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**LA THÈSE A ÉTÉ
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The Effect on Achievement
of a Paraphrasing Learning Strategy
in Air Force Technical Training

Albert Devitt

A Thesis
in
The Department
of
Education

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
Concordia University
Montréal, Québec, Canada

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Abstract

The Effect on Achievement of a Paraphrasing Learning Strategy in Air Force Technical Training

A. Devitt

In this study, the role of learning strategies in the acquisition and retention of knowledge is investigated. It is revealed that learning strategies are prime determinants of efficient and effective learning. Further, the question of learning strategies/skills training is examined: recent research indicates that potentially effective and trainable strategies have been identified; methods to teach the strategies have been developed; and the effectiveness of these learning strategies in enhancing learning has been assessed in the context of academic-like tasks. This study constitutes a direct test of Dansereau's paraphrasing learning strategy in the context of Air Force Technical training. Subjects are Air Force technical trainees. A posttest-only control group design is used. The experimental group is instructed in the use of the paraphrasing learning strategy; students in the control group use their own learning methods. Achievement on a standardized, multiple-choice examination is compared; the experimental group scores significantly higher than the control group.

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CHAPTER ONE

INTRODUCTION

Background

In April 1979 an Air Technical Trades Training Conference was convened to address the severe manning, training, and skill deficiency problems affecting the aviation technical trade group. A higher than normal attrition rate among this trade group had resulted in the manning shortage of 550 positions at aircraft maintenance organizations within Air Command. In addition, the Canadian Forces School of Aerospace and Ordnance Engineering did not have the facilities and instructors to produce sufficient graduates to overcome shortages. Because of the perceived deficiencies in the quality of technical training and the inability of the School of Aerospace and Ordnance Engineering to conduct the required number of basic and advanced courses, an alternate training plan for air technical trades became necessary. To resolve these problems, the Air Trades Advancement Training (ATAT) program was implemented in September 1980.

At the Air Trades Training Conference held in 1979 the decision was taken to set up Training Standards Review Boards which would recommend new approaches to training for air technical trades. The detailed recommendations of the Training Standards Review Boards were subsequently reviewed by an Air

Trades Advancement Training (ATAT) Steering Group Committee comprised of members at the colonel rank level from National Defence Headquarters/Director General Aerospace Engineering and Maintenance, Air Command Headquarters, Training System Headquarters, and the Canadian School of Aerospace and Ordnance Engineering. The Steering Group Committee formulated a coherent training program for ATAT.

Two concepts of the formulated ATAT program indicated a quite radical change from the previous formal training and on-job training program:

- a. Emphasis on individual study and the onus for assuring advancement shifted to the apprentice technician;
- b. Emphasis on a comprehensive theoretical background.

The Training Problem And Its Context

The Air Trades Advancement Training (ATAT) program commences with a formal, basic trade course conducted at the Canadian Forces School of Aerospace and Ordnance Engineering to bring the student technicians to a common Trade Qualification 3 (TQ3) status. This is followed by a program of self-study, trade advancement examinations (TAE) and further skill development in the work environment of an airbase. At commencement of this self-study phase of ATAT, the students are equal in terms of trade knowledge/skill development i.e., Trade Qualification level 3; also, prerequisite selection criteria assure that

measured aptitude scores and General Classification (GC test scores for all students are within a very restricted range). This homogeneity is mentioned as it has a direct bearing on experimental design.

The objective of the ATAT program is the development of comprehensive trade knowledge concurrent with skills development. The onus is on the student to learn through self-study; his Trade Advancement Study Manual (TASM) is the primary source of technical information. Accordingly, achievement in the Trade Advancement Examination may depend implicitly upon student possession of an effective and efficient repertoire of learning skills. This would appear to be a reasonable assumption for most, given their pre-enrollment academic success. But it may not hold true for all students in the Air Trades Advancement Training program; in the self-study situation, despite their best efforts some may not do well. This author therefore takes exception to the apparent ipso facto condemnation of students (Popadynec, 1982, pg. 6), where one of the major causes of learning difficulties is attributed to inadequate study and would posit that the cause of learning difficulties in the ATAT program is more elusive than assumed and that further investigation is merited, particularly as concerns the students in their interaction with study materials.

By several measures the ATAT program is a success:

it has instilled a renewed sense of personal responsibility in new technicians; and those who do succeed are more knowledgeable with enhanced ability to apply that knowledge to the job. However, some student technicians fail the Trade Advancement Exam, others experience considerable difficulty (Major D. Janes, Staff Officer, Air Command Headquarters, Personal Communication, January 3 and 29, 1985). Attrition due to learning difficulties need not be tolerated; this problem should be addressed just as other attempts at program refinement have been made. These efforts: task analyses to verify course content, improvements of study manuals, meticulous analysis of Trade Advancement Examinations to assure validity and reliability, have appreciably improved the ATAT program in respect to content, study materials, and examinations (Popadyne, 1982).

But in all the critical reviews of this Air Force technical training program the students are largely overlooked, particularly as concerns their ability to learn through self-study of the Trade Advancement Study Manual. Some students are quite adept at learning on their own and they probably achieve near their potential. This is assuredly not the case for other trainees; in this self-study situation, very different from that experienced in the supportive, teacher-led environment of high school, their approaches to learning are notably less effective than those of their peers. They are diligent students in the ATAT program but the Trade

Advancement Examination results are not commensurate with their efforts. Despite their best efforts they flounder in this type of self-study situation. Previously reliable methods which served as a complement to the teacher's efforts prove inadequate. And no matter how inefficient, they continue to use these strategies because they are familiar.

The pervasiveness of individual differences in achievement in training and education, even within one classroom and one course, demonstrates that there are different ways of going about learning, determined by the processing resources that individuals can or choose to bring to bear on the task of learning (Rigney and Munro in O'Neil, 1978). In the Canadian Armed Forces technical courses, including ATAT, where homogenous groups are deliberately formed, there is still wide-ranging achievement. We may confidently accept as a truism that for the vast majority of recruits, learning to learn was not part of the curriculum during their school years. They developed learning strategies spontaneously, and, however efficient, have retained them. Weinstein (1978) indicates that the assumption is made that learners are equipped with effective learning strategies when they arrive at school at the primary levels. She calls this a total misconception and recommends it be remedied by training learners to use effective learning strategies.

In the ATAT program where it is incumbent upon the student to assure his own trade advancement through self-study, this

author feels that the literature suggests that effective learning strategies are vital. And therefore; for a relatively modest investment in time for learning strategy skills training, a return may be produced in terms of enhanced learning as evidenced by fewer failures and higher Trade Advancement Examination scores.

The literature is rife with studies of the role of learning strategies in educational settings with subjects ranging from the early elementary grades to university level. These studies are interesting and helpful in making inferences as to the possible role of learning strategies in military technical training. It is felt that a focus on the effectiveness of learning strategy skills development in the context of Canadian Armed Forces technical training would be useful.

In summary, this author has found strong indications in the literature that student possession of effective and efficient learning strategies may be critical to the success of the self-study method of the Air Trades Advancement Training program. Research also shows that students can be helped to develop these strategies. A study of the effects of learning strategies may yield important information to improve Air Force technical training; on that premise this thesis on the effects of learning strategies was derived.

CHAPTER TWO

LITERATURE REVIEW

Literature Review

In recent years numerous approaches have been generated to examine the effectiveness of a number of learning strategies to facilitate the acquisition of knowledge. In order to focus the review and to enable relevant inferences, deriving a definition of learning strategy appropriate to the purpose of this study is necessary.

Learning Strategy Defined

As a theoretical construct, learning strategy can mean different things to different people. The term learning strategy is used by O'Neil (1978) to refer to cognitive processing operations used by the learner to improve acquisition, retention, and retrieval of representational and procedural knowledge. Rigney (1978) suggested that a strategy may be interpreted as signifying operations and procedures a learner may adopt to acquire, retain, and retrieve different kinds of information. A third definition is given by Newell & Simon (1972) who refer to an effective learning strategy as the simplest and most efficient means of processing the information inherent in a situation. There is a common theme in these definitions as concerns the notion of processing information.

However, Winn (1982) adds another useful dimension to the definition. He is in accord with the definitions as

they describe psychological mechanisms by means of which the learner perceives, assimilates, interprets, stores, and retrieves information; but he goes further in stating that experience and research both show that individual learners are proficient at using only some of these processes. These processes in which a learner has achieved a level of proficiency, that is to say, those processes that are capable of being used productively in learning, are said to have reached the status of mental skills. He states for example, that "imagery can be used in some shape or form by most people, but only some are said to be mentally skilled in its use. And when these learners use imagery in order to learn something, it is operating as a learning strategy." (p.3). Gagne (1977) also considers the idea of naturally occurring information processing strategies and operationally defines them as an acquired skill. Essentially Gagne considers learning strategies as skills involving learning how to learn.

A synthesis and simplification of the preceding definitions and discussion produces an adequate definition for the purpose of this thesis. To that purpose, learning strategy will be defined as a self-initiated or externally imposed means of utilizing information applied to a learning task.

Research On Role of Learning Strategies

Interpretation of learning strategy definitions leads to the very logical inference that learning strategies are prime

determinants of efficient and effective learning. This is a theme which recurs in the research literature. For example, Goldman and Hudson (1973) compared high, middle, and low grade point average high school learners and found them to vary significantly on type of learning strategy used; not on innate intellectual ability. In general, reports are unequivocal in ascribing a central role to learning strategies in the enhancement of learning, particularly in self-study situations (Blumenfeld, Newman, Johnson, and Taylor, 1984). Within the area of verbal learning the use of learning strategies has facilitated the acquisition and retention of specific information across a variety of age groups (Belmont & Butterfield, 1971; Bruner, Goodnow & Austin, 1956).

Several types of strategies that have been shown to promote learning are the learner's free choice of mnemonic techniques, various encoding instructions, or instruction in the use of particular strategies (Craik & Lockhart, 1972; Craik & Tulving, 1975). As a summary comment on their review of learning strategy research conducted in conjunction with their investigation of the roles of learning strategies Singer, Risdale & Korienek (1979) found that although the dependent measures differ in the many studies conducted, the conclusions drawn remain similar; strategy usage has a facilitatory effect on the acquisition and retention of information.

O'Neil (1981) refers to several recent examples of research which are particularly germane to the focus of this thesis; that is to say, the acquisition of knowledge in air force technical training: Strategies for Self-Directed Learning from Technical Manuals (Rigney, Munro & Crook, 1979); Development of a Systematic Training Program for Enhancing Learning Strategies & Skills (Dansereau & Collins, 1978); and Influence of Learning Strategies in Motor Skill Acquisition (Singer & Gerson, 1979). These are examples of projects sponsored by Defense Advanced Research Projects Agency.

Review of these research reports directed this researcher towards a wealth of related research sponsored by the Army Research Institute for the Behavioural Sciences in Alexandria, Virginia and the Air Force Human Resources Laboratory at Lowry Air Force Base, Colorado. Technical reports from these two organizations therefore comprise a substantial source of information on recent research on learning strategies.

