



National Library  
of Canada

Bibliothèque nationale  
du Canada

Canadian Theses Service

Services des thèses canadiennes

Ottawa, Canada  
K1A 0N4

## CANADIAN THESES

### NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

**THIS DISSERTATION  
HAS BEEN MICROFILMED  
EXACTLY AS RECEIVED**

## THÈSES CANADIENNES

### AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

**LA THÈSE A ÉTÉ  
MICROFILMÉE TELLE QUE  
NOUS L'AVONS REÇUE**

**Italicizing as a Cueing Device in Prose Material:**

**Its Effect on Learning of Field Dependent and  
Field Independent Nursing Students**

**Marilynn Gillies**

**A Thesis**

**in**

**The Department**

**of**

**Education**

**Presented in Partial Fulfilment of the Requirements  
for the degree of Master of Arts at  
Concordia University  
Montréal, Québec, Canada**

**June 1984**

**© Marilynn Gillies, 1984**

## ABSTRACT

### Italicizing as a Cueing Device in Prose Material: Its Effect on Learning of Field Dependent and Field Independent Nursing Students

Marilynn Gillies

This thesis examined how cueing of the main concepts in a prose passage affected the learning of field dependent, middle and field independent subjects.

First and second year nursing students from English-speaking CEGEPs in Montreal were divided into three groups according to their cognitive style. The prose passage was an article on coronary artery disease, a subject not taught at that point in the students' education.

Italicizing was done according to Johnson's analysis for structural importance of subunits. There were three versions of the article: the first, highly italicized; the second, moderately italicized; and the third, without any italicization. Subjects who received the italicized versions were divided further into those who received instructions as to their purpose, and those who did not.

A multiple-choice posttest was given based on the objectives of the article. All students were scored on the total information learned, and the amount of critical or intentional information learned from each version of the passage.

Contrary to what was expected, cueing did not benefit any one

group, either with or without instructions. Only cognitive style produced an effect, with highly field independent subjects receiving better scores than highly field dependent subjects. Results were discussed regarding the potency of italics as cueing devices, and possible alternatives to improve learning via cueing for field dependent learners.

## Table Of Contents

Chapter	page
1 Rationale.....	1
Cueing.....	2
Field Dependence-Independence.....	4
Use Of Italics.....	9
What Information Should Be Cued.....	10
The Amount Of Information To Be Cued.....	11
Supplantation.....	12
Trait-Treatment Interaction.....	12
Summary and Hypotheses.....	14
2 Review of Literature.....	16
Cueing.....	16
Field Dependence-Independence.....	22
Field Dependence -Independence and Concept Attainment in Reading.....	29
Supplantation.....	30
3 Method.....	33
Subjects.....	33
Design.....	33
Materials.....	34
Procedure.....	40
4 Results.....	43
Evaluation of Italics.....	50
5 Discussion.....	54
Use of Italics.....	55
Learner-Controlled versus Externally-Controlled Study Time.....	56

	page
Problems With the Dependent Variable.....	57
Amount of Text Cued.....	58
Cognitive Style.....	58
Summary.....	59
References.....	62
Appendix A.....	69
Appendix B.....	75
Appendix C.....	83
Appendix D.....	85
Appendix E.....	98
Appendix F.....	101
Appendix G.....	114
Appendix H.....	127
Appendix I.....	129
Appendix J.....	131
Appendix K.....	133
Appendix L.....	144
Appendix M.....	146

## CHAPTER ONE

### RATIONALE

In this age of burgeoning technology people must still learn a great deal from written prose material. Yet little is known of how this process occurs, or how to facilitate it. Professionals in all fields are now being exposed to a variety of other media such as television, slide-tape, film and computers. However, outside of the educational setting, in order to maintain competence, professionals must keep up to date with continuous developments in the field through reading.

In order to maximize students' comprehension of educational textual materials, instructional technologists must ensure that the structural design of the material complements the known strengths and weaknesses of the human information processing system (Glynn, 1978). This is an all encompassing and perhaps impossible task, as there will be different designs which will maximize the comprehension of different types of learners. It seems important then, to keep in mind Salomon's (1978) opinion that learners can learn from virtually all media. However, he further maintains that when some special potentialities of some media are being capitalized upon, under some conditions, some learners might benefit more in some areas. Using this as a basis for research in instructional design, the most useful outcome would be to provide designers with practical guidelines for maximizing learning.

The aim of this study was to look at reading performance among

the members of one profession, nursing, and based on population characteristics, to attempt to identify some means of improving their reading comprehension.

The medium under examination in this study was expository prose material which utilized a change in the typeface (italics) to provide emphasis on the main points. It was felt that the provision of emphasis might be of particular importance in the reading of medically oriented prose, in which the successful achievement of objectives are of vital importance to the health care of the public. The use of cueing was felt to be of particular value for nurses due to the dominance of a particular cognitive style (field dependence) among them.

First discussed is the whole issue of cueing in prose material, followed by an examination of its interaction with cognitive style. How italics might improve learning is covered next, with a theoretical rationale for its effects completing this chapter.

Cueing

It has been pointed out by Rothkopf (1970) that what the student does in a learning situation is an important key to what and how much will be retained. A student can be presented with a stimulus, but the stimulus itself does not have a direct effect on the student. Some action or activity (mathemagenic activity) must take place within the student to transform the stimulus, to make it effective. These mathemagenic activities or behaviors are what give "birth to learning". They have been called sets, attention or



orienting reflexes (Rothkopf, 1970). For educators it would seem important to find ways to influence these mathemagenic behaviors. One possible area of influence might be orienting directions, such as advanced organizers, objectives and adjunct questions. "An orienting direction is a verbal device which disposes the reader to respond to certain aspects of a text" (Fraser, 1970, p.338). It can activate the above mentioned "set" which in turn will initiate a selective search strategy on the part of the student which will determine what stimuli will be attended to and how these stimuli will be coded for storage in memory (Gagné, 1973).

Typographical cueing may be considered an orienting direction of the nonverbal type and may be equally effective in initiating search strategies and enhancing selection of certain textual information (Glynn, 1978). The Von Restorff effect is used by Glynn to justify the implementation of typographical cueing systems. This effect occurs when certain events have been set apart perceptually from other events. The result is that the isolated events have a higher probability of being recalled at a later time (Glynn, 1978).

It is questioned whether cueing will automatically activate the "set" to initiate selective search strategies or whether the subject requires knowledge of the purpose of cueing. Coles and Foster (1975) found that cueing did not facilitate search unless the readers were informed before hand of the cueing system. They found that simple instructions about cueing did not direct attention to the cued material, whereas a more elaborate set of instructions did have a

significant effect. This study attempted to determine differences between groups who received instruction on the purpose of the cueing and those who did not.

Most research has found that cueing increases the amount of critical information learned (Cashen & Leicht, 1970; Foster & Coles, 1977; Fowler & Barker, 1974; Glynn & DiVesta, 1979; Hershberger, 1964; Hershberger & Terry, 1965; Shebilske & Rotondo, 1981). However, some researchers report the cued material is assimilated at the expense of the incidental information learned (Fowler & Barker, 1974; Glynn & DiVesta, 1979; Hershberger, 1964; Hershberger & Terry, 1965). Although the present study with nursing students examined incidental learning, emphasis was on mastery of main concepts or critical learning, as these are vital to providing the public with safe health care.

#### Field Dependence - Independence

The ability of students to benefit from cueing might be related to their cognitive style, defined as "individual variation in modes of perceiving, remembering, and thinking, or as distinctive ways of apprehending, storing, transforming and utilizing information" (Kogan, 1971, p.244). There are a number of cognitive styles represented in the literature, each showing specific effects on learner processing. Perhaps the most commonly employed scale is that of field dependence-independence. It is according to Jonassen (1979), the "best established, most prominent and most extensively researched" (p. 28). People who are more field independent can easily

separate items from their background and tend to be analytical when dealing with problem solving tasks. They are more active learners, able to impose autonomously some order in relatively unstructured situations. People who are field dependent are "dominated by the most salient attributes of the stimulus," are influenced by the total field and have difficulty overcoming embeddedness (Goodenough, 1976).

Field independent people tend to be more self directed, higher in personal autonomy than field dependent people who rely more on external feedback for their self definition. At the same time field independent people tend to be low in social sensitivity and social skills while field dependent people like to be with others, are interested in and often choose the helping professions (Witkin, Moore, Oltman, Goodenough, Friedman, Owen & Raskin, 1977b).

As nursing is a helping profession, one might expect that the people who choose it would likely be leaning toward the field dependent end of the scale. In a study done on student nurses working in psychiatry and surgery, Quinlan & Blatt (1972) found that students rated as doing well in psychiatry (an area with strong emphasis on interpersonal relationships) were relatively field dependent. Students rated as doing well in surgery (an area with a rather impersonal nature) tended to be relatively field independent.

Women tend to be more field dependent than men. The difference is small, the range of scores on tests of field dependence-independence in each sex is greater than the difference in means

6

between the two sexes (Witkin et al, 1977b). Still in analyzing results of these tests, some experimenters take sex into consideration and give different means for determining field dependence-independence. (Annis, 1979; Annis & Davis, 1978; Witkin et al, 1977b).

Given that sex is a reliable indicator of field dependence, it would seem likely that in nursing, because it is a helping profession and largely made up of women, there will be a larger population of field dependent people.

Regarding the reading skills of field dependent and independent individuals, field dependent people (those who have difficulty overcoming embeddedness and who are influenced by the total organization of the field) would have more difficulty learning concepts from prose material than field independent people who are able to impose structure on an unorganized field.

Research has shown that field dependent subjects are dominated by the salient attribute of a stimulus and tend to ignore non-salient cues, while field independent subjects tend to sample more fully from all possible cues and are therefore better at concept attainment. It is likely that if the salient cues are not relevant to the concept definition there will be impaired performance on the part of the field dependent learner (Goodepough, 1976). Because of these factors, it seems pertinent in text design, to consider cueing the relevant or important information in order to enhance the learning of it by field dependent people. This experiment examined the use of typographical cueing, more specifically the use of italics

as cueing devices and how they influenced the mathemagenics of the learners.

In a study done by Greco and McClung (1979) it was hypothesized that attention directing techniques in an audiovisual presentation would benefit field dependent people as these techniques would provide structure to and/or identify relevant material. The opposite was found; attention directing techniques were more effective with analytical (field independent) subjects. It is likely that cueing devices in prose material will not hinder the learning of field independent subjects. They may do as well with or without cueing, or they may improve with cueing. They will likely improve in the time taken to read the article as they would not have to provide the structure necessary for identifying main concepts. On the other hand, because they are good at searching out and extracting salient information, their long-term recall may benefit more from the self-generated process than the external assistance. It is thought that the middle group, that is, those who fall between high independence and dependence should perform at an intermediate level as compared to the other two groups, but should still show improvement with cueing. In their experiment, Davis and Klausmeier (1970) found that such a group did perform at an intermediate level on a concept identification task.

One criticism of field dependent-independent research is that of failure to control for intelligence or general ability (Rosenberg, Mintz, & Clark, 1977). The field dependent-independent dimension is

measured by a variety of hidden figures tests which determine the individuals ability to overcome embeddedness. It is thought that the Block design, Object Assembly & Picture Completion subtests of intelligence tests also involve the capacity to overcome embeddedness. Thus a field independent individual who can overcome embeddedness, can score better on an I.Q. test (Goodenough & Karp, 1961). However, scores in tests given by Witkin et al (1977b) have shown little relationship to high school and college grade point averages or overall achievement. Nor have they shown relation to the amount of education obtained. Dickstein (1968) found that concept attainment performance is more closely related to field independence than general intelligence. Cognitive styles are concerned more with the "how" of ability and not "how much" as are intelligence tests. The field dependence-independence dimension has a bipolar characteristic. It is not better or worse to be at one pole or the other; there is less value judgement involved than there is in intelligence tests (Witkin, Moore, Goodenough, & Cox, 1977a). The subjects in this study were not tested for general intelligence. It was automatically taken for granted that if they had entered the nursing program, they were of at least average intelligence. As mentioned earlier, a variety of embedded figures tests have been used to measure the field dependence-independence construct. This study used the Hidden Figures Test or HFT (French, Ekstrom, & Price, 1963). The literature tends to be inconsistent as to the reliability and validity of the various tests and one concern is the relationship

between them. Jackson, Messick and Myers (1964) found that all five types of embedded figures tests (included Group Embedded Figures Test and Part I of the Hidden Figures Test) used in their study were substantially correlated. Kuder Richardson 21 reliabilities were tabulated, HFT = .71. Dumsha, Minard, and McWilliams (1973) found a positive correlation between the Group Embedded Figures Test (GEFT) and the HFT = .749. The HFT reliability of test-retest at a twelve-week interval was .92 as reported by Ausburn (1979) and at a ten-week interval in another study by Boersma (1968) it was .63. Weissenberg (1973) states that the HFT is a "reasonably efficient and effective instrument" for testing field dependence-independence in large group situations, at low cost and time spent (p. 462).

#### Use of Italics

Little has been written on the use of italics for instructional or other types of prose material. No research has been found by this writer on their use as cueing devices. However, italics are quite frequently used in textbooks - usually a word, phrase or sentence which the author idiosyncratically feels should be stressed. Because of their universal use, it seemed reasonable to study their influence.

Lockhead and Crist (1980) found that in contrast to the opinion that clean cut (unseraphed) letters were easy to read, seraphed letters (those with a line or bar at the end) are more distinctive and therefore may be classified more readily. This suggests that contrary to what Spencer reports in his summary of research on typographical variables (Burnhill & Hartley, 1975), namely

that italics reduce legibility, they may in fact aid it.

Tinker and Paperson (in Poulton, 1972) reported that italics took approximately three percent longer to read than roman letters. Their study was done in 1928, which suggests a need for updated research. It does seem likely that a change in typeface might increase reading times as the reader is probably paying more attention to the areas cued, especially those readers who have been told the purpose of cueing. This study measured the time taken by subjects to read the prose material, thus determining if italics do consume more time and simultaneously alter retention.

#### What Information Should Be Cued

The goal of this study was to design a text in order that relevant or important ideas are more efficiently learned by field dependent people. It is important then to determine what material is relevant and should be emphasized. This can be a very subjective process.

One factor which determines the importance of ideas is the structure of the text, that is, how ideas are interrelated among themselves (Duchastel, 1979). Information in text can be organized into hierarchial relationships. Information at the top levels of the hierarchial structure is generally referred to as main ideas; at the bottom, as details. Usually the more abstract material is at the top; while specifics, such as examples, are at the bottom. Research has shown that information at the top levels of the structure is recalled and retained better than information at the bottom.



(Meyer, 1979).

In order to determine what types of information should be italicized, a technique by Johnson (1970) was utilized. This technique requires two stages. The passage is first divided into linguistic subunits, usually phrases. Independent subject matter experts then work through the passage three times, each time attempting to eliminate approximately one quarter of the units deemed least important. The ratings are combined, thus labeling each unit according to its degree of perceived importance.

In Johnson's (1970) study, he used a group of 23 raters to determine the subunits. When at least one-half of the raters agreed upon a subunit, it was considered acceptable. He used another group of 50 raters to segment the same article and found a correlation of .98 between the judgements of the two groups. Frase and Schwartz (1979) cite this correlation as evidence that good readers are able to agree upon what meaningful segmentation is, and therefore they used their own judgement in segmenting text for research.

#### The Amount Of Information To Be Cued

The amount of information to be stressed or cued is not addressed in research, nor have comparisons been made of the results of stressing different amounts of material. It would seem likely that the cueing of large amounts of material would actually decrease the effectiveness of emphasizing that information. This study used two levels: a moderate amount of italics which involved cueing approximately 14 percent of the article on coronary artery

disease; and a high amount of italics which involved cueing approximately 30 percent of the article.

#### Supplantation

Cognitive style tends to remain stable over an individual's lifetime. Attempts to change it have not met with much success (Witkin, 1962 in Johnson, Flinn & Tyer, 1979; Case, 1975). It would seem then, that educational designers should consider ways of providing help to overcome the learners' particular difficulty.

Supplantation is one way of providing this help. It is defined as the "explicit and overt alteration or performance of a task requirement which a learner would otherwise have to perform for himself" (Ausburn & Ausburn, 1978, p.343). Compensatory supplantation is as the term implies, a way of providing compensation for the particular difficulty by supplying instructions or cues which the learner is unable to provide on his/her own (Ausburn & Ausburn, 1978). In this study, the use of italics act as a substitute for the restructuring skills necessary for overcoming embeddedness, a task with which field dependent people have some difficulty. By making the relevant information salient, the need for restructuring of the material is reduced. Furthermore, by giving instructions as to the purpose of the italics, the learner should attend to features of the text that normally might be ignored.

#### Trait-Treatment Interaction

A trait-treatment interaction refers to the results from research which considers the relationship between learner characteristics,

design characteristics and content to be learned at the same time.

This interaction is said to take place when one effect holds for one group of subjects under one set of conditions but does not hold the same way for other types of subjects under the same or other types of conditions. (Berliner & Cahen, 1973).

There are three kinds of possible results in this type of research. There can be no interaction between the aptitude of the learner and the types of treatment i.e. all students could do equally well or bad with the same type of treatment. There can be an ordinal interaction in which all students do better with both types of treatment, but some do much better with one particular treatment. There can be a disordinal interaction, in which some subjects do better and some subjects do worse with the treatments. The type of interaction obtained helps one to arrive at practical decisions regarding implementation of treatments (Berliner & Cahen, 1973). In this experiment the aptitude or trait of the learner was field dependence-independence. The treatments were: (a) moderate italicizing, cueing explained; (b) moderate italicizing, cueing not explained; (c) high italicizing, cueing explained; (d) high italicizing, cueing not explained. An ordinal interaction was expected which would show that all subjects--field dependent, middle and field independent--would benefit from moderately italicized prose when told the purpose of cueing, and that field dependent subjects would benefit the most.

### Summary and Hypotheses

In summary, this research examined the effects of typographical cueing (moderate amounts, high amounts, none) on total as well as critical and incidental learning of nursing students of varying degrees of field dependence.

Literature points to the fact that field dependent people are influenced by the total stimulus field and therefore have difficulty overcoming embeddedness. In concept attainment they are bound by the more salient cues. By making relevant material salient, and thus helping an individual to be more selective, it was hypothesized that cueing with italics would increase the efficiency and effectiveness of learning from prose by field dependent people. It would also enhance the learning of other groups, as cueing will reduce the chances of selection error, and allow for more time in processing the salient text. It was hypothesized that cueing would be more beneficial to the middle group than the field independent group as they will be midway in terms of abilities to overcome embeddedness.

As Coles and Foster (1975) suggest, cueing itself may not be enough to stimulate selective search strategies in people, but when given the purpose for cueing, learning is facilitated for the material that is cued. Thus it was hypothesized that when adequate instructions precede a cued passage, a greater amount of intentional learning would occur.

It was more difficult to hypothesize the effects of different amounts of cueing, i.e. high amounts of italicizing versus moderate

amounts of italicizing. The literature deals primarily with the type of cueing, e.g. use of colour, underlining, objectives, rather than varying quantities. Field independent subjects, who are more selective to begin with, might find high amounts of italics distracting and this may hinder learning. Field dependent subjects might show increased intentional learning with high italics as compared to moderate italics, since it would mean more salient information readily available to them.

As the literature suggests, cueing increases the retention of critical information (that which is cued), sometimes at the expense of information not cued (incidental), especially when the purpose of the cueing is known. It was hypothesized that all subjects who received italics and were told of their purpose would have increased learning of critical information over incidental information.

It was also hypothesized that reading times would be longer for those who received the highly italicized text than for those who received the moderately italicized passage; and the reading times for the latter would be longer than for those who did not receive an italicized passage.

