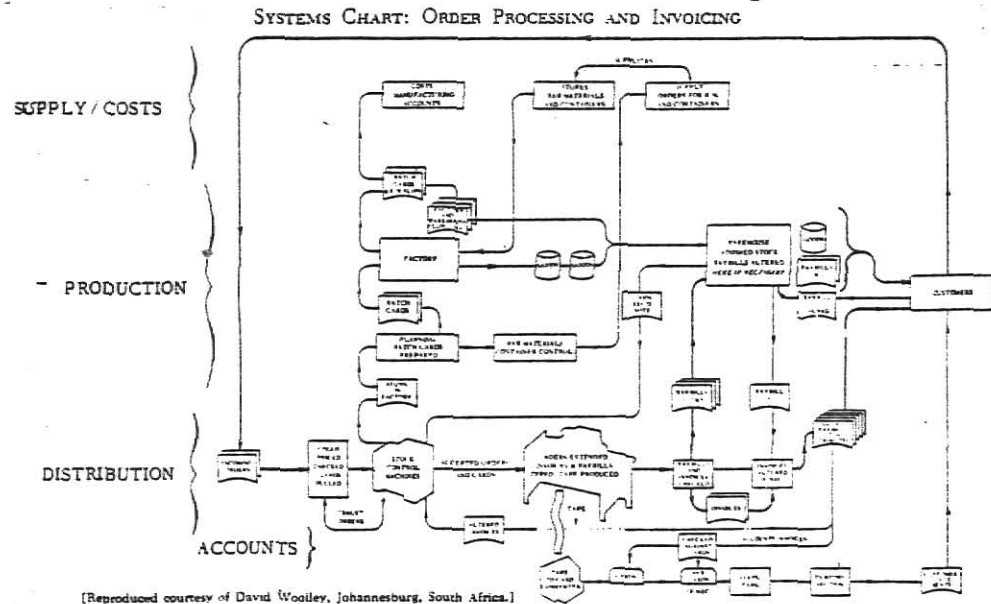


Figure i: Flow of goods and services in corporate organization. Building a chart of patterns related to production and distribution enhances the efficient delivery of services.

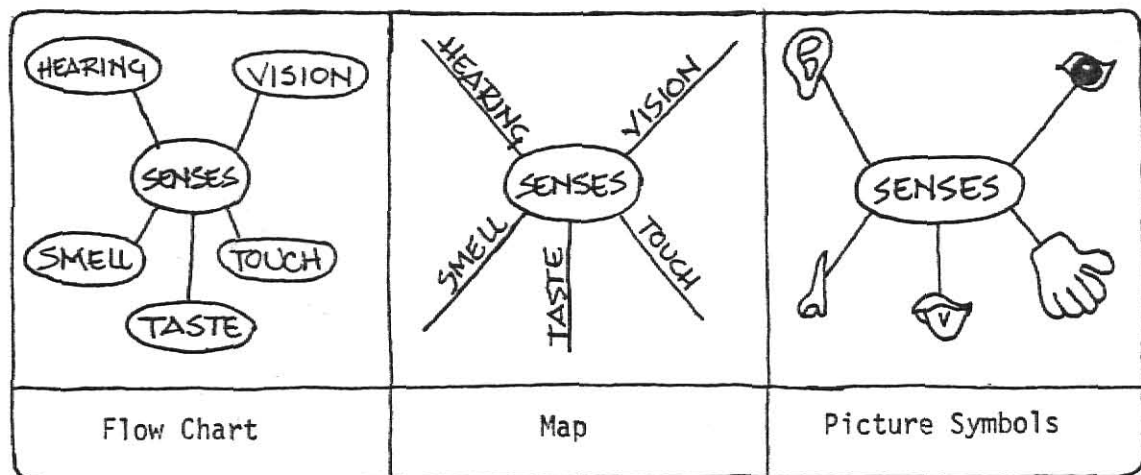


Figure j: Flow chart and mapping formats. The thesis project presents two organizational structures (flow charts and maps) with two methods of representing individual points (verbal labels and picture symbols).