Technical reports by Singer & Gerson (1978), Singer, Gerson & Risdale (1979), and Singer, Gerson & Korienek (1979a, 1979b, 1979c) describes a series of investigations they conducted on the role of strategies in learning; they drew the general conclusion that learning strategies have a facilitatory effect on the acquisition of both motor and verbal skills. Gagne (1967) reported similar findings while addressing the question of individual differences in achievement: he contends that the

manner in which a learner employs the various processes in relation to personal cognitive capabilities for the efficient use of information, in activities such as comprehension, listening and reading, is the major determinant of individual differences in the acquisition of skill. Studies by others (Belmont and Butterfield, 1971; Bruner, 1956; Craik and Tulving, 1975) have also shown the facilitatory effects of learning strategies in storage as well as retrieval of verbal information.

Learning Strategies Skills Training

Dansereau and collaborators (Dansereau et al, 1974, 1975, 1978, 1980) present a comprehensive series of reports on their learning strategy research project. They include reports on: the development of a learning strategy inventory, the development of a learning strategy skills training program, and the validity of the inventory and training program.

In essence, Dansereau and his colleagues found that academic performance differences within equal ability groups are correlated with the way students select and use differing information processing strategies; their own and other related research reveals that information processing or learning strategies may be more fundamental determinants of performance than actual abilities; and they experienced considerable success in showing that training in how to select and use more efficient techniques and strategies for selecting, storing, manipulating and outputting information would enhance learning performance.

His learning strategy research project involved three basic steps: the identification of potentially effective and trainable learning strategies, the development of methods for teaching these strategies to students, and the assessment of the strategies in the context of academic-like tasks.

The identification of effective strategies was accomplished using information from a review of psychological and educational research literature dealing with strategies, and from an analysis of responses to the specially developed Learning Strategy Inventory Dansereau, Long, McDonald & Actkinson, (1975). The results of research with the inventory indicated that students could be trained on four aspects of the learning process: identification of important, unfamiliar, and difficult material; the application of techniques for the comprehension and retention of the identified material; the efficient retrieval of this information; and effective coping with distractions while these other processes are being employed.

After these four areas were identified, specific strategies relating to each of these aspects were extrapolated from the educational and psychological literature. The process of applying techniques for enhanced comprehension and retention was believed to be most critical; consequently three alternative comprehension and retention strategies were extrapolated (paraphrasing, question-answering, and the use of visual imagery).

The work of Dansereau and his colleagues stressed content-independent learning strategies -- learning strategies relatively independent of a specific course subject or instructional method (Rigney, 1978). The content-independent strategies investigated operationally relate to the mental manipulation of information-to-be-learned and were aimed at improving the general information processing skills of the learner; these strategies were referred to as primary strategies in the Dansereau project as they are those used by the students in operating directly on the material.

In the assessment of the comprehension and retention strategies they found considerable success with the imagery strategy and the paraphrasing strategy (Dansereau et al, 1975, pg. 52).

The training program dramatically improved long-term retention of academic material. Consistent differences between the three training groups indicated that the imagery and paraphrase techniques should undergo further refinement and testing and the question-answer strategy should be dropped.

The premise of Dansereau and his fellow researchers that providing students with effective and efficient learning strategies would help them acquire and use information more effectively was borne out during the assessments of the learning strategy training program. The strategies are considered as sufficiently content-independent to be applicable in a wide

variety of instructional environments. Further, the basic components have been subjected to independent evaluations. These evaluations have indicated that the separate components, for example, the primary strategy of paraphrasing, could be profitably used in isolation to remediate learning deficiencies (Dansereau, 1980a). —

CHAPTER THREE

OBJECTIVE

The objective is to investigate the effectiveness of learning strategy training in acquisition of technical knowledge; specifically by directly testing the paraphrasing learning strategy developed by Dansereau et al, (1975) with Air Force technical students as subjects in the actual air base environment where the Air Trades Advancement Training program is conducted.

Rationale

During the final phase of assessment, Dansereau and his collaborators hoped that their program could be implemented in a military technical training context. But examination of the available possibilities indicated that such implementation was not feasible at the scheduled time of the evaluation (Dansereau et al, 1980b). Their intent had been to implement the program in a military technical training context to maximize the possibility of transfer to Air Force technical training. They could not; the proposal of this thesis is to extend their study by testing the paraphrasing strategy in that technical context.

Implementation of the strategy training program by Dansereau and his colleagues was in the context of a college level academic course with undergraduates as subjects. An additional premise for this extension of their study is that air force technical trainees are more appropriate; indeed,

they are ideal subjects to enable assessment of the effectiveness of strategy training in a technical context. Also, to that end, the Air Trades Advancement Training program provides a real operational air force training situation in which to conduct the study.

The paraphrasing strategy is viewed as particularly appropriate to the ATAT learning situation. The strategy training program involves manipulation of written materials just as the ATAT student is required to do in his trade study program. And the relatively short time requirement (approximately 3 hours) for presenting and assuring mastery of the learning strategy lends itself well to the operational context in which the study takes place; that is to say, care must be taken to not encroach unduly on the daily routines and military duties of the students in the course of the study.

The task presented to the ATAT student is predominantly text processing; in addition, the trade advancement study manual contains conceptually dense technical material. This latter factor further justifies the paraphrasing strategy as the most appropriate for this situation where students are at an ab initio stage of technical learning. Jones et al (1978) emphasize that learning and memory of new material is enhanced if the students change it in such a way to make it more meaningful to themselves; they accomplish this through putting the information into their own words or through elaboration. Of the several strategies put

forth as effective for processing text by Rigney (1977), the paraphrasing strategy is the one most appropriate for this ATAT learning task. Learning to use the paraphrasing strategy is in fact a preliminary stage in development of abilities to use other text processing strategies that more technically skilled persons would employ (Lutz, 1977).

In addition to the reported success of Dansereau and his colleagues in applying the paraphrasing strategy, there is other evidence in the literature to support a hypothesis that it would be effective in a variety of learning situations. In their study of the effects of student-generated elaboration during acquisition of concepts in science Lutz & Rigney (1977) put forth the view that paraphrasing forces the student to describe the concept in his own words, a form of active processing that results in better retention. They describe paraphrasing also in a rather simple sense as a type of review strategy. This notion of paraphrasing as a review has considerable import in view of the caution by Singer et al (1979) that in order to be effective, imposed strategies should not be inconsistent with any predisposition students may have to learn by a favoured strategy. The paraphrasing strategy is certainly apropos in this regard in the ATAT situation; it is a more effective and efficient replacement for what the students attempt now in a rote, read, read process; a technique which gets them off that type of learning treadmill should have appeal.

It is important to emphasize that the ATAT student population in this study is homogeneous; a very comprehensive, reliable selection process assures this. The literature discusses aptitude by treatment interaction and differential effects (McCombs, 1981). However, this is not applicable in this study of a homogeneous group.

Aaronsen (1976) and Pio & Andre (1977) argue for the beneficial effects paraphrasing has as a retention strategy, designed to facilitate storage in long-term memory. Thus, it is apparent that the paraphrasing learning strategy satisfies the two critical demands of the ATAT self-study learning situation -- it facilitates both acquisition and retention of knowledge, an effect apropos to a situation where students must follow a course of study of approximately 9 months duration from start to the writing of the Trade Advancement Examination.

Hypothesis

Cognitive achievement for students trained in the use of the paraphrasing learning strategy will exceed that of a control group employing their own learning methods.

Operational Definition

Cognitive achievement -- the score obtained on a standardized, multiple-choice examination administered subject to the treatment.

CHAPTER FOUR

METHOD

Synopsis: This study was conducted in an actual air force training environment, using a posttest-only control group design, with technical trainees as subjects.

Design

An experimental and control group were employed, using a posttest-only design with random grouping and equal n, illustrated below.

R	X	O ₁
R		O ₂

The posttest-only control group design is chosen in this study in part for reasons given by Campbell & Stanley (1966, pg. 26): "many problems exist for which pretests are unavailable, inconvenient, or likely to be reactive, and for such purposes the legitimacy of Design 6 still needs emphasis." Suitability of this design is discussed in the Analysis Section.

The posttest used in this study is the formal Trade Advancement Examination. Regulations do not permit its use except for formal evaluation of trade knowledge of candidates who have completed the ATAT course of study (Air Trades Advancement, Course Training Standard, 1984). In any event, were it possible to use it as a pretest, the results would be near meaningless due to the novel content of the technical

aviation course.

Subjects

The sample selected for this study numbered 64; Trade Qualification 3 course production and logistic considerations were factors in determining the number. They were randomly selected from the population of trainees commencing the self-study phase of the Air Trades Advancement Training (ATAT) program. By virtue of the selection process used to assign students for aviation technical training we are assured that the population in this study is homogeneous. The further random assignment to form the experimental and control groups, further assured that the groups were "equal" before the treatment. To accomplish the randomization, identification data was recorded on a file card for each subject. These cards were shuffled and dealt into two piles labelled "experimental" and "control" respectively.

Procedure

Students in the experimental group were instructed in the use of the paraphrasing strategy and given guided practice. Care was taken by the experimenter to avoid giving the impression that they were getting any special treatment other than what any ATAT student might expect from supervisory personnel.

Materials

Strategy training materials are contained in Appendix 1. These materials were detached from the ATAT study manual. They were contained in a separate booklet which included a generous

amount of blank paper for worksheets. This arrangement of strategy training materials and workspace in a single volume proved to be convenient for the students. It may be even more beneficial to have the strategy training materials embedded in the technical training manual. However, this was not done since the author was not given a mandate to make any revision to ATAT materials.

Briefly stated, the paraphrasing treatment involved learning to rate textual material in terms of difficulty and importance; learning to rephrase the information, first in a few sentences, then to connect the information connected in a series of related paragraphs. In this study, for initial presentation and practice, three closely-spaced sessions were used; the spacing between sessions was one day. Between training sessions students were advised to review the strategy training materials on their own. Singer et al (1979) rightfully focus attention on the need to ensure that students are fully trained in the use of a strategy before requiring them to apply it. The experimenter assured this by doing initial training in small groups of from 3 to 6 students at a time and then following up this instruction with one-on-one guided practice. Then, after two to three weeks into the self-study program, verification was made with each individual student that strategy usage was still well-understood and able to be applied to the trade study materials.

Control group activity. Subjects selected for the control group had no contact with the experimenter until after they had written the Trade Advancement Examination (TAE). They were left entirely to their own devices; how they had studied the ATAT materials was investigated during an interview with the author after they had completed the course and had written the TAE. The question of how they learned could not be ignored because these subjects should only be considered as controls in name only. That is to say, they naturally use some learning strategy; perhaps even a type of paraphrasing technique. There was also the possibility that some might discover and adopt the strategy taught to the experimental subjects.

Instrumentation and Data

On completion of the ATAT course of study, the formal Trade Advancement Examination was administered Air Trades Advancement Course Training Standard (1984). The completed examinations were forwarded to the Canadian Forces School of Aerospace and Ordnance Engineering for scoring. Scores expressed in percent were provided to the experimenter. No reliability measures were collected by the author since he had no access to the examination; this is performed by specialists in the Standards Cell of the School of Aerospace and Ordnance Engineering. In all matters of data collection, normal Canadian Forces security regulations pertained; confidentiality was assured by using a coding system for student identification.

Analysis

For this posttest-only control group design, Campbell & Stanley (1966) advise that the t-test would be the simplest form of test and that this design "is perhaps the only setting for which this test is optimal."