## CHAPTER TWO

### REVIEW OF LITERATURE

The major premise of this study is that cueing (to provide emphasis on the main concepts of prose material) will help field-dependent individuals learn from reading.

It is necessary then, to examine cueing (specifically italics) and field dependence-independence in order to determine how they might interact.

#### Cueing

Rothkopf (1970) contends that in a learning situation the presentation of a stimulus alone has no direct effect on retention. He points out that some type of cognitive activity (he calls it mathemagenic activity) on the part of the learner is required for learning to take place. This "mathemagenic activity" enables the learner to transform the stimulus into something meaningful and thus increase the possibility of remembering it. This process--the presentation of a stimulus, mathemagenic activity, and transformation of the stimulus--may be applied to learning from reading. As an example, one might consider Duchastel's (1982) remarks about what is required to learn through reading: "the reader of a text must constantly establish the status of the information being read at any given time and appropriately fit this information into his or her own internal representation of the subject being studied" (p. 178). In other words, the reader must transform the article in order to incorporate it into his or her own cognitive structure. He or she

must initially use some "mathemagenic activity" to establish or focus on the important elements of the text. There are some factors in reading which complicate this process. Focusing on important points is more difficult when these points are embedded in a mass of secondary ideas (Duchastel, 1982; Réder & Anderson, 1982), and when the text to be processed is long (Pace, 1982). These two factors affecting comprehension - the density of information and the length of the text - are of considerable significance for nursing students whose reading material is often lengthy and contains a great deal of important and secondary ideas. How is it possible then, to influence the "mathemagenic activities" of these students who read this type of prose material and attempt to learn from it?

One possible type of influencing factor is an orienting direction, described as "a verbal device which disposes the reader to respond to certain aspects of a text" (Fraser, 1970, p.338). It is a type of cue which authors may use to direct the reader's attention to those parts of the reading material which are considered important for meeting the objectives of the text. Orienting directions initiate a "selective search strategy" within the reader's mind and that strategy "determines what stimuli will be attended to and how these stimuli will be coded for storage in memory" (Gagné, 1973, p.15).

There are two types of orienting directions: first, verbal ones which have received the most attention from researchers and include advanced organizers, questions placed in various parts of the texts, and objectives; secondly, non-verbal or typographical types of

cueing systems which, to distinguish levels of information, use physical variations in the text such as underlining, color, and different type faces (Glynn, 1978). Glynn uses the Von Restorff effect to justify the implementation of typographical cueing systems. This effect occurs when certain events have been set apart perceptually from others. The result is that the isolated events have a higher probability of being recalled at a later time (Glynn, 1978). While Ausubel, Novak and Hanesian (1978) were rather skeptical about typographical cueing, believing it only provided mechanical aid to make material more salient; they did admit to certain perceptual organizers such as underlining having an integrative effect by illuminating the organizational structure of the material.

Various types of typographical cueing have been used by researchers such as capital letters, words written in red colours, underlining, bold type, and highlighting in yellow. Only Foster and Coles (1977) attempted to compare types (capital letters and bold type) to determine the optimal way of cueing. They found that bold type was a better means of distinguishing information than capital letters. Although italics are suggested for use in cueing, they have not been researched thus far in a definite way to stress the main points in standard prose material. Pratt, Krane, and Kendall (1981) however, found that italics used to stress certain parts of ambiguous passages did influence their interpretation. Thus, italics probably did direct attention to certain sentences.



Lockhead and Crist (1980) found that, in contrast to the modern trend of thinking that clean cut (unseraphed) letters were easy to read, seraphed letters (those with a line or bar at the end of the main stroke) are more distinctive and therefore may be classified more readily. This suggests that contrary to what Spencer reports in his summary of research on typographical variables (Burnhill & Hartley, 1975) namely that *italics* reduce legibility, they may in fact aid it. Tinker and Paterson (in Poulton, 1972) reported that *italics* took approximately 3 percent longer to read than roman letters. Their study was done in 1928 which suggests a need for updated research in this area. It does seem feasible that a change in type might have some effect on the rate of reading. Studies of typographical cueing which did discuss reading times reported various effects. The use of complex cueing (e.g., capital letters, red letters, and underlining) did not significantly effect reading times (Hershberger, 1964; Hershberger & Terry, 1965) nor did the use of brackets, line spaces and capital letters (Shebilske & Rotondo, 1981). Rickards and August (1975) found that subject-generated underlining took more time to read than experimenter-generated underlining, and both required more time to absorb than material read by the control group. Reading times might be affected more by the fact that the reader is simply paying more attention to those areas cued rather than responding to specific properties of the cues themselves.

Very little is written in the literature concerning the effect on recall of the amount of material cued. Bausell and Jenkins (1977)

found that the number of items cued in a 455 word passage did not affect the total recall score.

It is uncertain whether cueing will automatically initiate a selective search strategy or whether the subject requires knowledge of the purpose of cueing. Coles and Foster (1975) found that cueing did not facilitate search unless the readers were informed beforehand of the cueing system. They found that simple instructions did not direct attention to the cued material, whereas a more elaborate set of instructions did have a significant effect.

However, the more elaborate set of instructions emphasized the techniques of how to read an article rather than the actual purpose of cueing. Subjects were told to read the article quickly, pick out the main points, ask themselves questions, and read it again slowly, picking out main points, and then to review it again quickly.

Most studies informed subjects about the purpose of cueing. For example, Crouse and Idstein (1972) told subjects to pay attention to what was underlined since they would be questioned about it. Others have told subjects that cued material was the most important portion of the text and that they would be tested on it (Glynn & DiVesta, 1979; Rickards & August, 1975). However, these studies did not make comparisons between the effect of being told or not being told the purpose of the cueing. In their study of the use of text headings as aids to improve the recall of prose, Brooks, Dansereau, Spurlin and Holley (1983) did not find significant results when subjects were told the purpose of the headings.

As mentioned earlier, items set apart perceptually from other items have greater probability of being recalled at a later time. Most research has found that cueing increases the amount of critical material learned (Cashen & Leicht, 1970; Foster & Coles, 1977; Fowler & Barker, 1974; Glynn & DiVesta, 1979; Hershberger, 1964; Hershberger & Terry, 1965; and Shebilske & Rotondo, 1981).

While some researchers do not discuss the effect of cueing on incidental learning, among those that do, there is some variance as to whether the amount of cued material is assimilated at the expense of the incidental material learned. Shebilske and Rotondo (1981) found increased incidental as well as intentional learning from cued material. Foster and Coles (1977) found that only when capital letters were used as cues did subjects do worse on incidental learning. Cashen and Leicht (1970) reported that questions referring to material adjacent to the underlined material were answered significantly more often than the questions referring to non-underlined material.

Others such as Glynn and DiVesta (1979); Fowler and Barker (1974); Hershberger (1964); Hershberger & Terry (1965), report negative effects on incidental learning.

Reder and Anderson (1982) suggest that added details (incidental material) interfere with the learning of main concepts. They remark that the usefulness of these details probably consists of simply "increasing interest and credibility" (p. 101). In certain texts, such as reading material for nurses (where mastery of the main

concepts should help provide the end result of safe health care for the public) elimination of these details might be recommended. However, cueing may help reduce their supposed deleterious effects by making them less distinctive and still allow the element of interest to remain in the text. It was this approach that was pursued in this study.

#### Field Dependence-Independence

Although several studies have investigated the effects of typographical cueing, few have taken learner characteristics into account. It might be that cues are of benefit to only some types of learners and a possible hindrance or of no help to others.

Individual learning differences may be most affected by various levels of cognitive style, defined as "individual variation in modes of perceiving, remembering, and thinking; or as distinctive ways of apprehending, storing, transforming and utilizing information" (Kogan, 1971, p. 244). A number of different dimensions of cognitive style have been identified and examined by researchers. Field dependence-independence is one of them. It is, according to Jonassen (1979), the "best established, most prominent and most extensively researched" (p. 28).

"Field dependent and field independent cognitive styles are contrasting ways of processing information. The field dependent person is likely to rely on more external referents as guides for processing information, the field independent person tends to give greater credit to internal referents" (Witkin, Moore, Oltman,

Goodenough, Friedman, Owen & Raskin, 1977b, p. 197). These styles developed from a series of experiments which studied how individuals perceived "true uprightness". One of the most common instruments used to test it was the Rod and Frame Test (RFT), also available in portable form (PRFT). The individual was placed in a darkened room in front of an illuminated rod and frame. The person had to adjust the rod within the tilted frame into a position of "true uprightness" in space. Those who adjusted the rod according to its position within the frame were considered to be field dependent, that is, dependent upon the visual field as their reference for "true uprightness" in space. Those who adjusted the rod according to kinesthetic cues, and ignore the tilted frame were considered to be field independent i.e. independent of the visual field as their reference for "true uprightness". These tendencies for determining "true uprightness" were exhibited by other similar perceptual tests such as the Body Adjustment Test (BAT) and the Rotating Room Test (RRT).

The Embedded Figures Test (EFT) was developed to see if these tendencies would carry over to other areas of perception. People who tended to rely on the visual field (field dependent) in the RFT were discovered to have more difficulty locating a simple geometric figure within a field of embedded figures. Those who used kinesthetic cues in the RFT found it relatively easy to disembed the geometric figure (Witkin and Goodenough, 1981). These differences in style have been found to occur at all ages, from kindergarten and on.

People tend to change as they mature, becoming less field dependent as they approach mid-adolescence, and remain stable throughout adult life (Witkin & Goodenough, 1981). In old age, however, they move toward field dependency again (Fogliani-Messina, 1983; Witkin & Goodenough, 1981). Nonetheless, one's position on the field dependence-independence continuum tends to remain stable relative to one's peer group for the given time in development (Ausburn & Ausburn, 1978). Deliberate attempts to change an individual's style do not bring about results (Witkin, in Johnson, Flinn & Tyer, 1979). Case (1975) mentions a study reporting a two-year attempt which brought only small gains.

The field dependence-independence construct has entered into the area of learning and memory. People who are field independent, and who can easily separate items from their background, were discovered to be more analytical when dealing with problem solving tasks. They were more active learners, able to impose automatically some order in a relatively unstructured situation. They are described as having a "participant role" in the learning process (Goodenough, 1976).

On the other hand, individuals who had more difficulty separating the items from their background (field dependent) tended to be more global in a learning situation, and to be less able to impose structure. They are described as having a "spectator role" in the learning process (Goodenough, 1976).

Field independent learners are able to attend selectively and

in fact, they see themselves as having this ability. Field dependent learners are influenced by the whole and they seem themselves as being curious about peripheral stimuli (Berger & Goldberger, 1979). Goodenough (1976) reports that field dependent subjects are "dominated by the most salient attributes of the stimulus" while field independent subjects are "able to restructure the field as required by the task" (p. 677).

Field dependence-independence has also been studied in the area of interpersonal relations and social functioning. Field dependent individuals are more socially oriented, showing greater skill at getting along with others, while field independent individuals prefer less personal situations and are more task-oriented. This carries over into areas of academic choice and into the professions that these people choose to enter. Field independent subjects tend to enter the disciplines which allow more personal autonomy and that are task oriented such as sciences, drafting, mathematics. Field dependent people choose areas which involve relating to others, such as education, nursing, social work (Johnson et al, 1979; Lusk & Wright, 1981; Witkin et al 1977b). In nursing, those who did well in psychiatry (an area requiring interpersonal relations) tended to be more field dependent, while those who did well in surgery (more task oriented) tended to be more field independent (Quinlan & Blatt, 1972). This seems consistent with the findings of Witkin et al (1977b), that those who entered the disciplines which matched their cognitive style did well in them,

and stayed in them.

It appears to be generally accepted that men are more field independent than women. However, research has not been consistent in its findings of sex related differences. Some studies have accounted for differences by using separate distributions of the EFT for each sex (Annis, 1979; Annis & Davis, 1978). Many agree with Witkin et al (1977b), that there are differences (Copeland, 1983; Erdos, 1979; Lotwick, Simon & Ward, 1981; Pande, 1970; Provost, 1981), albeit, they are small. Others report no significant differences (Allen & Chalet, 1978; Boersma, 1968; Jackson et al, 1964; Johnson et al, 1979; Lusk & Wright, 1981). In their studies on sex differences and curricula, Johnson et al, (1979), and Lusk & Wright (1981) found that differences appeared to be related to field of interest. For example, Johnson et al (1979) found that males in liberal arts scored worse than males in either of the other two groups studied (drafting and mathematics).

As the subjects of this present study were nurses, a profession consisting of a high proportion of women, it was expected that there would be a tendency toward field dependence among them. Examining differences in terms of curricula is more difficult as nursing is both a science and an art.

One criticism of field dependence-independence research is that of failure to control for intelligence and general ability (Wachtel, 1972). As mentioned earlier, the field dependence-independence dimension is measured by tests which determine the individuals'



ability to overcome embeddedness. It is felt that the Block Design and Object Assembly subtests of intelligence tests also involve the capacity for overcoming embeddedness and thus, field independent subjects would do better in them (Goodenough & Karp, 1961). However, it has been shown that field dependence is not related to overall academic achievement as seen in highschool and college grades. Nor is it related to the amount of education obtained (Witkin et al, 1977b). Dickstein (1968) found that concept attainment was more closely related to field dependence than to general intelligence.

Cognitive styles are more concerned with the "how" of learning and not "how much" as are intelligence tests. The field dependence-independence dimension has a bi-polar characteristic, that is, it is not better or worse to be at one pole or the other (Witkin et, 1977b). It seems then, that as long as one is dealing with subjects of average intelligence, the controlling for intelligence is not necessary.

Many tests have been used to measure the field dependence-independence construct. The literature tends to be inconsistent as to their reliability and validity. There appear to be three areas of difficulty. Does the RFT actually measure field dependence-independence? Is there a positive relationship between RFT and embedded figures tests? and is there a positive relationship between the various embedded figures tests?

Reinking (1977) suggests that the RFT is influenced by several variables, such as those used in his study, giving instructions on

types of cues to use during the taking of the test. As such, he questions whether the Rod and Frame Test is actually a measure of field dependence. Denmark, Havlena and Murgatroyd (1971) found a correlation of .43 between EFT and RFT. However, when 12 pairs of extreme scores were used, then the correlation was .82. Is one or the other then, not measuring field dependence? Barrett, Cabe and Thornton (1968) also reported the lack of a linear relationship between the HFT and RFT, albeit admitting that their sample size was small. Dumsha, Minard and McWilliams (1973) found a positive correlation between GEFT and HFT (.749) but negative correlations between each of the embedded figures tests and the RFT. This suggests that the embedded figures tests measure the same ability, which is, in turn, different from that of the RFT. Scores on Jackson's short form of the EFT correlated .60 with the RFT (Berger & Goldberger, 1979). Jackson, Messick and Myers (1964) found that all five types of embedded figures substantially correlated. Kuder Richardson 21 reliabilities were tabulated. HFT=.71. On the other hand, Navarro (1978) reported low correlations between the PRFT, CEFT (Childrens Embedded Figures Test) and HFDT (Hidden Figures Drawing Test).

It has been suggested by Wideger, Knudson and Rorer (1980) that research assess the test-retest reliabilities of various measures to determine the existence of the field dependence-independence construct. The HFT reliability of test-retest at a twelve-week interval was .92 as reported by Ausburn (1979) and at a ten-week interval in another study it was .63 (Boersma, 1968). As mentioned

earlier, Dumsha et al (1973) reported a .74 correlation of GEFT and HFT. Weissenberg (1973) states that the HFT is a "reasonably efficient and effective instrument" for testing field dependence-independence in large group situations, at low cost and time spent (p. 462).

Sack and Rice (1974) divide the act of attending into three separate processes: selectivity, resistance to distraction and shifting. Selectivity, as the word implies, is the act of selection of a stimulus from several stimuli, or establishing a focus. Distraction is the involuntary change of focus from the stimulus to something else, and shifting is voluntary change of focus. All aspects of attention may be measured using various tests. They found that the selectivity factor was defined by "heavy and exclusive weighings of embedded figures tests." (p. 1009).

While all three categories of attention are important in examining problems which people may have in reading, it is the area of selectivity which is of concern in this study, and it does seem that selectivity or the establishment of focus is measured by several embedded figures tests.

#### Field Dependence-Independence and Concept attainment in Reading

Chester (1976) reports that while individuals who are field independent are better readers than those who are field dependent in early ages, the effect disappears before high school. However, it does seem likely that field dependent individuals (those who have difficulty overcoming embeddedness and are influenced by the

total organization of the field) would have more difficulty learning main concepts from prose material than field independent individuals (those who are more able to impose structure on an unorganized field).

Research has shown, as mentioned earlier, that field dependent subjects are dominated by the salient attributes of a stimulus. They tend to ignore non-salient cues. Field independent subjects tend to sample more fully from all possible cues and therefore are better at concept attainment (Goodenough, 1976).

Dickstein (1968) found field independent subjects better at concept attainment tasks than their field dependent counterparts. Davis and Klausmeier (1970) received the same findings for concept identification tasks. Both of these studies, however, did not attempt to replicate typical learning situations, but used cards and other devices to clump concepts.

It seems pertinent then, to consider some type of aid such as cueing to help field dependent individuals more readily identify the relevant points in text material and thus enhance their learning.

#### Supplantation

As attempts to change cognitive styles have not met with much success, (Case, 1975; Witkin in Johnson et al, 1979), it seems that designers of educational material must direct their efforts toward providing help for those elements with which the learner is having difficulty. Field dependent individuals require aid with cognitive restructuring skills. Supplantation might be the means of providing this help.

Ausburn and Ausburn (1978) describe supplantation as the "explicit and overt alteration or performance of a task requirement which a learner would otherwise have to perform covertly for himself". (p. 343). They describe two types of supplantation; conciliatory, where the requirement causing the learner difficulty in successfully completing the task is "removed"; and compensatory, where the learner is "provided with help" such as instructions and cues regarding the requirement causing difficulty in successful completion of the task. An attempt at compensatory supplantation appears in the study by Greco and McClung (1979) in which students were given tapes which directed their attention toward important visual cues in a slide-tape presentation. While they hypothesized that attention directing would increase the learning of field dependent students, their results did not show the expected effects. The attention directing technique was more effective than the tape without cueing, but field independent subjects did better than field dependent subjects. They attributed the results to the possibility that field independent individuals are superior learners from the auditory mode. The suggestion that cues and instructions might help field dependent subjects compensate for their difficulty in imposing structure on a stimulus may only apply to certain media. Cueing may not be effective in the auditory mode, but results might be found in learning from reading. Use of italics for main concepts might act as a substitute for restructuring skills necessary to overcome embeddedness in reading. Italics should make

relevant information salient and thus reduce the need for restructuring of the material.

### CHAPTER THREE

#### METHOD

##### Subjects

The subjects used in this experiment were first and second year nursing students from two English-speaking CEGEPs in Montreal. There were 133 female students ranging between 17 and 44 years of age. One hundred and ten subjects took part in the main experiment. The loss of 23 subjects was due to failure of some learners to complete all parts of the experiments. All subjects had received instruction in the anatomy and physiology of the heart, but had not received any formal instruction on coronary artery disease which was the topic of the experimental material.

##### Design

The dependant variables for this experiment were: (a) the overall score on the posttest given following the reading of the article on coronary artery disease; (b) the scores on the critical and incidental information tested in the posttest; and (c) the time taken to read the article through once.

The independent variables were:

- (a) cognitive style: highly field independent, middle, and highly field dependent.
- (b) typographical cueing: italicizing high amounts of the content of the article, italicizing moderate amounts of the content of the article, and no italics (control).

(c) instructions regarding cueing: informed of the purpose of cueing with an example of how to use it, and not informed of the purpose of cueing.

The design is thus a 3 cognitive style (high field independent, middle, and high field dependent) by 3 typographical cueing (high amounts, moderate amounts and none) by 2 instructions (present, absent) mixed model (See figure 1):

#### Materials

At the first meeting, all subjects (133) were given the Hidden Figures Test, a pretest and an autobiographical questionnaire.