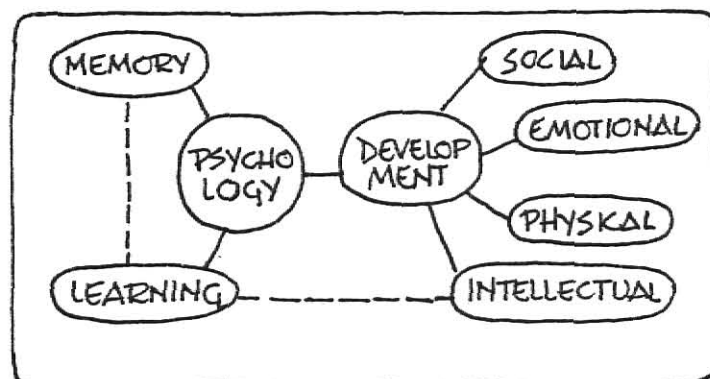


Figure k: A flow chart breaking into component parts. Development is the portion of Psychology shown in greater detail in this case.

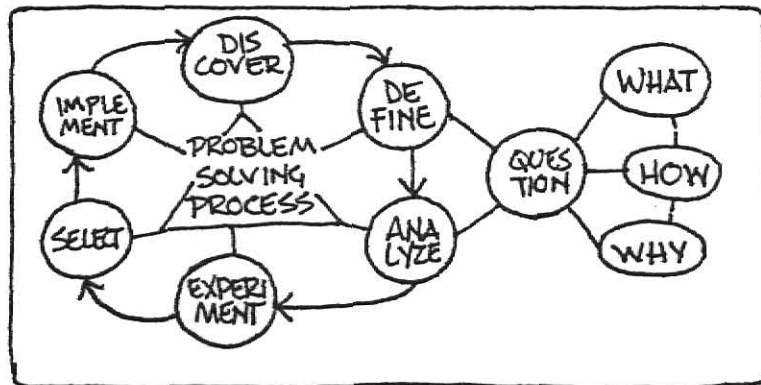


Figure 1: The type and number of details included help to shape meaning.

Figure m: Maps. Stages forms the center from which associations are made. Proximity of items suggests other associations. Lines and arrows show relationships.

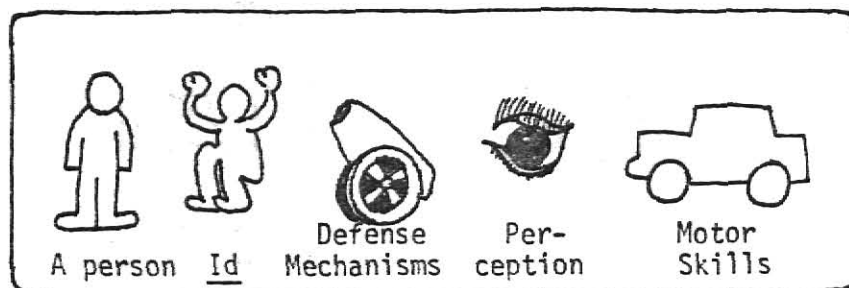
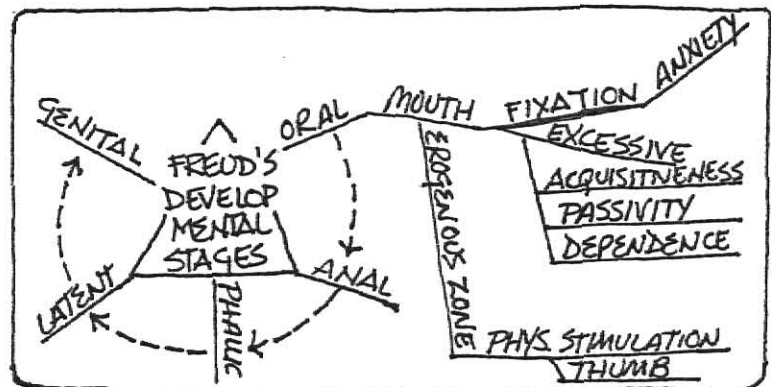


Figure n: Visual Metaphors.