As stated previously, the students in the ATAT program commence the self-study phase with the common Trade Qualification level 3 (TQ3). Prior to the TQ3 course at the Canadian Forces School of Aerospace and Ordnance Engineering, the students are submitted to a trade assignment process. The battery of tests and interviews used, in effect, accomplishes a type of blocking or levelling on subject variables. With the further step of randomly assigning students to the experimental and control groups, there is adequate assurance of the lack of initial biases between groups for this study. The post-study interview provides another required element of control by enabling the identification of those control subjects who may have used a paraphrasing strategy in the course of their studies.

Time Schedule

O'Neil (1981) points out that in learning strategy research the most pervasive problem has been that it has not been possible for researchers to gain control over enough subjects for a long enough time. Dansereau et al (1980) are of like opinion and also infer that the time requirement for the effects of strategy training to be revealed precludes

exploring the effects in the context of typical short-time experiments. This researcher also feels that in a sort of learning sample test over a period of a few days or weeks there is a danger that a statistical artifact would result rather than a real measure of the effectiveness of learning strategy training.

Although there was some similar difficulty in terms of time available to instruct the strategies in the ATAT program, conducting the study over the full nine-month duration of the program enabled a good evaluation of the effectiveness of the paraphrasing learning strategy in air force technical training.

CHAPTER FIVE

RESULTS

Results

The Trade Advancement Examination results were promulgated by confidential message from Air Command Headquarters. The results for the experimental group and control group were extracted from the message and are contained in Table 1 and Table 2 respectively. The original total number of subjects for each group was 32. The experimental group was reduced to 31 due to voluntary release of one subject. The control group was reduced to 28 due to voluntary release of 2 subjects and the elimination of 2 subjects who had gained access to the strategy training manuals.

Statistical Analysis

The analysis was performed using the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1977) as implemented on the CDC Cyber computer at Concordia University. Table 3 contains the T-Test data and reveals that the achievement of the experimental group was significantly higher than that of the control group ($P < .05$).

TABLE I

EXPERIMENTAL GROUP TRADE ADVANCEMENTEXAMINATION RESULTS

Subject	Identifier Code	Score
1	5582 B	70
2	5902 D	79
3	2832 K	77
4	5432 L	79
5	9432 H	80
6	4322 N	77
7	3172 H	79
8	6912 K	84
9	0852 P	83
10	1502 K	86
11	6372 P	78
12	8532 Z	78
13	0712 M	75
14	4702 G	77
15	8392 S	79
16	6732 S	73
17	2242 B	82
18	2012 D	76
19	7092 B	76

(table continues)

TABLE I (continues)

Subject	Identifier Code	Score
20	1502 K	76
21	0002 H	88
22	2932 S	79
23	5432 L	70
24	9252 K	90
25	7252 L	66
26	1912 B	66
27	1692 L	92
28	2322 S	88
29	2832 K	71
30	4322 N	80
31	5902 D	76

TABLE 2

CONTROL GROUP TRADE ADVANCEMENT
EXAMINATION RESULTS

Subject	Identifier Code	Score
1	9861 F	68
2	4601 L	78
3	3591 W	75
4	1251 T	76
5	1561 D	74
6	2551 C	80
7	4391 L	52
8	9271 L	70
9	3571 N	68
10	3591 N	72
11	4881 C	78
12	4391 L	70
13	6321 A	76
14	2431 L	79
15	5261 L	67
16	9271 L	72
17	1561 D	66
18	5161 C	81
19	2551 D	85

(table continues)

TABLE 2 (continues)

Subject	Identifier Code	Score
20	4881 C	77
21	1171 C	79
22	4701 M	73
23	5591 L	77
24	4431 F	85
25	4391 L	74
26	8101 R	83
27	7651 B	82
28	6321 A	72

TABLE 3
T-TEST

1 Experimental				2 Control		
<u>Group</u>	<u>N</u>	<u>Mean</u>	<u>sd</u>	<u>t-Value</u>	<u>df</u>	<u>2-tail prob</u>
1	31	78.42	6.3	2.21	57	.031 p < .05
2	28	74.61	6.9			

CHAPTER SIX

DISCUSSION

Discussion

The aviation technical students encountered during the course of the study were very receptive to advice on how to study effectively. They had been issued the Trade Advancement Study Manuals prior to the first meeting with the experimenter. The volume of technical material set before them presaged the difficult task of preparing for the Trade Advancement Examination; this no doubt provided some extra impetus to "learn how to learn" when the offer was made.

The learning strategy training materials served the purpose of developing the capability of using the paraphrasing strategy effectively. The topics were varied and interesting and by virtue of this experimenters' experience in using them I would attest to Dansereau's claim that the strategies are sufficiently content-independent to be applicable in a variety of instructional environments. It may be that technical material developed for the same purpose could enable a more efficient transfer from the strategy training materials to the actual trade study manuals; that could be the subject for a study at the Canadian Forces Training Development Centre. However, the students in the experimental group expressed satisfaction with the materials so one may conclude that the materials were apropos to the task at hand.

After the Trade Advancement Examination (TAE) results were received, each student in the control group was interviewed by the author. Two of these subjects had gained access to the strategy training materials provided to the experimental group and adopted the paraphrasing strategy; their TAE results were therefore eliminated from the subsequent analysis. None of the other students employed a strategy similar to that provided to the experimental group.

The remaining 28 subjects can be divided into two categories in accordance with the organization they applied to their studies. One group (11 students) were more methodical in their study of the Trade Advancement Study Manual (TASM) than the other group (17 students) who had virtually no organized approach to the learning task.

The former group employed a strategy which involved identification of material as difficult/important and they either highlighted or underlined it in the TASM, or occasionally kept separate notebooks containing excerpts from the TASM. Their general strategy was to read and reread the study materials with extra attention given to the portions deemed important. A few of the students would also sporadically employ a self-questioning technique to test retention of the material, but this was rarely done. The process of attempting to commit the information to memory had served them reasonably well during their pre-enrolment

school years. Despite the unpredictability of retention and recall they admitted to, it was a familiar strategy which had to serve as they were unaware of another way to proceed.

The latter group did not bring any order to the learning task; their efforts could be characterized by a near total lack of organization beyond that provided by the order of material presentation in the TASM. They simply read the TASM over and over with the hope that the information would be retained and retrieved when required at examination time. Further inquiries by the author as to how this repetitive reading was done revealed another interesting phenomenon. At the commencement of each study session they habitually started reading at the beginning of a chapter, no matter where they had left off at the end of the last session. And, in the latter phases of the ATAT course the restart point was often the beginning of the manual. As a consequence the early chapters of the TASM and of individual chapters were reviewed more often than the last parts of the manual and chapters.

This type of behaviour may be explained in part by this author's statement on page 5 that we may accept as a truism that in the vast majority of Canadian Armed Forces recruits, learning to learn was not part of the curriculum during their school years. In addition, these students offered the explanation that the

self-study situation they faced in the ATAT program was novel. They had never faced this type of learning task before and simply did not know how to go about learning on their own. Most claimed that they had rarely expended more than minimal effort outside of normal school hours; the only exception was at exam time when a "eleventh hour" cram session always sufficed. In light of these anecdotal findings this author feels that one may reasonably assume that the further pursuit of learning strategy skills training in the ATAT program could have beneficial effects.

In respect to the difference in achievement between groups, although statistically significant, the approximate 4% difference between the means does not appear important. This occurrence was of interest to the author and the matter was called to the attention of training authorities. It was revealed that the subjects scored higher than what is regularly reported (Captain B. Shearer, Staff Officer, 14 Training Group Headquarters, Personal Communication, October 7 and 8, 1986.)

Some additional queries were made to discover possible reasons for these examination results. The consensus among National Defence Headquarters Staff Officers is that the present recruit population is not representative of that normally available. A lack of employment opportunities due to prevailing economic conditions has made a military career an attractive alternative for persons with academic qualifications higher than

the norm of our traditional recruit pool. These candidates score in the normal range by aptitude measures used in trade selection, but they may be described as high-achievers in relative terms. That is to say, there are many who have surpassed the minimum grade 10 entry requirement by 2 - 3 years.

So it appears that the intervention was less effective with this group of high achievers than perhaps it would have been with subjects of lower academic standing. This is conjecture only on the part of the author. However, a trial with a more typical trainee population may prove that the intervention could have greater effect.

Conclusion and Recommendation

The intent of this thesis was to conclude the Dansereau project in the context of Air Force technical training. This extension of the trial was accomplished successfully with results that encourage further investigation of the effect of learning strategy skills training in Canadian Forces technical training.

Indeed, this investigation could be conducted in parallel with a gradual implementation of learning strategy skills training in Air Force technical training. It may be reasonably argued that the results of the intervention in this study are not conclusive. But in view of the findings of Dansereau and collaborators and the supportive findings of this author, the gradual implementation of learning strategy skills training may

have a positive effect on the quality of technical training.

The personnel resources now available for course modification need not be increased; the additional expertise to embed strategy skills training in the ATAT program is available on a consultative basis from educational technologists on the staff of the Canadian Forces Training Development Centre. It is recommended that Air Command training authorities pursue this implementation with the Senior Staff Officer Training Development at Training System Headquarters.

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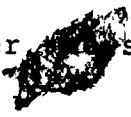
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Appendix 1
Learning Strategy Training Materials

UNDERSTANDING RATINGS:

CHOOSING WHEN TO APPLY THE CONNECTION TECHNIQUE

Understanding Ratings

When you study a textbook, you probably make some decisions about how well you understand each passage or section. For the purposes of this training program, we would like you to get some practice in making this type of judgment formally. First, consciously making understanding judgments may improve your ability to determine what material needs further review, and second, these judgments will be used in other parts of the training we will be giving you. What we are going to ask you to do is read a fairly long passage and periodically make understanding judgments. Please look at the scale on the following page. This is the scale we will ask you to use. Your job is to rate your understanding of the material you have read since your last judgment by choosing the number of the statement that best describes your level of understanding. Your level of understanding may fall in between two of the statements, so you can use the numbers between the statements to indicate just where it falls. I'll give you a minute or so to look over  scale in order to see if you have any questions.

Understanding Rating

Please note that the rating scale statements not only deal with how well you have understood the paragraph in the traditional sense but also how well you will be able to remember the information in order to explain it at some future time. Thus, your rating should reflect both how well you understood the paragraph and how well you will be able to remember it.

- (1) It would be impossible for me to explain this material to another individual in the future.
- (2)
- (3)
- (4)
- (5) I could roughly explain this material to another individual in the future.
- (6)
- (7)
- (8)
- (9) It would be very easy for me to explain this material in great detail to another individual in the future.

Please remember your understanding ratings should include not only how well you can follow the material as you are reading, but also how well you feel you will be able to remember the material in the future. If you can't follow what is being said or if you don't think you will be able to remember it, your rating should be close to (1). If you can easily follow the material and would have no trouble in remembering it your rating should be close to (9). If you feel your understanding falls somewhere between these two extremes, choose a number more towards the middle of the scale as your rating.

You will make your ratings in the spaces provided within the reading material. After the passage you will be given some questions to let you know how well you did.

You are now ready to start your ratings of the material. Please refer back to the understanding rating scale as often as necessary so that your ratings will be accurate. You will be given 10 minutes to read and rate the passage. You may go back and review the material and your ratings but do not continue until I have given further instructions.