The Hidden Figures Test (French, Ekstrom, & Price, 1963) was used to place individuals on the field dependent-independent continuum (See Appendix A.) It is suitable for adults, is administered to groups, and is less costly than other tests used to establish the same cognitive style. The test consists of two parts, each containing sixteen complex patterns. The subject must locate one of five given figures in each of the complex figures. Ten minutes is allowed for each of the two parts. Two examples are given at the beginning of the test. Those who correctly identify the most figures within the given amount of time are the more highly field independent.

Isolation of extreme scores has tended to result in more interactions between cognitive style and treatment, than the use of the median of the scores (Greco & McClung, 1979.) No definite trend has been established for isolating extremely analytical (field



Figure 1

Research Design

		<u>Field Dependence-Independence</u>		
<u>Instruction</u>	<u>Cueing</u>	high field dependence	middle	high field independence
	high			
	medium			
		high field dependence	middle	high field independence
<u>No Instruction</u>	<u>Cueing</u>			
	high			
	medium			
		high field dependence	middle	high field independence
<u>Control</u>				
	high			
	medium			

independent) and extremely global (field dependent) subjects. Methods which have been used to isolate extreme scores are the upper and lower 27 percent of the Hidden Figures Test scores (Greco & McClung, 1979), and the upper and lower third of the total scores (Annis, 1979).

In this study, subjects were divided into three even groups: upper third, middle third and lower third.

The pretest was given to determine the subjects' present knowledge of coronary artery disease. (See Appendix B.) It was based on learning objectives for the article on coronary artery disease (to be read by them in the main experiment), and it included multiple choice, fill-in-the-blank questions and true-false items. Each correct answer was worth one point for a total of 24 points. A score of 19.2 (80 percent) or above was the point at which students were considered to be knowledgeable in the area of coronary artery disease and would be eliminated from the study. As much time as necessary was given to complete the test.

The autobiographical questionnaire was also given to determine prior knowledge of coronary artery disease. (See Appendix C.) It questioned the amount of contact the student had had with individuals with coronary artery disease, and how much, if any, reading they had done in the area.

The experimental passage was an article of approximately 3000 words on coronary artery disease written by myself.

It was based on the following objectives:

- (a) identify the coronary arteries.
- (b) explain the functions of the coronary arteries.
- (c) describe the process of atherosclerosis as related to coronary artery disease.
- (d) describe at least six risk factors involved in coronary artery disease to include the rationale.

Versions of the article containing moderate and high amounts of italics were prepared according to the technique developed by Johnson (1970). The article was divided into subunits by myself.

(See Appendix D.) A copy of the segmented article was then given to each of four subject matter specialists. They were asked to eliminate the subunits which they considered to be the least important to the overall meaning of the article until approximately three-quarters of the words in the article remained. This process was repeated until one-half of the original words in the article remained, and again until one-quarter of the words in the article remained. (See Appendix E for instructions on this process.) The subunits which were not eliminated equaled approximately one-quarter of the number of words in the article, and were considered those which the individual raters deemed vital to the meaning of the text. Elimination was done by colour-coding to make it possible to quantify the subunits. The least important subunits equaled one point, the next equaled two points, the next equaled three points, and the core subunits, or those most important equaled four points. Totals of each subunit from the four subject matter specialists were

computed. The alpha reliability coefficient equaled .728. An example of the process can be seen by using the last subunit (See Appendix D) on page 86 of the article; "they are called coronary arteries because they circle the heart like a crown." This subunit was rated as least important to the meaning of the article by two of the raters. It received one point from each of them. But each of the other two raters considered it the most important and from them it received a total of eight points. This particular subunit then, received ten points. Subunits receiving a score of 14 to 16 points were considered core material, that is, the most important elements in the article. Subunits which received a score of 11 to 13 points were considered the next most important.

When moderate amounts of italicizing were required, the subunits equaling 14 to 16 points were used. (See Appendix F.) High amounts of italics included the subunits equaling 11 to 16 points. (See Appendix G.) The italics were done using IBM Light Italic Type, 12 pitch. (See Appendix F.)

A space was provided at the end of the article for the subject to mark the time taken to read it through once. (See Appendix F.)

Directions on the front page informed the subjects that they would have twenty minutes to complete the article, that they should write the time taken to read it through once in the space provided and to continue reading until told to stop. (See Appendix H.) Also included on the front page of the article, for those subjects receiving both italics and instructions, was information as to the

purpose of the italics. They were told that the main points had been italicized and were given an example. (See Appendix I.)

An evaluation questionnaire was prepared and placed at the end of the package for those subjects who received italics. (See Appendix J.) This was given to measure their personal opinions on the use of italics and cueing. Subjects were informed of the presence of the evaluation questionnaire through a statement attached to the answer sheet accompanying the posttest.

A posttest of 27 multiple-choice questions was prepared. It was based on the content of the article. (See Appendix K.) Each question was rated as to whether it tested critical or incidental learning. The "critical/incidental" distinction was based on whether the answer to the question was found in the italicized part of the passage. If so, it was considered to be measuring critical information. This was done separately for the moderate amount of italicizing and the high amount of italicizing. Thus a question might be measuring critical learning in the highly italicized passage and incidental learning in the moderately italicized passage.

A question in which the right answer contained a multiple of distractors was analyzed according to each distractor. If there was a mix (e.g. one right distractor measured critical learning and two other right distractors measured incidental learning), then the majority determined what the question measured. Thus, in the previous instance, the question would have measured incidental

learning.

The incidental-critical marking scheme was used for each group of subjects including the control group. Thus each subject received five scores: the total number of questions answered correctly; the total number of critical questions answered correctly based on whether the passage was moderately italicized; the total number of incidental questions answered correctly based on whether the passage was moderately italicized; the total number of critical questions answered correctly based on whether the passage was highly italicized; and, the total number of incidental questions answered correctly based on whether the passage was highly italicized.

An interpolated task was prepared to be placed in front of the posttest. This consisted of nine mathematical computations. (See Appendix L.)

#### Procedure

Of the 133 student nurses who completed the pretest, one student received 88 percent, and was eliminated from the experiment.

Information from the autobiographical questionnaire showed that a total of 46 of the remaining 132 students had done some reading on coronary artery disease. Of these 46 students, 16 had also nursed at least one patient with the disease. Three students had nursed a patient with the disease but had not read of it. The extra reading and/or nursing did not appear to have had an appreciable effect on the pretest scores. The marks ranged between 21 and 67 percent, with a mean of 42 percent. Because of this, no additional students were

removed from the experiment.

Based on scores received on the Hidden Figures Test, the subjects were divided into three groups: field dependent, middle and field independent. Scores on this test ranged from 1 to 26 out of a total of 32, with a mean of 7. (see Appendix M for frequencies)

Subjects were ranked in order of scores from highest to lowest. The "field independent" group consisted of those individuals obtaining the top 44 scores. These scores ranged from 11 to 26. The "middle" group consisted of the next forty-five individuals whose scores ranged from 7 to 10. The "field dependent" group was made up of the remaining students and lowest scores ranging from 1 to 6.

The subjects in each of these three groups were randomly assigned to one of five subgroups: control; moderate amount of italics with information as to their purpose; moderate amount of italics without information as to their purpose; high amount of italics with information as to their purpose; and, high amount of italics without information. This resulted in nine subjects per group except for two groups who had eight subjects each.

The experimental sequence consisted of: a) general instructions and introduction; b) article presentation; c) interpolated task; d) posttest; and e) the evaluation form on the use of italics for those who had received them.

Packets had been prepared with the subjects first name, initial, and student number written on the outside. These were distributed and subjects were asked to remove only the article from the packet.

Instructions were read and questions answered. Subjects were told when to start reading. After 10 minutes, the experimenter marked the time on a blackboard and every 20 seconds thereafter. When they had read the article through once, subjects marked--as per instructions--the time from the blackboard in the space provided at the end of the article and then continued reading until told to stop.

At 20 minutes, subjects were told to stop reading and to put the article back in the packet. They were then asked to remove the posttest with the interpolated task attached to the front. One minute was given to complete the interpolated task. They were then asked to begin the posttest and when finished to sit quietly until told to leave. Twenty-five minutes was given for the posttest. Those who had received evaluation forms completed them after finishing the posttest. The students were thanked for their cooperation.



## CHAPTER FOUR

### RESULTS

Subjects' posttests were scored by assigning one point per item. When the passage was moderately italicized, there were 21 possible incidental items and six possible critical items. When the passage was highly italicized, the number of possible correct incidental items was 17, and critical items ten. Using the split-half technique and the Spearman-Brown Prophecy Formula, the reliability for the posttest was .78.

An analysis of variance was used for the overall posttest scores with cognitive style, typographical cueing and information on the purpose of cueing as variables. Means and standard deviations are presented in Table 1.

The analysis of overall posttest scores produced a statistically significant main effect for cognitive style,  $F(2,106)=4.52$ ,  $p < .01$ . A post hoc Tukey test showed that the field independent and field dependent groups differed,  $q(106)=4.76$ ,  $p < .01$ .

A multivariate analysis was then conducted on the four scores of critical and incidental items with both high and moderate levels of cueing. The only prominent effect was produced by cognitive style, and in that case, the multivariate  $F$  was still only marginal ( $F(8,206)=1.82$ ,  $p < .07$ ). It was decided, nevertheless, to further examine the univariates, as three of the four were highly statistically significant.

Cognitive style had an effect on the score of items testing

Table 1

Means and Standard Deviations of the Control Group

	posttest/27	hinc/17	hicri/10	modinc/21	modcri/6	time/secs
FIELD DEPENDENT						
mean	13.00	7.50	5.50	8.75	4.25	985
S.D.	4.69	3.80	2.06	3.56	1.29	144
<u>n</u>	8	8	8	8	8	8
MIDDLE						
mean	16.86	9.86	7.00	12.00	4.86	853
S.D.	4.85	2.47	2.50	3.54	1.35	150
<u>n</u>	7	7	7	7	7	6
FIELD INDEPENDENT						
mean	17.00	9.33	7.66	12.00	5.00	777
S.D.	4.32	3.54	1.10	3.65	1.15	150
<u>n</u>	6	6	6	6	6	6

hinc=score on items measuring incidental information when the passage was highly italicized.

hicri=score on items measuring critical information when the passage was highly italicized.

modinc=score on items measuring incidental information when the passage was moderately italicized.

modcri=score on items measuring critical information when the passage was moderately italicized.

Table 1 (cont.)

Means and Standard Deviations of the Group Which Received a Moderately Italicized Passage Without

Instructions

	posttest/27	hiinc/17	hicri/10	modinc/21	modcri/6	time/secs
mean	15.00	9.75	5.25	10.75	4.25	875
S.D.	.70	.82	.82	.82	.43	216
<u>n</u>	4	4	4	4	4	4
FIELD DEPENDENT						
mean	15.00	9.13	5.88	11.00	4.00	900
S.D.	4.44	3.33	1.89	4.00	1.00	159
<u>n</u>	8	8	8	8	8	8
MIDDLE						
mean	18.44	11.33	7.11	13.22	5.22	956
S.D.	4.13	3.16	1.66	3.61	.62	188
<u>n</u>	9	9	9	9	9	9
FIELD INDEPENDENT						

Table 1 (cont.)

Means and Standard Deviations of the Group Which Received A Moderately Italicized Passage With

Instructions

	posttest/27	hiinc/17	hicri/10	modinc/21	modcri/6	time/secs
mean	14.25	7.88	6.38	10.12	4.13	975
S.D.	4.38	2.71	2.11	3.37	1.26	180
<u>n</u>	8	8	8	8	8	8
FIELD DEPENDENT						
mean	15.50	9.00	6.50	10.63	5.00	954
S.D.	2.73	1.87	1.32	2.44	1.00	157
<u>n</u>	8	8	8	8	8	7
MIDDLE						
mean	16.14	9.43	6.71	11.00	5.14	960
S.D.	3.48	3.06	1.16	3.50	.83	132
<u>n</u>	7	7	7	7	7	7

FIELD INDEPENDENT

Table I (cont.)

Means and Standard Deviations of Group Which Received a Highly Italicized Passage Without

Instructions

	posttest/27	hiinc/17	hicri/10	modinc/21	modcri/6	time/secs
mean	12.33	7.22	5.55	8.56	3.78	1068
S.D.	3.97	2.43	2.58	3.23	1.13	166
<u>n</u>	9	9	9	9	9	8
FIELD DEPENDENT						
mean	14.75	8.13	6.63	10.00	4.75	990
S.D.	4.49	3.25	1.57	4.00	.82	206
<u>n</u>	8	8	8	8	8	8
MIDDLE						
mean	20.17	12.83	7.33	15.33	4.83	897
S.D.	4.45	3.02	1.59	3.68	1.06	169
<u>n</u>	6	6	6	6	6	6
FIELD INDEPENDENT						

Table 1 (cont.)

Means and Standard Deviations of Group Which Received A Highly Italicized Passage With

Instructions

		posttest/27	hiinc/17	hicri/10	modinc/21	modcri/6	time/secs
FIELD DEPENDENT	mean	17.83	10.66	7.17	12.67	5.17	1030
	S.D.	3.48	1.97	1.57	2.92	.68	53
	n	6	6	6	6	6	6
MIDDLE	mean	16.33	9.88	6.44	11.88	4.44	949
	S.D.	4.54	2.88	1.89	3.69	1.34	121
	n	9	9	9	9	9	9
FIELD INDEPENDENT	mean	16.00	9.57	6.43	11.43	4.57	863
	S.D.	3.38	2.55	1.39	3.28	.90	157
	n	7	7	7	7	7	6

incidental information when the passage was moderately italicized,  $F(2,107)=4.51$ ,  $p<.01$ . The Tukey test showed that the difference lay between field independent subjects and field dependent subjects,  $q(107)=4.24$ ,  $p<.01$ .

Cognitive style also had an effect on the score of items testing critical information for moderately italicized material,  $F(2,107)=3.76$ ,  $p<.03$ . The Tukey test again showed that the difference lay between field independent and field dependent subjects,  $q(107)=3.88$ ,  $p<.05$ .

Finally, cognitive style had an effect on the score of items testing incidental information when the article was highly italicized,  $F(2,107)=4.41$ ,  $p<.01$ . The Tukey test again showed that the differences were between field independent and field dependent subjects,  $q(107)=4.19$ ,  $p<.01$ .

Cognitive style produced a statistically significant effect on the time taken to read the article,  $F(2,106)=2.98$ ,  $p<.05$ . However, a post hoc Tukey test showed that the high and low groups were only different by marginally statistical significance,  $q(106)=2.42$ ,  $p<.1$ . Therefore, the hypothesis that reading times would be longer with italics was tentatively accepted.

There were no other effects among any of the variables. Thus the first hypothesis, that cueing with italics would be of more benefit to field dependent subjects by increasing the amount learned from prose, was rejected.

Contrary to what was expected, the use of italics did not have

an effect on the amount of critical or incidental information learned by any one group, whether told the purpose of cueing or not. Thus the hypothesis, that cueing with italics would increase the retention of critical information over incidental information in all subjects who received it, when told of its purpose, was rejected.

#### Evaluation of Italics

In order to determine how subjects felt about the use of italics, those who read articles using italics were asked to complete an evaluation form. (Appendix K.) The majority (as seen on table 2) felt that the use of italics in the article made it clear, pleasant and easy to read. Most stated that italics made the main concepts easy to identify and to remember, and that emphasis on certain ideas was necessary.

Of the 74 subjects who evaluated italics, 62 felt that the italics had helped them to respond to the test items better. Subjects offered the following explanations for this: more attention was paid to the italics and therefore remembering later was easier; no effort was required in the search for the main ideas; the italicized parts were read more slowly and read twice or more; and an overt attempt was made to retain the italicized information.

On the negative side, one respondent said that the article itself and not the italics helped to answer the questions. Another felt that the italicizing of subunits and not whole sentences made it difficult.

Forty-six of 74 respondents preferred reading material which



Table 2

## Results Of Evaluation Questionnaire On The Use Of Italics

Questions	mean	S.D.	mode	median	no of respondents
1.....7					
clear					
confusing	2.41	1.55	1.00	2.00	75
1.....7					
difficult to read					
easy to read	5.58	1.69	7.00	6.00	72
1.....7					
slow to read					
fast to read	4.60	1.70	7.00	4.60	71
1.....7					
pleasant					
objectionable	3.28	1.67	4.00	3.20	71
1.....7					
easy to identify					
main concepts	2.00	1.40	1.00	1.50	75
1.....7					
easy to remember					
main concepts	2.30	1.49	1.00	1.90	75
1.....7					
necessary for emphasis					
on certain points	2.50	1.67	1.00	2.10	78
unnecessary for emphasis					
on certain points					

supplied emphasis (like italics) on main ideas, fourteen would have preferred to underline themselves, and fourteen replied that they liked both the supplied emphasis and to underline themselves.

Comments were: with italics supplied one could be certain of what was important; they bring out the message without being boring; they decrease study time and stress level; one is able to read quickly with

italics and to go over the article again; there is no need to search for information; and italics are easier. One respondent reported liking italics if told the reason for them in advance. Another preferred italics only if the text content was difficult, otherwise she preferred underlining herself. One preferred italics because she tended to underline too much of the material being read. Those who preferred underlining felt that they could decide themselves what was, or was not important in the text; that they preferred to organize in their own way; and that they could remember the material better if they underlined themselves.

Subjects felt that italics influenced what they learned from the article by helping them to grasp the main ideas and by causing them to read carefully and therefore understand the content. One subject felt that italics were detrimental to learning because they disturbed her reading.

Fifty-one subjects felt that less attention was paid to material that was not italicized. They stated that this information was read faster and usually forgotten by the end of the article. One subject commented on the fact of nonitalicized material sometimes being

interesting, while another said it depends upon the information in the article as to whether much of this information is attended to.

Additional comments on the use of italics were: that they are spoonfeeding; they would not be useful in psychology or philosophy texts; they are only useful when the taking of a test is required, and they help one to reflect back to where the information required is placed on a page.

## CHAPTER FIVE

### DISCUSSION

The prediction that moderate amounts of italicizing of the main points in an article would benefit all groups of field dependent-independent subjects (when they were told the purpose of cueing) was not borne out by the data. Contrary to what was expected--that field dependent subjects would benefit more from cueing with italics than the middle group, and the latter more than field independent subjects--no one group benefited from their use.

Nor did the data support the hypothesis that instructions preceding the cued passage would result in increased intentional learning. Being informed of the purpose of italics had no effect on the critical or incidental scores, whether the article was highly or moderately italicized. Italics also had no effect on the amount of time it took to read the article.

The results show that the only independent variable to produce an effect was cognitive style. This result supports other research in which improvement in concept learning is related to cognitive style (Davis & Klausmeier, 1970; Provost, 1981). The further along the continuum towards field independence that one is, the more facility one has in learning main concepts. This effect occurred in spite of the fact that the population in this study was skewed to the field dependent side of the continuum (scores on the HFT ranged from 1 to 26 out of total of 32, the mean was 7 and the median was 7.5. Even so, those closer to field independency scored better than the

the rest of the subjects on the posttest. They also took less time to read the article, suggesting a greater ability to locate the main concepts if one tends toward field independency.

With this established, it seems important when analysing this study to look at the treatment. Why didn't it work for those subjects closer to the field dependent end of the continuum?

There are several possible reasons why the data do not bear out the experimental hypotheses.

#### Use of Italics

It is possible that italics used as cueing devices, do not provide a sharp enough distinction between the critical and incidental information. There is not much research done in which various cueing devices are compared. Foster and Coles (1977) found that bold typeface was superior to capital letters in facilitating the learning of main points. It might be that bold typeface is more effective than italics at visually distinguishing important material.