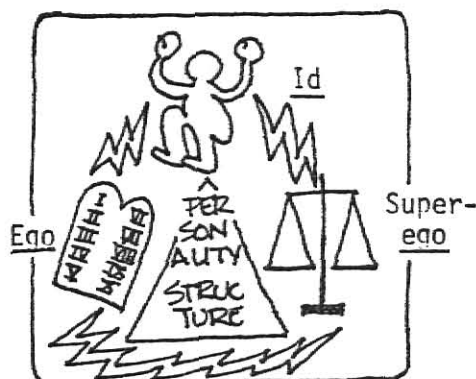


Figure o: Interactive functions illustrate abstract terms visually.

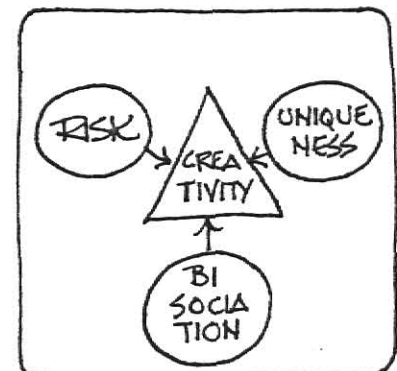


Figure p: Understood process. All points are abstract but some require more clarification.



- Anderson, J.R. and Bower, G.H. Recognition and retrieval processes in free recall. Psychological Review, 1972, 79, 97-123.
- Anderson, R.C. and Freebody, P. Vocabulary knowledge and reading. Reading Education Report #11. National Institute of Education, Washington, D.C. ERIC Microfiche No. 177 488, 1979.
- Arnheim, R. Visual Thinking. (Berkeley, CA.:UC Press), 1969.
- Astin, A. Four Critical Years. (SF:Jossey-Bass), 1977.
- Atkinson, R.C. and Shiffrin, R.M. Human memory: A proposed system and its control processes. In K.W. Spence and J.T. Spence (eds.) The Psychology of Learning and Motivation: Advances in Research and Theory, Vol.2. (NY:Academic Press), 1968.
- Ausubel, D.P. The Psychology of Meaningful Verbal Learning. (NY:Grune and Stratton), 1963.
- Bourne, L., Dominowski, R.L., and Loftus, E.F. Cognitive Processes. (Englewood Cliffs, N.J.:Prentice-Hall), 1979.
- Bower, G.H. Imagery as a relational organizer in associative learning. Journal of Verbal Learning and Verbal Behavior, 1970,9, 529-533.
- Bower, G.H. A selective view of organizational factors in memory. In E.T. Tulving and W. Donaldson (eds.) Organization and Memory. (NY: Academic Press), 1972.
- Brown, R.W. and McNeill, D. The 'tip of the tongue' phenomenon. Journal of Verbal Learning and Verbal Behavior, 1966, 5, 325-337.
- Butcofsky, D. Any learning skills taught in high school? Journal of Reading, 1971, 15, 3, 195-198.
- Buzan, T. Use Both Sides of Your Brain. (NY:Dutton), 1976.
- Carter, J.F. and Van Metre, N.H. Note taking vs. note having. Journal of Educational Psychology, 1975, 67, 900-904.
- Clayback, J., Goforth, F., and Spillman, C. Read, translate, compose, and evaluate: Visual thinking skills. Language Arts, 1980,57,6, 628-634.
- Craik, F.I.M. and Lockhart, R.S. Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 671-684.
- Cross, K.P. Accent on Learning. (SF:Jossey-Bass), 1977.
- Dale, E. Organization. (American Management Association), 1967.
- Day, R.S. Teaching from notes: Some cognitive consequences. In W.J. McKeachie (ed.) New Directions for Teaching and Learning: Cognition and College Teaching. (SF:Jossey-Bass), 1980.