Fighting between members of the same species is almost universal among vertebrates, from fish to man. Casual observation suggests the reason: animals of the same kind, occupying the same niche in nature, must compete for the same food, the same nesting sites and the same building materials. Fighting among animals of the same species therefore serves the important function of "spacing out" the individuals or groups in the area they occupy. It thereby secures for each the minimum territory required to support its existence, prevents overcrowding and promotes the distribution of the species. Fighting also arises from competition for mates, and thus serves to select the stronger and fitter individuals for propagation of the species. It is no wonder, then, that herbivores seem to fight each other as readily as do carnivores, and that nearly all groups of vertebrates, except perhaps some amphibians, display aggressive behavior.

Understanding _____

A complete investigation of fighting behavior must take account, however, of another general observation: fights between individuals of the same species almost never end in death and rarely result in serious injury to either combatant. Such fights, in fact, are often highly ritualized and more nearly resemble a tournament than a mortal struggle. If this were not the case - if the loser were killed or seriously injured - fighting would have grave disadvantages for the species. The animal that loses a fight is not necessarily less healthy or less viable; it may simply be an immature animal that cannot withstand the attack of a mature one.

Understanding _____

In view of the disadvantages of serious injury to a member of the species, evolution might be expected to have exerted a strong selective pressure against aggressive behavior. But spacing out through combat was apparently too important to permit a weakening of aggressive tendencies; in fact, aggressiveness seems to have been favored by natural selection. It is in order to allow spacing out - rather than death or injury - to result from fighting that the ceremonial combat routines have evolved.

Understanding _____

Investigators of aggressive behavior, often strongly motivated by concern about aggressive impulses in man, have usually been satisfied to find its origin in the life experience of the individual animal or of the social group. Aggressiveness is said to be learned and so to be preventable by teaching or conditioning. A growing body of evidence from observations in the field and experiments in the laboratory, however, points to the conclusion that this vital mode of behavior is not learned by the individual but is innate in the species, like the organs specially evolved for such combat in many animals. The ceremonial fighting routines that have developed in the course of evolution are highly characteristic for each species; they are faithfully followed in fights between members of the species and are almost never violated.

Understanding _____

All-out fights between animals of the same species do occur, but usually in species having no weapons that can inflict mortal injury. Biting animals that can kill or seriously injure one another are usually also capable of quick flight. They may engage in damaging fights, but these end when the loser makes a fast getaway. They may also "surrender", by assuming a submissive posture that the winner respects. Konrad Z. Lorenz of the Max Planck Institute for the Physiology of Behavior in Germany has described such behavior in wolves and dogs. The fight begins with an exchange of bites; as soon as one contestant begins to lose, however, it exposes its vulnerable throat to its opponent by turning its head away. This act of submission immediately inhibits further attack by its rival. A young dog often submits by throwing itself on its back, exposing its belly: a pet dog may assume this posture if its master so much as raises his voice. Analogous behavior is common in birds: a young rail attacked by an adult turns the back of its head - the most sensitive part of its body - toward the aggressor, which immediately stops pecking. Lorenz has pointed out that acts of submission play a similar role in fights between men. When a victim throws himself defenseless at his enemy's feet, the normal human being is strongly inhibited from further aggression. This mechanism may now have lost its adaptive value in human affairs, because modern weapons can kill so quickly and from such long distances that the attacked individual has little opportunity to appeal to his opponent's feelings.

Understanding _____

Most animals depend neither on flight nor on surrender to avoid damaging fights. Instead they engage in a ceremonial struggle, in the course of which the contestants measure their strength in bodily contact without harming each other seriously. Often these contests begin with a duel of threats - posturings, movements and noises - designed to cow the opponent without any physical contact at all. Sometimes this competition in bravado brings about a decision; usually it is preliminary to the remainder of the tournament.

Understanding _____

On the lava cliffs of the Galapagos Islands a few years ago I observed such contests between marine iguanas (*Amblyrhynchus cristatus*), large algae-eating lizards that swarm by the hundreds over the rocks close to shore. During the breeding season each male establishes a small territory by defending a few square yards of rock on which he lives with several females. If another male approaches the territorial border, the local iguana responds with a "display". He opens his mouth and nods his head, presents his flank to his opponent and parades, stiff-legged, back and forth, his apparent size enlarged by the erection of his dorsal crest. If this performance does not drive the rival off, the resident of the territory attacks, rushing at the intruder with his head lowered. The interloper lowers his head in turn and the two clash, the tops of their heads striking together. Each tries to push the other backward. If neither gives way, they pause, back off, nod at each other and try again. (In an apparent adaptation to this mode of combat the head of the marine iguana is covered with horn-like scales.) The struggle ends when one of the iguanas assumes the posture of submission, crouching on its belly. The winner thereupon stops charging and waits in the threatening, stiff-legged stance until the loser retreats. A damaging fight is triggered only when an invader does not perform the ceremonies that signal a tournament; when, for example, the animal is suddenly placed in occupied territory by a man, or crosses another animal's territory in precipitous flight from an earlier contest. On these occasions the territory owner attacks by biting the intruder in the nape of the neck. Female iguanas, on the other hand, regularly engage in damaging fights for the scarce egg-laying sites, biting and shaking each other vigorously.

Understanding _____

The lava lizard (*Tropidurus albemarlensis*) of the larger Galapagos Islands engages in a similar ceremonial fight that begins with the rivals facing each other, nodding their heads. Suddenly one of them rushes forward, stands alongside his opponent and lashes him with his tail once or several times, so hard that the blows can be heard several yards away. The opponent may replay with a tail-beating of his own. Then the attacker turns and retreats to his original position. The entire procedure is repeated until one of the lizards gives up and flees.

Understanding _____

According to Gertraud Kitzler of the University of Vienna, fights between lizards of the central European species *Lacerta Agilis* may terminate in a curious manner. After an introductory display one lizard grasps the other's neck in his jaw. The attacked lizard waits quietly for the grip to loosen, then takes his turn at biting. The exchange continues until one lizard runs away. Often, however, it is the biter, not the bitten, that does the fleeing. The loser apparently recognizes the superiority of the winner not only by the strength of the latter's bite but also by his unyielding resistance to being bitten.

Understanding _____

Stop.

Do not turn the page.

Rating Check

- 1) Aggressive behavior which seems to be characteristic of nearly all vertebrates serves several useful purposes. Name one.

- 2) Fights between individuals of the same species (a) often (b) rarely (c) never end in serious injury to both/either participant(s).

- 3) The universality of fighting among animals would imply that aggressiveness has been favored by

- 4) Current research seems to indicate that aggressive behavior is learned by the species.
True _____ False _____
- 5) An animal may surrender and avoid further injury by assuming a _____.
- 6) This mechanism for avoiding serious injury is particularly valuable to human beings today due to new technological advances.
True _____ False _____
- 7) The lava lizard "fights" until one of the participants is killed.
True _____ False _____
- 8) Other lizards may be victorious in a fight by their ability to withstand _____.
- 9) In a _____ struggle, participants compare their strength in bodily contact without inflicting serious injury on each other. _____
- 10) The fact that ceremonial fighting routines are highly characteristic for each species and are faithfully followed in fights among members of the species has been used to conclude that aggressiveness is _____.

- 11) Biting animals that can kill or serious injure one another are usually also capable of _____.
- 12) A young dog who throws itself on its back exposing its belly is exhibiting a _____.
- 13) Unlike males, female iguanas often engage in damaging fights.
True _____ False _____
- 14) A male iguana performs a "display" as a last ditch effort to drive off an intruder.
True _____ False _____
- 15) List one reason why fighting may occur.

USING PARAPHRASING
(FOR IMPROVING COMPREHENSION AND RETENTION)

Introduction to the Paraphrase Connection Technique

In this part of the program we will be teaching you a connection technique that will help you form effective organizational and incidental connections or cues.

During your years at school, you have done a lot of studying, and have quite a bit of experience in trying to remember material at the time of a test. You may feel that you know the material well and do in fact perform well on exams; but maybe you aren't completely satisfied with the results, either because you don't remember all that you need to or because your studying takes too long. Actually, people aren't taught how to study in the same way that they are taught to add or subtract or do long division. They are just expected to pick it up as they go along. Our investigations have shown that students most commonly use just two study methods: note-taking and underlining. These are perfectly good study methods but they are not complete. They are simply methods to collect and record material that needs to be remembered.

You have probably had the experience of reading a chapter in a book and remembering practically nothing of what you read. This occurs because fixing something in your memory is an active process. You have to do something with the material in order to fix it in memory. And, as a matter of fact, you now know that what you have to do with the material is establish additional connections or cues which will let you find it when you need it. It is this part of the process that is usually left out in note-taking and underlining. People spend a lot of effort in reviewing "underlined" or "note" material but they often merely read it, a method which only refreshes the connections or cues which were established in the first reading. It doesn't give any opportunity to build new connections.

In paraphrase training you read material and after every paragraph or so, you form a paraphrase or summary of the material that you have read. This requires active processing because in order to form the paraphrase you have to select the important ideas presented and determine how these ideas are related to each other. Furthermore, the forming of a paraphrase produces new memory connections in addition

to those normally developed during "straight" reading. The more novel or unique you make the paraphrase, the more effective the incidental connections will be for retrieval.

Paraphrasing is a very efficient way of remembering material because it is a way of putting the ideas presented in your own words. Research has shown that students remember ideas stated in their own words far better than ideas stated by another person. So when you need to remember the material, you simply call up your novel paraphrase to find the information.

We have found that the paraphrasing technique is very helpful in studying, but we are not promising that it is an easy, no-work solution to learning academic material. Like any other skill you might find useful, the paraphrase technique is difficult to use when you first start. It seems so much faster just to read straight through a passage without stopping, and of course it is faster, but speed doesn't pay off if you can't remember what you have read. As you practice the paraphrasing technique it will get easier and more automatic. In the long run, if you do practice the technique, you will be able to make substantially more efficient use of your study time.

Let's put it this way. Learning to study is very much like learning a new sport.-- The key to success is hard work on the fundamental skills. Some of you may start getting bored and tired as you go through the connection training exercises. However, you should remember that working hard during this program will save you time and effort in studying for your Trade Advancement Examination.

If there aren't any questions we are now ready to start with the first part of your Paraphrase Connection Technique Training.

The Relationship Between the Passage
and the Paraphrase

We are going to start by giving you experience with paraphrases that are not particularly unique. These paraphrases do, however, provide an alternate way of viewing the main ideas presented in the passage and, consequently should help you understand and remember the material.

For the present you will be given four paragraphs. Underneath each paragraph is a paraphrase that we have especially constructed to help in remembering the material presented in the paragraph. Parts of the first paraphrase have been circled and numbered to give an example. You are to circle and number the parts of the other paraphrases in the same manner. You will then turn the page and see if your circling and numbering of the paragraph corresponds to ours. By doing this you can see what we thought the main ideas of the paragraph were, and you can also see what we mean by a relevant paraphrase.

You will have ten minutes to go through the paragraphs.

Are there any questions on how to proceed?

Since trout often live in clear lakes and streams, care must be taken to remain unseen. The best fishermen often crawl on their bellies to the edge of the streams or cast from behind a screen of bushes.

Paraphrase:

In order to not be seen by trout living in clear water, the best fishermen either crawl to the edge of the stream or cast from behind bushes.