Another factor worth noting is that the use of italics did not influence the amount of time taken to read the article, while cognitive style did. Field dependent people take more time to read perhaps because they have more difficulty successfully locating or selecting the main concepts. However, the extra time per se was apparently insufficient compensation for this weakness. The fact that the presence of italics did not effect reading time for any group suggests that the italics may not have been used effectively. This may have been due to lack of enough detail in the instructions

given prior to reading the article, or again, the italics' lack of distinctiveness. Coles and Foster (1975) found increased critical learning with increased detail in instructions. Related to instructions was the learners' probable lack of practice or inexperience in the use of cueing. Perhaps more detailed instructions along with several practice sessions would have improved learning, especially for field dependent subjects. This group apparently needed the extra guidance but were unable to take advantage of it under the circumstances offered here.

#### Learner-Controlled versus Externally-Controlled Study Time

In a real learning situation, students prepare for exams using the amount of time they feel is required to learn the material. Crouse and Idstein (1972) found cueing to be valuable when a longer study time was allowed. Shebilske and Rotondo (1981), in their experiment with typographical and spatial cues, reported low scores in the control and experimental groups, 59 and 63 percent respectively. A comparable group which was allowed to take the passage home and spent an average of 67 minutes with it, obtained a mean score of 75 percent on the same test. It is possible that in this study, field independent subjects who are more adept at identifying main concepts may have been able to read the article through more than once and therefore received higher scores. Further studies should either account for or control this influence to assess its effect.

Problems With The Dependent Variable (posttest)

Hartley, Bartlett and Branthwaite (1980) found that nearly all studies on the effects of underlining as a cueing device used multiple choice questions or constructed response items to assess recall. They suggest that these measures may be a reason for the lack of significant results. These methods of testing seem prevalent in most research of typographical cueing (e.g., Cashen & Leicht, 1970; Coles & Foster, 1975; Crouse & Idstein, 1972; Foster & Coles, 1977; Fowler & Barker, 1974; Hershberger, 1964; Hershberger & Terry, 1965). It is possible that the use of multiple choice questions in this study did not glean the entire amount of information learned. Free recall and/or essay type items might have produced different results. However, because entry into the nursing profession (in North America) is based upon the individual's knowledge as measured by multiple choice questions, the present study selected the most valid (if not most sensitive) dependent variable.

One difficulty which arose with respect to the power of the dependent variable was the small number of questions measuring the learning of critical information. Hindsight has revealed that in most studies on cueing, over one half of the questions measured critical information (Foster & Coles, 1977; Hershberger, 1964; Hershberger & Terry, 1965; Shebilske & Rotondo, 1981). Fowler and Barker (1974) was one of the few studies to have more questions measuring incidental information than critical information. Thirty-

three percent of the items on their questionnaire measured critical information (twenty percent of the material). In this study, when a moderate amount of italics was used, twenty-two percent of the items tested critical information (fourteen percent of the material), and when a high amount of italics was used, 37 percent of the items tested critical information (40 percent of the material). This disproportionate balance arose in part because the main ideas of the article were major and comprehensive, thus not lending themselves to many questions. Incidental information included, on the other hand, a great deal of detail, rich in multiple-choice item type material. Future research should attempt to have at least one half of the items measure critical information.

#### Amount of Text Cued

The proportion of text cued may also have inappropriately influenced the results of the study. It is possible that too much of the article was cued, especially in the highly italicized version. Obviously the effect of highlighting is diminished when there is not as dramatic a contrast. Again the amount of cueing which best directs attention requires further analysis:

#### Cognitive Style

The literature varies as to the relationship between field dependent-independent cognitive style and general intelligence. Some studies have found low but positive correlations between them (Black in Provost, 1981; Goodenough, 1976), while others have found no relationship (Bigelow & Frederick in Provost, 1981). Because of



the inconsistency which exists, it might be advisable for researchers who are measuring field dependence-independence with embedded figures tests to also test for general intelligence.

Since the literature on studies of field dependence-independence points to some inconsistency in the reliability of the various means for measuring the construct, future researchers should consider using more than one measure for determining a subjects' position on the field dependence-independence continuum.

Although this study did not show an interaction between italics, instruction on their use, and cognitive style, one positive outcome of it was the students' attitude toward the use of italics. Most students found that italics made the article clear, pleasant, and easy to read. More important, most students felt that emphasis on certain ideas was necessary. It was therefore surprising that student perceptions failed to influence in any way their actual performance. A delayed retention test may have tapped this affective variable. In any case, in order that a real change in comprehension take place, educational technologists should work in this area, taking advantage of the possible influence this positive attitude might have on text processing.

#### Summary

In summary, this research supports other findings which indicate that people who are field dependent have difficulty selecting the main concepts from prose material. An attempt at trying to help these individuals by cueing the main concepts with italics, and

providing instructions as to their use, was not successful. As discussed, several possible explanations exist for the lack of success in this study. It is worth noting that most of these possible reasons involve external factors which could be controlled in future studies, and eventually be considered in the preparation of actual course materials and/or the learning environment.

The only effect on learning shown in this study was that of cognitive style. This has implications for educational technologists. As mentioned previously, designers of text might consider substituting italics with boldface type to increase the cueing effect. Provision of more detailed instructions on the use of cueing devices, along with practice sessions and feedback, should also be utilized.

Finally, evaluation should assess the "deepest" levels of learning, by including free recall and application type problems, to ensure that the main ideas have in fact been measured.

While this study concentrated on the use of a type of physical variation of important segments of the text to direct the learners' attention, educational technologists might consider other methods to help field dependent individuals learn from reading. Objectives, adjunct questions, and advance organizers have been shown to assist learners in acquiring information more effectively and efficiently. The use of summaries of the main ideas at relevant points throughout the text may also be considered.

In conclusion, the results of this study can only provide tentative implications for the preparation of prose text for field-

dependent learners. Due to the apparent predominance of field dependency among nurses, it remains important that the central conceptual ideas be emphasized for their benefit. While italics seem not to be sufficiently potent, the need for some orienting device has been clearly demonstrated.

## References

- Allen, M.J., & Cholet, M.E. (1978). Strength of association between sex and field dependence. Perceptual and Motor Skills, 47, 419-421.
- Annis, L.F. (1978). Effect of cognitive style and learning passage organization on study technique effectiveness. Journal of Educational Psychology, 71, 620-626.
- Annis, L., & Davis, J.K. (1978). Study techniques and cognitive style: their effect on recall and recognition. Journal of Educational Research, 71, 175-178.
- Ausbel, D.P., Novak, J.D., & Hanesian, H. (1978). Educational Psychology: A Cognitive View. New York: Holt, Rinehart and Winston.
- Ausburn, L.J. (1979). Impact of Learning Styles on Airforce Technical Training: Relationships Among Cognitive Style Factors and Perceptual Types. Norma, Oklahoma: College of Education.
- Ausburn, L.J., & Ausburn, F.B. (1978). Cognitive styles: some information and implications for instructional design. Education, Communication and Technology Journal, 26, 337-354.
- Barrett, G.V., Cabe, P.A., & Thornton, C.L. (1968). Relation between hidden figures test and rod and frame test measures of perceptual style. Educational and Psychological Measurement, 28, 551-554.
- Bausell, R.B., & Jenkins, J.R. (1977). Effects on prose learning of frequency of adjunct cues and the difficulty of the material cued. Journal of Reading Behaviour, 9, 227-232.
- Berger, E., & Goldberger, L. (1979). Field dependence and short-term memory. Perceptual and Motor Skills, 49, 87-96.
- Berliner, D., & Cagen, L.S. (1973). Trait-treatment interaction and learning. In F.N. Kerlinger (Ed.), Review of Research in Education. Itasca, Illinois: F.E. Peacock Publishers.
- Boersma, F.J. (1968). Test-retest reliability of the CF-1 hidden figures test. Educational and Psychological Measurement, 28, 555-559.
- Brooks, L.W., Dansereau, D.F., Spurlin, J.E., & Holley, C.D. (1983). Effects of headings on text processing. Journal of Educational Psychology, 75, 292-302.

- Burnhill, P., & Hartley, J. (1975). Psychology and textbook design: a research critique. In J. Baggailey, G. Harry, J. & H. Marchant (Eds.), Aspects of Educational Technology (Vol. VIII) Bath, England: Pitman.
- Case, R., (1975). Gearing the demands of instruction to the developmental capacities of the learning. Review of Educational Research, 45, 59-87.
- Cashen, V.M., & Leicht, K.L. (1970). Role of the isolation effect in a formal educational setting. Journal of Educational Psychology, 61, 484-486.
- Chester, R. (1974). The psychology of reading. Journal of Educational Research, 67, 403-408.
- Coles, P., & Foster, J. (1975). Typographic cueing as an aid to learning from typewritten text. Programmed Learning and Educational Technology, 12, 102-108.
- Copeland, B.D. (1983). Cognitive style of female university students of visual art. Perceptual and Motor Skills, 56, 439-442.
- Crouse, J.H., & Idstein, P. (1972). Effects of encoding cues on prose learning. Journal of Educational Psychology, 63, 309-313.
- Davis, J.K. & Klausmeier, H.J. (1970). Cognitive style and concept identification as a function of complexity and training procedures. Journal of Educational Psychology, 61, 423-430.
- Denmark, F.L., Havlena, R.A., & Murgatroyd, D. (1971). Reevaluation of some measures of cognitive styles. Perceptual and Motor Skills, 33, 133-134.
- Dickstein, L.S. (1968). Field independence in concept attainment. Perceptual and Motor Skills, 27, 635-642.
- Duchastel, P. (1979). Learning objectives and the organization of prose. Journal of Educational Psychology, 71, 100-106.
- Duchastel, P.C. (1982). Textual display techniques. In D.H. Jonassen (Ed.), The Technology of Text: Principles for Structuring, Designing and Displaying Text. Englewood Cliffs, New Jersey: Educational Technology Publications.
- Dumsha, T.C., Minard, J., & McWilliams, J. (1973). Comparison of two self-administered field dependency measures. Perceptual and Motor Skills, 36, 252-254.

- Erdos, G. (1979). Sex differences in feedback effects on rod and frame performance. Perceptual and Motor Skills, 48, 1279-1285.
- Fogliani-Messina, T.M., Fogliani, A.M., & di Nuovo, S. (1983). Embedded figures test in old age: a psychometric note. Perceptual and Motor Skills, 56, 284-286.
- Foster, J., & Coles, P. (1977). An experimental study of typographic cues in printed text. Ergonomics, 20, 57-66.
- Fowler, R.L., & Barker, A.S. (1974). Effectiveness of highlighting for retention of text material. Journal of Applied Psychology, 59, 358-364.
- Frase, L.T. (1970). Boundary conditions for mathemagenic behaviors. Review of Educational Research, 40, 337-347.
- Frase, L.T., & Schwartz, B.J. (1979). Typographical cues that facilitate comprehension. Journal of Educational Psychology, 71, 197-206.
- French, J.W., Ekstrom, R.B., and Price, L.A. (1963). Manual for Kit of Reference Tests for Cognitive Factors. Princeton, New Jersey: Educational Testing Service.
- Gagné, R.M. (1973). Learning and instructional sequence. In F.H. Kerlinger (Ed.), Review of Research In Education. Itasca, Illinois: F.E. Peacock Publishers.
- Glynn, S.M. (1978). Capturing readers' attention by means of typographical cueing strategies. Educational Technology, 7-12.
- Glynn, S.M., & DiVesta, F.J. (1979). Control of prose processing via instructional and typographical cues. Journal of Educational Psychology, 71, 595-603.
- Goodenough, D.R. (1976). The role of individual differences in field dependence as a factor in learning and memory. Psychological Bulletin, 83, 675-695.
- Goodenough, D.R. & Karp, S.A. (1961). Field dependence and intellectual functioning. Journal of Abnormal and Social Psychology, 62, 241-246.
- Greco, A.A., & McClung, C. (1979). Interaction between attention directing and cognitive style. Education, Communication and Technology Journal, 27, 97-102.

Hartley, J., Bartlett, S., & Branthwaite, A. (1980). Underlining can make a difference--sometimes. Journal of Educational Research, 73, 218-223

Hershberger, W. (1964). Self-evaluational responding and typographical cueing: Techniques for programming self-instructional reading materials. Journal of Educational Psychology, 55, 288-296.

Hershberger, W.A., & Terry, D.F. (1965). Typographical cueing in conventional and programmed texts. Journal of Applied Psychology, 49, 55-60.

Jackson, D.N., Messick, S.M. & Myers, C.T. (1964). Evaluation of group and individual forms of embedded-figures measures of field-independence. Educational and Psychological Measurements, 23, 177-191.

Johnson, R.E. (1970). Recall of prose as a function of the structural importance of linguistic units. Journal of Verbal Learning and Verbal Behavior, 9, 12-20.

Johnson, S., Flinn, J.N., & Tyer, Z.E. (1979). Effect of practice and training in spatial skills on embedded figures scores of males and females. Perceptual and Motor Skills, 48, 975-984.

Jonassen, D.H. (1979). Cognitive styles/controls and media. Educational Technology, 28-32.

Kogan, N. (1971). Educational implications of cognitive styles. In G.S. Lesser (Ed.), Psychology and Educational Practice. Glenview, Illinois: Scott, Foresman.

Lockhead, G.R., & Crist, W.B. (1980). Making letters distinctive. Journal of Educational Psychology, 72, 483-493.

Lotwick, G.H., Simon, A., & Ward, L.O. (1981). Field dependence/independence and its relation to sex of polytechnic students. Perceptual and Motor Skills, 53, 271-272.

Lusk, E.J., & Wright, H. (1981). Differences in sex and curricula on learning the group embedded figures test. Perceptual and Motor Skills, 53, 8-10.

Meyer, B.J. (1979). Organizational patterns in prose and their use in reading. In M.L. Kamil & A.J. Mee (Eds.), Reading research: Studies and Applications. 28th yearbook. Clemson, South Carolina: National Reading Conference, Inc.

Navarro, M.S. (1978). Chicano childrens' cognitive styles: A review of the literature and effects of a pretest intervention. (Eric Document Reproduction Service No. ED 217 075).

Pace, A.J. (1982). Analyzing and describing the structure of text. In D. Jonassen (Ed.), The Technology of Text: Principles for Structuring, Designing and Displaying Text. Englewood Cliffs, New Jersey: Educational Technology Publications.

Pande, C.G. (1970). Sex differences in field dependence: confirmation with Indian sample. Perceptual and Motor Skills, 31, 70.

Poulton, E.C. (1972). How efficient is print? In I.K. Davies and J. Hartley (Eds.), Contributions to an Educational Technology. New York: Crane, Russak.

Pratt, M.W., Krane, A.R., & Kendall, J.R. (1981). Triggering a schema: the role of italics and intonation in the interpretation of ambiguous discourse. American Educational Research Journal, 18, 303-315.

Provost, G.L. (1981). Teaching strategies, modes of evaluation, and field dependence factor. Perceptual and Motor Skills, 52, 163-173.

Quinlan, D.M., & Blatt, S.J. (1972). Field articulation and performance under stress: differential predictions in surgical and psychiatric nursing training. Journal of Consulting and Clinical Psychology, 39, 517.

Reder, L.M., & Anderson, J.R. (1982). Effects of spacing and embellishment on meaning for the main points of a text. Memory and Cognition, 10, 97-102.

Reinking, R.H. (1977). Cognitive set influences on Witkins rod-and-frame test. Perceptual and Motor Skills, 44, 439-444.

Rickards, J.P., & August, G.J. (1975). Generative underlining strategies in prose recall. Journal of Educational Psychology, 67, 860-865.

Rosenberg, H., Mintz S., & Clark, R.E. (1977). The educational significance of field dependence research. Educational Technology, 43-44.

Rothkopf, E.Z. (1970). The concept of mathemagenic activities. Review of Educational Research, 40, 325-336.



- Sack, S.A., & Rice, C.E. (1974). Selectivity, resistance to distraction and shifting as three attentional factors. Psychological Reports, 34, 1003-1012.
- Salomon, G. (1978). On the future of media research: no more full acceleration in neutral gear. Education, Communication and Technology Journal, 26, 37-46.
- Shebilske, W.L., & Rotondo, J.A. (1981). Typographical and spatial cues that facilitate learning from textbooks. Visible Language, 15, 41-54.
- Wachtel, P.L. (1972). Field dependence and psychological differentiation: re-examination. Perceptual and Motor Skills, 35, 179-189.
- Weissenberg, P. (1973). Concurrent validity of hidden figures test (CF-1). Perceptual and Motor Skills, 36, 460-462.
- Widiger, T.A., Knudson, R.M., & Rorer, L.G. (1980). Convergent and discriminant validity of measures of cognitive styles and abilities. Journal of Personality and Social Psychology, 39, 116-129.
- Witkin, H.A., & Goodenough, D.R. (1981). Cognitive Styles: Essence and Origins. New York: International Universities Press.
- Witkin, H.A., Moore, C.A., Goodenough, D.R., Cox, P.W. (1977a). Field dependent and field independent cognitive styles and their educational implications. Review of Educational Research, 47, 1-64.
- Witkin, H.A., Moore, C.A., Oltman, P.K., Goodenough, D.R., Friedman, F., Owen, D.R. & Raskin, E. (1977b). Role of the field dependent and field-independent cognitive styles in academic evolution: a longitudinal study. Journal of Educational Psychology, 69, 197-211.

## Appendices

## Appendix A

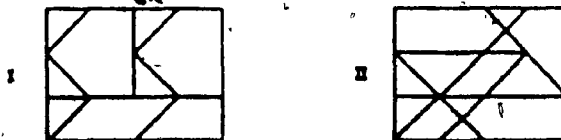
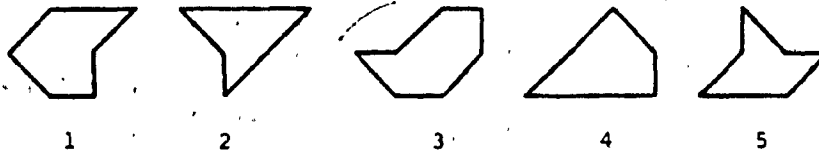
### Hidden Figures Test

## HIDDEN FIGURES TEST

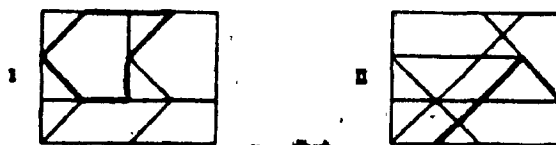
This is a test of your ability to tell which one of five simple figures can be found in a more complex pattern. At the top of each page in the test are five simple figures numbered 1 to 5. Beneath the row of figures is a page of patterns. For each pattern decide which of the five simple figures it contains and mark that alternative by the appropriate number on your answer sheet.

Note: There is only one of these figures in each pattern, and this figure will always be right side up and exactly the same size as one of the five numbered examples.