- Debes, J.L. Mind, languages, and literacy. A paper presented at the annual convention of the NCTE, 11/28/74. ERIC Microfiche No. 108 659, 1976.
- deGroot, A.D. Perception and memory versus thinking. In B. Klienmuntz (ed.) Problem Solving. (NY:Wiley), 1966.
- DiVesta, F.J. and Gray, G.S. Listening and note taking. Journal of Educational Psychology, 1972, 63, 8-14.
- Driskell, J. Mapping the idea: A note taking system. Proceedings of the Tenth Annual Conference, WCRA, 1977.
- Ellis, H., Bennett, T.L., Daniel, T.C., and Rickert, E.J. Psychology of Learning and Memory. (Monterey, CA.:Brooks/Cole), 1979.
- Flavell, J.H. The Developmental Psychology of Jean Piaget. (Princeton, NJ:D. Van Nostrand), 1963.
- Flavell, J.H. Cognitive Development. (Englewood Cliffs, NJ:Prentice-Hall), 1977.
- Gagne', R.M. Conditions of Learning, Third Edition. (NY:Holt, Rinehart, and Winston), 1977.
- Groninger, L.D. Mnemonic imagery and forgetting. Psychonomic Science, 1971, 23, 161-163.
- Hanf, M.B. Mapping: A technique for translating reading into thinking. Journal of Reading, 1971, 13, 4, 225-230.
- Hanks, K. and Belliston, L. Draw! (Los Altos, CA:Kaufman), 1977.
- Hanks, K., Belliston, L., and Edwards, D. Design Yourself. (Los Altos, CA:Kaufman), 1978.
- Harris, R.J. General Psychology class notes; unpublished. Kansas State University, 1981.
- Howe, M.J.A. Using students' notes to examine the role of the individual learner in acquiring meaningful subject matter. Journal of Educational Research, 1970, 64, 61-63.
- Hudgins, B.B. Learning and Thinking: A Primer for Teachers. (Itasca, IL:Peacock), 1977.
- Klatzky, R. Human Memory. (SF:WH Freeman), 1975.
- Koestler, A. The Act of Creation. (NY:MacMillan), 1964.
- Maslow, A. Emotional blocks to creativity. In S. Parnes and H. Harding A Source Book for Creative Thinking. (NY:Scribners), 1962.
- Maxwell, M. Improving Student Learning Skills. (SF:Jossey-Bass), 1980.
- McKim, R.M. Experiences in Visual Thinking. (SF:Brooks/Cole), 1977.



- McWhorter, K. College Reading and Study Skills. (NY:Little, Brown), 1980.
- Miller, G.A. The magical number 7, plus or minus 2: some limits on our capacity for processing information. Psychological Review, 1956, 63, 81-97.
- Moates, D.R. and Schumacher, G.M. An Introduction to Cognitive Psychology. (Belmont, CA:Wadsworth), 1980.
- Mussen, P.H., Conger, J.J., and Kagan, J. Child Development and Personality, Fourth Edition. (NY:Harper and Row), 1974.
- National Assessment of Educational Progress Reading in America: A Perspective on Two Assessments. Reading Report 06-R-01. 1974-75 Assessment. Washington, DC:National Institute for Education, 1976.
- Nelsen, R. Toward visual literacy. Elementary English. 1975, 52, 4, 523-526.
- Paivio, A. Mental imagery and associative learning and memory. Psychological Review, 1969, 76, 241-263.
- Paivio, A. Imagery and Verbal Processes. (NY:Holt, Rinehart, and Winston), 1971.
- Palkovitz, R.J. and Lore, R.K. Notetaking and note review: Why students fail questions based on lecture material. Teaching of Psychology, 1980, 7, 3-8.
- Palmatier, R.A. A notetaking system for learning. Journal of Reading, 1973, 17, 1, 36-39.
- Patten, B.M. Visually mediated thinking: A report of the case of Albert Einstein. Journal of Learning Disabilities, 1973, 6, 7, 415-420.
- Pauk, W. How to Study in College. (Boston:Houghton-Mifflin), 1974.
- Perry, W.G., Jr. Forms of Intellectual and Ethical Development in the College Years: A Scheme. (NY:Holt, Rinehart, and Winston), 1968.
- Piaget, J. Piaget's theory. In P.H. Mussen (ed.) Carmichael's Manual of Child Psychology, Third Edition, Vol. 1. (NY:Wiley), 1970a.
- Rindone, D.P. and Tixier y Vigil, Y. Teaching concept development through a mult-cultural literary perspective. Proceedings of the Tenth Annual Conference, WCRA, 1977, 155-158.
- Ruesch, J. and Kees, W. Nonverbal Communication. (Berkeley, CA:VC Press), 1956.
- Shepherd, J. College Study Skills. (Boston:Houghton-Mifflin), 1979.
- Shepherd, R.N. and Metzler, J. Mental rotation of 3-dimensional objects. Science, 1971, 171, 701-703.

Tubbs, S.L. and Koske, W.C. Apply nonverbal techniques to organizational diagnosis. Dept. of Communication and Organizational Behavior, General Motors Institute, 1973. ERIC Microfiche No. 162 355, 1973.

Tulving, E. Subjective organization in free recall of "unrelated words." Psychological Review, 1962, 69, 344-354.

Yussen, S.R. and Santrock, J.W. Child Development: An Introduction. (Dubuque, IA:Wm. C. Brown), 1978.

Zimbardo, P. Psychology and Life, Ninth Edition. (Glenview, IL:Scott, Foresman), 1977.

VISUAL CONCEPTUALIZING

IN NOTE REVIEW

by

BENJAMIN SILLIMAN

B.A., Colorado State University, 1975  
M.Div., Princeton Theological Seminary, 1978

AN ABSTRACT OF

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

COLLEGE OF EDUCATION  
Department of Curriculum and Instruction

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1981

## ABSTRACT

A study skills model is proposed in which flow charts, maps, and picture symbols serve to represent and organize points in lecture notes. A curriculum project included is designed to interpret the language of visual note review to the study of psychology. Discussion of related literature accompanies the lessons.

Visual note review offers a system of deliberate steps by which college students can recognize and relate significant points from lecture. Research on note taking and memory emphasizes the importance of organization and rehearsal processes as means to enhance retention. Designers and teachers, who use shapes and patterns to communicate and express ideas, advocate visual thinking as a critical and creative tool for organization. Educators such as Robert Gagne note the central place of concept-units in learning. Visual formats, incorporating the perspectives of these fields, use shapes and picture symbols to represent concept units and connecting lines to build patterns of meaning. This language and its rules of operation are presented as a basis upon which students can create personalized review sheets. Definition and identification as objects, ideas, or processes builds a foundation for understanding and relating main points and details. Grouping of details in part, type, characteristic, function, and stage categories sets a pattern for relating points at several levels of complexity via direct, indirect, and sequential relationships. Verbal labels are integrated with visual symbols in explanation, example, and exercise sectors of the curriculum project. Higher-order questioning and synthesizing skills are likewise included in choices made during note review.

Visual conceptualizing is, at present, restrictively applied to interpreting and representing information. Since the simple, flexible format used allows the reviewer to condense, relate, and add more information, it seems ideal for note review. The thesis presents literature suggesting the viability of two types of visual formats (flow charts and maps) used with verbal labels and/or picture symbols to explore and rehearse notes. Further, the curriculum project supplies a model for instruction and empirical validation of the merits of visual note review.