The most hopeful sign for the future is the attempt by the rebellious young to reject our social values. Their protests indicate that mankind is becoming disturbed by increasing dehumanization and so may act in time to reverse the trend. Despite so many intellectual and ethical setbacks, despite so much evidence that human values are being spoiled or cheapened, despite the massive destruction of beauty and of natural resources, as long as there are rebels in our midst, there is reason to hope that our society can be saved.

Circle and number the parts of the paraphrase below.

Paraphrase:

There is still hope for our society while there are young rebels in our midst protesting the destruction of our natural resources, the cheapening of our human values, and the dehumanization of man.

Then turn the page to compare your circling and numbering with ours.

The most hopeful sign for the future is the attempt by the rebellious young to reject our social values. Their protests indicate that mankind is becoming disturbed by increasing dehumanization and so may act in time to reverse the trend. Despite so many intellectual and ethical setbacks, despite so much evidence that human values are being spoiled or cheapened, despite the massive destruction of beauty and of natural resources, as long as there are rebels in our midst, there is reason to hope that our society can be saved.

Paraphrase:

There is still hope for our society while there are young rebels in our midst, protesting the destruction of our natural resources, the cheapening of our human values, and the dehumanization of man.

Cancer is still an unsolved problem. Its incidence has increased in proportion to the aging of the population. Although many early cases can be cured through surgical operations, X-ray, and radium, yet a large-scale attack is impossible unless its cause and pathogenesis are known. Biochemistry may solve this problem also, unless we are faced with a biological principle that still escapes us. It is extremely difficult to understand the biology of the cancer cell because it reacts differently from all other cells. In a differentiated organism the cells form a social community. They are specialized and co-operate in a perfect way. The cancer cell is asocial. It goes its own way, has its own metabolism, thrives at the expense of the organism like a parasite, destroys it and in so doing destroys itself. This is against all rules and therefore is difficult to conceive.

Circle and number the parts of the paraphrase below.

Paraphrase:

Even though some early cases of cancer can be cured through surgery, X-ray, and radium, a large-scale attack is not yet possible because it is extremely difficult to understand the biology of the cancer cell. Unlike cells in a differentiated organism

which form a social community, specializing and co-operating perfectly, the cancer cell is asocial and breaks all the rules. The cancer cell goes its own way, has its own metabolism, is parasitic and destroys both the organism and itself.

Then turn the page to compare.

Cancer is still an unsolved problem. Its incidence has increased in proportion to the aging of the population. Although many early cases can be cured through surgical operations, X-ray, and radium, yet a large-scale attack is impossible unless its cause and pathogenesis are known. Biochemistry may solve this problem also, unless we are faced with a biological principle that still escapes us. It is extremely difficult to understand the biology of the cancer cell because it reacts differently from all other cells. In a differentiated organism the cells form a social community. They are specialized and co-operate in a perfect way. The cancer cell is asocial. It goes its own way, has its own metabolism, thrives at the expense of the organism like a parasite, destroys it and in so doing destroys itself. This is against all rules and therefore is difficult to conceive.

Paraphrase:

1
Even though some early cases of cancer can be cured through surgery, X-ray and radium, a large-scale attack is not yet possible because it is extremely difficult to understand the biology of the cancer cell.

2
Unlike cells in a differentiated organism which form a social community, specializing and co-operating perfectly, the cancer cell is asocial and breaks all the

rules. The cancer cell goes its own way, has its own metabolism, is parasitic and destroys both the organism and itself.

Psychologists as well as parents have observed that order of birth in a family often affects the personality of the developing child. There is no biological factor at work; the effects depend on the relations of children with parents and siblings. The first-born usually gets more attention (often more anxious over-protection) than later children and is likely to be more oriented to adults than to children. For a time he has the status of only child and may be upset by the birth of a rival. The youngest child may be pampered because he or she is the baby of the family. Second or middle children may feel left out, as having the status of neither eldest nor "baby". On the other hand, they may have a warmer relation with the mother than a first-born because the mother is less anxious and tense. Obviously the parents' behavior toward their children can make the birth-order problem anything from minor to traumatic.

Circle and number the parts of the paraphrase below.

Paraphrase:

Depending upon the parents' behavior, birth order may strongly affect the personality of the child.

First-borns usually get more attention, are more adult

oriented, and are likely to be upset by the birth of a rival. The youngest child may be pampered and middle children may feel left out. However, these later borns may have a warmer relationship with their mother than a first born.

Then turn the page to compare.

Psychologists as well as parents have observed that order of birth in a family often affects the personality of the developing child. There is no biological factor at work; the effects depend on the relations of children with parents and siblings. The firstborn usually gets more attention (often more anxious overprotection) than later children and is likely to be more oriented to adults than to children. For a time he has the status of only child and may be upset by the birth of a rival. The youngest child may be pampered because he or she is the baby of the family. Second or middle children may feel left out, as having the status of neither eldest nor "baby". On the other hand, they may have a warmer relation with the mother than a firstborn because the mother is less anxious and tense. Obviously the parents' behavior toward their children can make the birth-order problem anything from minor to traumatic.

Paraphrase:

① Depending upon the parents' behavior, birth order may strongly affect the personality of the child.

② Firstborns usually get more attention, are more adult oriented, and are likely to be upset by the birth of

③ a rival. The youngest child may be pampered and middle children may feel left out. However, these later borns

④ may have a warmer relationship with their mother than a first born.

Step-by-Step Construction of Paraphrases

We will now give you two paragraphs, one of which you have already seen in the first section, and we will show you, in a step-by-step fashion, how the paraphrases have been constructed. You will notice that in formulating a paraphrase we first choose the main idea of the paragraph and then add the specific facts that have been presented. The underlining indicates which portion of the paragraph has been included in a particular version of the paraphrase. In this part of the pre-training you are to closely observe how these paraphrases were constructed because in the next series of exercises you will be asked to construct your own.

You will have ten minutes to go through the two paragraphs. When you reach the next set of instructions please stop.

Cancer is still an unsolved problem. Its incidence has increased in proportion to the aging of the population. Although many early cases can be cured through surgical operations, X-ray, and radium, yet a large-scale attack is impossible unless its cause and pathogenesis are known. Biochemistry may solve this problem also, unless we are faced with a biological principle that still escapes us. It is extremely difficult to understand the biology of the cancer cell because it reacts differently from all other cells. In a differentiated organism the cells form a social community. They are specialized and co-operate in a perfect way. The cancer cell is asocial. It goes its own way, has its own metabolism, thrives at the expense of the organism like a parasite, destroys it and in so doing destroys itself. This is against all rules and therefore is difficult to conceive.

Paraphrase:

...it is extremely difficult to understand the biology of the cancer cell. Unlike cells in a differentiated organism which form a social community, specializing and co-operating, the cancer cell is asocial...

FIRST STAGE

Cancer is still an unsolved problem. Its incidence has increased in proportion to the aging of the population. Although many early cases can be cured through surgical operations, X-ray, and radium yet a large-scale attack is impossible unless its cause and pathogenesis are known. Biochemistry may solve this problem also, unless we are faced with a biological principle that still escapes us. It is extremely difficult to understand the biology of the cancer cell because it reacts differently from all other cells. In a differentiated organism the cells form a social community. They are specialized and cooperate in a perfect way. The cancer cell is asocial. It goes its own way, has its own metabolism, thrives at the expense of the organism like a parasite, destroys it and in so doing destroys itself. This is against all rules and therefore is difficult to conceive.

Paraphrase:

...it is extremely difficult to understand the biology of the cancer cell. Unlike cells in a differentiated organism which form a social community, specializing and co-operating, the cancer cell is asocial and breaks all the rules. The cancer cell goes its own way, has its own metabolism, is parasitic, and destroys both the organism and itself.

SECOND STAGE

Cancer is still an unsolved problem. Its incidence has increased in proportion to the aging of the population. Although many early cases can be cured through surgical operations, X-ray, and radium yet a large-scale attack is impossible unless its cause and pathogenesis are known. Biochemistry may solve this problem also, unless we are faced with a biological principle that still escapes us. It is extremely difficult to understand the biology of the cancer cell because it reacts differently from all other cells. In a differentiated organism the cells form a social community. They are specialized and cooperate in a perfect way. The cancer cell is asocial. It goes its own way, has its own metabolism, thrives at the expense of the organism like a parasite, destroys it and in so doing destroys itself. This is against all rules and therefore is difficult to conceive.

Paraphrase:

Even though some early cases of cancer can be cured through surgery, X-ray and radium, a large-scale attack is not yet possible because it is extremely difficult to understand the biology of the cancer cell. Unlike cells in a differentiated organism which form a social community, specializing and co-operating perfectly, the cancer cell is asocial and breaks all the rules. The cancer cell goes its own way, has its own metabolism, is parasitic and destroys both the organism and itself.

FINAL PRODUCT

The earliest "psychiatry" of which we have any knowledge was that practiced by stone age cave men some half million years ago. For certain forms of mental illness, probably those where the patient complained of severe headaches and developed convulsive attacks, the early medicine man treated the disorder by means of an operation called trephining in which one area of the skull was chipped away in the form of a circle until the skull was chipped through. This opening called a trephine, presumably permitted the evil spirit which was causing all the trouble to escape, and incidentally may have relieved a certain amount of pressure on the brain. In some cases trephined skulls of primitive men show healing around the opening, indicating that the individual survived the operation and lived for many years afterward.

Paraphrase:

The earliest "psychiatry" occurred a half a million years ago when cavemen suffering from mental illness marked by severe headaches and convulsive attacks were given an operation called trephining...

FIRST STAGE

The earliest "psychiatry" of which we have any knowledge was that practiced by stone age cave men some half million years ago. For certain forms of mental illness, probably those where the patient complained of severe headaches and developed convulsive attacks, the early medicine man treated the disorder by means of an operation called trephining in which one area of the skull was chipped away in the form of a circle until the skull was chipped through. This opening called a trephine, presumably permitted the evil spirit which was causing all the trouble to escape, and incidentally may have relieved a certain amount of pressure on the brain. In some cases trephined skulls of primitive men show healing around the opening, indicating that the individual survived the operation and lived for many years afterward.

Paraphrase:

The earliest "psychiatry" occurred a half a million years ago when cavemen suffering from mental illness marked by severe headaches and convulsive attacks were given an operation called trephining in which their skulls were chipped through in the form of a circle.

SECOND STAGE

The earliest "psychiatry" of which we have any knowledge was that practiced by stone age cave men some half million years ago. For certain forms of mental illness, probably those where the patient complained of severe headaches and developed convulsive attacks, the early medicine man treated the disorder by means of an operation called trephining in which one area of the skull was chipped away in the form of a circle until the skull was chipped through. This opening called a trephine, presumably permitted the evil spirit which was causing all the trouble to escape, and incidentally may have relieved a certain amount of pressure on the brain. In some cases trephined skulls of primitive men show healing around the opening, indicating that the individual survived the operation and lived for many years afterward.

Paraphrase:

The earliest "psychiatry" occurred a half a million years ago when cavemen suffering from mental illness marked by severe headaches and convulsive attacks were given an operation called trephining in which their skulls were chipped through in the form of a circle. The opening in the skull, called a trephine, was believed to permit evil spirits to escape. Actually it may have relieved some of the pressure on the brain.