Now try these two examples:



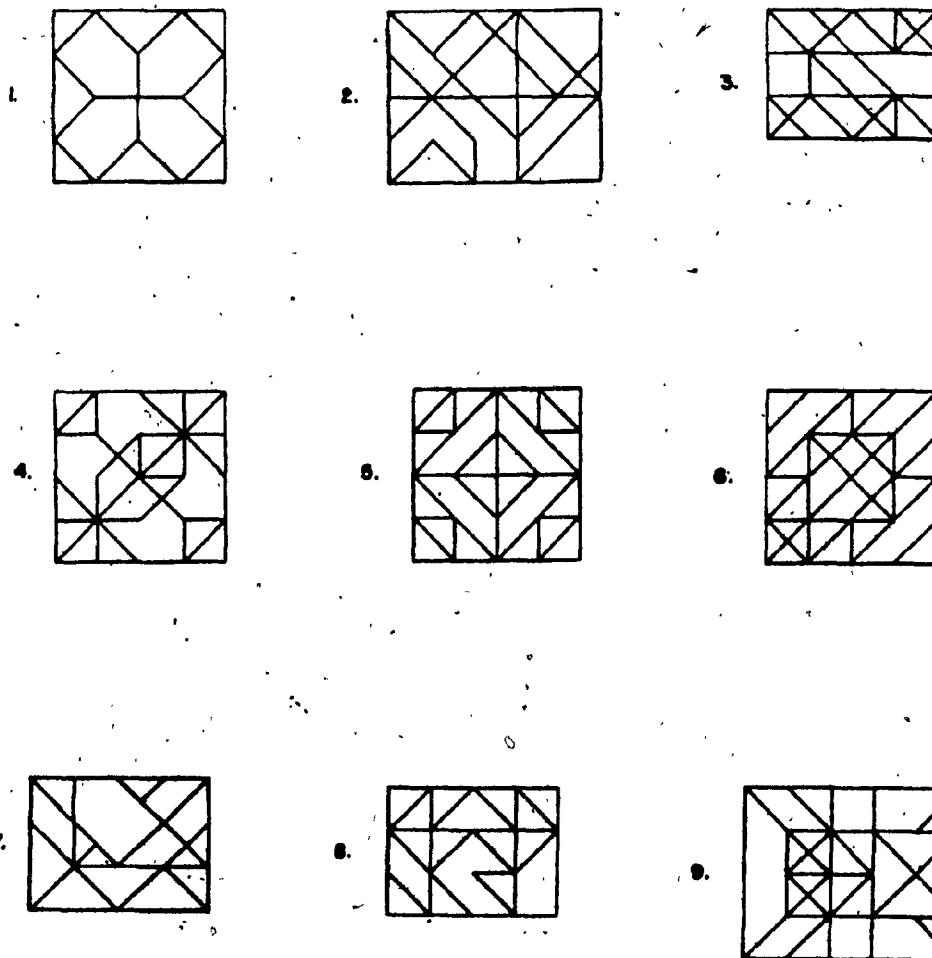
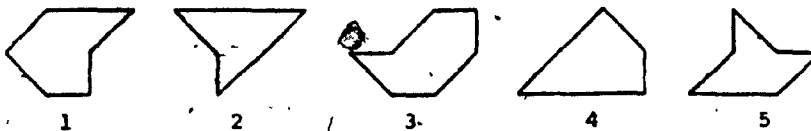
The figures below show how the figures are included in the problems. Figure 1 is in the first problem and Figure 4 in the second.



You will have 10 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

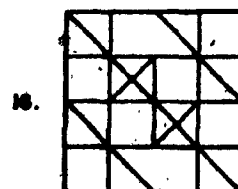
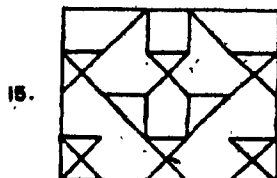
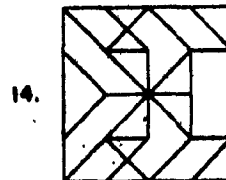
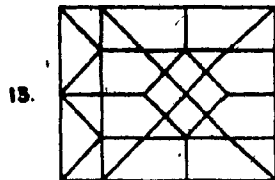
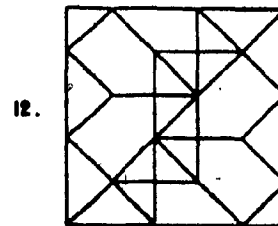
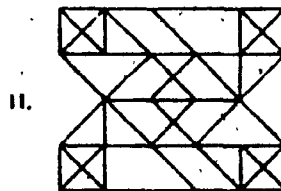
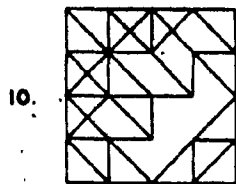
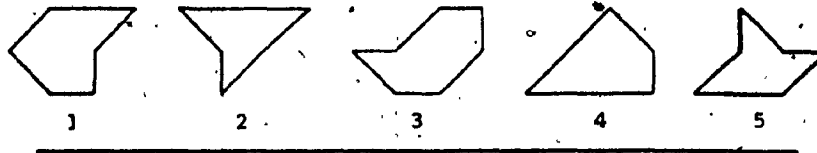
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Page 2

Part 1 (10 minutes)

GO ON TO THE NEXT PAGE

## Part.1 (continued)



DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

STOP.

Page 4

Part 2 (10 minutes)

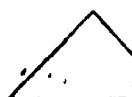
1



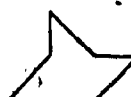
2



3

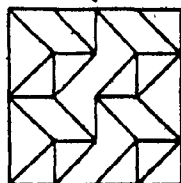


4

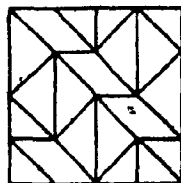


5

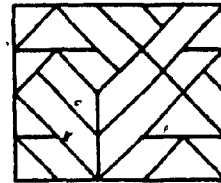
17.



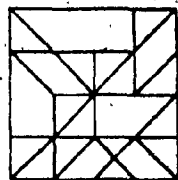
18.



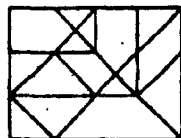
19.



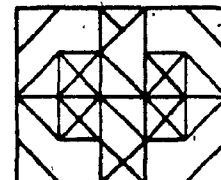
20.



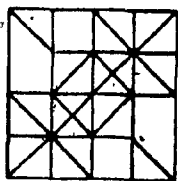
21.



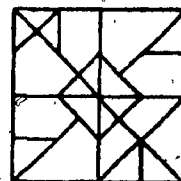
22.



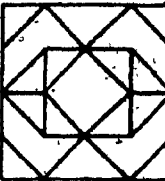
23.



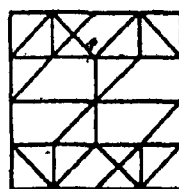
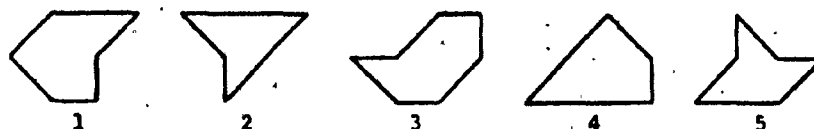
24.



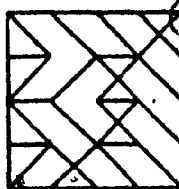
25.



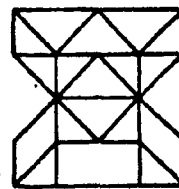
Page 5

Part 2 (continued)

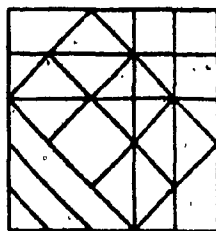
27.



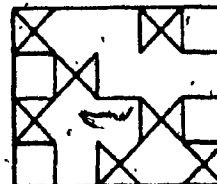
28.



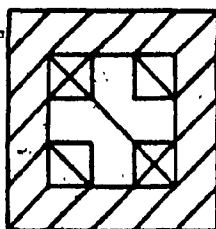
29.



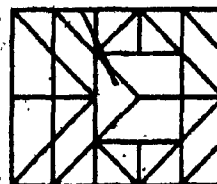
30.



31.



32.



DO NOT GO BACK TO PART 1, AND  
DO NOT GO ON TO ANY OTHER TEST UNTIL ASKED TO DO SO.



Appendix B

Pretest

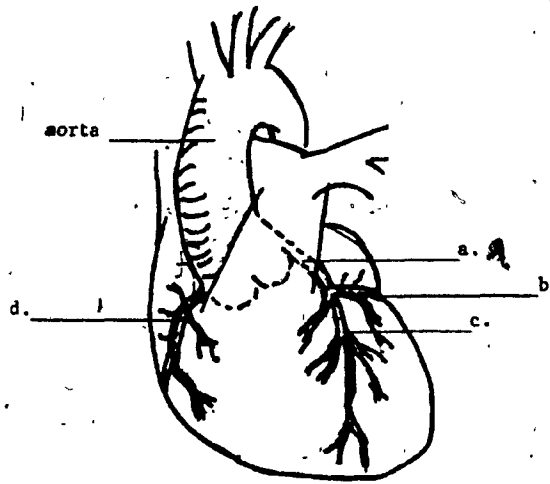
PRETEST

The following questions examine how much knowledge you have concerning coronary artery disease. You will have as much time as you need, so please consider each alternative carefully, and do your best.

Please do not mark the question sheet. Please your answers on the answer sheet provided.

DO NOT START THE QUESTIONS UNTIL TOLD TO DO SO.

1. Identify the labeled parts of the heart in the diagram below.



2. Which of the following are correct concerning coronary disease:

- a. They encircle the heart like a crown.
- b. They originate from the descending aorta soon after it leaves the heart.
- c. Their function is to supply oxygen to the myocardium.
- d. Obstruction in them will result in chest pain.

- 1. a,b
- 2. b,c,d
- 3. a,c,d
- 4. a,b,d

3. Atherosclerosis is:

- a. a process which very likely starts early in life.
- b. thought to begin with damage to the endothelial cells of the intima.
- c. relatively easy to cure if diagnosed early.
- d. a process involving proliferation of smooth muscle cells and

2.

the collection of fats.

1. a,b,d
2. b,c,d
3. a,b,c
4. a,c,d

4. The following statements are true or false. Circle the correct answer on the answer sheet.

- a. coronary artery disease is the cause of angina pectoris and myocardial infarction.
- b. the major cause of coronary artery obstruction is the development of atherosclerotic plaques.
- c. the incidence of coronary artery disease is greater in men than women at all ages.
- d. clinical symptoms of coronary artery disease are only noticed when there is 60 to 70 percent blockage of blood flow through the coronary arteries.
- e. weight reduction will result in reduced cholesterol levels but not reduced triglyceride levels.
- f. there does not appear to be a relationship between the lifestyles of our modern technological society and coronary artery disease.
- g. the three primary or major risk factors in coronary artery disease are family history, smoking and hypertension.
- h. coronary artery disease has reached epidemic proportions in the United States and Canada.

5. Which of the following are controllable risk factors in coronary artery disease:

1. smoking
2. sex
3. family history
4. blood pressure
5. diet
6. stress
7. age
8. heart rate

3.

6. It is thought that regular exercise helps decrease the risk of coronary artery disease by:

- a. keeping the blood pressure at an even level.
- b. causing involved vessels to enlarge.
- c. decreasing the blood triglyceride levels.
- d. increasing the oxygen carrying ability of the blood.

- 1. a,b
- 2. b,c
- 3. c,d
- 4. a,d

7. Research evidence seems to point to which of the following factors regarding smoking and coronary artery disease:

- 1. there is a relationship between smoking and lung cancer, but not between smoking and coronary artery disease.
- 2. carbon monoxide is the most harmful agent in cigarettes due to the resulting decrease in the oxygen carrying capacity of the blood.
- 3. nicotine carries a greater risk for heavy smokers due to increased sympathetic stimulation.
- 4. tar is the most harmful agent in cigarettes as it is carried directly through the blood stream.

8. You have taken the blood pressure of a 50 year old man in for a regular check up. It is 155/98. You might consider the following:

- a. his risk for coronary artery disease is almost four times that of someone under 30.
- b. his weight is not a probable factor.
- c. his salt intake should be evaluated.
- d. his blood pressure is showing a normal increase for his age.

- 1. a,c
- 2. b,d
- 3. a,b,c
- 4. d only

9. Which of the following are correct concerning lipid (fat) levels in the blood and coronary artery disease?

- a. of the five types of hyperlipidemia only two, elevated cholesterol and triglyceride levels are associated with coronary artery disease.
- b. most people are unaware of increased plasma lipids because they have not been tested for them.
- c. there is a significant relationship between saturated fats, cholesterol and coronary artery disease.
- d. cholesterol levels cannot be reduced by diet alone, as the liver will produce extra to maintain a constant level.

- 1. a,d
- 2. b,c,d
- 3. a,b,c
- 4. all of the above.

10. Which of the following are correct concerning coronary artery disease?

- a. the so-called Type A personality has a high risk of developing coronary artery disease.
- b. chronic stress raises certain hormone levels which result in a toxic effect on the heart.
- c. more than two ounces of alcohol a day may increase susceptibility to coronary artery disease.
- d. sudden physical or emotional stress are important factors in the development of coronary artery disease.

- 1. a,b,d.
- 2. a,c,d.
- 3. b,c,d.
- 4. a,b,c

First name and initial \_\_\_\_\_

I.D. Number \_\_\_\_\_

ANSWER SHEET

1. a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_  
d. \_\_\_\_\_
2. Circle the most correct answer.  
1. 2. 3. 4.
3. Circle the most correct answer.  
1. 2. 3. 4.
4. Circle the correct answer.  
a. T F  
b. T F  
c. T F  
d. T F  
e. T F  
f. T F  
g. T F  
h. T F
5. Write the correct number (s).  
\_\_\_\_\_
6. Circle the most correct answer.  
1. 2. 3. 4.
7. Circle the most correct answer.  
1. 2. 3. 4.

9. Circle the most correct answer.

1. 2. 3. 4.

10. Circle the most correct answer.

1. 2. 3. 4.



**Appendix C**  
**Autobiographical Questionnaire**

BACKGROUND QUESTIONNAIRE

First name and initial \_\_\_\_\_

I.D. number \_\_\_\_\_

Age \_\_\_\_\_

Sex \_\_\_\_\_

School \_\_\_\_\_

Circle your year in nursing: 1      2      3

Have you nursed someone with coronary artery disease?    yes    no

If yes, how many?

Have you read any material specifically related to coronary  
artery disease?    Yes                      no

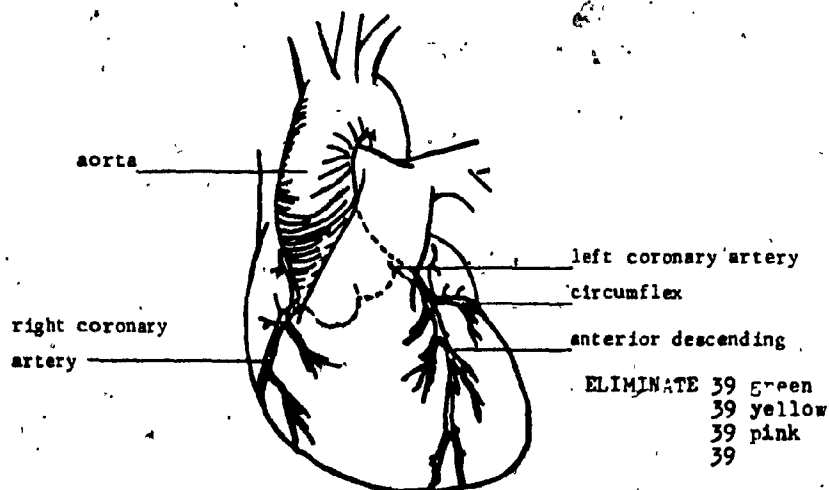
**Appendix D**

**Article Divided Into Subunits**

### CORONARY ARTERY DISEASE

The heart and blood vessels, because they are so interdependent, are referred to as the cardiovascular system. Disease of this system is the leading cause of death and disability in Canada. Some diseases primarily affect blood vessels, others only the heart itself. This article is about coronary artery disease, a disease of the blood vessels which supply oxygenated blood to the muscle or myocardium of the heart.

Although the heart is relatively small, 20 percent of the total blood flow is needed to provide nourishment for itself. As it pumps oxygenated blood to the entire body, it also pumps blood into its own muscle. Approximately 15 gallons of blood are pumped into the heart each hour. The heart supplies nourishment to itself by way of two vessels called the right and left coronary arteries. They originate from the ascending aorta shortly after it leaves the heart. They are called coronary arteries because they encircle the heart like a crown.



The Normal Coronary Arteries

About one inch from its origin, the left coronary artery splits into two vessels, one called the left anterior descending artery, and the other called the circumflex artery. The anterior descending artery runs along the groove on the front of the heart between the left and right ventricles. The circumflex follows a groove along the wall that separates the left atrium from the left ventricle. The right coronary artery curves to the right between the right atrium and right ventricle to reach the groove between the two ventricles on the back of the heart. A fine network of vessels arises from these arteries and serves as tributaries to ensure a supply of oxygenated blood to all the muscle of the heart. Without this supply of oxygen, the heart is unable to do its work, to pump adequate amounts of blood to the rest of the body. The individual experiencing lack of oxygen to the myocardium will have chest pain. Muscle without oxygen is painful. The area is infarcted, tissue has died, thus the term, myocardial infarction, death of a portion of the myocardium due to lack of oxygen. This is the same as the lay term "heart attack".

Of the major types of heart disease, heart attack is the single leading killer of Canadians. In the past 20 years research seems to have paid off in terms of the reduction of cardiovascular disease except for heart attacks which has shown only an 11 percent decrease as compared to strokes, down 42%, rheumatic heart disease, down 66% and high blood pressure down 87 percent. It seems important that nurses understand coronary artery disease as much of their work involves patient and public education.

The coronary arteries in adults are about four to five inches long. The

ELIMINATE 70 green  
70 yellow  
70 pink  
70

lumen is about one-eighth of an inch in diameter. An artery has three layers, the outer called the adventitia, the middle called the media, and the inner called the intima. The intima has a clean, smooth lining of endothelial cells to allow the blood to go through the artery without difficulty. It is in the intima that one sees the beginning of the process called atherosclerosis. This is the cause of coronary artery disease. It is thought that the process of atherosclerosis very likely starts early in life. Post-mortem studies done on young soldiers killed in the Korean war indicated that many of them had a significant degree of blockage of their coronary arteries due to atherosclerosis by the time they were in their mid twenties. The process begins with damage to the endothelial lining of the intima. Once this damage has occurred, cholesterol enters the intima from the blood stream and stimulates the growth and proliferation of smooth muscle cells. The site where this occurs is called a lesion. One sees a focal accumulation of lipids within the intima, both inside the proliferating smooth muscle cells and because of cell death or necrosis, outside of the smooth muscle cells. Gradually the substances around the cells of arteries loosen or swell and smooth muscle cells from the media of the artery enter the intima causing more thickening, leading to death and necrosis.

Atherosclerotic lesions are usually divided into three categories. The first is fatty streak, which is seen in animals and all human societies. Fatty streaks begin early in life and except in western societies do not progress to form more dangerous types of atheromatous lesions. In the fatty streak which tends to be a yellow flat lesion, much of the cholesterol is inside the cells.

ELIMINATE ?? green  
?? yellow  
?? pink

The second type of lesion is the fibrous plaque. Most of the fats in a fibrous plaque are outside of the cells and they, along with broken down cells, form a core. This core is covered by a cap of collagen tissue, elastic fibers and smooth muscle cells filled with fat. The cap extends or protrudes out into the lumen of the artery.

The third and most dangerous type of atherosclerotic lesion is called the complicated lesion or plaque. It contains a core of lipid material, mainly cholesterol and cholesterol esters, in a center of dead tissue. Hemorrhage, thrombosis, tissue destruction and calcification may convert a fibrous plaque into a complicated lesion.

There are a number of different patterns of atherosclerosis. The first relates to the progression of the disease. In some cases it is extremely rapid, leading to death within less than a year after initial onset of symptoms. This is sometimes called "galloping atherosclerosis". In other cases, people show evidence of atherosclerosis in one vascular bed and have no more progression for years.

The second pattern is distribution of lesions. In some individuals they may be confined to peripheral arteries, in others only the arteries supplying the central nervous system are involved. Some people have more than one area affected such as the central nervous system, the renal arteries and the coronary arteries. This article pertains to the coronary arteries and the effect of atherosclerosis on them. When atherosclerosis involves the coronary arteries, one is said to have coronary artery disease.

The major cause of coronary artery obstruction is atherosclerotic plaques. Obstruction of a coronary artery will result in death of the part of the

ELIMINATE 63 green  
63 yellow  
63 pink  
63

muscle which it supplies with oxygen. If it is a large area it can cause death of the individual.

Although the process is believed to begin early, clinical symptoms of the disease do not appear until there is a reduction in the lumen of the artery by at least 60 to 70 percent. Thus, when one has chest pain, the disease is greatly progressed.

In North America, the incidence of coronary artery disease has reached epidemic proportions. Various theories have been proposed, but to date no scientifically proven cause has been outlined. However, there are well recognized risk factors which make it more likely that an individual will have a heart attack at an early age. This points to the importance of prevention. In fact, the statement "prevention is better than cure" is a misleading one for coronary artery disease because there is no cure. Prevention is the only route. It is in this area where nurses may have their greatest impact.

There are three primary risk factors involved in coronary artery disease. These are: cigarette smoking, hypertension and hypercholesterolemia. Perhaps in as many as 75 percent of the people who die or are disabled from coronary artery disease and its complications, one or more of these primary risk factors are present.

The danger of smoking is now pointed out on all packages of cigarettes. The precise way in which smoking leads to coronary artery disease is not known, but the relationship of cigarette smoking to the risk of coronary artery disease has been clearly documented. People who smoke the most cigarettes have the most advanced coronary artery disease. There are three

ELIMINATE 73 in green  
73 in yellow  
73 in pink  
73



potentially harmful agents in cigarettes. These are nicotine, tar, and carbon monoxide. Tars are not carried in the blood so are unlikely to be involved in heart disease. For many years nicotine was blamed for heart disease. It is known that the first cigarette of the morning increases the heart rate and that nicotine is a stimulator of the sympathetic nervous system. It has been shown however, that nicotine in large concentrations decreases sympathetic stimulation. Thus excessive sympathetic stimulation and the resulting vasoconstriction is more likely to occur in the "infrequent smoker" than the heavy smoker. It is the heavy smoker, according to studies done that runs the greatest risk of coronary artery disease. Carbon monoxide is the most harmful agent in cigarettes as it decreases the oxygen carrying capacity of the blood. Even if the same amount of blood gets to the heart, it functions at a lower partial pressure of oxygen. Studies have shown that non smokers can have elevated carbon monoxide levels if they are in enclosed environments with cigarette smoke. The tobacco industry focuses its advertizing on low tar-low nicotine cigarettes and ignores the carbon monoxide factor.

Discussion of serum cholesterol as a risk factor in coronary artery disease provokes a great deal of controversy. Cholesterol and triglycerides are blood fats or lipids. When present in the blood in excessive amounts an individual is said to have hyperlipidemia. There are five types of hyperlipidemia, but only two, cholesterol and triglycerides are related to coronary artery disease. The evidence linking triglycerides to coronary artery disease is not as strong as that for cholesterol.

ELIMIN:TE 69 in green  
69 in yellow  
69 in pink  
69

Cholesterol and triglycerides in the blood stream are derived from diet and production by the body. Most evidence points to a direct relationship between dietary saturated fats and serum cholesterol, and between serum cholesterol and coronary artery disease. There was a marked decrease in coronary artery disease death rates in parts of Europe during periods of food shortages during the war. Shortages of meat and dairy products decreased the consumption of cholesterol and saturated fats. Saturated fats are animal fats; they tend to be solid at room temperature and include dairy products, most meats, in particular, organ meats. Fish, poultry and veal are not as rich in saturated fats as beef and pork, but certain fish such as shrimp and crayfish are excluded on a cholesterol restricted diet.

For many years it was thought that serum cholesterol could not be reduced by diet, as an inherent negative feedback system exists in the body to regulate cholesterol production by the liver. For example, the more cholesterol intake in the diet, the less produced by the liver, and a decrease in dietary cholesterol results in increased production by the liver. However, evidence shows that it is possible to lower serum cholesterol at least 10 to 15 percent by making relatively simple modifications in the diet.

An elevation of serum cholesterol over 260 milligrams percent increases the risk of developing coronary artery disease in five years by three and one half times or more as compared to the risk with a cholesterol level less than 200 milligrams percent. In countries where serum cholesterol is less than 150 milligrams percent, atherosclerosis is virtually non-existent.

Two of the main contributors to elevated serum triglycerides are obesity

ELIMINATE 70 in green  
70 in yellow  
70 in pink  
70

and excessive consumption of alcohol. Reduction in weight usually brings about a corresponding reduction in serum triglycerides. This is not the case with serum cholesterol. There does not seem to be a relationship with weight loss and decrease in cholesterol. Alcohol can indirectly dispose one to the risks of coronary artery disease. As a food, alcohol provides little nutritive value, just additional calories. An excessive consumption of alcohol, more than two ounces per day, may cause an elevation in blood triglycerides.

It has been found that some individuals have an inherited tendency to high levels of serum cholesterol, triglycerides or both. It is recommended that children of parents with high serum lipids be screened to determine whether or not they are affected. Most people do not know their serum lipid levels as they are not routinely tested for them.

The third of the primary risk factors is hypertension or high blood pressure. There is no question about the association of hypertension and coronary artery disease based on either diastolic or systolic pressure. As one goes up the scale of optional pressures to levels of 85 mm. Hg. diastolic or higher for persons aged 30 years or older, the risk of coronary artery disease increases. Hypertension is referred to as the "silent killer", as it often produces no noticeable symptoms before severe damage occurs in the heart and other areas. In 90 percent of cases the cause is unknown. Hypertension affects nearly 2,000,000 Canadians. Fifty percent of these are unaware of their condition, 25 percent are aware but are not receiving therapy, 12 and 1/2 percent are aware with adequate control, and 12 and 1/2 percent are aware but not

ELIMINATE 67 in green  
67 in yellow  
67 in pink  
67

adequately controlled. Hypertension as a risk factor is illustrated in the study done of the effect of diastolic blood pressure on the ten year mortality rate. When the diastolic blood pressure is 85 to 95mm.Hg., the mortality rate is 60 percent higher than that for subjects who have diastolic pressures of less than 85mm Hg. When the diastolic pressure ranges from 95 to 104mm Hg. the mortality rate is 60 percent higher than the rate for those people with diastolic pressures of 85mm.Hg. to 94mm Hg. The major impact occurs when the diastolic pressure is over 105mm Hg. at which level the mortality rate is three times the normal.

Occurrence of hypertension is twice as common in black people, and more importantly, when it is present in black persons, it is twice as severe. Hypertension is also related to age. In individuals from 10 to 20 years of age, the incidence is 1.25 percent; at 75 to 79 years of age, the incidence is 42.5 percent, demonstrating that it is a disease or abnormality that increases as age advances. It is more common in men than women.

Hypertension is a controllable risk factor. Its complications can be prevented. Salt intake and obesity are contributing factors to hypertension. Salt tends to increase plasma volume and thus pressure on the vessels.

Hypertension tends to run in families, and is associated with cigarette smoking.

The presence of the three main risk factors, smoking, hyperlipidemia, and hypertension in combination greatly increases the chances of developing coronary artery disease.

There are some risk factors for coronary artery disease over which we

ELIMINATE 69 in green  
69 in yellow  
69 in pink  
69

have no control. One of these is whether we are male or female. It is a well-established fact that women are protected against atherosclerosis prior to menopause and, statistically, the risk of coronary artery disease death is lower than for men. Between the ages of 40 and 49 the incidence of clinically significant coronary artery disease in men is about five times greater than in women. Above age fifty, the ratio begins to decrease. The reasons for protection against atherosclerosis in premenopausal women are not known. It is likely due to the production of the female hormone estrogen which declines after menopause.

Heredity plays a major part in determining an individual's susceptibility to coronary artery disease. Obviously, this is another risk factor over which the individual has no control. There are genetic susceptibilities to elevation of cholesterol and triglycerides, hypertension, obesity and perhaps even to coronary artery disease and atherosclerosis in ways that are not yet known.

It is thought that the sedentary living habits of our affluent North American society are related to coronary artery disease. There is no proof that exercise delays or prevents the onset of coronary artery disease, but it may be the single most important weapon a person has to fight it. It is believed that exercise enlarges the coronary arteries, allowing for adequate blood flow despite any pathological changes that might exist. Two studies done on the Masai tribe of East Africa demonstrate this fact. The Masai live almost exclusively on meat and fermented milk and consume about 300 Gm. of fat and 600 mg. of cholesterol daily. This intake of animal fat exceeds that of American men. At the same time, the Masai are exceptionally active and physically fit. 600 Masai were examined including 350 men over

ELIMINATE 84 in green  
84 in yellow  
84 in pink  
84

the age of 40. They found only one man with electrocardiographic evidence of myocardial infarction. High blood pressure was unusual. Serum cholesterol levels were low. Neither rose with age. The hearts and aortas of 50 Masai men were examined at autopsy. None had died from coronary artery disease. Their arteries showed distinct thickening from atherosclerosis equaling that of elderly men in America, but the vessels had enlarged with age enough to compensate for the degree of atherosclerosis present.

It has been found that serum cholesterol and triglycerides fall with exercise. They tend to rise again fairly quickly with cessation of exercise. This says something for exercise which is regular and not in spurts. Physical leisure time is related to coronary artery disease. People who are active during their leisure time, for example, those who participate in bowling, tennis, or sailing tend to have a lower incidence of coronary artery disease which is unrelated to job activity.

Diabetes mellitus is another risk factor for coronary artery disease. Diabetics suffer from atherosclerosis of large vessels, and also have trouble with circulation through smaller peripheral vessels. It is not known yet whether strict control of the blood sugar will prevent or retard development of vascular complications in these people. The decrease in risk of coronary artery disease for the premenopausal female is cancelled by the presence of diabetes.

Obesity may directly or indirectly affect a number of coronary artery risk factors. It tends to exacerbate hypertension, elevate serum triglyceride levels and worsen diabetes. The excess of fat imposes an additional burden on the heart by requiring more oxygen from the blood stream.

ELIMINATE 67 in green  
67 in yellow  
67 in pink  
67

Personality type has begun to receive attention as a possible risk factor. This attention has been brought about by the book "Type A Personality And Coronary Artery Disease" by Drs. Meyer Friedman and Ray Rosenman. They noticed that the upholstery on the chairs in their office was worn out at the front edges, indicating a certain type of person coming in with cardiac problems. They began to study the personalities of their patients and could classify them into types - A and B. Type A is the hard driving person who creates stressful circumstances even where they do not exist. He never relaxes or takes an afternoon off from work, he paces up and down at the airport waiting for a plane and is constantly conscious of time. He honks his horn when the person in the car ahead does not move fast enough at a green light. Type B personality is the opposite, takes life in stride and according to Friedman and Rosenman is less prone to heart attacks.

Stress is a potential risk factor. Sudden emotional or physical stress will elevate the blood pressure and cause the heart to pump against increased resistance. Usually the body makes an appropriate adjustment to stress, but it is conceivable that chronic stress could have an adverse effect on the cardiovascular system by indirectly affecting a number of the risk factors such as blood pressure and smoking.

Both stress and personality type are factors which can potentially increase hormones such as catecholamines, adrenalin and noradrenalin. These hormones can affect the sympathetic nervous system causing vasoconstriction and eventually hypertension.

In conclusion, prevention of coronary artery disease must begin with an aim toward reduction of known risk factors. Nurses can play a large role in this area because of the amount of contact they have with patients and the public.

ELIMINATE 74 in green  
74 in yellow  
74 in pink  
74

**Appendix E**

**Instructions For Determining The Importance  
Of Subunits**



## INSTRUCTIONS

This is a process of elimination to eventually determine which words in the article are essential to maintain the essence of the story. Some words can be taken out of reading material and the main ideas will still remain.

The article is divided into subunits by slash-marks, eg.. The train will be late tonight/but I don't care/ about anything./ You will be asked to eliminate subunits until only a certain number of words will remain on a page. The total number of words to be eliminated on each page will be marked at the bottom. And the color of pen to use will be marked also.

eg. Eliminate 40 words in green

40 words in yellow

40 words in pink

Remember this is not forty subunits, but enough subunits to make up 40 words. You will not be able to do it to the exact number but approximately.

PROCEDURE: Using the example at the side:

1. read the entire page. "It was a hot muggy/night,
2. Using the green pen, eliminate the revolutionaries,/who for the the subunits you consider most part/ were poor peasants,/ least important to the story, were ready to attack/. The but allow the essence to village,/snuggly hidden in the remain. The subunits eliminatedvalley,/was not ready./" should equal to 40 words.

3. Do the same with the yellow pen.

Eliminate the next least important subunits to equal 40 words.

4. Do the same with the pink pen. Eliminate the next least important subunits to equal to 40 words.

\* If you make an error, eg. you have crossed a subunit in green and decide it is more important and should be done in yellow, stroke it out in pen and underline in the colour you think it should be in.

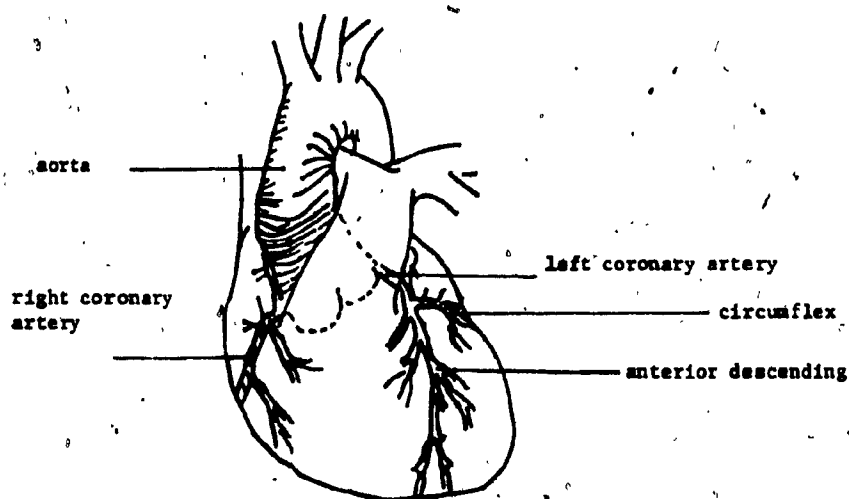
Appendix F

Article With Moderate Amounts of Italicizing

### CORONARY ARTERY DISEASE

The heart and blood vessels, because they are so interdependent, are referred to as the cardiovascular system. Disease of this system is the leading cause of death and disability in Canada. Some diseases primarily affect blood vessels, others only the heart itself. This article is about coronary artery disease, a disease of the blood vessels which supply oxygenated blood to the muscle or myocardium of the heart.

Although the heart is relatively small, 20 percent of the total blood flow is needed to provide nourishment for itself. As it pumps oxygenated blood to the entire body, it also pumps blood into its own muscle. Approximately 15 gallons of blood are pumped into the heart each hour. The heart supplies nourishment to itself by way of two vessels called the right and left coronary arteries. They originate from the ascending aorta shortly after it leaves the heart. They are called coronary arteries because they encircle the heart like a crown.



THE NORMAL CORONARY ARTERIES.

About one inch from its origin, the left coronary artery splits into two vessels, one called the left anterior descending artery, and the other called the circumflex artery. The anterior descending artery runs along the groove on the front of the heart between the left and right ventricles. The circumflex follows a groove along the wall that separates the left atrium from the left ventricle. The right coronary artery curves to the right between the right atrium and right ventricle to reach the groove between the two ventricles on the back of the heart. A fine network of vessels arises from these arteries and serves as tributaries to ensure a supply of oxygenated blood to all the muscle of the heart. Without this supply of oxygen, the heart is unable to do its work, to pump adequate amounts of blood to the rest of the body. The individual experiencing lack of oxygen to the myocardium will have chest pain. Muscle without oxygen is painful. The area is infarcted, tissue has died, thus the term, myocardial infarction, death of a portion of the myocardium due to the lack of oxygen. This is the same as the lay term "heart attack".

Of the major types of heart disease, heart attack is the single leading killer of Canadians. In the past 20 years research seems to have paid off in terms of the reduction of cardiovascular disease except for heart attacks which has shown only an 11 percent decrease as compared to strokes, down 42%, rheumatic heart disease, down 66% and high blood pressure down 87 percent. It seems important that nurses understand coronary artery disease as much of their work involves patient and public education.

The coronary arteries in adults are about four to five inches long. The

lumen is about one-eighth of an inch in diameter. An artery has three layers, the outer called the adventitia, the middle called the media, and the inner called the intima. The intima has a clean, smooth lining of endothelial cells to allow the blood to go through the artery without difficulty. It is in the intima that one sees the beginning of the process called atherosclerosis. This is the cause of coronary artery disease. It is thought that the process of atherosclerosis very likely starts early in life. Post-mortem studies done on young soldiers killed in the Korean War indicated that many of them had a significant degree of blockage of their coronary arteries due to atherosclerosis by the time they were in their mid twenties.

*The process begins with damage to the endothelial lining of the intima.*

Once this damage has occurred, cholesterol enters the intima from the blood stream and stimulates the growth and proliferation of smooth muscle cells. The site where this occurs is called a lesion. One sees a focal accumulation of lipids within the intima, both inside the proliferating smooth muscle cells and because of cell death or necrosis, outside of the smooth muscle cells. Gradually the substances around the cells of arteries loosen or swell and smooth muscle cells from the media of the artery enter the intima causing more thickening, leading to death and necrosis.

*Atherosclerotic lesions are usually divided into three categories. The first is fatty streak, which is seen in animals and all human societies. Fatty streaks begin early in life and except in western societies do not progress to form more dangerous types of atheromatous lesions. In the fatty streak which tends to be a yellow flat lesion, much of the cholesterol is inside the cells.*

*The second type of lesion is the fibrous plaque.* Most of the fats in a fibrous plaque are outside of the cells and they, along with broken down cells, form a core. This core is covered by a cap of collagen tissue, elastic fibers and smooth muscle cells filled with fat. The cap extends or protrudes out into the lumen of the artery.

*The third and most dangerous type of atherosclerotic lesion is called the complicated lesion or plaque.* It contains a core of lipid material, mainly cholesterol and cholesterol esters, in a center of dead tissue. Hemorrhage, thrombosis, tissue destruction and calcification may convert a fibrous plaque into a complicated lesion.

There are a number of different patterns of atherosclerosis. The first relates to the progression of the disease. In some cases it is extremely rapid, leading to death within less than a year after initial onset of symptoms. This is sometimes called "galloping atherosclerosis". In other cases, people show evidence of atherosclerosis in one vascular bed and have no more progression for years.

The second pattern is distribution of lesions. In some individuals they may be confined to peripheral arteries, in others only the arteries supplying the central nervous system are involved. Some people have more than one area affected such as the central nervous system, the renal arteries and the coronary arteries. This article pertains to the coronary arteries and the effect of atherosclerosis on them. When atherosclerosis involves the coronary arteries, one is said to have coronary artery disease.

*The major cause of coronary artery obstruction is atherosclerotic plaques.* Obstruction of a coronary artery will result in death of the part of the

*muscle which it supplies with oxygen. If it is a large area it can cause death of the individual.*

Although the process is believed to begin early, clinical symptoms of the disease do not appear until there is a reduction in the lumen of the artery by at least 60 to 70 percent. Thus, when one has chest pain, the disease is greatly progressed.

In North America, the incidence of coronary artery disease has reached epidemic proportions. Various theories have been proposed, but to date no scientifically proven cause has been outlined. However, *there are well recognized risk factors* which make it more likely that an individual will have a heart attack at an early age. This points to the importance of prevention. In fact, the statement "prevention is better than cure" is a misleading one for coronary artery disease because there is no cure. Prevention is the only route. It is in this area where nurses may have their greatest impact.