THIRD STAGE

The earliest "psychiatry" of which we have any knowledge was that practiced by stone age cave men some half million years ago. For certain forms of mental illness, probably those where the patient complained of severe headaches and developed convulsive attacks, the early medicine man treated the disorder by means of an operation called trephining in which one area of the skull was chipped away in the form of a circle until the skull was chipped through. This opening called a trephine, presumably permitted the evil spirit which was causing all the trouble to escape, and incidentally may have relieved a certain amount of pressure on the brain. In some cases trephined skulls of primitive men show healing around the opening, indicating that the individual survived the operation and lived for many years afterward.

Paraphrase:

The earliest "psychiatry" occurred a half a million years ago when cavemen suffering from mental illness marked by severe headaches and convulsive attacks were given an operation called trephining in which their skulls were chipped through in the form of a circle. The opening in the skull, called a trephine, was believed to permit evil spirits to escape. Actually it may have relieved some of the pressure on the brain. Healed skulls of trephined persons have been found indicating that some patients survived the operation and lived many years afterwards.

Paraphrase Connections to Single Paragraphs

Now that you have had experience with some of our paraphrases we are going to give you a chance to construct your own. On the first page of this exercise there is a paragraph with a blank space beneath it. You are to read the paragraph and in the blank space write the paraphrase that you have formed. Then, when you are satisfied with your paraphrase turn both the page you are on and the following blank page and you will find the same paragraph with a paraphrase that we have constructed. Our paraphrase is to give you an idea of how a paraphrase could have been formed. It may help if you were having a hard time thinking of a paraphrase that captured all the main ideas. But remember, the paraphrase we provide is just a suggestion. It is certainly not the only way to form a paraphrase. In fact, in many cases your paraphrase will probably be much better than ours.

Remember, the more unique or unusual you can make your paraphrase the more memorable it will be. Our paraphrase was made in a standard fashion without an effort to create anything unusual, so your job is to make your paraphrase at least more unique than ours.

Are there any questions?

You will now construct paraphrases and receive feedback on four paragraphs after which we will stop and see if there are any questions. You will be given ten minutes to do these four exercises. Please do not hurry; it is not necessary for you to complete all four. If you do finish early, please go back and check over your work. Do not go further into the booklet.

The mountain Arapesh are poor people whose tiny villages cling to the sides of barren mountains. Their gardens perch on hillsides, difficult to fence off from the wild pigs.

Write your paraphrase below. Then turn to the page following the blank to check our paraphrase.

The mountain Arapesh are poor people whose tiny villages cling to the sides of barren mountains. Their gardens perch on hillsides, difficult to fence off from the wild pigs.

Paraphrase:

Arapesh have gardens on steep hillsides, making it hard to fence the gardens off from the wild pigs.

Americans and Spaniards at a bullfight provide a familiar example of how the same set of circumstances can be experienced differently. The American experiences the fear he would have if he were in the ring; the Spaniard, vicariously, the joy in the control the matador exercises over the bull.

Write your paraphrase below. / Then turn to the page following the blank to check our paraphrase.

Americans and Spaniards at a bullfight provide a familiar example of how the same set of circumstances can be experienced differently. The American experiences the fear he would have if he were in the ring; the Spaniard, vicariously, the joy in the control the matador exercises over the bull.

Paraphrase:

A bullfight can produce fear in an American and joy in a Spaniard, thus showing that the same set of circumstances can be experienced differently.

Synesthesia is a regular linking of the perception of a certain sensation with images from another sensory modality, producing a subjective sensation of a sense other than the one being stimulated. The most common form is "colored hearing" (chromesthesia), where certain sounds evoke images of colors.

Write your paraphrase below. Then turn to the page following the blank to check our paraphrase.

Synesthesia is a regular linking of the perception of a certain sensation with images from another sensory modality, producing a subjective sensation of a sense other than the one being stimulated. The most common form is "colored hearing" (chromesthesia), where certain sounds evoke images of colors.

Paraphrase:

Synesthesia occurs when the stimulation of one sense produces the subjective experience of another sense, as when sounds evoke images of colors.

To understand the behavior of an individual, the psychologist must have some understanding of the effect of the society in which the individual lives and was reared. Since so much of a person's behavior is determined by his relation to his society, we can understand him as an individual only if we understand how his behavior fits the expectations of his society and know when his behavior is deviating from such expectations.

- Write your paraphrase below. Then turn to the page following the blank to check our paraphrase.

To understand the behavior of an individual, the psychologist must have some understanding of the effect of the society in which the individual lives and was reared. Since so much of a person's behavior is determined by his relation to his society, we can understand him as an individual only if we understand how his behavior fits the expectations of his society and know when his behavior is deviating from such expectations.

Paraphrase:

Since society plays a large part in determining what is expected of an individual it is necessary to understand an individual's relationship to society in order to understand his behavior.

Further Instructions

O.K.! If there are no further questions you will now go through the next three paragraphs in the same way. Again you will be given ten minutes to do this. If you finish early you may go back and check your work. Please remember that you do not need to hurry.

By the process of ionization, electrons can be removed from the influence of the parent atom. These electrons, once removed from the atom, are capable of moving through the material under the influence of external forces. It is by virtue of the movement of these electrons that electrical energy is transported from place to place.

Write your paraphrase below. Then turn to the page following the blank to check our paraphrase.

By the process of ionization, electrons can be removed from the influence of the parent atom. These electrons, once removed from the atom, are capable of moving through the material under the influence of external forces. It is by virtue of the movement of these electrons that electrical energy is transported from place to place.

Paraphrase:

Electrical energy is transported by external forces moving electrons which have been removed from their parent atom by the process of ionization.

Emotional disorders are commoner in bedwetters (enuretics) than in nonbedwetters, but most children who are enuretic are psychiatrically normal. The relationship between emotional disturbance and enuresis holds true at all ages and is stronger for girl enuretics and for children who wet both at night and during the day.

Write your paraphrase below. Then turn to the page following the blank to check our paraphrase.

Emotional disorders are commoner in bedwetters (enuretics) than in nonbedwetters, but most children who are enuretic are psychiatrically normal. The relationship between emotional disturbance and enuresis holds true at all ages and is stronger for girl enuretics and for children who wet both at night and during the day

Paraphrase:

Bedwetters, especially girls and day and night wetters, are more likely to have emotional disturbances than nonbedwetters even though most of them are psychiatrically normal.

It has long been recognized that the group can be an awesomely powerful force for changing individual behavior. The problem is that, up until recently, group power has not been harnessed in the service of man. One possible reason for this scientific boycott is the widely held belief that groups act as a toxin to the human spirit, that their power is most often used to manipulate a person's actions in a manner antithetical to social values and personal dignity. The view of a group as a force for supporting anti-social acts is subscribed to by many scientists and laymen alike. Currently, for example, we are hearing much about the way teen-age groups (read "gangs") force youth into drugs, crime and disrespect for their elders.

Write your paraphrase below: Then turn to the page following the blank to check our paraphrase.

It has long been recognized that the group can be an awesomely powerful force for changing individual behavior. The problem is that, up until recently, group power has not been harnessed in the service of man. One possible reason for this scientific boycott is the widely held belief that groups act as a toxin to the human spirit, that their power is most often used to manipulate a person's actions in a manner antithetical to social values and personal dignity. The view of a group as a force for supporting anti-social acts is subscribed to by many scientists and laymen alike. Currently, for example, we are hearing much about the way teenage groups (read "gangs") force youth into drugs, crime and disrespect for their elders.

Paraphrase:

Teenage gangs forcing youths into drugs, crime and disrespect for their elders is an example of the way that both scientists and laymen view the destructive force of a group. While it is recognized that the group can be a powerful force for changing individual behavior, belief in its destructive nature has prohibited its use for the good of man until recently.

Instructions for Forming Cumulative Paraphrases

In the last training session you gained some experience in creating paraphrases to single, independent paragraphs. With most academic material, however, information is presented in multiple, related paragraphs. In such cases, it would seem reasonable to create paraphrases that include more and more of the material being presented. In this section of the program we will give you information and experience in expanding your paraphrases to include material presented in previous paragraphs. In essence we want you to form cumulative paraphrases, paraphrases that accumulate information as you proceed from paragraph to paragraph.

First it is necessary to give you a more specific idea of what we mean by cumulative paraphrases. In the following examples pairs of related paragraphs are presented with their associated paraphrases. As you will notice, the paraphrases to the second paragraph of a pair includes information from the first. Because of the new connections formed, putting paraphrases together in this way should make the information easier to remember.

For the next 15 minutes we would like you to look through the following 4 pairs of related paragraphs and their associated paraphrases. Please pay close attention to how these paraphrases have been created since you will be producing your own cumulative paraphrases in the next training exercise. Please ask for assistance if you have any difficulty understanding the process.

Asthenic reaction is a psychoneurotic syndrome marked by chronic tiredness. The asthenic person finds it hard to concentrate and lacks the energy to complete mental or physical work. He may say that he needs extra sleep, but he wakes up feeling worse than when he went to bed. He often complains of headache, indigestion or other bodily ailments. He tends to be listless and unable to cope with routine problems, though he may occasionally "wake up" and enjoy a card game or other specially interesting activity.

Paraphrase:

An asthenic reaction is a syndrome characterized by chronic tiredness. The asthenic person is always tired, no matter how much sleep he gets, finds it hard to concentrate, complains about bodily ailments, and seems unable to complete even the most routine task. Only occasionally will an especially interesting activity catch his attention and "wake him up". Was Rip Van Winkle suffering from an asthenic reaction?

At one time the condition was labelled neurasthenia (literally, "nerve weakness") and was attributed to exhaustion of the nerves from prolonged overwork. The treatment of choice was rest and relaxation. Psychologists now believe that the problem is not fatigue from too much work but is a reaction to prolonged stress and frustration. Temporary feelings of fatigue or listlessness are normal in the face of conflict and stress. But where others get over these problems, the neurotic man or woman makes tiredness a way of life. Neurasthenic symptoms have a certain value in that they serve as an excuse for failure and a means to get attention. Psychotherapy can help the asthenic patient change his pattern.

Paraphrase:

At one time an asthenic reaction which is marked by chronic tiredness was believed to be caused by overwork and was treated by rest and relaxation. Psychologists now think that such a reaction is due to prolonged stress and frustration. This reaction serves as an excuse for failure and as an attention-getting device. Psychotherapy, rather than rest and relaxation, is now used to change the person's behavior. Was Rip Van Winkle suffering from this reaction?

Determinism is the doctrine that every event has a cause or causes and that these antecedents completely explain the event. In philosophy, this brings up the question of free will: does man have any control over his destiny, or is it shaped by circumstances outside him?

Paraphrase:

Determinism is the doctrine that all events can be completely explained in terms of what has happened before. This raises the question of whether or not man has any control over his destiny. Many people are apparently determined to determine if they have free will.

Without necessarily answering this question, scientific psychology assumes a degree of determinism in behavior. Three categories of determinants are studied, usually as they interact to influence behavior. Biological factors include heredity, bodily constitution and physiological health and disease. Psychological determinants include emotions, drives, attitudes, conscious and unconscious conflicts and traumas, and learning experiences. Social and cultural factors include economic status, social status, customs and mores, and social conflicts.

Paraphrase:

Scientific psychology believes that behavior can be partially explained in terms of what has happened before. That is, behavior is determined by biological factors, psychological factors, and social and cultural factors.