*There are three primary risk factors involved in coronary artery disease. These are: cigarette smoking, hypertension and hyperlipidemia. Perhaps in as many as 75 percent of the people who die or are disabled from coronary artery disease and its complications, one or more of these primary risk factors are present.*

The danger of smoking is now pointed out on all packages of cigarettes. The precise way in which smoking leads to coronary artery disease is not known, but the relationship of cigarette smoking to the risk of coronary artery disease has been clearly documented. *People who smoke the most cigarettes have the most advanced coronary artery disease. There are three*



potentially harmful agents in cigarettes. These are nicotine, tar, and carbon monoxide. Tars are not carried in the blood so are unlikely to be involved in heart disease. For many years nicotine was blamed for heart disease. It is known that the first cigarette of the morning increases the heart rate, and that nicotine is a stimulator of the sympathetic nervous system. It has been shown however, that nicotine in large concentrations decreases sympathetic stimulation. Thus excessive sympathetic stimulation and the resulting vasoconstriction is more likely to occur in the "infrequent smoker" than the heavy smoker. It is the heavy smoker, according to studies done that runs the greatest risk of coronary artery disease. Carbon monoxide is the most harmful agent in cigarettes as it decreases the oxygen carrying capacity of the blood. Even if the same amount of blood gets to the heart, it functions at a lower partial pressure of oxygen. Studies have shown that non smokers can have elevated carbon monoxide levels if they are in enclosed environments with cigarette smoke. The tobacco industry focuses its advertizing on low tar-low nicotine cigarettes and ignores the carbon monoxide factor.

Discussion of serum cholesterol as a risk factor in coronary artery disease provokes a great deal of controversy. Cholesterol and triglycerides are blood fats or lipids. When present in the blood in excessive amounts an individual is said to have hyperlipidemia. There are five types of hyperlipidemia, but only two, cholesterol and triglycerides are related to coronary artery disease. The evidence linking triglycerides to coronary artery disease is not as strong as that for cholesterol.

7

*Cholesterol and triglycerides in the blood stream are derived from diet and production by the body.* Most evidence points to a direct relationship between dietary saturated fats and serum cholesterol, and between serum cholesterol and coronary artery disease. There was a marked decrease in coronary artery disease death rates in parts of Europe during periods of food shortages during the war. Shortages of meat and dairy products decreased the consumption of cholesterol and saturated fats. Saturated fats are animal fats; they tend to be solid at room temperature and include dairy products, most meats, in particular, organ meats. Fish, poultry and veal are not as rich in saturated fats as beef and pork, but certain fish such as shrimp and crayfish are excluded on a cholesterol restricted diet.

For many years it was thought that serum cholesterol could not be reduced by diet, as an inherent negative feedback system exists in the body to regulate cholesterol production by the liver. For example, the more cholesterol intake in the diet, the less produced by the liver, and a decrease in dietary cholesterol results in increased production by the liver. However, evidence shows that it is possible to lower serum cholesterol at least 10 to 15 percent by making relatively simple modifications in the diet.

*An elevation of serum cholesterol over 260 milligrams percent increases the risk of developing coronary artery disease in five years by three and one half times or more as compared to the risk with a cholesterol level less than 200 milligrams percent.* In countries where serum cholesterol is less than 150 milligrams percent, atherosclerosis is virtually non-existent.

*Two of the main contributors to elevated serum triglycerides are obesity*

and excessive consumption of alcohol. Reduction in weight usually brings about a corresponding reduction in serum triglycerides. This is not the case with serum cholesterol. There does not seem to be a relationship with weight loss and decrease in cholesterol. Alcohol can indirectly dispose one to the risks of coronary artery disease. As a food, alcohol provides little nutritive value, just additional calories. An excessive consumption of alcohol, more than two ounces per day, may cause an elevation in blood triglycerides.

It has been found that some individuals have an inherited tendency to high levels of serum cholesterol, triglycerides or both. It is recommended that children of parents with high serum lipids be screened to determine whether or not they are affected. Most people do not know their serum lipid levels as they are not routinely tested for them.

The third of the primary risk factors is hypertension or high blood pressure. There is no question about the association of hypertension and coronary artery disease based on either diastolic or systolic pressure. As one goes up the scale of optional pressures to levels of 85 mm. Hg. diastolic or higher for persons aged 30 years or older, the risk of coronary artery disease increases. Hypertension is referred to as the "silent killer", as it often produces no noticeable symptoms before severe damage occurs in the heart and other areas. In 90 percent of cases the cause is unknown. Hypertension affects nearly 2,000,000 Canadians. Fifty percent of these are unaware of their condition, 25 percent are aware but are not receiving therapy, 12½ percent are aware with adequate control, and 12½ percent are aware

but not adequately controlled. Hypertension as a risk factor is illustrated in the study done of the effect of diastolic blood pressure on the ten year mortality rate. When the diastolic blood pressure is 85 to 95mm Hg., the mortality rate is 60 percent higher than that for subjects who have diastolic pressures of less than 85mm Hg. When the diastolic pressure ranges from 95 to 104mm Hg. the mortality rate is 60 percent higher than the rate for those people with diastolic pressures of 85mm Hg. to 94mm Hg. The major impact occurs when the diastolic pressure is over 106mm Hg. at which level the mortality rate is three times the normal.

Occurrence of hypertension is twice as common in black people, and more importantly, when it is present in black persons, it is twice as severe. Hypertension is also related to age. In individuals from 10 to 20 years of age, the incidence is 1.25 percent; at 75 to 79 years of age, the incidence is 42.5 percent, demonstrating that it is a disease or abnormality that increases as age advances. It is more common in men than women.

Hypertension is a controllable risk factor. Its complications can be prevented. Salt intake and obesity are contributing factors to hypertension. Salt tends to increase plasma volume and thus pressure on the vessels.

Hypertension tends to run in families, and is associated with cigarette smoking.

The presence of the three main risk factors, smoking, hyperlipidemia, and hypertension in combination greatly increases the chances of developing coronary artery disease.

There are some risk factors for coronary artery disease over which we

have no control. One of these is whether we are male or female. It is a well-established fact that women are protected against atherosclerosis prior to menopause and, statistically, the risk of coronary artery disease death is lower than for men. Between the ages of 40 and 49 the incidence of clinically significant coronary artery disease in men is about five times greater than in women. Above age fifty, the ratio begins to decrease. The reasons for protection against atherosclerosis in premenopausal women are not known. It is likely due to the production of the female hormone estrogen which declines after menopause.

*Heredity plays a major part in determining an individual's susceptibility to coronary artery disease.* Obviously, this is another risk factor over which the individual has no control. There are genetic susceptibilities to elevation of cholesterol and triglycerides, hypertension, obesity and perhaps even to coronary artery disease and atherosclerosis in ways that are not yet known.

It is thought that the sedentary living habits of our affluent North American society are related to coronary artery disease. There is no proof that exercise delays or prevents the onset of coronary artery disease, but it may be the single most important weapon a person has to fight it. It is believed that exercise enlarges the coronary arteries, allowing for adequate blood flow despite any pathological changes that might exist. Two studies done on the Masai tribe of East Africa demonstrate this fact. The Masai live almost exclusively on meat and fermented milk and consume about 300 Gm. of fat and 600 mg. of cholesterol daily. This intake of animal fat exceeds that of American men. At the same time, the Masai are exceptionally active and physically fit. 600 Masai were examined including 350 men over

the age of 40. They found only one man with electrocardiographic evidence of myocardial infarction. High blood pressure was unusual. Serum cholesterol levels were low. Neither rose with age. The hearts and aortas of 50 Masai men were examined at autopsy. None had died from coronary artery disease. Their arteries showed distinct thickening from atherosclerosis equaling that of elderly men in America, but the vessels had enlarged with age enough to compensate for the degree of atherosclerosis present.

It has been found that serum cholesterol and triglycerides fall with exercise. They tend to rise again fairly quickly with cessation of exercise. This says something for exercise which is regular and not in spurts. Physical leisure time is related to coronary artery disease. People who are active during their leisure time, for example, those who participate in bowling, tennis, or sailing tend to have a lower incidence of coronary artery disease which is unrelated to job activity.

*Diabetes mellitus is another risk factor for coronary artery disease.* Diabetics suffer from atherosclerosis of large vessels, and also have trouble with circulation through smaller peripheral vessels. It is not known yet whether strict control of the blood sugar will prevent or retard development of vascular complications in these people. The decrease in risk of coronary artery disease for the premenopausal female is cancelled by the presence of diabetes.

*Obesity may directly or indirectly affect a number of coronary artery risk factors.* It tends to exacerbate hypertension, elevate serum triglyceride levels and worsen diabetes. The excess of fat imposes an additional burden on the heart by requiring more oxygen from the blood stream.

*Personality type has begun to receive attention as a possible risk factor.* This attention has been brought about by the book "Type A Personality And Coronary Artery Disease" by Drs. Meyer Friedman and Ray Roseman. They noticed that the upholstery on the chairs in their office was worn out at the front edges, indicating a certain type of person coming in with cardiac problems. They began to study the personalities of their patients and could classify them into types - A and B. Type A is the hard driving person who creates stressful circumstances even where they do not exist. He never relaxes or takes an afternoon off from work, he paces up and down at the airport waiting for a plane and is constantly conscious of time. He honks his horn when the person in the car ahead does not move fast enough at a green light. Type B personality is the opposite, takes life in stride and according to Friedman and Roseman is less prone to heart attacks.

*Stress is a potential risk factor.* Sudden emotional or physical stress will elevate the blood pressure and cause the heart to pump against increased resistance. Usually the body makes an appropriate adjustment to stress, but it is conceivable that chronic stress could have an adverse effect on the cardiovascular system by indirectly affecting a number of the risk factors such as blood pressure and smoking.

Both stress and personality type are factors which can potentially increase hormones such as catecholamines, adrenalin and noradrenalin. These hormones can affect the sympathetic nervous system causing vasoconstriction and eventually hypertension.

In conclusion, *prevention of coronary artery disease must begin with an aim toward reduction of known risk factors.* Nurses can play a large role in this area because of the amount of contact they have with patients and the public.

TIME: \_\_\_\_\_

Appendix G

Article With High Amount of Italicizing

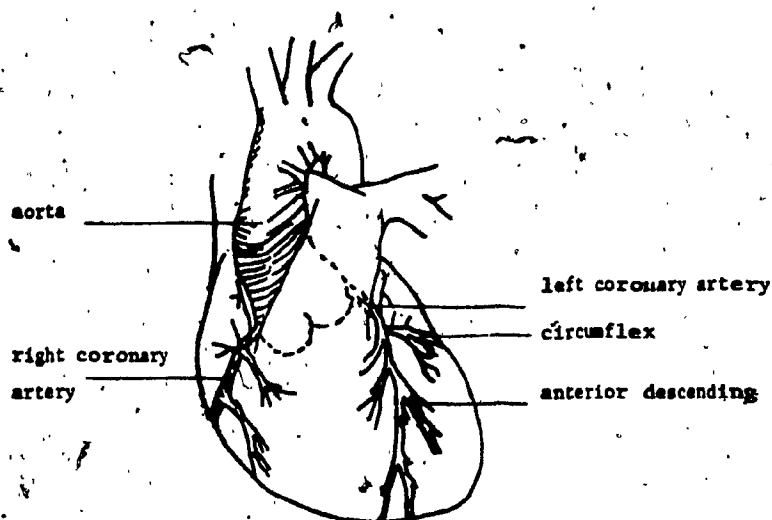


### CORONARY ARTERY DISEASE

The heart and blood vessels, because they are so interdependent, are referred to as the cardiovascular system. Disease of this system is the leading cause of death and disability in Canada. Some diseases primarily affect blood vessels, others only the heart itself. This article is about coronary artery disease, a disease of the blood vessels which supply oxygenated blood to the muscle or myocardium of the heart.

Although the heart is relatively small, 20 percent of the total blood flow is needed to provide nourishment for itself. As it pumps oxygenated blood to the entire body, it also pumps blood into its own muscle.

Approximately 15 gallons of blood are pumped into the heart each hour. The heart supplies nourishment to itself by way of two vessels called the right and left coronary arteries. They originate from the ascending aorta shortly after it leaves the heart. They are called coronary arteries because they encircle the heart like a crown.



THE NORMAL CORONARY ARTERIES

About one inch from its origin, the left coronary artery splits into two vessels, one called the left anterior descending artery, and the other called the circumflex artery. The anterior descending artery runs along the groove on the front of the heart between the left and right ventricles. The circumflex follows a groove along the wall that separates the left atrium from the left ventricle. The right coronary artery curves to the right between the right atrium and right ventricle to reach the groove between the two ventricles on the back of the heart. A fine network of vessels arises from these arteries and serves as tributaries to ensure a supply of oxygenated blood to all the muscles of the heart. Without this supply of oxygen, the heart is unable to do its work, to pump adequate amounts of blood to the rest of the body. The individual experiencing lack of oxygen to the myocardium will have chest pain. Muscle without oxygen is painful. The area is infarcted, tissue has died, thus the term, myocardial infarction; death of a portion of the myocardium due to lack of oxygen. This is the same as the lay term "heart attack".

Of the major types of heart disease, heart attack is the single leading killer of Canadians. In the past 20 years research seems to have paid off in terms of the reduction of cardiovascular disease except for heart attacks which has shown only an 11 percent decrease as compared to strokes, down 42%, rheumatic heart disease, down 66% and high blood pressure down 87 percent. It seems important that nurses understand coronary artery disease as much of their work involves patient and public education.

The coronary arteries in adults are about four to five inches long. The

3.

lumen is about one-eighth of an inch in diameter. An artery has three layers, the outer called the adventitia, the middle called the media, and the inner called the intima. *The intima has a clean, smooth lining of endothelial cells to allow the blood to go through the artery without difficulty. It is in the intima that one sees the beginning of the process called atherosclerosis. This is the cause of coronary artery disease. It is thought that the process of atherosclerosis very likely starts early in life. Post-mortem studies done on young soldiers killed in the Korean war indicated that many of them had a significant degree of blockage of their coronary arteries due to atherosclerosis by the time they were in their mid twenties. The process begins with damage to the endothelial lining of the intima. Once this damage has occurred, cholesterol enters the intima from the blood stream and stimulates the growth and proliferation of smooth muscle cells. The site where this occurs is called a lesion. One sees a focal accumulation of lipids within the intima, both inside the proliferating smooth muscle cells and because of cell death or necrosis, outside of the smooth muscle cells. Gradually the substances around the cells of arteries loosen or swell and smooth muscle cells from the media of the artery enter the intima causing more thickening, leading to death and necrosis.*

*Atherosclerotic lesions are usually divided into three categories. The first is fatty streak, which is seen in animals and all human societies. Fatty streaks begin early in life and except in western societies do not progress to form more dangerous types of atheromatous lesions. In the fatty streak which tends to be a yellow flat lesion, much of the cholesterol is inside the cells.*

*The second type of lesion is the fibrous plaque. Most of the fats in a fibrous plaque are outside of the cells and they, along with broken down cells, form a core. This core is covered by a cap of collagen tissue, elastic fibers and smooth muscle cells filled with fat. The cap extends or protrudes out into the lumen of the artery.*

*The third and most dangerous type of atherosclerotic lesion is called the complicated lesion or plaque. It contains a core of lipid material, mainly cholesterol and cholesterol esters, in a center of dead tissue. Hemorrhage, thrombosis, tissue destruction and calcification may convert a fibrous plaque into a complicated lesion.*

*There are a number of different patterns of atherosclerosis. The first relates to the progression of the disease. In some cases it is extremely rapid, leading to death within less than a year after initial onset of symptoms. This is sometimes called "galloping atherosclerosis". In other cases, people show evidence of atherosclerosis in one vascular bed and have no more progression for years.*

*The second pattern is distribution of lesions. In some individuals they may be confined to peripheral arteries, in others only the arteries supplying the central nervous system are involved. Some people have more than one area affected such as the central nervous system, the renal arteries and the coronary arteries. This article pertains to the coronary arteries and the effect of atherosclerosis on them. When atherosclerosis involves the coronary arteries, one is said to have coronary artery disease.*

*The major cause of coronary artery obstruction is atherosclerotic plaques. Obstruction of a coronary artery will result in death of the part of the*

muscle which it supplies with oxygen. If it is a large area it can cause death of the individual.

Although the process is believed to begin early, clinical symptoms of the disease do not appear until there is a reduction in the lumen of the artery by at least 60 to 70 percent. Thus, when one has chest pain, the disease is greatly progressed.

In North America, the incidence of coronary artery disease has reached epidemic proportions. Various theories have been proposed, but to date no scientifically proven cause has been outlined. However, there are well recognized risk factors which make it more likely that an individual will have a heart attack at an early age. This points to the importance of prevention. In fact, the statement "prevention is better than cure" is a misleading one for coronary artery disease because there is no cure. Prevention is the only route. It is in this area where nurses may have their greatest impact.

There are three primary risk factors involved in coronary artery disease. These are: cigarette smoking, hypertension and hyperlipidemia. Perhaps in as many as 75 percent of the people who die or are disabled from coronary artery disease and its complications, one or more of these primary risk factors are present.

The danger of smoking is now pointed out on all packages of cigarettes. The precise way in which smoking leads to coronary artery disease is not known, but the relationship of cigarette smoking to the risk of coronary artery disease has been clearly documented. People who smoke the most cigarettes have the most advanced coronary artery disease. There are three

potentially harmful agents in cigarettes. These are nicotine, tar, and carbon monoxide. Tar is not carried in the blood so is unlikely to be involved in heart disease. For many years nicotine was blamed for heart disease. It is known that the first cigarette of the morning increases the heart rate and that nicotine is a stimulator of the sympathetic nervous system. It has been shown however, that nicotine in large concentrations decreases sympathetic stimulation. Thus excessive sympathetic stimulation and the resulting vasoconstriction is more likely to occur in the "infrequent smoker" than the heavy smoker. It is the heavy smoker, according to studies done that runs the greatest risk of coronary artery disease. Carbon monoxide is the most harmful agent in cigarettes as it decreases the oxygen carrying capacity of the blood. Even if the same amount of blood gets to the heart, it functions at a lower partial pressure of oxygen. Studies have shown that non smokers can have elevated carbon monoxide levels if they are in enclosed environments with cigarette smoke. The tobacco industry focuses its advertising on low tar- low nicotine cigarettes and ignores the carbon monoxide factor.

Discussion of serum cholesterol as a risk factor in coronary artery disease provokes a great deal of controversy. Cholesterol and triglycerides are blood fats or lipids. When present in the blood in excessive amounts an individual is said to have hyperlipidemia. There are five types of hyperlipidemia, but only two, cholesterol and triglycerides are related to coronary artery disease. The evidence linking triglycerides to coronary artery disease is not as strong as that for cholesterol.

7.

*Cholesterol and triglycerides in the blood stream are derived from diet and production by the body. Most evidence points to a direct relationship between dietary saturated fats and serum cholesterol, and between serum cholesterol and coronary artery disease. There was a marked decrease in coronary artery disease death rates in parts of Europe during periods of food shortages during the war. Shortages of meat and dairy products decreased the consumption of cholesterol and saturated fats. Saturated fats are animal fats; they tend to be solid at room temperature and include dairy products, most meats, in particular, organ meats. Fish, poultry and veal are not as rich in saturated fats as beef and pork, but certain fish such as shrimp and crayfish are excluded on a cholesterol restricted diet.*

*For many years it was thought that serum cholesterol could not be reduced by diet, as an inherent negative feedback system exists in the body to regulate cholesterol production by the liver. For example, the more cholesterol intake in the diet, the less produced by the liver, and a decrease in dietary cholesterol results in increased production by the liver. However, evidence shows that it is possible to lower serum cholesterol at least 10 to 15 percent by making relatively simple modifications in the diet.*

*An elevation of serum cholesterol over 260 milligrams percent increases the risk of developing coronary artery disease in five years by three and one half times or more as compared to the risk with a cholesterol level less than 200 milligrams percent. In countries where serum cholesterol is less than 150 milligrams percent, atherosclerosis is virtually non-existent.*

*Two of the main contributors to elevated serum triglycerides are obesity.*

and excessive consumption of alcohol. Reduction in weight usually brings about a corresponding reduction in serum triglycerides. This is not the case with serum cholesterol. There does not seem to be a relationship with weight loss and decrease in cholesterol. Alcohol can indirectly dispose one to the risks of coronary artery disease. As a food, alcohol provides little nutritive value, just additional calories. An excessive consumption of alcohol, more than two ounces per day, may cause an elevation in blood triglycerides.

It has been found that some individuals have an inherited tendency to high levels of serum cholesterol, triglycerides or both. It is recommended that children of parents with high serum lipids be screened to determine whether or not they are affected. Most people do not know their serum lipid levels as they are not routinely tested for them.

The third of the primary risk factors is hypertension or high blood pressure. There is no question about the association of hypertension and coronary artery disease based on either diastolic or systolic pressure. As one goes up the scale of optimal pressures to levels of 85mm Hg. diastolic or higher for persons aged 30 years or older, the risk of coronary artery disease increases. Hypertension is referred to as the "silent killer", as it often produces no noticeable symptoms before severe damage occurs in the heart and other areas. In 90 percent of cases the cause is unknown. Hypertension affects nearly 2,000,000 Canadians. Fifty percent of these are unaware of their condition, 25 percent are aware but are not receiving therapy, 12½ percent are aware with adequate control, and 12½ percent are aware but not adequately controlled. Hypertension as a risk factor is



illustrated in the study done of the effect of diastolic blood pressure on the ten year mortality rate. When the diastolic blood pressure is 85 to 95 mm Hg. the mortality rate is 60 percent higher than that for subjects who have diastolic pressures of less than 85mm Hg. When the diastolic pressure ranges from 95 to 104mm Hg. the mortality rate is 60 percent higher than the rate for those people with diastolic pressures of 85 to 94mm Hg. The major impact occurs when the diastolic pressure is over 105mm Hg. at which level the mortality rate is three times the normal.

Occurrence of hypertension is twice as common in black people, and more importantly, when it is present in black persons, it is twice as severe. Hypertension is also related to age. In individuals from 10 to 20 years of age, the incidence is 1.25 percent; at 75 to 79 years of age, the incidence is 42.5 percent, demonstrating that it is a disease or abnormality that increases as age advances. It is more common in men than women.

Hypertension is a controllable risk factor. Its complications can be prevented. Salt intake and obesity are contributing factors to hypertension. Salt tends to increase plasma volume and thus pressure on the vessels.

Hypertension tends to run in families, and is associated with cigarette smoking.


The presence of the three main risk factors, smoking, hyperlipidemia, and hypertension in combination greatly increases the chances of developing coronary artery disease.

There are some risk factors for coronary artery disease over which we

*have no control.* One of these is whether we are male or female. It is a well-established fact that women are protected against atherosclerosis prior to menopause and, statistically, the risk of coronary artery disease death is lower than for men. Between the ages of 40 and 49 the incidence of clinically significant coronary artery disease in men is about five times greater than in women. Above age fifty, the ratio begins to decrease. The reasons for protection against atherosclerosis in premenopausal women are not known. It is likely due to the production of the female hormone estrogen which declines after menopause.

*Heredity plays a major part in determining an individual's susceptibility to coronary artery disease.* Obviously, this is another risk factor over which the individual has no control. There are genetic susceptibilities to elevation of cholesterol and triglycerides, hypertension, obesity and perhaps even to coronary artery disease and atherosclerosis in ways that are not yet known.

*It is thought that the sedentary living habits of our affluent North American society are related to coronary artery disease.* There is no proof that exercise delays or prevents the onset of coronary artery disease, but it may be the single most important weapon a person has to fight it. *It is believed that exercise enlarges the coronary arteries,* allowing for adequate blood flow despite any pathological changes that might exist. *Two studies done on the Masai tribe of East Africa demonstrate this fact. The Masai live almost exclusively on meat and fermented milk and consume about 300 Gm. of fat and 600 mg. of cholesterol daily. This intake of animal fat exceeds that of American men. At the same time, the Masai are exceptionally active and physically fit. 600 Masai were examined including 350 men over the age of 40.*



They found only one man with electrocardiographic evidence of myocardial infarction. High blood pressure was unusual. Serum cholesterol levels were low. Neither rose with age. *The hearts and aortas of 50 Masaj men were examined at autopsy. None had died from coronary artery disease. Their arteries showed distinct thickening from atherosclerosis equaling that of elderly men in America, but the vessels had enlarged with age enough to compensate for the degree of atherosclerosis present.*

*It has been found that serum cholesterol and triglycerides fall with exercise. They tend to rise again fairly quickly with cessation of exercise. This says something for exercise which is regular and not in spurts. Physical leisure time is related to coronary artery disease. People who are active during their leisure time, for example, those who participate in bowling, tennis, or sailing tend to have a lower incidence of coronary artery disease which is unrelated to job activity.*

*Diabetes mellitus is another risk factor for coronary artery disease. Diabetics suffer from atherosclerosis of large vessels, and also have trouble with circulation through smaller peripheral vessels. It is not known yet whether strict control of the blood sugar will prevent or retard development of vascular complications in these people. The decrease in risk of coronary artery disease for the premenopausal female is cancelled by the presence of diabetes.*

*Obesity may directly or indirectly affect a number of coronary artery risk factors. It tends to exacerbate hypertension, elevate serum triglyceride levels and worsen diabetes. The excess of fat imposes an additional burden on the heart by requiring more oxygen from the blood stream.*

*Personality type has begun to receive attention as a possible risk factor. This attention has been brought about by the book "Type A Personality And Coronary Artery Disease" by Drs. Meyer Friedman and Ray Roseman. They noticed that the upholstery on the chairs in their office was worn out at the front edges, indicating a certain type of person coming in with cardiac problems. They began to study the personalities of their patients and could classify them into types - A and B. Type A is the hard driving person who creates stressful circumstances even where they do not exist. He never relaxes or takes an afternoon off from work, he paces up and down at the airport waiting for a plane and is constantly conscious of time. He honks his horn when the person in the car ahead does not move fast enough at a green light. Type B personality is the opposite, takes life in stride and according to Friedman and Roseman is less prone to heart attacks.*

*Stress is a potential risk factor. Sudden emotional or physical stress will elevate the blood pressure and cause the heart to pump against increased resistance. Usually the body makes an appropriate adjustment to stress, but it is conceivable that chronic stress could have an adverse effect on the cardiovascular system by indirectly affecting a number of risk factors such as blood pressure and smoking.*

*Both stress and personality type are factors which can potentially increase hormones such as catecholamines, adrenalin and noradrenalin. These hormones can affect the sympathetic nervous system causing vasoconstriction and eventually hypertension.*

*In conclusion, prevention of coronary artery disease must begin with an aim toward reduction of known risk factors. Nurses can play a large role in this area because of the amount of contact they have with patients and the public.*

TIME: \_\_\_\_\_

**Appendix H**

**Instructions on Front Page of Article**

The following article is about coronary artery disease. Please read it carefully. You will have 20 minutes to complete it. If you have completed it before 20 minutes, please mark in the space provided at the end of the article, the time at which you completed the reading. Then begin to read it again - until told to stop.

PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO

Appendix I

Instructions For Subjects Who Received An  
Italicized Version Of The Article

## INSTRUCTIONS

The following article is about coronary artery disease.

Please read it carefully. You will have 20 minutes to complete it.

If you have completed it before 20 minutes, please mark in the space provided at the end of the articles, the time at which you completed the reading. Then begin to read it again--until told to stop.

NOTE: To help you understand the article, the important points have been italicized.

For example, "There are many types of fractures, but *a compound fracture is said to occur when the bone protrudes out of the skin.*"

In the above sentence, the main idea is in italics, that is, "*compound fracture is said to occur when the bone protrudes out of the skin.*"

PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.



**Appendix J**  
**Evaluation Form**

EVALUATION FORM

1. "I found the use of italics in this article made it:"

Circle one of the numbers

- a. clear ..... 1 2 3 4 5 6 7 .....confusing
- b. difficult to read..... 1 2 3 4 5 6 7 .....easy to read
- c. slow to read.. 1 2 3 4 5 6 7 .....fast to read.
- d. pleasant..... 1 2 3 4 5 6 7 .....objectionable
- e. easy to identify main concepts..1 2 3 4 5 6 7 .....difficult to identify main concepts
- f. easy to remember main concepts..1 2 3 4 5 6 7 .....difficult to remember main concepts

2. Do you feel that the italics helped you to respond to the test items better?

please explain:

3. Do you prefer reading material which supplies emphasis (like italics) on the main ideas, or do you prefer to underline etc. yourself?

please explain:

4. How do you feel the use of italics influences what you learn from reading material?

5. Do you feel that you pay less attention to the material that is not emphasized (italicized)?

6. How do you feel about emphasis being placed on certain ideas in reading material? Circle one of the numbers.

very necessary.....1 2 3 4 5 6 7.....unnecessary

7. Additional comments:

PLEASE PLACE ALL MATERIALS BACK IN THE ENVELOPE AND WAIT QUIETLY. THANK YOU.

**Appendix K**

**Posttest**

The following is a test based on the article you have just read.

You will be given 25 minutes to finish. Please consider each alternative carefully and place your answer on the answer sheet provided.

Good Luck.

DO NOT START THE QUESTIONS UNTIL TOLD TO DO SO.

1.

1. Which of the following is(are) correct concerning the coronary arteries?

- a. they supply oxygen to the myocardium.
- b. they encircle the heart like a crown.
- c. they originate from the ascending aorta.
- d. they pump blood from the left ventricle to the aorta.

- 1. a only.
- 2. a,b,c.
- 3. b,c,d.
- 4. a,b,c,d.

2. Your patient has had a myocardial infarction in the area around the left atrium and left ventricle. Which coronary vessel has been affected?

- 1. right coronary artery
- 2. anterior descending artery
- 3. posterior descending artery.
- 4. circumflex artery.

3. Chest pain can mean which of the following?

- 1. lack of oxygen to the myocardium.
- 2. ten percent obstruction of one of the coronary vessels.
- 3. elevated carbon monoxide levels.
- 4. pressure on the coronary vessels due to increased plasma volume.

4. Which of the following is(are) correct concerning the process of atherosclerosis?

- a. it can occur in all arteries of the body.
- b. it begins in the intima of an artery.
- c. it is known for its rapid progression.
- d. it begins early in life.

- 1. a,b,c.
- 2. a,b,d.
- 3. a,c,d.
- 4. b,c,d.

2.

5. Coronary arteries may be described as:

1. being four to five inches long.
2. having a lumen of approximately 1/4 inch.
3. being composed of two layers.
4. being very easily damaged.

6. Which of the following are primary risk factors for coronary artery disease?

1. smoking, family history, hyperlipidemia.
2. smoking, hypertension, hyperlipidemia.
3. hypertension, male sex, smoking.
4. obesity, hypertension, hypercholesterolemia.

7. Cardiovascular research has resulted in a reduction in which of the following area(s)?

- a. hypertension.
- b. strokes.
- c. heart attacks.
- d. rheumatic heart disease.

1. a,b.
2. a,b,d.
3. a,c,d.
4. c only.

8. Which of the following is(are) correct concerning atherosclerotic lesions?

1. fatty streak is only seen in Western societies.
2. clinical symptoms of them occur early.
3. they are all equally dangerous.
4. they begin early in life.

3.

9. Which of the following is(are) correct concerning coronary artery disease?

- a. it should not be mistaken for coronary atherosclerosis.
- b. obstruction of a coronary artery will result in death of part of the myocardium.
- c. atherosclerotic plaques are the main cause of coronary artery obstruction.
- d. the only hope for its reduction lies in prevention.

- 1. a,b.
- 2. a,b,c,d.
- 3. b,c,d.
- 4. d only.

10. Research evidence points to which of the following factors concerning smoking and coronary artery disease?

- 1. there is a relationship between smoking and lung cancer, but not between smoking and coronary artery disease.
- 2. carbon monoxide is the most harmful agent in cigarettes due to the resulting decrease in the oxygen carrying capacity of the blood.
- 3. nicotine carries a greater risk for heavy smokers due to increased sympathetic stimulation.
- 4. tar is the most harmful agent in cigarettes as it is carried directly through the blood stream.

11. Mr. Johnson has a serum cholesterol of 300 milligrams percent. Which of the following is(are) correct?

- a. his serum cholesterol levels will go down if he loses weight.
- b. his risk of developing coronary artery disease within five years is three and one-half times greater than if his level was lower than 200 milligrams percent.
- c. his diet will be very rigid as the liver will produce the amount of cholesterol eliminated from the diet.
- d. meat such as fish and chicken will be better for him than beef and pork.

1. a,b.
2. a,c.
3. b,d.
4. c,d.

12. Which of the following is(are) correct concerning blood lipids?

- a. excessive amounts in the blood are called hyperlipidemia.
- b. only three types are related to coronary artery disease.
- c. there is a direct relationship between unsaturated fats and serum cholesterol.
- d. there is a direct relationship between serum cholesterol and coronary artery disease.

1. a,b.
2. a,c,d.
3. a,d.
4. b,c.

13. High serum triglycerides can be related to:

- a. obesity.
- b. exercise.
- c. heredity.
- d. alcohol.

1. a,b,c.
2. a,b,d.
3. a,c,d.
4. b,c,d.

14. Hypertension is:

- a. associated with cigarette smoking.
- b. associated with salt intake.
- c. more common in women than men.
- d. related to age.

1. a,b,c.
2. a,b,d.
3. a,c,d.
4. b,c,d.



5.

15. Which of the following blood pressure readings is likely to increase the mortality rate to three times the normal?

1. 150/106
2. 160/100
3. 184/96
4. 190/80

16. Mr. Jones is a 60 year old black air traffic controller. He has been to the clinic for a check-up. His blood work shows a serum cholesterol of 190 milligrams percent, his blood pressure is 140/80. His father and brother died of heart attacks. How many risk factors does Mr. Jones have?

1. 4
2. 5
3. 6
4. 7

17. Which of the following is(are) true concerning the Masai tribe of East Africa?

- a. they do not have high blood pressure.
- b. they consume about 300 Gm. fat and 600mg. cholesterol daily.
- c. they are not afflicted with coronary artery disease.
- d. their animal fat intake exceeds that of American men.

1. a,c.
2. a,b,d.
3. b,c,d.
4. a,b,c,d.

18. Exercise is important in preventing coronary artery disease because:

1. it increases the oxygen carrying capacity of the blood.
2. it decreases the blood sugar.
3. it maintains blood lipid levels.
4. it enlarges the coronary arteries.

6.

19. Which of the following is correct concerning diabetes as a risk factor?

1. blood sugar levels are not easily maintained.
2. circulation is impaired in large and small vessels.
3. diabetics are prone to increased blood lipids.
4. it contributes to estrogen levels in premenopausal women.

20. Obesity is related to coronary artery disease because:

- a. it exacerbates hypertension.
- b. it elevates serum triglycerides.
- c. it worsens diabetes.
- d. it decreases the partial pressure of oxygen.

1. a,b,c.
2. a,d.
3. b only.
4. a,b,c,d.

21. The atherosclerotic lesion, fatty streak is:

1. flat and composed of collagen tissue and elastic fibers.
2. characterized by cholesterol remaining inside the cells.
3. has a cap which protrudes into the lumen of the artery.
4. made of a core of lipid material.

22. Hypertension is:

1. referred to as the "silent killer".
2. a risk factor only if the diastolic pressure is elevated.
3. present in nearly 4,000,000 Canadians.
4. reaching epidemic proportions in North America.

23. Which of the following foods are likely to be found on a "cholesterol restricted" diet?

1. shrimp, crayfish.
2. pork, beef.
3. liver, kidney
4. chicken, veal.

24. Stress is considered a risk factor in coronary artery disease because:

- a. hormones causing vasoconstriction are released.
- b. serum cholesterol and serum triglycerides tend to be elevated.
- c. it increases the heart rate.
- d. it indirectly affects other factors such as smoking and hypertension.

- 1. a,b.
- 2. a,d.
- 3. b,c.
- 4. d only.

25. Which of the following is(are) correct concerning coronary artery disease?

- a. the so-called Type A personality has a high risk of developing coronary artery disease.
- b. chronic stress raises certain hormone levels which cause increased blood pressure.
- c. more than two ounces of alcohol a day may increase susceptibility to coronary artery disease.
- d. sudden physical or emotional stress are important factors in the development of coronary artery disease.

- 1. a,b,c.
- 2. a,b,d.
- 3. a,c,d.
- 4. b,c,d.

26. Between what ages is the incidence of coronary artery disease five times greater in men than women?

- 1. 30-39
- 2. 40-49
- 3. 50-59
- 4. 60-69

8.

27. Alcohol increases the risk of coronary artery disease because:

1. the additional calories contribute to obesity.
2. it decreases the ability of the liver to regulate cholesterol.
3. it may cause an elevation in serum triglycerides.
4. it contributes to hypertension.

First name and initial: \_\_\_\_\_

ANSWER SHEET

I.D. number: \_\_\_\_\_

Circle the answer which you consider to be correct.

1. 1. 2. 3. 4.

21. 1. 2. 3. 4.

2. 1. 2. 3. 4.

22. 1. 2. 3. 4.

3. 1. 2. 3. 4.

23. 1. 2. 3. 4.

4. 1. 2. 3. 4.

24. 1. 2. 3. 4.

5. 1. 2. 3. 4.

25. 1. 2. 3. 4.

6. 1. 2. 3. 4.

26. 1. 2. 3. 4.

7. 1. 2. 3. 4.

27. 1. 2. 3. 4.

8. 1. 2. 3. 4.

9. 1. 2. 3. 4.

10. 1. 2. 3. 4.

11. 1. 2. 3. 4.

12. 1. 2. 3. 4.

13. 1. 2. 3. 4.

14. 1. 2. 3. 4.

15. 1. 2. 3. 4.

16. 1. 2. 3. 4.

17. 1. 2. 3. 4.

18. 1. 2. 3. 4.

19. 1. 2. 3. 4.

20. 1. 2. 3. 4.

Appendix L  
Interpolated Task

COMPLETE AS MANY OF THE FOLLOWING PROBLEMS AS ACCURATELY AS POSSIBLE

$$\begin{array}{r} 47835 \\ -37956 \\ \hline \end{array}$$

$$\begin{array}{r} 94618 \\ 38229 \\ + 11722 \\ \hline \end{array}$$

$$72 \overline{) 4927}$$

$$66 \overline{) 9933}$$

$$\begin{array}{r} 725913 \\ -48825 \\ \hline \end{array}$$

$$\begin{array}{r} 7281 \\ \times 412 \\ \hline \end{array}$$

$$\begin{array}{r} 927 \\ 567 \\ 182 \\ + 834 \\ \hline \end{array}$$

$$\begin{array}{r} 74639 \\ \times 63255 \\ \hline \end{array}$$

$$47 \overline{) 63884}$$

PLEASE DO NOT TURN TO THE NEXT PAGE

Appendix M

Frequencies of Scores on Hidden Figures Test



Frequencies of Scores on Hidden Figures Test (132 subjects)

<u>Scores</u>	<u>Frequencies</u>
1	6
2	5
3	6
4	7
5	11
6	8
7	19
8	10
9	10
10	6
11	6
12	3
13	4
14	7
15	5
16	4
17	5
18	3
19	2
20	1
22	2
26	1

Frequencies of Scores on Hidden Figures Test (110 subjects)

<u>Scores</u>	<u>Frequencies</u>
1	5
2	5
3	6
4	7
5	11
6	9
7	12
8	8
9	10
10	6
11	5
12	2
13	7
14	7
15	1
16	2
17	3
19	2
20	1
26	1