Displacement is the process by which an emotion originally attached to a particular person, object or situation is transferred to something else. The unacceptable feelings are usually transferred from an object that is of central importance in the individual's life to an external object that is relatively harmless. A boy who is angry at his parents may kick a dog or clout a baseball instead of striking his father. He remains unaware of where his anger was originally focused.

Paraphrase:

Displacement is the unconscious process of transferring unacceptable feelings and actions toward a central figure in the individual's life to a relatively harmless external object. An example of this is a child who is mad at his father but tortures his dog instead.

The displacement of these feelings onto an animal enables him to live comfortably with his father and remains unchanged even after he leaves home and is living independently.

Paraphrase:

Displacement allows the individual to remain on comfortable terms with the original object of his hostility because he has transferred his unacceptable feelings and actions to something else. You can live with your father because you torture your dog.

Dominance relationships are a system of status within a social organization in which individuals occupy different ranks in respect to one another. Such systems, found in both human and animal societies, are sometimes called "pecking orders". The relationships may be based only on physical characteristics, such as strength or cunning, as in the case of most animal social organizations, but in the more complex human societies they usually depend on the acquisition of prestige symbols, such as titles or material possessions.

Paraphrase:

Dominance relationships, also called pecking orders, are the rankings of individuals within a social organization. In animal societies this ranking is usually based on strength or cunning, while in human societies the ranking is usually based on acquired possessions. Top dogs and top sergeants can peck at will.

Dominance relationships are usually hierarchical in nature and are subject to change through competitiveness by the members of the society. Psychologists and sociologists believe such an organization of relationships allows the group to remain intact and assures its survival against outside pressures.

Paraphrase:

Dominance relationships or rankings within a social group can be changed by competition between differently ranked individuals. This gives the under dog a chance. These dominance relationships keep the group intact and protect it from outside pressures.

Further Information on Forming
Cumulative Paraphrases

Now that you have some experience with our cumulative paraphrases we would like you to form some of your own. As in the earlier exercise you will read a paragraph, write your paraphrase beneath it, and then turn the next page to see the paraphrase we have created in order to give you some further ideas. In this section pairs of paragraphs will contain related material so that the second paraphrase you form should contain, when possible, the information presented in both paragraphs.

As before, most of our paraphrases are pretty tame so your job is to create paraphrases that are at least more unusual than ours.

You will be given 15 minutes to go through as many of the next 5 pairs of paragraphs as you can. There is no hurry; there is no need to go through all of them. This is just practice. If you should get to the next set of instructions before the time is up, please stop.

ANY QUESTIONS?

If he goes to live in another culture, the learning process is often reactivated. For most Americans tied down at home this is not possible.

Paraphrase

If a person moves to another culture the learning process is often reactivated, but this is not possible for most Americans.

The varieties of wines are beyond count, not only because every year there is a new tide of all kinds of wines flowing in from all the vineyards of the world, but also because the wines made from the grapes of those same vineyards in previous years change for better or worse with age. There are, however, three main great classes or divisions of wines called Table Wines, Sparkling Wines and Fortified Wines.

Write your paraphrase below.

The varieties of wines are beyond count, not only because every year there is a new tide of all kinds of wines flowing in from all the vineyards of the world, but also because the wines made from the grapes of those same vineyards in previous years change for better or worse with age. There are, however, three main great classes or divisions of wines called Table Wines, Sparkling Wines and Fortified Wines.

Paraphrase:

Although there are three main divisions of wines, the table wines, sparkling wines and fortified wines, the specific varieties of each are beyond count because of the production of new wines and the aging of stored wines.

The table wines are the beverage wines, with as little as 8% of alcohol or as much as 13%: they are mostly inexpensive wines with no claim to any attractive bouquet or finesse. The sparkling wines of which champagne is an example owe their effervescence to a carbonic acid gas, while the fortified wines have a much higher alcoholic content than the first two, due to the addition of brandy.

Write your paraphrase below.

The table wines are the beverage wines, with as little as 8% of alcohol or as much as 13%: they are mostly inexpensive wines with no claim to any attractive bouquet or finesse. The sparkling wines of which champagne is an example owe their effervescence to a carbonic acid gas, while the fortified wines have a much higher alcoholic content than the first two, due to the addition of brandy.

Paraphrase:

The three main divisions of wines are table wines which are inexpensive beverage wines with 8 - 13% alcohol content; sparkling wine, such as champagne, which has carbonic acid gas added to produce the effervescent quality, and fortified wines which have the highest alcohol content due to the addition of brandy.

Frozen foods are preserved by quick-freezing. This is done at a very low temperature, and the food must be kept at zero fahrenheit or below to retain its texture and flavor.

Write your paraphrase below.

Frozen foods are preserved by quickfreezing. This is done at a very low temperature, and the food must be kept at zero fahrenheit or below to retain its texture and flavor.

Paraphrase:

Some foods are quickly frozen at a very low temperature and then kept at zero fahrenheit or below to retain their texture and flavor.

Although foods will freeze at temperatures as high as 32 degrees Fahrenheit, the freezing process is slow and ruins the texture and flavor of the food. In a standard refrigerator, the freezer is mainly useful for storing commercially frozen food, not for home prepared foods.

Write your paraphrase below.

Although foods will freeze at temperatures as high as 32 degrees Fahrenheit, the freezing process is slow and ruins the texture and flavor of the food. In a standard refrigerator, the freezer is mainly useful for storing commercially frozen food, not for home prepared foods.

Paraphrase:

In order to retain texture and flavor, foods should be frozen quickly at temperatures lower than those available in standard refrigerator freezers. Thus such refrigerators are mainly useful for storing food that has been quick-frozen.

The greatest benefit derived from mixing sawdust with soil is physical, for it contains little nutrients. It loosens heavy soils and makes them easier to work.

Write your paraphrase below:

The greatest benefit derived from mixing sawdust with soil is physical, for it contains little nutrients. It loosens heavy soils and makes them easier to work.

Paraphrase:

Sawdust will make the soil looser and easier to work but not more fertile.

Sawdust increases the water-holding capacity of all types of soil because it will absorb up to four times its weight in water. Hence, a slightly sandy soil is improved too.

Write your paraphrase below:

Sawdust increases the water-holding capacity of all types of soil because it will absorb up to four times its weight in water. Hence, a slightly sandy soil is improved too.

Paraphrase:

Sawdust improves the water-holding capacity of, all soils.

Instructions on Forming

"Shorthand" Paraphrases

Most of the time it would be too time consuming to completely write out your paraphrases. A better procedure would be to form a paraphrase in your head and then write down a few notes to help you remember it. These notes would act like a "shorthand" paraphrase and might ultimately replace underlining and notetaking in your normal studying.

In this section of your training we would like to give you some experience on forming unusual, "shorthand" paraphrases. You will read a paragraph, form a paraphrase in your head, write down a few notes to help you remember the paraphrase, and then turn the next page to see our paraphrase for further ideas. In some of the examples we have provided a shorthand paraphrase as feedback. However, in most cases we have provided a more elaborate version in order to make our ideas clearer. Generally your paraphrases should be simpler than ours.

Some of the paragraphs in this section are related, so in these cases your later "shorthand" paraphrases should contain information from earlier paragraphs. As before, your job is to make your paraphrases more unusual than ours.

You will have 15 minutes to go through the next set of paragraphs. Remember, it is not necessary for you to hurry. Take your time and relax. If you reach the end of the booklet, please stop.

Remember, as in previous exercises, feel free to ask me for advice or assistance. I want to be sure you can use the paraphrasing strategy.

Early in the 1960s a researcher named Stunkard performed a simple but important experiment. He asked a group made up of obese and normal-weight subjects to visit his laboratory at breakfast time. They were given only one previous instruction: do not eat any food in the early morning hours before the visit to the laboratory. When they arrived, Stunkard had each visitor swallow a gastric balloon that continuously recorded their stomach contractions. Then, at regular fifteen-minute intervals, he asked the subjects, "Do you feel hungry?" They, in turn, answered "yes" or "no", giving Stunkard a measure of how stomach contractions correlate with subjective experiences of hunger. The results for normal subjects were predictable: their reports of hunger correlated directly with their stomach contractions. "For the obese, on the other hand, there (was) little correspondence between gastric motility and self-reports of hunger." In other words, "whether or not the obese subject (described) himself as hungry seems to have almost nothing to do with the state of his gut."

Turn back a page to confirm that you understand the procedure. Then you may continue.

Write your notes below.

Paraphrase:

Early in the 1960s, Stunkard had both normal weight and obese individuals swallow a gastric balloon that recorded their stomach contractions. He then asked them every fifteen minutes whether or not they were hungry. The hunger reports for normals correlated directly with their stomach contractions while those for obese people showed very little relationship to their contractions. . Apparently, feelings of hunger in an obese person are not related to the state of his stomach.

If the obese person does not experience hunger as a result of stomach contractions, then what does motivate him to eat - and overeat? This question intrigued Columbia University psychologist Stanley Schachter. Through a series of experiments, he came to the following conclusion: "Eating by the obese seems unrelated to any internal visceral state, but is determined by external food-related cues such as the sight, smell and taste of food." Schachter recognized, of course, that everyone's eating is, to some extent, influenced by his immediate environment. Most tourists, for example, are not hungry for meat after watching a gory bullfight. However, for normal people, situational factors are not dominant; whereas, for the obese, "internal state is irrelevant, and eating behavior is determined largely by external cues."

Write your notes below.

Paraphrase:

After a series of experiments, a psychologist named Schachter concluded that eating by fat people is determined by external food-related cues such as sight, smell and taste of food instead of the internal visceral state which produces hunger in normals. Although everyone's eating is influenced by the situation to some extent, these situational factors aren't nearly so dominant for normals as they are for obese people.

Although you may not need an engineering degree to operate your array of household appliances, it does help to know this much about electricity: appliances that heat electrically use vastly more electricity than light bulbs, radio and T.V. or electric motors.

Write your notes below.

Paraphrase:

Appliances which heat electrically such as toasters, irons and air conditioners require many times the amount of electricity of "non-heaters" such as radios, T.V.s and vacuum cleaners.

Your breakfast toaster may use nearly ten times as much current while it's on than the most powerful vacuum cleaner, while your electric iron requires more watts than a dozen light bulbs plus the radio. Air conditioners (heat pumps) are also heavy users of electricity.

Write your notes below.

Paraphrase:

Appliances which heat electrically such as toasters, irons and air conditioners require many times the amount of electricity of "non-heaters" such as radios, T.V.s and vacuum cleaners.

Imagine that you are visiting your first English pub and that your host challenges you to a game of darts. Never having played, you graciously decline and then, in the finest American spirit, run out, buy a set, and begin practicing in your hotel. After the first hundred tosses, you begin getting a feel for the game; by the next day, you're ready to go out and challenge the queen's finest.

Write your notes below.

Paraphrase:

Having been challenged to a game of darts in an English pub, you decline because of lack of experience, you practice for a day, and you are then ready to play.

You have learned your dart game well. But pretend that you were forced to practice your throws blindfolded with plugs in your ears. Could you ever perfect your toss under these conditions? No. Improvement would be impossible because you lacked the vital component of learning: feedback concerning your performance. Deprived of visual feedback, unable to gain knowledge of results concerning your throwing accuracy, your plight would be hopeless.

Write your notes below.

Paraphrase:

If you practiced your dart game blindfolded you would never improve because you could not see how you were doing (feedback) and you couldn't make corrections.

Paraphrase

Deciding When to Use Your Connection Technique

You now have had some experience on forming your own cumulative, "shorthand" connections. If practiced, this connection technique should dramatically improve your studying. However, you may have been wondering if the strategy doesn't take too much time. Well, there are two points to be considered here. First, the more you practice the technique, the faster and more automatic it will become. In fact, eventually it will be so automatic that it will not substantially slow down your reading speed. Second, it is not necessary to apply this technique after every paragraph. In this training session we want to help you learn how to decide when to use the technique.

Think about it this way. When you study a textbook, you make some decisions about what part of the text is important enough to demand intensive study. Maybe you also make decisions about how well you understand each passage or section. Certainly, that's what very efficient learners do. They decide how important a passage is, and whether they understand it well enough. Then they put that information together to decide whether they should give it more attention; that is, whether they should apply a connection technique of some sort.

For the purposes of this training program we are going to simplify this decision procedure somewhat. We want you to consider that all of the material that you will be reading is important. That is, consider that all of the material has some chance of appearing on a later test. This is certainly the case in your ATAT. Now, assuming that everything is important the only judgment you need to make after each paragraph is how well you understood the material. If you understood it very well and could remember it sufficiently to explain it to someone else there would be no reason to use the connection technique. However, if you did not understand it too well or if you thought you would have difficulty remembering it, you should apply the technique of forming unusual, cumulative, "shorthand" connections.

Now, the decision procedure that you should follow is this: read the paragraph, write the rating of your understanding in the blank provided, and if that rating is 6 or less, form an unusual, cumulative, "shorthand" connection to the material presented in the paragraph. If your rating is 7 or more, just proceed on to the next paragraph. If in doubt, it is better to form the connection than to skip over the material.

To gain practice on this technique we would like you to through a Scientific American article that has been broken down into paragraphs. After each paragraph you are to rate your understanding and, depending on your rating, form a "shorthand" connection. You can then turn the next page to see the connection that we have formed. In most cases we have provided you with a standard, total connection. Remember, your job is to make a "shorthand" connection that is more unusual than ours and one that is cumulative whenever possible.

Again, the rule is if your rating is 6 or less, you should form a connection. You will be given 15 minutes to go through the next set of paragraphs. Please stop when you get to the next instructions.

ANY QUESTIONS?

In population growth the human species is conspicuously out of line with the rest of the animal kingdom. Man is almost alone in showing a long-term upward trend in numbers; most other animals maintain their population size at a fairly constant level. To be sure, many of them fluctuate in number from season to season, from year to year or from decade to decade. Such fluctuations, however, tend to swing erratically around a constant average value. More commonly animal populations maintain a steady state year after year and even century after century. If and when the population does rise or fall permanently, because of some change in environment, it generally stabilizes again at a new level.

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Paraphrase:

The human population has continued to increase over a long period of time while almost all other animal populations have fluctuated around a constant average value.

This well-established fact of population dynamics deserves to be studied with close attention because the growth of human populations has become, in recent years, a matter of increasing concern. What sort of mechanism is responsible for such strict control of the size of populations? Each animal population, apart from man's, seems to be regulated in a homeostatic manner by some system that tends to keep it within not too wide limits of a set average density. Ecologists have been seeking to discover the nature of this system for many years.

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Paraphrase:

Because the growth of human population has become a matter of increasing concern, the work of ecologists in determining how other animals homeostatically limit their growth deserves considerable attention.

The prevailing hypothesis has been that population is regulated by a set of negative natural controls. It is assumed that animals will produce young as fast as they efficiently can, and that the main factors that keep population density within fixed limits are predators, starvation, accidents and parasites causing disease. On the face of it this assumption seems entirely reasonable; overcrowding should increase the death toll from most of these factors and thus act to cut back the population when it rises to a high density. On close examination, however, these ideas do not stand up.

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Paraphrase:

It has been hypothesized that animals produce young as fast as they can and that as overcrowding increases, death from predators, starvation, accidents and disease cut back the population to a lower level. This view of population regulation, however, does not seem to stand up under close examination.

The notions that predators or disease are essential controllers of population density can be dismissed at once. There are animals that effectively have no predators and are not readily subject to disease and yet are limited to a stable level of population. Disease per se does not act on a large scale to control population growth in the animal world. This leaves starvation as the possible control. The question of whether starvation itself acts directly to remove a population surplus calls for careful analysis.

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Paraphrase:

Predation and disease can be eliminated as the essential controllers of population because there are animals who maintain a stable population and yet have virtually no predators and are not readily susceptible to diseases. This leaves starvation as a possibility for further examination.

Even a casual examination makes it clear that in most animal communities starvation is rare. Normally all the individuals in the habitat get enough food to survive. Occasionally a period of drought or severe cold may starve out a population, but that is an accident of weather - a disaster that does not arise from the density of population. We must therefore conclude that death from hunger is not an important density-dependent factor in controlling population size except in certain unusual cases.

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Paraphrase:

Starvation seems like an unlikely candidate for the major factor controlling population because, except for occasional accidents of weather resulting in droughts or severe cold which starve out a population, starvation in most animal communities is rare.

Yet the density of population in the majority of habitats does depend directly on the size of the food supply; the close relation of one to the other is clear in representative situations where both variables have been measured. We have, then, the situation that no individual starves but the population does not outgrow the food supply available in its habitat under normal conditions.

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Paraphrase:

Although starvation in animal communities is rare, the population density does vary directly with the size of the food supply available.

For many of the higher animals one can see therefore that neither predators, disease nor starvation can account for the regulation of numbers. There is of course accidental mortality, but it strikes in unpredictable and haphazard ways, independently of population density, and so must be ruled out as a stabilizer of population. All these considerations point to the possibility that the animals themselves must exercise the necessary restraint!

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Paraphrase:

It may be that animals themselves exercise the necessary restraint in regulating their population. Since neither predators, disease nor starvation perform this function, and since accident mortality, though it certainly occurs, happens haphazardly and is thus independent of population density.

Man's own history provides some vivid examples of what is entailed here. By overgrazing he has converted once rich pastures into deserts; by overhunting he has exterminated the passenger pigeon and all but eliminated animals such as the white whale, the southern fur seal and, in many of their former breeding places, sea turtles; he is now threatening to exterminate all five species of rhinoceros inhabiting tropical Africa and Asia because the horns of those animals are valued for their alleged aphrodisiac powers. Exploiting the riches of today can exhaust and destroy the resources of tomorrow. The point is that animals face precisely this danger with respect to their food supply, and they generally handle it more prudently than man does.

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Paraphrase:

Man has not shown restraint in using available natural resources. Due to overgrazing, extermination of animals by overhunting, and elimination of species of exotic purposes, man is left with deserts and depleted animal species. Animals face the same problem with respect to their food supply but they handle it with much more restraint than humans.

Birds feeding on seeds and berries in the fall or chickadees living on hibernating insects in winter are in such a situation. The stock of food to begin with is so abundant that it could feed an enormous population. Then, however, it would be gone in hours or days, and the birds must depend on this food supply for weeks or months. To make it last through the season the birds must restrict the size of their population in advance. The same necessity holds in situations where unlimited feeding would wipe out the resources that replenish the food supply. Thus, the threat of starvation tomorrow, not the hunger itself today, seems to be the factor that decides what the density of a population ought to be. Long before starvation would otherwise occur, the population must limit its growth in order to avoid disastrous over-exploitation of food resources.

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Paraphrase:

The factor that seems to determine the population density is the threat of starvation in the future, not present hunger. Although for birds feeding on seeds and berries in the fall the stock of food is so abundant that it could feed a huge population; at the fall rate of consumption the food would be gone in a matter of days rather than the weeks or months it will have to last. Thus, the population must limit its growth in advance in order to avoid over-exploitation of its food resources.

All this implies that animals restrict their population density by some artificial device that is closely correlated with the food supply. What is required is some sort of automatic restrictive mechanism analogous to the deliberate conventions or agreements by which nations limit the exploitation of fishing grounds.

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All this implies that animals restrict their population density by some artificial device that is closely correlated with the food supply. What is required is some sort of automatic restrictive mechanism analogous to the deliberate conventions or agreements by which nations limit the exploitation of fishing grounds.

Paraphrase:

- To explain animals' restriction of population density there must be some restrictive mechanism that is closely correlated with food supply. Perhaps the mechanism would be analogous to the agreements by which nations limit exploitation of fishing grounds.

One does not need to look far to realize that animals do indeed possess conventions of this kind. The best known is the territorial system of birds. The practice of staking out a territory for nesting and rearing a family is common among many species of birds. In the breeding season each male lays claim to an area of not less than a certain minimum size and keeps out all other males of the species; in this way a group of males will parcel out the available ground as individual territories. If a male is unsuccessful in gaining a territory he will be forced to leave the area, thus limiting overcrowding. This is a perfect example of an artificial mechanism geared to adjusting the density of population to the food resources. Instead of competing directly for the food itself, the members compete furiously for pieces of ground, each of which then becomes the exclusive food preserve of its owner. If the standard territory is large enough to feed a family, the entire group is safe from the danger of over-taxing the food supply.

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Paraphrase:

The territorial system of birds which involves staking out a territory for nesting and rearing a family provides an example of a convention that restricts the population size. According to the convention of territoriality a group of males in a species compete for individual territories in the available ground, thus putting a limit on crowding. If these territories contain sufficient food to feed a family then the entire group is safe.

Grade AA or Grade A eggs are top quality, with a large amount of firm white, and a well-rounded, high-standing yolk. While good for all uses, their high quality and freshness are most appreciated for poaching, frying or boiling in the shell.

Write your paraphrase below

Grade AA or Grade A eggs are top quality, with a large amount of firm white, and a well-rounded, high-standing yolk. While good for all uses, their high quality and freshness are most appreciated for poaching, frying or boiling in the shell.

Paraphrase:

Grade A and AA eggs, which have large, firm whites and high-standing yolks, are of the highest quality and are good poached, boiled, fried or any other way.

Grade B and Grade C eggs have thinner whites and the yolks tend to flatten out. They are especially useful in omelets, salad dressings and for combining with foods, as they have the same food value as top-grade eggs.

Write your paraphrase below.

Grade B and Grade C eggs have thinner whites and the yolks tend to flatten out. They are especially useful in omelets, salad dressings and for combining with foods, as they have the same food value as top-grade eggs.

Paraphrase:

Although Grade B and C eggs have thinner whites and flatter yolks, they have the same food value as higher grade eggs and are very useful in combination with other foods.

Man's tremendous brain has endowed him with a drive and a capacity for learning which appear to be as strong as the desire for food or sex. This means that when a middle-aged man stops learning he is often left with a great drive and highly developed capacities.

Write your paraphrase below.

* Man's tremendous brain has endowed him with a drive and a capacity for learning which appear to be as strong as the desire for food or sex. This means that when a middle-aged man stops learning he is often left with a great drive and highly developed capacities.

Paraphrase:

Man's drive and capacity for learning appear to be as strong as his drive for food or sex, so when a middle-aged man stops learning he's left with a great drive and highly developed capacities.

If he goes to live in another culture, the learning process is often reactivated. For most Americans tied down at home this is not possible.

Write your paraphrase below: