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THE EFFECTS OF ADVANCE ORGANIZERS AND DIFFERENT METHODS OF SYMBOLIC CODING ON TRAINING OUTCOMES

By

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ABSTRACT

THE EFFECTS OF ADVANCE ORGANIZERS AND DIFFERENT METHODS OF SYMBOLIC CODING ON TRAINING OUTCOMES

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Using an information processing perspective, this research was designed to investigate the linkage between previous knowledge and new learning on training outcomes by examining three variables: advance organizers, symbolic coding, and cognitive ability. The research was broken down into two studies. In the first study, the effects of advance organizers and cognitive ability were examined in the absence of symbolic coding. The results indicated that cognitive ability had a positive effect on retention and generalizability and a negative effect on self-efficacy. In the second study, using a 2 (Symbolic Coding) X 2 (Pre-training Information) design, analyses also revealed a positive effect of ability on retention and generalizability. In addition, symbolic coding had an effect on retention through a mediating variable, learning. Implications for training and future research are discussed.

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INTRODUCTION

Billions of dollars are being spent in today's workplace with the hopes of imparting new knowledge on the workforce (Michilak, 1981). However, much of the knowledge and skills learned in training are either not retained or are difficult to generalize from the training situation to the actual work. Such training is not only a waste of time for the trainees, but a financial loss for the organization sponsoring the training.

Pre-training factors such as a trainee's readiness or a trainee's motivation in the training have a substantial influence on the effectiveness of various training approaches. Another pre-training factor is the trainee's previous knowledge base and the structure of that knowledge. Training programs often do not take into account the trainee's knowledge background in the construction of various programs. One example is the training of assertiveness skills to employees. Training may provide the knowledge of how to be assertive, and even demonstrate the appropriate steps to take in a situation. Yet, the trainee may have learned to be assertive in a particular situation exemplified in training, and may be unable to transfer this newfound skill to a different situation that arises on their

own individual job. If the training had been structured around the background knowledge already in the trainee's cognitive framework, this new information might not only be encoded more accurately and retained longer, but a general structure could be provided that was not situation-specific.

Taking an information processing view, this study examines the linkage between previous knowledge and new learning in a behavior modeling context. The process of acquiring new information involves effectively gathering, storing, and retrieving new material. The proficiency of this information processing can have an effect on the outcomes of training programs. This research study examines three issues that can affect the gathering, storing, and retrieval of new information which, in turn, can affect such training outcomes as the retention and generalizability of new training material, a trainee's self-efficacy and the quality of generated learning points. First, researchers have suggested that the use of advance organizers, introductory materials constructed at a high level of generality and inclusiveness to serve an assimilative role for new learning material, could be beneficial in their application to training (Goldstein, 1991; Howell & Cooke, 1989). Not only should the trainee's background knowledge be taken into account, but advance organizers provide a method by which this background knowledge can be used to increase the learning, retention, and generalizability of training material. What these mechanisms are and how they

can be applied to aid in the efficient processing of information, however, has never been fully understood in the context of training in work organizations. Second, a key component of behavior modeling training is the use of learning points to serve as a summary of the key behaviors required to perform the task (Decker & Nathan, 1985). The second factor in this study is the symbolic coding of these learning points through different methods. In particular, providing trainees with learning points and having trainees' generate their own are two symbolic coding methods that are examined in this study. Third, cognitive ability has been shown to be a useful predictor of job performance (Dunnette, 1976; Hunter, 1986) and skill acquisition (Ackerman & Humphreys, 1990). Individuals with higher levels of cognitive ability are viewed as being more efficient processors of information in gathering, storing, and retrieving new information in a more organized fashion. Cognitive ability's effect on linking previous knowledge to training material is also explored in this study.

In summary, all three variables have been suggested to aid in not only the gathering and storing of new information, but in the retrieval of this information as well. This study examines how they jointly affect the information processing of new material in the context of the training outcome measures of retention, generalizability, self-efficacy, and quality of learning points generated.

Advance Organizers

Conceptual history. Advance organizers were derived from the work of Ausubel (1963, 1968) in relation to new meaningful learning, or the learning of material that specifies an incorporation of new information into the individual's cognitive structure. Ausubel asserted that the individual's existing cognitive structure, both the content of the knowledge and its organizational properties, is the most important factor influencing meaningful learning and retention. Meaningful material is learned in relation to the individual's previous learned background of concepts, principles, and information. The more clear, stable, organized, and accurate the individual's background, the more likely it will be that new information will be learned and retained (Ausubel, 1968).

In meaningful learning, it is impossible to think of new learning outside the realm of one's existing cognitive structure because this new information must somehow be incorporated into the individual's existing cognitive structure. Prior experience is conceptualized by Ausubel (1968) as a cumulatively acquired, hierarchically organized, established body of knowledge which can be related either positively or negatively to the new learning task. Ausubel defines this transfer situation as existing whenever an individual's cognitive structure influences new cognitive functioning, irrespective of whether it is in regard to initial learning or problem solving (Ausubel, 1968).

Several factors influence the learning and retention of new meaningful information (Ausubel, 1968). The first factor is the availability in the cognitive structure of relevant anchoring ideas at a level of abstraction or inclusiveness appropriate to provide optimal reliability and anchorage for the to-be-learned material. The second factor is the extent to which the new information is discriminable from the established structures into which it is assimilated or that might be assimilated into the new information. Ausubel (1968) asserts that discriminable categorical information (information of a category that "stands out" from other information) of more inclusive established meanings are more likely to be retained over the long-term. The third and final factor that affects the learning and retention of meaningful material is the stability and clarity of the anchoring ideas. If the anchoring ideas are ambiguous and unstable, they not only relate poorly to the new material, but they also cannot be easily discriminated from them. For example, an unstable anchoring idea will change in its relationship to the to-be-learned material depending on factors like the situation.

The concept of anchoring ideas and the factors affecting the learning and retention of meaningful material led to the concept and application of advance organizers. Advance organizers are the principal strategy espoused by Ausubel (1968) to enhance the learning and retention of new meaningful material. These advance organizers are

introductory materials constructed at a high level of generality and inclusiveness whose relevance to the learning task is made explicit, to serve an assimilative role, rather than relying on the spontaneous availability or use of appropriate anchoring ideas in cognitive structure (Ausubel, 1968). These organizers are not to be confused with summaries and overviews which present information at the same level of abstraction, generality, and inclusiveness as the learning material itself by emphasizing the important points of the material and omitting the less important information. Advance organizers, on the other hand, serve the function of bridging the gap between what the individual already knows and what he/she needs to know before he/she can successfully learn the task at hand.

The rationale for using advance organizers is based primarily on the importance of using relevant and appropriately established ideas already in an individual's cognitive structure to make new learning material potentially meaningful and give the material stable and clear anchorage (Ausubel, 1968). The use of advance organizers is also based on the advantages of using the more general and inclusive ideas or subsumers for the new information. In addition, advance organizers identify the relevant content in the individual's cognitive structure and their own relevance for the new learning material.

Advance organizers have two functions (Ausubel, 1968): (1) to provide a structure for the learning and retention of

more detailed and differentiated material that follows in the learning material, and (2) to increase the discriminability between the learning material and similar or conflicting ideas already in the individual's cognitive structure. The organizers not only give the learner a general structure of the more detailed information in advance of his/her actual confrontation with it, but also provide organizing elements that are inclusive of and take into account the particular content contained in the material.

Ausubel (1968) makes note of two kinds of advance organizers. The first kind of advance organizer is an expository organizer that is used with material that is unfamiliar to the learner. These subsumers furnish ideational anchorage in terms that are already familiar to the learner. In learning unfamiliar material, this organizer might include whatever established and relevant knowledge presumably exists in the individual's cognitive structure that would make the learning material more easily comprehended. A second kind of advance organizer is the comparative organizer that is used in the case of relatively familiar learning material. Its function is to integrate new ideas with similar concepts in cognitive structure, as well as to increase the discriminability between new and existing ideas which are different but can be easily confused. This organizer might point out ways in which the two concepts are similar and different. The use of either

of these organizers makes the relevance of the anchoring ideas to the learning material more explicit and is itself more related to the differentiated content of the material to be learned.

Empirical work. Substantial amounts of research on the effectiveness of advance organizers can be found in the educational literature. While this research contains conflicting results regarding the effectiveness of advance organizers, some basic tenants regarding the effective use of advance organizers can be stated. This section highlights some of those common themes in relation to the use of advance organizers.

The research on advance organizers begins with Ausubel's series of studies designed to examine the effects of advance organizers on learning from text (Ausubel, 1960; Ausubel & Fitzgerald, 1961, 1962; Ausubel & Youssef, 1963). In a typical study, (i.e., Ausubel & Youssef, 1963), subjects would read either a comparative advance organizer displaying the differences between Buddhism and Christianity or a historical introduction prior to reading a passage on Buddhism. Retention for the passage was higher for the advance organizer group based on the assumption that the advance organizer helped the subjects learn Buddhism using existing concepts in their own cognitive structures.

Recent work has tested the parameters of Ausubel's subsumption theory, providing a slight modification on his work. This work has examined the validity of fundamentally

different views of how an advance organizer influences learning (Derry, 1984). On one hand, the assimilation encoding hypothesis proposes that an advance organizer will facilitate the process by which material is subsumed by more inclusive anchoring ideas. In this subsumption, the material to be learned and the anchoring knowledge are combined so that the details of the discourse are obscured and the higher order ideas that are related to the schema are enhanced (Mayer 1975a). On the other hand, Ausubel proposed the schema + correction hypothesis which argues that advance organizers do not obliterate the relevant factual detail in the "to be learned" material. Instead, advance organizers increase the discriminability between the text information and the anchoring ideas.

Derry (1984) tested the differences between Mayer's assimilation encoding view, Ausubel's schema + correction view, and a third view which combines the two views mentioned above entitled assimilation + correction. The assimilation encoding view describes the integrating function of the organizer on incoming information and the schema + correction view highlights the role played by the organizer in enhancing the discriminability of new material from the anchoring ideas of the subsumer. The assimilation + correction view asserts that both occur simultaneously as part of the same learning mechanism (Derry, 1984). This system suggests the operation of a dual-encoding system whereby schema-consistent ideas are assimilated into prior

active knowledge, and novel and inconsistent details are added to memory as discrete schema corrections. Schema-consistent information is thought to lose detailed specificity at encoding and will be difficult to be retrieved at a later date, whereas modifying details should be enhanced (Derry, 1984). The results of Derry's (1984) research favored the assimilation + correction view. The prevalent effect was assimilatory loss of detail associated with information consistent with the schema (Derry, 1984).

Two meta-analyses have examined the effects of advance organizers on the learning and retention of information (Luiten, Ames, & Ackerson, 1980; Stone, 1983). These meta-analyses have found small, but facilitative effects for advance organizers in measuring learning and retention. In his review of the advance organizer research, Mayer (1979b) developed four important parameters for the use of advance organizers in regards to the structure of the learning material, the characteristics of the subjects, and the outcomes of using advance organizers. These parameters can help to explain the small, facilitative effects found in the research. First, advance organizers have a stronger effect for poorly organized or structured material than for well organized material. This finding has been fairly well documented in the advance organizer research (Daniels & Whitman, 1981; Mayer, 1978; Schumacher, Liebert, & Fass, 1975). If the material is not well organized, the advance organizer provides the learner with a structure to encode

the new material. Second, advance organizers should have a stronger positive effect for learners lacking prerequisite knowledge. While supported by Ausubel's work (Ausubel & Fitzgerald, 1961, 1962; Ausubel & Youssef, 1963), subsumption theory predicts that advance organizers should have a stronger effect for learners who lack the prerequisite knowledge. Those who already possess the prerequisite knowledge have their own structure in regards to the new material. Third, advance organizers should have an especially strong effect on measures of transfer rather than retention. Advance organizers provide the individual with a general structure that is applicable to more than one situation. For example, if the goal of training is to instruct individuals on a three-step process to turn on a machine, advance organizers would not be necessary for retention. However, if you were instructing individuals on a skill that would need to be applied to a variety of different situations, an advance organizer could aid in the generalizability by providing a general structure for the learner.

While most of the research on advance organizers has been in the area of learning and retention, issues of far transfer and generalizability need to be addressed. Research by Mayer (Mayer, 1975a, 1975b, 1976) found that subjects in an advance organizer (AO) condition performed better on far transfer items and control subjects performed better on near transfer items with far transfer items being

those that require the adaptation of knowledge to new situation and near transfer items being those that require rote memorization of information. In another study, Mayer and Bromage (1980) found that AO subjects recalled different types of information than control subjects and subjects who received the organizer after the learning material (PO). The AO subjects tended to recall more idea units concerning conceptual aspects, more intrusions concerning the model, and more novel interpretations concerning the material which would be more suited for situations requiring the generalizability of information. The control group and PO group recalled more technical and specific idea units which would be more suited for situations that require rote memorization.

Fourth, advance organizers should have a stronger effect for learners lacking prerequisite cognitive abilities (Mayer, 1979b). High ability subjects are typically those experienced learners who more readily use their own existing knowledge as an assimilative set during learning, even without the assistance of an advance organizer. Low ability learners do not necessarily use their existing knowledge as readily as higher ability learners; therefore, advance organizers should provide a larger benefit for those with lower abilities.

Of these parameters, a major point of conflict concerns the issue about the differences in ability levels. In regards to the four parameters mentioned above, the results

of the meta-analyses (Luiten, Ames, & Ackerson, 1980; Stone, 1983) tend to conflict with the contention that low-ability subjects benefit the most from the use of advance organizers. Both meta-analyses not only refute this statement by saying that both high-ability and low-ability subjects benefit from advance organizers, but in one meta-analysis (Luiten, Ames, & Ackerson, 1980) the authors argue that high-ability subjects might benefit more from the use of advance organizers. While this notion conflicts with Ausubel's subsumption theory, a possible limitation of the meta-analyses is that not all of the studies measured ability in the same way. In addition, not all advance organizers are well constructed in this research which could also lead to conflicting results. This fact will be expanded upon in the next section. In studies that are well constructed (i.e., Mayer, 1975a), lower ability subjects tended to benefit more from the use of advance organizers than high ability subjects.

Construction of advance organizers. A common criticism of advance organizers is the operational construction of an advance organizer in relationship to subsumption theory proposed by Ausubel (1968). Many critics argue that there is no clear, concise, or standard way to construct advance organizers, and most researchers tend to construct the organizers based on the notions and writings of Ausubel (Barnes & Clawson, 1975; Clark & Bean, 1982; McEneany, 1990). This criticism questions not only the nature of the

studies conducted, but the results obtained from the meta-analyses listed above (Luiten, Ames, & Ackerson, 1980; Stone, 1983), as well as other reviews that conclude advance organizers have a small facilitative effect on learning and retention. If they are poorly constructed in a study (i.e., uses titles and main points instead of subsumers), it is no surprise that they have small facilitative effects, if any at all, because they violate Ausubel's principles for constructing an advance organizer (Mayer, 1979b). Solutions to the problem of poorly constructed advance organizers can be found in a variety of ways.

In his theory, Ausubel (1968) described advance organizers as being presented at a higher level of abstraction, generality, and inclusiveness. Mayer (1979a) defined an advance organizer as generally having the following characteristics: (1) a short set of verbal or visual information, (2) presented prior to learning a larger body of to-be-learned information, (3) containing no specific content from the to-be-learned material, (4) providing a means of generating the logical relationships among the elements in the to-be-learned material, and (5) influencing the learner's encoding process. In practice, these organizers have been in the form of outlines, questions, graphic displays, and abstract passages. While fitting Ausubel's description of relevant and inclusive introductory materials, no clear consensus has been reached on how to construct advance organizers. Often, advance

organizers that have a positive effect do not necessarily follow Ausubel's prescription for abstractness (Corkill, Glover, & Bruning, 1988).

Effective organizers reported in the literature have a tendency to be concrete instead of abstract (Mayer, 1979b; Stone, 1983). One can explain the superiority of concrete organizers over abstract organizers because the former are more familiar to the learner (Paivio, 1983), more easily remembered than abstract materials (Marshark, 1985), and more easily visualized than abstract materials (Paivio, 1983). However, some investigators have argued that this is not a problem for Ausubel's subsumption theory because a concrete organizer would allow the formation of memorable schemata or call up prior knowledge for assimilating new information better than an abstract organizer (Corkill et al, 1988). In addition, some evidence has been found that organizers which are concrete, oral, and visual are more effective than written ones (Luiten et al, 1980; Stone, 1983). However, a confound in this research is that most written organizers tend to be abstract, while most nonwritten organizers tended to be more concrete.

In working with the assumption that concrete organizers are more effective than abstract organizers, analogical techniques could be highly useful. The literature concerning the use of analogical reasoning, particularly in problem solving, has not been widely referenced in relation to the use of advance organizers. The most likely reason

for this omission is that a majority of advance organizer work deals with the learning of prose material. Analogical problem solving takes into account the application of knowledge and not just the rote learning and retention that is typically examined in advance organizer research.

In problem solving research, people deal with new events by retrieving information about holistically similar experiences (episode-based processing) or about abstracted characteristics of those experiences (rule-based processing). In episode-based processing, individuals access previous problems that are similar analogically or in other ways. The problem is similar to one they have previously experienced and they map the solution of the previous problem onto the new one (Holyoak, 1984). In contrast, rule-based processing occurs when people form abstract schemata that characterize sets of problems sharing similar structures (Gick & Holyoak, 1983, 1987). The presentation of an analogical model of the domain during training should encourage people to identify and abstract rules and concepts in the domain. These analogical models encourage people to integrate new information with a pre-existing meaningful knowledge base (Mayer, 1979b). In terms of the organization of material, subjects tend to use episode-based processing when material is presented randomly and rule-based processing when material is presented in an organized fashion (Homa, 1984).

The complexity of the material also has an effect on

the type of processing because the more complex the task/material, the more people must make multiple decisions which can be open-ended in nature. When material is complex, subjects tend to abstract rules and structures. Fried and Holyoak (1984) found that when subjects were exposed to highly variable examples of artificial categories, they were more likely to demonstrate transfer of the material when new exemplars were presented. In terms of transfer appropriate processing (episode vs. rule-based), performance on a memory task should be best when the processing required at retrieval is similar to that evoked at encoding (Brooks, 1987). If two events are processed in the same way, the processing of the second can serve as a retrieval cue for the first.

In a series of studies, Mayer (1975a, 1976) provided empirical support for this proposition. Mayer demonstrated that providing people with analogical models for the material they are learning has systematic effects on later performance. Such models generally improve individuals' understanding of underlying concepts and performance on complex, far-transfer tasks. In contrast, they have no effect on simple, near-transfer tasks (Mayer 1975a, 1976; Mayer & Bromage, 1980). In general, when tasks are complex, model-provided training is beneficial and when tasks are simple, no-model provided training is beneficial. In a recent problem-solving study, Caplan and Schooler (1990) found empirical support for the use of models and organized

instructions for complex tasks and they found support for the use of no-models for simple tasks. Also, in simple tasks the organization of instructions was not essential.

In a series of experiments, Dinnel and Glover (1985) proposed that how well the advance organizer is encoded should influence its effectiveness in facilitating learning from prose. An advance organizer encoded in a way that requires attention to its semantic base would be better recalled than an organizer encoded more superficially. The authors assert that the conflicting results in the literature are partially attributed to the fact that organizers are not encoded very well (Dinnel & Glover, 1985). In their experiments, it was found that subjects who paraphrased the advance organizer prior to receiving the learning material were able to recall more information. The authors do note that this paraphrasing does require more time in the training/educational setting, however, the positive effects were well worth it (Dinnel & Glover, 1985). In addition, Kloster and Winne (1989) found that simply presenting a genuine advance organizer does not guarantee that individuals will use it effectively. However, when individuals did use an advance organizer effectively, their achievement increased, especially when the organizer was of a concept or analogy nature.

Advance organizers typically come before the material to-be-learned to set up a mental schema to encode this new material. In a series of experiments, Mayer and Bromage

(1980) presented either an organizer before or after reading a text concerning a new computer programming language. The before group scored higher on recall of conceptual idea units, produced more appropriate intrusions, and made more novel inferences. The after group scored higher on technical idea units, but produced more inappropriate intrusions, connectives, and vague summaries (Mayer & Bromage, 1980). Their results support the notion that the locus of the effects was at the time of encoding rather than at the time of retrieval.

Overall, advance organizers have generally been used with tasks involved with the learning of prose. Their effect, especially in a behavior modeling training environment, on skill acquisition has not been thoroughly explored. This study examines skill acquisition in a behavior modeling training context. Advance organizers should be more effective with material that is poorly structured and with measures of transfer over retention (Mayer, 1979b). Complex skills, especially those of a social nature, need to be transferred to various situations more than a simple task that is performed the same way each time. With the learning of a complex skill, advance organizers should serve an assimilative role for the learning of new material by providing anchoring ideas at a high level of inclusiveness. The advance organizer should provide a structure to assimilate the new learning material with the individual's prior knowledge and should enhance not

only the retention of complex skills, but their generalizability to different situations as well. In addition, this study explores their effectiveness across various levels of ability.

Symbolic Coding

As a training technique, behavior modeling (Goldstein & Sorcher, 1974) has proven to be an effective device in the acquisition of skills, particularly those of a manual or social nature (Decker & Nathan, 1985; Latham & Saari, 1979). Based to a large extent on social learning theory (Bandura, 1977), behavior modeling enables the learner to observe others in a model performing the to-be-learned task and to learn the proper methods and techniques required for the skill/task. The purpose of this review is to examine how to best train individuals to symbolically code information received in behavior modeling training.

Behavior modeling typically involves five components: (1) a modeling component where trainees observe the behavior, (2) a retention component where trainees try to retain the information, (3) a behavioral rehearsal component where trainees practice the modeled performance, (4) a feedback component where comments are provided to the trainees, and (5) a transfer of training component where the trainees attempt to generalize the learned material (Decker & Nathan, 1985). The training involved in this study deals primarily with the modeling and retention components of behavior modeling training. How best to get trainees to

code symbolically, whether providing them with rule codes or having them generate their own, is examined in this study.

With behavior modeling training, subjects are first provided with a model that displays a set of key behaviors. The modeling component contains learning points which are written descriptions of key behaviors that must be used to complete a task (Decker & Nathan, 1985). These learning points can be behavior descriptions which are simple specific descriptions of the behavior performed ("Say hello to the applicant"), summary labels which are key words used to define or cue certain behaviors or classes of behaviors ("greet applicant"), or rule-oriented codes which specify underlying sets of behaviors which can be used to complete the task but do not necessarily include a description of the actual behavior ("greet applicant warmly and have the applicant sit down so you can start the interview"). With simple manual skills, the behavior descriptive learning points are preferable. With social skills or tasks that require complex cognitive abilities, rule-oriented learning points are more effective as there is more than one way to complete the task. (Decker & Nathan, 1985).

In other research, Baldwin (1992) examined the effects of alternative modeling strategies on the outcomes of interpersonal-skills training. He found that the presentation of multiple scenarios had no effects on trainee reactions, learning, retention, and behavioral measures of reproduction and generalization. On the other hand, models

that displayed positive and negative displays had a significant positive effect on trainee generalization and a significant negative effect on reproduction.

Mann and Decker (1984) examined the effect of key behavior distinctiveness on generalization and recall. Making key behaviors with low or moderate natural distinctiveness more distinctive enhanced attention to and retention of modeled events, but did not have the same effect for those key behaviors which were already naturally distinctive. In addition, they found that observing learning points and a form of a model (combined or with learning points interspersed in the model) significantly facilitated generalization for the dimensions shown to have moderate to low natural distinctiveness. The dimension with the highest distinctiveness was less affected by the various combinations of learning points and models. However, generalization scores still were significantly greater for subjects who saw learning points and a model than for those who saw learning points only. The authors recommend the use of an interspersed condition, whereby the learners view the model, then view the learning points, and then view the model with the learning points displayed just before the key behaviors appear in the model. This condition is preferred because it is anticipated that both contrast and meaningfulness would increase as learning points and behavior became more closely linked (Mann & Decker, 1984).

In viewing the model, the question arises as to "How

would subjects best encode the learning material?" Various retentional processes help the trainee remember and retain what was seen in the modeling display. These retentional processes include the building of better models as mentioned above, the use of symbolic coding and rehearsal, as well as the generation of learning points by the trainees themselves. Research by Decker (1980, 1982) highlights the importance of a formalized retention process over any retention processes performed by the trainees spontaneously. The author defines symbolic coding as the process by which individuals organize and reduce the diverse elements of a modeled performance into a pattern of verbal symbols that can be easily stored, retained intact over time, quickly retrieved, and used to guide performance. Symbolic rehearsal is the process in which individuals visualize or imagine themselves performing behaviors that previously were seen performed by another individual (Bandura, 1977).

Training that includes both symbolic coding and rehearsal significantly facilitated the generalization of observational learning to a novel context (Decker, 1982). In other research, the use of trainee-generated codes over trainer-produced codes has been examined. Decker (1982) found that trainee-generated rule codes in assertiveness training enhanced generalization and displayed the least amount of reproduction decay. Along similar lines, Hogan, Hakel, and Decker (1986) addressed the effect of trainee-generated codes on generalization. The authors hypothesized

that trainee-generated codes would yield greater generalization assuming that code generation requires greater initial information processing and results in more meaningful codes that are better integrated into the unique cognitive framework of each individual trainee. In their study, self-generation of rule codes led to significantly better performance on generalization tests given one week after training. Content analysis of the trainee-generated codes revealed that they were conceptually similar to but of lower quality than the trainer-provided codes. Even though the codes were of lower quality, they were retained longer than the higher quality codes provided by the trainer. In addition, there was no difference between conditions in participant reactions to the training (Hogan et al, 1986). The authors list some qualifications to their conclusions concerning trainee-generated codes: (1) trainee competence and bias should be considered in determining the optimal strategies for rule coding procedures, and (2) a high quality modeling display based on thorough job analysis is a prerequisite for the use of trainee-generated codes (Hogan et al, 1986).

This study further explores the effect of symbolic coding on the retention and generalizability of training material and the effect of symbolic coding on trainee self-efficacy. How best to induce the symbolic coding of training material, whether through trainer-provided codes or trainee-generated codes is examined. While not a <u>complete</u>

behavior modeling training session (which includes behavioral rehearsal and feedback), using a videotaped model and learning points enables a trainee to more effectively encode skill material than instructing trainees using such formats as lectures. By providing the model and learning points, the trainees could be better prepared to practice the learning material.

Cognitive Ability

Individual differences in cognitive ability have long been associated with differences in job performance (Dunnette, 1976; Hunter, 1986) as well as skill acquisition (Ackerman & Humphreys, 1990). Ackerman (1987, 1989) has expanded the work of Norman and Bobrow (1975) to describe individual differences in cognitive ability as differences in the amount of cognitive or attentional resources available to that individual. A person with higher cognitive ability should have more attentional resources available to engage in tasks. This is particularly beneficial in complex tasks that require more attentional resources (resource-dependent) in their acquisition.

In learning a skill, cognitive ability has its greatest effects early in the skill acquisition when the task is novel. However, this effect is not as strong in later performance when the individual has practiced the task sufficiently (Ackerman & Humphreys, 1990). This effect is only strong in later performance when the consistency of the underlying processing is lacking or the task is too complex

for the learners to fully understand (Ackerman & Humphreys, 1990). In this situation, it is conceivable that correlations between performance and general cognitive ability could remain relatively stable or increase over time (Schmidt, Hunter, Outerbridge, & Goff, 1988).

In terms of assimilation, Mayer (1979b) asserts that some measures of ability may also tap the extent to which a subject tends to use an assimilative strategy during learning. If ability measures the subjects' efficiency of learning, then it may also indicate the presence or absence of assimilative strategy. Individuals with higher cognitive ability may use more effective strategies than individuals with lower cognitive ability.

In the context of advance organizers and symbolic coding, the individual is in the beginning or early stages of skill acquisition, so the effect of cognitive ability on retention, generalizability, self-efficacy, and quality should be present. How advance organizers and symbolic coding affect individuals of various ability levels is explored in this study.

Effects on the Processing of New Information

With advance organizers and symbolic coding, two mechanisms are encountered that are used to enhance the effectiveness of the encoding of training material. One could view the process of encoding as similar to the processes that occur during performance appraisal research. The three-stage process model for performance appraisal

revolves around the gathering, storing, and retrieval of information (Ilgen, Barnes-Farrell, & McKellin, 1993). For the purposes of this examination, the first two phases, gathering and storing, will be combined as the concepts of advance organizers and symbolic coding affect the storing of information while it is gathered in a learning environment. Individuals with higher levels of cognitive ability are viewed as being more efficient in gathering new information, storing it in a more organized fashion, and in accurately retrieving the information.

Gathering and storing. These phases involve the attention and observation of material as well as the way it is stored. If advance organizers operate in an assimilation and correction fashion (Derry, 1984), then information that is similar to the structure in the advance organizers is assimilated into it, thereby losing its context-specificity. On the other hand, dissimilar information from the advance organizer maintains its specificity. This observation falls in line with the research in performance appraisal where information that is different from that of the category is retained over long periods of time (Foti & Lord, 1987) along with information from the whole category. While this can be detrimental in performance appraisal where you attribute schema information to an individual even though they did not display those behaviors, it should be beneficial in training where an individual needs to retain all aspects of the schema. In the assimilation and correct function, advance

organizers guide the encoding of training material. By knowing the structure of the skill before receiving the training material, individuals using advance organizer map the training information onto the structure already stored in memory. Structurally, symbolic coding differs from advance organizers in two ways: (1) symbolic coding occurs during the learning of the training information based upon the summary points of the material, whereby advance organizers are placed prior to the training information and (2) symbolic coding is based upon the content of the material, whereby advance organizers are content-free of the training material, but contain a similar structure to that of the learning points.

In this experiment, the advance organizer of a jungle cat serves as a guide in discovering and encoding the learning points of assertive communication. When learning points are given, subjects first view the model of assertive communication, then see the learning points. Individuals are instructed beforehand that there are certain key behaviors that they should be trying to pick out. If they have received an advance organizer, the individual should be able to pick up the main points of the skill quicker than those who have not received an advance organizer because they have a preconceived notion of what those learning points already are and will search for those points more actively. In addition, these learning points will not only be observed quickly, but they are also provided with a link

to a concept that is already familiar to the subject. With an advance organizer containing material the subject is already familiar with, what he/she then learns can be connected to that knowledge stored in long-term memory, thus enhancing the effectiveness of its encoding. Without an advance organizer, the individual does not have a preconceived notion of what the learning points are. Once they receive the learning points, they might be stored in a context-specific fashion, whereby the individual retains the learning point, but can only apply them in a situation that is similar to the one in training or they have trouble retaining them because they do not have an established link to long-term memory while they were encoded.

The advance organizer should have quite a different effect with trainee-generated learning points. In this situation, the individual views the model and then has to generate learning points which represent the key behaviors rather than receiving them from the trainer. While not having a preconceived notion of what the structure of the learning points might be or a link to an already familiar model, having to create one's own learning points enacts a different type of observation and encoding. Knowing that you will have to generate your own learning points should lead to an increase in the attention being placed upon the model thus requiring a deeper level of processing. In addition, trainees would develop learning points based upon their own knowledge structure, thus increasing the chances

that they will be stored in their own frame of reference. This own frame of reference should be beneficial to the long-term encoding of information, thus weakening the positive effects of an advance organizer. However, a slight problem would be that individuals with lower ability might have a more difficult time in paying attention to the important information in the models. Advance organizers could provide this link by providing the structure to a low-ability individual who has difficulty paying attention to or creating a structure on their own.

Retrieval. After an individual leaves the training context, a person might not need to immediately apply the skills learned. The need to apply the skills might occur after a certain time interval and the skills might need to be applied in a different context. In this case, the material, to be useful, needs not only to be retained over time, but retained in a fashion that will allow it to be used in situations that might be different from the ones in which they were acquired.

Advance organizers provide a link between an established structure in long-term memory and the summary points of the training material. This link should provide a quicker and more effective access to the training information. Even if individuals fail to retrieve the specifics of the training information, they should be able to retrieve the advance organizer which will either provide the structure for the skills or activate the specific

information of the training material in which it was linked to during training. In addition, novel or dissimilar information is more readily retrieved, and an advance organizer would certainly qualify as a novel scenario to the individual trainee.

Once again, the differences in symbolic coding should also affect the effectiveness of the advance organizer. If an individual is provided with learning points, an advance organizer will be helpful in the encoding of material into a network in long-term memory versus the attempt to store this new information without a readily available linkage that the advance organizer provides. However, this advance organizer effect could diminish when learning points are generated by the individual trainee. By generating information in their "own terms," the individual is not only processing the information more deeply, but they are setting up the summary points in their own frameworks versus being given a framework by the instructor. Once again, there could be a problem with low-ability learners not processing the information properly, but this negative effect could be eliminated with the use of an advance organizer. With the advance organizer, these low-ability learners could be provided with a structure to encode the information and this structure could lead to an increased retrieval of information.

Overall, advance organizers provide more of a linking effect with networks in long-term memory that enhance the

retention and generalizability of training material. However, this increased effect can be compensated for in different ways. One of these ways is the trainee-generated learning point. This mechanism increases retention and generalizability but in a way that is different from the advance organizer. Instead of providing a linkage between a familiar structure and a guiding mechanism, retention and generalizability are increased through an increased depth of processing of the codes. Instead of providing a linkage to a familiar structure, the trainees who generate their own learning points store the information in their own terms.

Summary. It would seem that advance organizers and trainee-generated learning points reach the same end in terms of increased retention and generalizability, but they use different routes to get there. For advance organizers, encoding is enhanced through a schematic mechanism whereby learners have some prior knowledge as to what the main points are as well as a long-term memory concept that provides a linkage to aid retrieval. Trainee-generated learning points lead to greater encoding through a "deeper" level of encoding, whereby individual trainees have higher levels of attention and processing in the generation of learning points.

Research Study

In training research, advance organizers, symbolic coding, and cognitive ability have not been examined simultaneously in a behavior modeling context. The various

issues involved with the three variables and the four dependent variables (retention, generalizability, self-efficacy, and quality) are addressed below.

Previous research. With behavior modeling, the models used in the beginning of the process are usually displayed by means of a videotaped performance. In the use of televised instruction, Nugent and her colleagues (Nugent, Tipton, & Brooks; 1980) examined the effectiveness of introductory organizers with affective material presented via television. An advance organizer, consisting of superordinate generalizations and conceptual questions was given to a group of students prior to viewing the televised performance. Results demonstrated that the advance organizer significantly increased student comprehension. In an early study, it was found that subjects who underwent a videotaped, modeled-learning experience with an advance organizer acquired and transferred empathic understanding communication better than subjects who simply read about the counseling behavior (Dalton, Sundblad, & Hylbert, 1973). While this experiment used advance organizers with behavior modeling, it does not show that advance organizers improved behavior modeling because the same group received both behavior modeling and an advance organizer, and the other groups were more or less control conditions.

Retention. One dependent variable is the retention of the training material. Learning a skill, while necessary, might not be sufficient once a trainee leaves the training,

and retention of the learned material becomes a larger issue. This study, examining advance organizers, symbolic coding, and cognitive ability, investigates the linkage of training material with an individual's previous knowledge. Differences in cognitive ability have been shown to be associated with differences in skill acquisition (Ackerman, 1987, 1989), especially in the early stages of skill acquisition. With complex skills, it takes a larger amount of practice to reach a certain level of automaticity than it would for simple skills. In this experiment, subjects should not reach that level of automaticity and cognitive ability should have a main effect on the retention of training material.

H_1: Subjects higher in ability will retain more information than subjects lower in ability.

Typically, advance organizer research examines the learning of prose material without examining the retention of the same material. By linking current training material to the individual's previous knowledge, retention should be enhanced because the advance organizer sets up a connection in long-term memory. Meta-analyses on advance organizers (Luiten et al, 1980; Stone, 1983) have found a small facilitative effect for retention, however, these meta-analyses have included studies with poorly designed advance organizers. The better studies (i.e., Mayer) have shown

this effect to be fairly consistent.

H_2: Subjects who receive advance organizers will retain more information than subjects who did not receive advance organizers.

Symbolic coding using trainee-generated codes allows the individual to store the training material in terms consistent with his/her cognitive framework rather than being provided with one. This personalized coding should enhance retention as well. A motivational issue can also support the notion of the superiority of trainee-generated codes. When placed in a situation where a trainee is told that they will have to generate their own codes, the trainee might be more likely to pay closer attention to the material at hand which would be beneficial in the encoding of the training material. By providing the learning points, a trainer takes more of a chance as to how well the trainee is attending to the provided codes.

H_3: Subjects who generate their own learning points will retain more information than subjects who are provided with learning points.

The placement of advance organizers at the beginning of training can also increase their effectiveness. These prior presentations give individuals a schema in which to

assimilate the new information into their knowledge base and structure (Mayer, & Bromage, 1980). The learning points used in symbolic coding are very similar to the nature of advance organizers in the way they provide macro-propositions (Kintsch & van Dijk, 1978), but they do this while the individual is learning the new material. These learning points serve more along the lines of an overview which, while effective, do not take into account the individual's prior knowledge base and structure (Ausubel, 1968). By providing an advance organizer before the modeling, symbolic coding should be more effective both in terms of linking the provided codes to previous knowledge and in terms of generating higher quality codes that are also linked to the individual's cognitive structure.

One of the major qualifications for the use of advance organizers is that their effectiveness is reduced when used with material that is highly structured. Behavior modeling, by nature of its method, is a very structured process, so the effectiveness of advance organizers could be called into question. Although symbolic coding takes a great deal of care to provide a structure to be stored in memory, it does not take into account the learner's existing knowledge base. Advance organizers provide a general schema that allows the new information to be properly assimilated into the individual's current network of prior knowledge. Assimilation into previous knowledge should be further increased when trainees generate their own codes instead of

being provided with rule codes. The assimilation of trainee-generated codes with advance organizers allows the learner to develop a more general schema that is in context with his/her current knowledge, instead of just learning the structure of the behavior in the context of a scenario or two. Symbolic coding provides the structure, but an advance organizer provides the linkage with previous knowledge. However, the increased depth of processing required by trainee-generated learning points should decrease the effectiveness of advance organizers compared to that of trainee-provided learning points.

H_4: Subjects who receive advance organizers and are provided with learning points will retain more information than subjects who do not receive advance organizers and are provided with learning points. Subjects receiving advance organizers and generating their own learning points will retain more information than subjects who do not receive advance organizers and generate their own learning points, however, the effect will not be as large (see Figure 1).

Previous research on the relationship between ability and advance organizers has been mixed (Luiten et al, 1980; Mayer, 1979b; Stone, 1983), and the relationship between symbolic coding and cognitive ability has not been

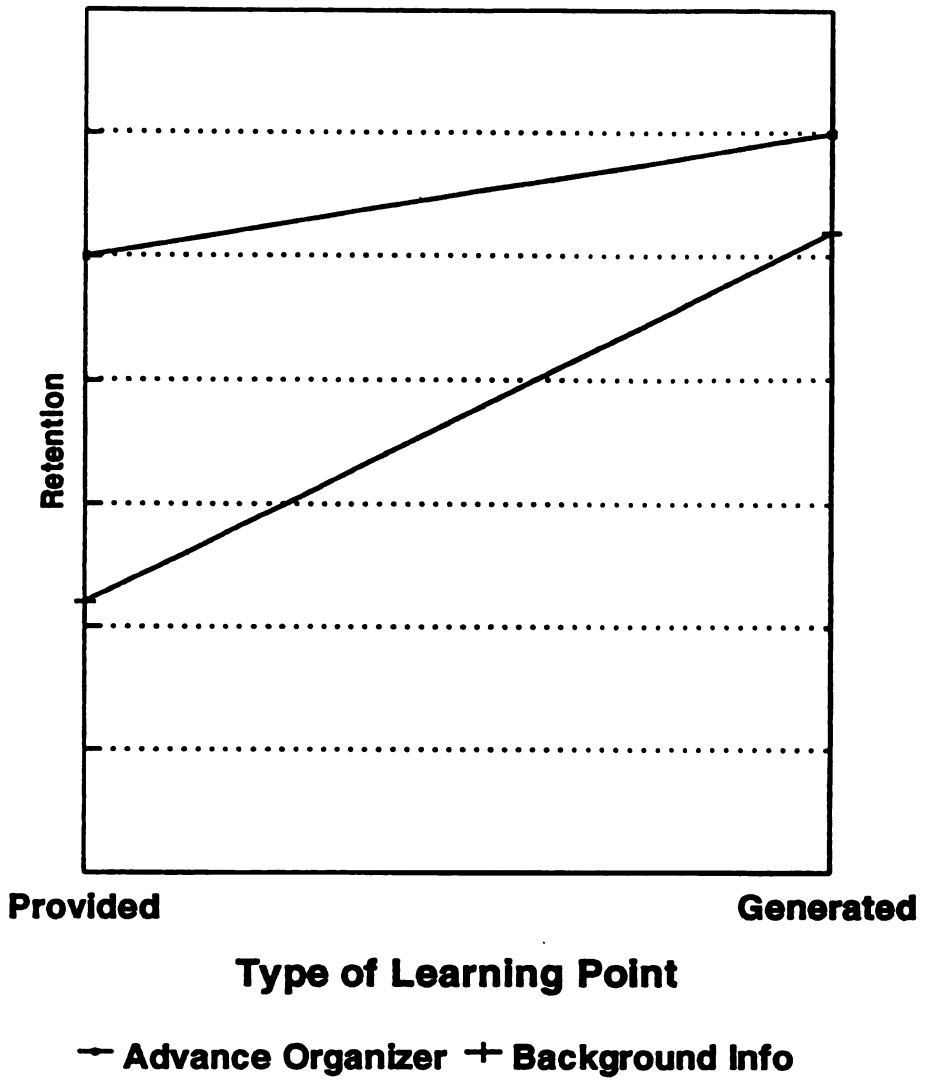


Figure 1. Hypothesized Effects of Pre-Training Information and Symbolic Coding on Retention

thoroughly explored. Due to mixed results, this research will examine these relationships in an exploratory fashion. The key issue is will advance organizers mainly benefit those with lower cognitive ability or will they benefit those individuals with higher cognitive ability; and how effective are various methods of symbolic coding with various levels of cognitive ability?

In regards to symbolic coding and ability, it is the author's viewpoint that low ability individuals should retain more information if they generate their own learning points than if they are provided with learning points. High ability individuals should retain similar amounts of information regardless of whether they are provided with learning points or they generate their own. In regards to advance organizers and ability, it is the author's viewpoint that low ability individuals who receive advance organizers should retain more information than low ability individuals who receive either background or no prior information, while high ability individuals should retain similar amounts of information, regardless of whether or not they receive an advance organizer, background information, or no information before training.

Generalizability. The second dependent variable is the generalizability of the training material. The transfer of training material from the training environment to the job has long been recognized as a problem in the workforce (Michilak, 1981; Baldwin & Ford, 1988). The usefulness of

training material is minimized when it is not applied to various situations. While transfer may not be an issue for simple manual tasks, it is vital for complex tasks that need to be applied to various situations, such as the one in this study. Whereas a manual skill might not need to take into account generalizability (i.e., running a machine), social skills require a great deal of adaptability and flexibility in their application to various situations.

Cognitive ability should demonstrate a main effect for the generalizability of training material. Individuals with higher levels of cognitive ability should retain more information than individuals with lower levels of cognitive ability. This increased retention of general principles for assertive communication should lead to more information being generalized to different situations.

H_5: Subjects who are high in ability will be better able to generalize learned information than subjects low in ability.

Rather than just learning a social skill in the context of a scenario or two, advance organizers could enhance the process of generalizability by the nature of its encoding. In its assimilation with the individual's prior knowledge, the to-be-learned material is encoded with a generalizability mechanism already built into it. Mayer (1979b) notes that advance organizers should have an

especially strong effect on measures of transfer because they provide the individual with a general structure rather than one that is situationally-specific. This not only improves encoding, but it provides a general structure that can be adapted to different situations. Without advance organizers, information could be stored in a very situationally specific manner, especially for subjects who are low in ability. In his work, Mayer (1975a, 1975b, 1976) found that subjects who receive advance organizers performed better on far transfer items and control subjects performed better on near transfer items.

H_6: Subjects who receive advance organizers will be better able to generalize information than subjects who have not received advance organizers.

In addition, symbolic coding using trainee-generated codes should increase generalizability because the individual is not only retaining the material in his/her own framework, but applying these general rules to various situations as well. Being provided with rules might be too closely tied to the model situation in which they were received, thus affecting the material's generalizability. Research has shown that trainee-generated codes should be more effective than trainer-provided codes in the generalizability of training information (Hogan et al, 1986).

H_7: Subjects who generate their own learning points will be better able to generalize information than subjects who are provided with learning points.

As noted above, one of the major qualifications for the use of advance organizers is that their effectiveness is reduced when used with material that is highly structured. Behavior modeling, by nature of its method, is a very structured process, so the effectiveness of advance organizers could be called into question. However, this reduced effectiveness of advance organizers in the research is generally exhibited in the learning and retention of prose material, not in the generalizability and far-transfer of learned material. Advance organizers provide a general schema that allows the new information to be properly assimilated into the individual's current network of prior knowledge. Symbolic coding, while helping to create a structure to be stored in memory, does not take into account what the individual already possesses in the structure. Assimilation into previous knowledge should be further increased when trainees generate their own rule codes instead of being provided with codes. The assimilation of trainee-generated codes with advance organizers allows the learner to develop a more general schema that is in context with his/her current knowledge and can be applied to various situations thereby increasing the generalizability of the training material. Symbolic coding provides the structure

for the training material, but an advance organizer provides the linkage with previous knowledge. However, the increased depth of processing required by trainee-generated learning points should decrease the effectiveness of advance organizers compared to that of trainee-provided learning points.

H_8: Subjects who receive advance organizers and are provided with learning points will generalize more information than subjects who do not receive advance organizers and are provided with learning points. Subjects who receive advance organizers and generate their own learning points will generalize more information than subjects who do not receive advance organizers and generate their own learning points, however, the effect won't be as large (see Figure 2).

Previous research on the relationship between ability and advance organizers has been mixed (Mayer, 1979b; Luiten et al, 1980; Stone, 1983), and the relationship between symbolic coding and cognitive ability has not been thoroughly explored. In terms of generalizability, both relationships have not been thoroughly examined. This research will further explore these two relationships concerning generalizability. The key issues are twofold. First, will advance organizers mainly benefit those with lower cognitive ability or will they benefit those

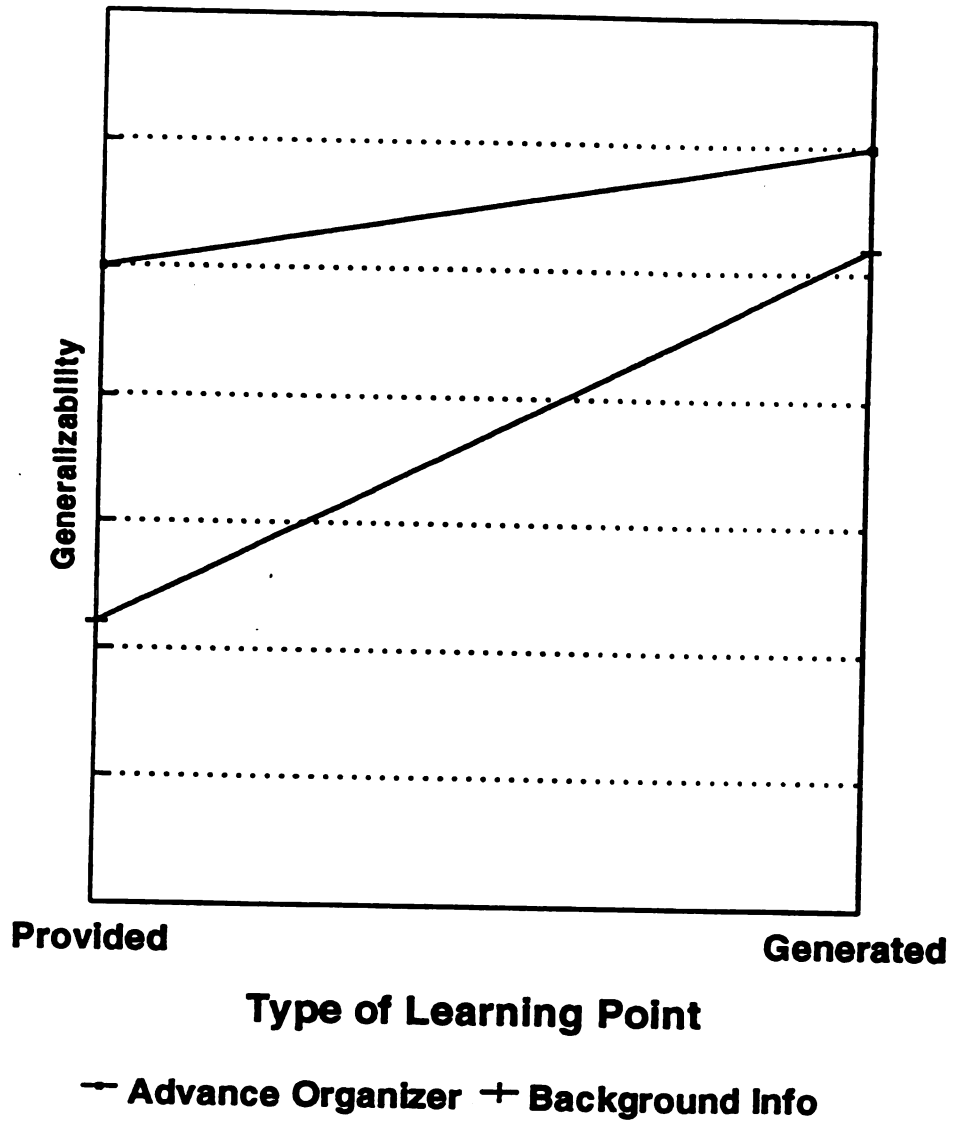


Figure 2. Hypothesized Effects of Pre-Training Information and Symbolic Coding on Generalizability

individuals with higher cognitive ability? Second, how effective are various methods of symbolic coding with various levels of cognitive ability?

Concerning symbolic coding and ability, it is the author's belief that subjects who are low in ability should be better able to generalize learned material when they generate their own learning points than low ability subjects who are provided with learning points, while high ability subjects who generate their own learning points should also be able to generalize learned material better than high ability subjects who are provided with learning points. However, the effect size should be smaller than that of low ability subjects. Concerning advance organizers and ability, it is the author's belief that subjects who are low in ability and receive an advance organizer should be better able to generalize learned information than subjects who receive background information or nothing, while high ability subjects who receive an advance organizer should do only slightly better, if any at all, than high ability subjects who receive background information or nothing.

Self-Efficacy. The third dependent variable is an individual's self-efficacy. Self-efficacy refers to a person's estimate of his/her capacity to perform a task (Bandura, 1986). Research has shown that individuals who think they can perform well on a task tend to do better than those who think they will fail (Gist & Mitchell, 1992), so increasing one's self-efficacy about a task should be

beneficial for the trainee.

Differences in cognitive ability are associated with differences in the acquisition of skills (Ackerman & Humphreys, 1990). In accordance, cognitive ability should also be related to higher degrees of self-efficacy toward assertive communication skills.

H_9: Subjects who are higher in ability will have higher self-efficacy than subjects who are lower in ability.

How advance organizers affect self-efficacy is also examined. Subjects receiving advance organizers are told that these organizers should be applied to the upcoming training. These advance organizers facilitate the encoding of the information to-be-learned. This will not only lead to more effective understanding and encoding of the training material, but it should also lead the individual to form beliefs that he/she is effectively learning and understanding the material, thereby, increasing his/her self-efficacy.

H_{10}: Subjects who receive advance organizers will have higher self-efficacy than subjects who receive background information.

A behavior modeling approach with trainer-provided codes has been shown to have a positive affect on self-

efficacy (Gist, Schwoerer, & Rosen, 1989). This effect should be higher when the trainees generate their own codes because they are more involved in the training, in addition to retaining and generalizing the material more effectively.

H_{11}: Subjects who generate their own learning points will have higher self-efficacy than subjects who are provided with learning points.

Subjects who are provided with an advance organizer and who generate their own rule codes have two opportunities to successfully encode the codes. However, the effect of including an advance organizer with trainees generating their own learning points should be smaller than when trainees are provided with learning points.

H_{12}: Subjects who receive advance organizers and are provided with learning points have higher self-efficacy than subjects who do not receive advance organizers and are provided with learning points. Subjects receiving advance organizers and generating their own learning points will have higher self-efficacy than subjects who do not receive advance organizers and generate their own learning points, however, the effect will not be as large (see Figure 3).

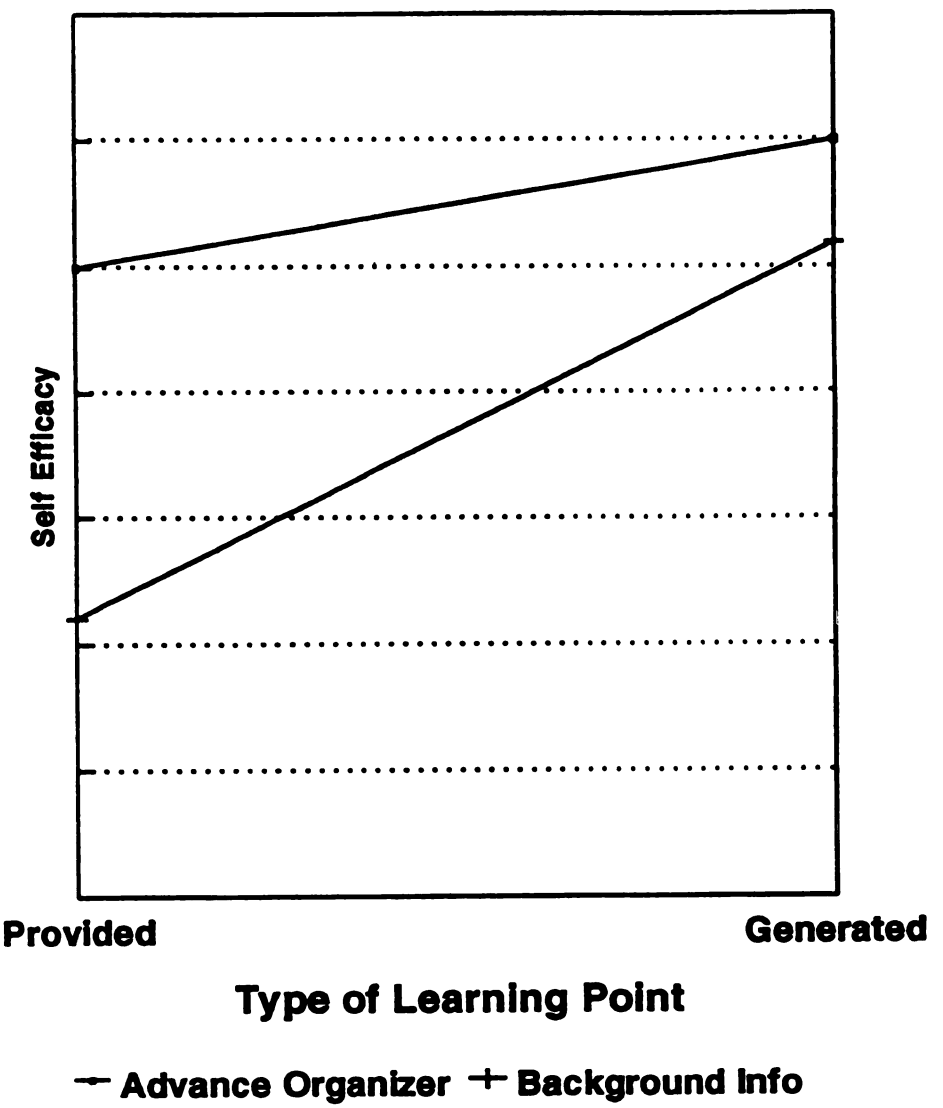


Figure 3. Hypothesized Effects of Pre-Training Information and Symbolic Coding on Self-Efficacy

In addition, the relationship between symbolic coding and cognitive ability, and advance organizers and cognitive ability will be explored. It is expected that even though subjects who are high in ability should retain and generalize more information and construct learning points of higher quality than low ability subjects, the difference in self-efficacy between the two low ability groups should be larger than the difference between the two high ability groups.

Concerning symbolic coding and ability, it is the author's belief that subjects who are low in ability should have higher self-efficacy when they generate their own learning points than low ability subjects who receive learning points. Subjects who are high in ability should have higher self-efficacy when they generate their own learning points than high ability subjects who are provided with own learning points. However, the effect should be larger for the low ability subjects. Concerning advance organizers and ability it is the author's belief that subjects who are low in ability and receive advance organizers should have higher self-efficacy than subjects who are low in ability and receive background information. Subjects who are high in ability should have similar levels of self-efficacy, regardless of whether or not they received advance organizers or background.

Quality of Learning Points. Finally, there is a quality issue in the generation of codes by trainees. Lower

ability trainees might experience difficulty in generating codes of high quality, which could lead to problems in generalizing the material to other situations. However, an advance organizer could provide lower ability individuals with a schema that could guide them in generating codes of a higher quality that are similar to the ones in the learning points-provided condition. This quality issue as related to ability and advance organizers is explored in this study.

H_{13}: Subjects who are high in ability will produce higher quality learning points than subjects who are low in ability.

H_{14}: Subjects who receive advance organizers will produce higher quality learning points than subjects who receive background or no information.

H_{15}: Low ability subjects who receive advance organizers will produce higher quality learning points than low ability subjects receiving background or no information. High ability subjects will produce similar learning points in terms of quality, regardless of the type of pre-training information.

METHOD

Sample

The sample consisted of 183 undergraduates (Study I = 61; Study II = 122) recruited from the Psychology Department subject pool at Michigan State University.

Design

The participants ran through a modified behavior modeling training course on assertive communication in both studies. In order to examine the effect of advance organizers in the absence of symbolic coding, the experiment was reported in two studies. The first study examined the effects of pre-training information in the absence of symbolic coding and the second study examined the dual effects of pre-training information and symbolic coding on the outcomes of training.

Study I. The research consisted of two pre-training information conditions (advance organizer & background information).

Study II. 2 (trainer-provided & trainee generated learning points) X 2 (advance organizer & background information) design.

Independent Variables.

Pre-training information/advance organizer. The advance organizer is of an expository nature (Ausubel, 1968). An expository advance organizer is used with material that is unfamiliar to the learner. These subsumers furnish anchorage in terms that are already familiar to the learner. This advance organizer includes established and relevant knowledge that already exists in the individual's cognitive structure (see Appendix A).

Background knowledge concerning assertive communication skills (see Appendix B) was obtained from the work of Smith (1975).

Symbolic coding. Trainer-provided rule codes were obtained from an assertive communication behavior modeling training course used in research by Baldwin (1992) based on the work by Smith (1975). Trainee-generated rule codes were constructed by the trainees after viewing the models in the videotape.

Cognitive Ability. Participants took the Wonderlic Personnel Test to obtain a measure of their cognitive ability (see Appendix C).

Dependent Variables

Learning. The dependent variable was measured using a 20-item multiple choice paper-and-pencil test based upon the six learning points to measure the amount of material from the training that was learned (see Appendix D).

Reproduction. Participants underwent a videotaped role-play in which they needed to utilize the assertive communication skills obtained in training in a situation that is identical to that used in the positive videotaped model (see Appendix E). They were rated by expert undergraduate students assisting in the study using a 14-item, seven-point Likert scale. While not being used as the learning measure, this role-play serves as an opportunity for the participants to practice their skill.

Retention. Two weeks after the training, participants returned to take a paper-and-pencil test identical to that of the learning measure, measuring the amount of knowledge from the original training that was retained.

Generalizability. Two weeks after the training, subjects returned and underwent a videotaped role-play exhibiting a different situation that required assertiveness communication skills (see Appendix F). They were rated by expert undergraduate students assisting in the study using a 10-item, seven-point Likert scale.

Self-Efficacy. Self-efficacy was measured using a seven-item paper-and-pencil measure with a nine-point Likert scale (see Appendix G). This measurement occurred after the participants completed the retention and generalizability measures, two weeks after the training. Before training, participants across research cells were assumed to have equal distributions of self-efficacy.

Quality. This variable is measured to see how accurate the trainee-generated learning points are to the pre-established learning points. They were rated by expert undergraduate students assisting in the study using a 7-item, seven-point Likert scale containing the pre-established learning points (see Appendix H).

Procedure

Participants underwent the training in groups ranging from three to eight, based upon how many of those signed-up for the experiment arrived at their scheduled time.

Pre-training information conditions. Participants were in one of two conditions at the beginning of training: (1) an advance organizer condition, or (2) a background information condition based upon factual knowledge concerning assertive communication. In the advance organizer condition, participants were instructed on the reasons for using advance organizers, and were given an example of one in use. In the background information condition, participants were just told they were to receive background information on assertive communication. After the introduction, both conditions had three minutes to read the information with instructions that they would have to paraphrase the material when the time expired. After three minutes, both conditions took four minutes to paraphrase the information they received in the pre-training condition. This was done to ensure that the information was encoded (Dinnel & Glover, 1985). After four minutes, participants

in both conditions handed in their paraphrased sheets and were told that they would be accountable for the material and tested on it at a later time.

Videotaped models. Subjects began the behavior modeling session by viewing a videotaped sequence of three displays. The first model displayed a positive example of assertive communication (see Appendix I). The second model is the same situation, however, the person in the model displayed a negative example of assertive communication (see Appendix J). The third model is a replay of the first model displaying a positive example of assertive communication. The content of the models was constructed in lines with the work by Smith (1975) on assertive communication. The videotaped models were taken from previous research conducted by Baldwin (1992).

Symbolic coding conditions. The study was divided into two studies. Study I did not have a symbolic coding condition. In study I, participants watched all three models in succession without any time in between models for symbolic coding. Each model was merely introduced as being either a positive or a negative example of assertive communication. Study II had two symbolic coding conditions: (1) a trainer-provided learning point condition (see Appendix K), or (2) a trainee-generated learning point condition. This procedure is similar to that used in prior research (Hogan et al, 1986). Prior to the symbolic coding manipulation, both groups were instructed on the purpose of

rule coding and on the existence of six rules underlying effective assertive communication, along with an example of learning points for a skill. In the trainee-generated condition, participants were given an additional example of how learning points could be applied to a variety of situations as well as instruction on how to generate a learning point. After the instruction, participants in the trainee-generated condition practiced generating learning points for a familiar skill (doing well in a class) while the experimenter walked around the room to inspect their learning points. After the practice, participants in the trainee-generated condition were told that they would have to generate learning points of assertive communication skills after watching the models. Participants in both conditions then watched the models. After the model, participants in the trainer-provided condition were given four minutes to look over the rule codes, while participants in the trainee-generated condition were given four minutes to construct the six learning points. Before viewing the second model of a negative example, participants in the trainer-provided condition were told to closely attend to the learning points as they were being displayed in the model, while participants in the trainee-generated condition were told they would have to generate six learning points exemplifying negative assertive communication. After the second model, participants in the trainer-provided condition were told to review their codes for four minutes, while

participants in the trainee-generated condition had four minutes to generate learning points describing ineffective assertive communication skill. Before the third model, participants in the trainer-provided condition were told to closely attend to the learning points as they were being displayed in the model, while participants in the trainee-generated condition were told to attend to the two sets of codes they had generated, as they would be generating a third set of codes representing effective assertive communication after the third model. After the third model, participants in the trainer-provided condition were given four minutes to review their learning points, while participants in the trainee-generated condition had four minutes to generate the six main learning points of effective assertive communication.

Tests for learning and reproduction. At the conclusion of the training, the participants provided two measures based upon the training material: (1) a paper-and-pencil learning test and (2) a role-play reproduction.

Post-training measures. Two weeks after the training, participants returned to take the cognitive ability measure, the generalizability role-play, the paper-and-pencil retention test, and the self-efficacy measure. In addition, participants were asked to recall the pre-training information concepts from the training session.

Pilot Test

The pilot study sample consisted of 30 undergraduates recruited from the Psychology Department subject pool at Michigan State University. A pilot test was conducted for the pre-training information conditions (advance organizer and background information) X symbolic coding conditions (learning points provided, learning points generated, and control). The pilot was conducted to examine the strength of the independent variable manipulations and the reliability of the dependent variables.

Several changes were made based on the results of the pilot study. First, the author decided to strengthen the manipulations of the independent variables due to small effect sizes for advance organizers and symbolic coding in the pilot study. To strengthen the manipulation of advance organizers, participants in the advance organizer condition were given a description of the purpose of advance organizers, an example of how an advance organizer works as well as instructions to apply the advance organizer to the upcoming training material. These hints were designed to facilitate the transfer of the advance organizer to increase the retention and generalizability of the training material (Gick & Holyoak, 1987). To strengthen the symbolic coding manipulation from the pilot study, participants practiced generating learning points to a well-known skill. Second, interrater reliabilities were calculated for the reproduction and generalizability measures. For the items

where the reliabilities were low, the experimenter and raters created anchors for those items to improve the reliabilities. In addition, the learning and retention measure had several items with high difficulty values, so the distractors were modified to lower the p-values.

Further results from pilot study as well as previous use of the some of the measures by Baldwin (1992) are presented in Appendix L.

RESULTS

The results for this study are reported in three parts. First, the reliability of the measures used in this study was examined. Second, the effect of pre-training information (advance organizers and background information) on training outcomes was examined in a condition where participants did not undergo symbolic coding (Study I). Third, the hypotheses of the study, along with certain exploratory analyses were examined in a 2 (advance organizer and background information) X 2 (learning points provided and learning points generated) design (Study II).

Reliability of Measurement

Various methods were used to examine the reliability of the measures of the performance of 183 participants in this study. Reproduction, generalizability, and quality were assessed using interrater reliability for two raters. Learning, retention, and self-efficacy were assessed using coefficient alpha. The reliability for cognitive ability, as measured by the Wonderlic, was based upon information from the publisher ("Wonderlic Personnel Test," 1992).

The interrater correlation matrix for reproduction scores is displayed in Table 1. The correlations for the 14 items of the scale varied in strength from .53 to .96, with

Table 1

Interrater Correlation Matrix for Reproduction Scale

Rater (A/B)	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
B1	.54													
B2	.10	.71												
B3	.04	.03	.92											
B4	-.02	.23	.34	.71										
B5	-.01	.07	.17	.16	.74									
B6	.11	.13	.03	.19	.07	.81								
B7	.08	.27	.19	.23	.09	.12	.63							
B8	.17	.17	.18	.15	.02	.31	.36	.64						
B9	.08	.27	.08	.20	.02	.21	.24	.31	.69					
B10	.11	.23	.12	.19	-.02	.21	.34	.32	.32	.67				
B11	.05	.20	-.06	.06	-.05	.01	.19	.14	.08	.14	.95			
B12	.11	.11	.13	.08	.09	.15	.12	.18	.20	.19	.06	.96		
B13	.17	.20	.24	.27	.17	.11	.17	.22	.24	.29	.26	.18	.53	
B14	.24	.41	.27	.39	.11	.28	.42	.40	.38	.41	.39	.33	.38	.67

n = 183

a reliability of .67 for the overall rating (Item #14). To measure reliability for the experiment, a mean of the 14 items of the reproduction scale was calculated for each rater, generating an interrater reliability of .85. This was the reliability used in the experiment. To measure reproduction in the experiment, an overall mean of the consensus ratings between the two raters (items 1 - 14) was used.

The interrater correlation matrix for generalizability scores is displayed in Table 2. The correlations for the 10 items of the scale varied in strength from .36 to .74, with a reliability of .57 for the overall rating (Item #10). To measure reliability for the experiment, a mean of the 10 items of the generalizability scale was calculated for each rater, generating an interrater reliability of .64. This was the reliability used in the experiment. To measure generalizability in the experiment, an overall mean of the consensus ratings between the two raters (items 1 - 10) was used.

The interrater correlation matrix for Quality scores is displayed in Table 3. The correlations for the seven items of the scale varied in strength from .31 to .78, with a reliability of .31 for the overall rating (Item #7). To measure reliability for the experiment, a mean of the seven items of the reproduction scale was calculated for each rater, generating an interrater reliability of .58. This was the reliability used in the experiment. To measure

Table 2

Interrater Correlation Matrix for Generalizability

Rater (A/B)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
A1	.64									
A2	.33	.50								
A3	.29	.32	.48							
A4	.21	.19	.25	.52						
A5	.08	.09	.20	.06	.38					
A6	.21	.22	.18	.18	.22	.36				
A7	.18	.22	.26	.27	.23	.32	.63			
A8	.04	.10	.03	.08	.05	.06	.23	.74		
A9	.29	.13	.24	.23	.21	.27	.29	.11	.38	
A10	.40	.31	.32	.32	.20	.36	.43	.13	.38	.57

n = 183

Table 3

Interrater Correlation Matrix for Quality

Rater (A/B)	A1	A2	A3	A4	A5	A6	A7
B1	.71						
B2	-.14	.49					
B3	.19	.09	.78				
B4	-.14	.05	.01	.54			
B5	.02	.05	-.06	-.10	.54		
B6	-.22	-.04	-.24	-.19	-.17	.60	
B7	.14	.25	.18	.26	.26	-.07	.31

n = 63

quality in the experiment, an overall mean of the consensus ratings between the two raters (items 1 - 7) was used.

The learning measure consisted of twenty multiple choice items based upon the learning points of assertive communication. In examining the corrected item-total correlations for the twenty items (see Table 4), items eight and eleven displayed negative item-total correlations and were subsequently dropped. Using the eighteen remaining items, the coefficient alpha was .64. Like the learning measure, retention was evaluated using only the eighteen items specified by the learning measure with a coefficient alpha = .61.

Finally, the reliability of self-efficacy was evaluated using coefficient alpha. This seven item measure was based upon one's confidence in their ability to enact the learning points as well as their assessment of their overall assertive communication ability. The coefficient alpha of self-efficacy was .91.

The reliability of the Wonderlic Personnel Test has been demonstrated in a number of different ways. Test-retest reliabilities have ranged from .82 to .94 ("Wonderlic Personnel Test," 1992). Longitudinal reliability as measured by Dodrill (1983) was .94. Correlation of odd items and even items ranged from .88 to .94 ("Wonderlic Personnel Test," 1992).

Table 4

Corrected Item-Total Correlations for Learning Scale

Item #	Item-Total Correlation
1	.23
2	.23
3	.17
4	.26
5	.20
6	.18
7	.12
8	-.04
9	.14
10	.03
11	-.08
12	.14
13	.38
14	.30
15	.19
16	.35
17	.27
18	.42
19	.22
20	.40

n = 183

Study I

In the first study, 61 participants received either an advance organizer (n = 34) or background information (n = 27) in a no symbolic coding condition to discover the nature of their independent effect on the dependent variables. Regression analyses were conducted by first entering cognitive ability and then learning as covariates. This was done to examine the effects of pre-training information on the dependent variables over and above that which could be attributed to cognitive ability and the learning of the training material. The means and standard deviations for these two conditions, along with the adjusted means with cognitive ability and learning covaried out, are listed in Table 5 and the correlation matrix for the variables is listed in Table 6.

Retention. The results of the regression on retention are displayed in Table 7. In the first step, cognitive ability produced an R^2 of .13, $p<.01$., and learning produced a significant change in R^2, .47, $p<.01$. After these two variables were entered, pre-training information resulted in a near zero change in R^2. After the main effects were added, all two-way interactions, including exploratory analyses, among cognitive ability, learning, and pre-training information were added. None of these resulted in a significant interaction. After the two-way interactions were entered, the three-way interaction was entered producing a non-significant change in R^2. The total

Table 5

Means and Standard Deviations of Study Variables for Study I

	AO n=34			BI n=27		
	Mean	SD	AM	Mean	SD	AM
Reproduction	3.20	0.88	3.12	3.42	0.88	3.53
Cognitive Ability	24.38	5.91		22.59	4.75	
Learning	11.76	2.09		11.07	2.73	
Retention	12.71	2.44	12.41	12.22	2.78	12.59
Generalizability	3.92	0.59	3.88	3.79	0.74	3.84
Self-Efficacy	6.87	1.71	6.93	7.33	1.00	7.26

n = 61

AO = Advance Organizer
BI = Background Information
AM = Adjusted Mean with Cognitive Ability and Learning as Covariates

Table 6

Intercorrelations Among Study Variables: Study I

	(1)	(2)	(3)	(4)	(5)	(6)
Cognitive Ability (1)	1.00					
Learning (2)	.30[b]	1.00				
Retention (3)	.36[c]	.76[c]	1.00			
Generalizability (4)	.29[b]	.27[b]	.25[b]	1.00		
Self-Efficacy (5)	-.31[b]	-.07	-.11	-.08	1.00	
Pre-training Information (6)	.16	.14	.09	.09	-.16	1.00

n=61

b = p<.05
c = p<.01

Pre-training Information: 0=Background Information
1=Advance Organizer

Table 7

Regression Analysis Results on Retention Measure: Study I

VARIABLE	Beta	R	R^2	R^2 Change
Step 1: Cognitive Ability (C)	-0.92	.36	.13	.13[c]
Step 2: Learning (L)	0.02	.77	.60	.47[c]
Step 3: Pre-training Info (P)	-4.01[a]	.77	.60	.00
Step 4:				
C X L	1.34			
C X P	4.78[a]			
L X P	3.39	.79	.62	.02
Step 5:				
C X L X P	-4.28	.80	.64	.02

n=61

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

variance accounted for by all the variables for retention was .64.

With learning taking up the largest amount of variance in the prediction of retention, it was postulated that learning might mediate the relationship between pre-information and retention. However, with further analysis, it was discovered that the correlation between the use of advance organizers and retention was non-significant (.09), therefore, negating the idea that learning served as a mediator between pre-information and retention.

Generalizability. The results of the regression on generalizability are displayed in Table 8. Cognitive ability and learning were entered in the first two steps. Cognitive ability produced a significant R^2 of .08, $p<.05$, and learning did not produce a significant change in R^2. After these two variables were entered, pre-training information resulted in a near zero change in R^2. After the main effects, all two-way interactions, including exploratory analyses, among cognitive ability, learning, and pre-training information were entered into the equation. None of these resulted in a significant interaction. Finally, the three-way interaction was entered in the final step and resulted in a near zero change in R^2. The total variance accounted for by all the variables for generalizability was .14.

Self-efficacy. The results of the regression on self-efficacy are displayed in Table 9. Cognitive ability and

Table 8

Regression Analysis Results on Generalizability: Study I

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	-0.38	.29	.08	.08[b]
Step 2:				
Learning (L)	-0.48	.35	.12	.04
Step 3:				
Pre-training Info (P)	-1.80	.35	.12	.00
Step 4:				
C X L	1.14			
C X P	1.69			
L X P	2.43	.37	.14	.02
Step 5:				
C X L X P	-2.42	.38	.14	.00

n=61

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights are used

Table 9

Regression Analysis Results on Self-Efficacy: Study I

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	0.14	.31	.09	.09[b]
Step 2:				
Learning (L)	0.18	.31	.09	.00
Step 3:				
Pre-training Info (P)	4.28	.33	.11	.02
Step 4:				
C X L	-0.34			
C X P	-5.23			
L X P	-3.72	.38	.15	.04
Step 5:				
C X L X P	4.65	.41	.17	.02

n=61

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights used

learning were entered in the first two steps. Cognitive ability produced a significant R^2 of .09, $p<.05$. However, the relationship was in a negative direction, with individuals with lower scores on the cognitive ability measure having higher self-efficacy. Learning was then entered and produced a non-significant change in R^2. The use of pre-information was then entered and it did not produced a significant change in R^2. After the main effects, all two-way interactions, including exploratory analyses, among cognitive ability, learning, and pre-training information were entered into the equation. None of these resulted in a significant interaction. Finally, the three-way interaction was entered and did not produce a significant change in R^2. The total variance accounted for by all the variables for self-efficacy was .17.

Study II

In the second study, 122 participants were randomly assigned to one of four conditions (advance organizer and learning points provided, n = 31; advance organizer and learning points generated, n = 30; background information and learning points provided, n = 28; and background information and learning points generated, n = 33). Like study I, regression analyses were conducted by first entering cognitive ability and the learning score as covariates. The means and standard deviations for these four conditions are listed in Table 10, the adjusted means with cognitive ability and learning covaried out are listed

Table 10

Means and Standard Deviations for Study II

	AO & LPP n=31		AO & LPG n=30		BI & LPP n=28		BI & LPG n=33	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Reproduction	2.96	0.70	3.08	0.72	3.12	0.74	3.30	0.56
Cog. Ability	23.48	5.01	24.07	4.46	23.93	4.75	23.09	4.18
Learning	14.68	1.94	11.20	2.46	15.25	1.82	11.88	2.85
Retention	14.45	2.51	12.37	2.79	15.46	1.32	13.18	2.20
Generalizability	3.70	0.74	3.78	0.72	3.86	0.61	3.88	0.69
Self-Efficacy	7.13	1.00	6.98	1.25	7.13	1.55	7.30	0.97
Quality			2.65	0.51			2.58	0.58

n=122

AO = Advance Organizer
BI = Background Information
LPP = Learning Points Provided
LPG = Learning Points Generated

in Table 11 and the correlation matrix for the variables is listed in Table 12.

Retention. H_1 stated that cognitive ability would have a positive effect on the retention of training information. This hypothesis was confirmed when entered into the regression equation first, producing an R^2 of .07, $p<.01$ (see Table 13). Next, learning was entered into the regression equation producing a significant change in R^2 of .46, $p<.01$. H_2 stated that individuals who received an advance organizer would retain more training information than individuals who received background information and H_3 stated that individuals who generated their own learning points would retain more information than individuals who received learning points. Both were entered into the regression at the same time and produced a non-significant change in R^2., disconfirming both hypotheses. Next, all two-way interactions, including exploratory analyses, among the four variables were entered into the equation. H_4 predicted an interaction between the conditions of pre-training information and symbolic coding. Results found that the interaction between symbolic coding and pre-training information was not significant, thereby disconfirming the hypothesis. Exploratory analyses for the other two-way interactions also produced non-significant results. Finally, all three-way interactions were included in the final step. No significant interaction was discovered. The total variance accounted for by all the

Table 11

Adjusted Means for Dependent Variables in Study II

	AO & LPP n=31	AO & LPG n=30	BI & LPP n=28	BI & LPG n=33
Reproduction	2.88	3.18	3.00	3.39
Retention	13.61	13.48	14.26	13.99
Generalizability	3.67	3.83	3.80	3.93
Self-Efficacy	7.09	7.06	7.08	7.32
Quality		2.67		2.56

n=122

AO = Advance Organizer
BI = Background Information
LPP = Learning Points Provided
LPG = Learning Points Generated

Table 12

Intercorrelations Among Study Variables: Study II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cognitive Ability (1)	1.00							
Learning (2)	.16	1.00						
Retention (3)	.27[c]	.71[c]	1.00					
Generalizability (4)	.18[b]	.09	.13	1.00				
Self-Efficacy (5)	-.12	.03	-.06	.04	1.00			
Quality (6)	.13	.27[b]	.27[b]	.24	.01	1.00		
Pre-training Information (7)	.03	-.08	-.16	-.10	-.07	.06	1.00	
Symbolic Coding (8)	-.02	-.59[c]	-.42[c]	.04	.01		-.05	1.00

n = 122

b = p<.05
c = p<.01

Pre-training Info.: 0=Background Information, 1=Advance Organizer
Symbolic Coding: 0=Learning Points Provided, 1=Learning Points Generated

Table 13

Regression Analysis Results on Retention: Study II

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	-0.88	.27	.07	.07[c]
Step 2:				
Learning (L)	-0.37	.73	.53	.46[c]
Step 3:				
Pre-training Info (P)	-1.37			
Symbolic Coding (S)	-3.71	.74	.54	.01
Step 4:				
C X L	1.30			
C X P	0.47			
C X S	3.91			
L X P	1.12			
L X S	2.60			
P X S	-0.12	.76	.58	.04
Step 5:				
C X L X P	-0.44			
C X L X S	-2.94			
C X P X S	0.18			
L X P X S	0.12	.77	.60	.02

n=122

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

variables for retention was .60.

Exploratory hypotheses once again examined the large amount of variance attributed to learning as being a possible mediator for advance organizers. The correlation between pre-training information and retention was once again non-significant, thereby, disconfirming the idea of mediation. In further examination of the correlation matrix (see Table 12), the correlation between symbolic coding and retention was noticeably large (-.42, $p<.01$) suggesting that when learning points were provided, individuals retained larger amounts of training material. This was tested using learning as a mediator variable to see if its effects would hold true after accounting for the effects of symbolic coding on retention (James & Brett, 1984). To test for mediator effects, a separate regression analysis was conducted (see Table 14). Cognitive ability was covaried out of retention prior to conducting the test for mediation. In the first equation, symbolic coding was entered before learning. Symbolic coding produced a significant change in R^2 of .18, $p<.01$, when added to the equation after cognitive ability, and learning produced a significant change in R^2 of .28, $p<.01$ after cognitive ability and symbolic coding. In the second equation, learning was entered before symbolic coding. Learning produced a significant change in R^2 of .46, $p<.01$, after cognitive ability, and symbolic coding did not produce a significant change in R^2 after cognitive ability and learning. These results support the mediated

Table 14

Regression Analysis Results of Test of Mediation of Learning on Retention: Study II

VARIABLE	Beta	R	R^2	R^2 Change
EQUATION 1				
Step 1: Cognitive Ability (C)	0.16	.27	.07	.07[c]
Step 2: Symbolic Coding (S)	0.67	.50	.25	.18[c]
Step 3: Learning (L)	-0.02	.73	.53	.28[c]
EQUATION 2				
Step 1: Cognitive Ability (C)	0.16	.27	.07	.07[c]
Step 2: Learning (L)	0.67	.73	.53	.46[c]
Step 3: Symbolic Coding (S)	-0.02	.73	.53	.00

n=122

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

relationship of learning between the relationship of symbolic coding and retention.

Generalizability. H_5 stated that cognitive ability would have a positive effect on the generalizability of training information (see Table 15). This hypothesis was confirmed when cognitive ability was entered into the regression equation, producing a change in R^2 of 03, $p<.05$. Next, learning was entered into the regression equation but did not produce a significant change in R^2. H_6 stated that individuals who received an advance organizer would retain more training information than individuals who received background information and H_7 stated that individuals who generated their own learning points would retain more information than individuals who received learning points. Both were entered into the regression at the same time and produced a non-significant change in R^2, disconfirming both hypotheses. After the main effects, all two-way interactions, including exploratory analyses, among the four variables were entered into the equation. H_8 predicted an interaction between the conditions of pre-training information and symbolic coding. Results found no significant interaction between pre-training information and symbolic coding, thereby disconfirming the hypothesis. Exploratory analyses of the other interactions found that two interactions resulted in significant ($p<.10$) standardized weights. The first interaction was between pre-training information and learning. Background

Table 15

Regression Analysis Results on Generalizability: Study II

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	-2.18	.18	.03	.03[b]
Step 2:				
Learning (L)	-2.53[a]	.19	.04	.01
Step 3:				
Pre-training Info (P)	-5.53			
Symbolic Coding (S)	-2.61	.23	.05	.01
Step 4:				
C X L	3.67[a]			
C X P	3.93			
C X S	2.97			
L X P	5.52[a]			
L X S	2.49			
P X S	1.06	.38	.14	.09[a]
Step 5:				
C X L X P	-4.19			
C X L X S	-2.90			
C X P X S	-0.20			
L X P X S	-0.49	.41	.17	.03

n=122

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

information had little effect on generalizability for individuals with various levels of learning, whereas advance organizers led to higher scores on generalizability for individuals with higher levels of learning, and lower scores on generalizability for individuals with lower levels of learning. The second interaction was between cognitive ability and learning. For individuals with lower levels of cognitive ability, higher levels of learning led to lower scores on generalizability, and lower levels of learning led to higher scores on generalizability. For individuals with higher levels of cognitive ability, higher levels of learning led to higher scores on generalizability, and lower levels of learning led to lower scores on generalizability. Finally, all three-way interactions were entered into the regression equation. No significant interactions resulted. The total variance accounted for by all the variables for generalizability was .17.

Self-Efficacy. H_9 stated that cognitive ability would have a positive effect on the trainee's self-efficacy (see Table 16). This hypothesis was not confirmed when entered into the regression equation first, producing a non-significant R^2. Next, learning did not produce a significant change in R^2. H_{10} stated that individuals who received an advance organizer would have more self-efficacy than individuals who received background information and H_{11} stated that individuals who generated their own learning points would have more self-efficacy than individuals who

Table 16

Regression Analysis Results on Self-Efficacy: Study II

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	1.15	.12	.02	.02
Step 2:				
Learning (L)	1.27	.13	.02	.00
Step 3:				
Pre-training Info (P)	1.69			
Symbolic Coding (S)	3.21	.15	.02	.00
Step 4:				
C X L	-1.49			
C X P	-0.70			
C X S	-2.80			
L X P	-0.83			
L X S	-2.04			
P X S	-0.98	.23	.05	.03
Step 5:				
C X L X P	-0.08			
C X L X S	1.83			
C X P X S	-0.02			
L X P X S	0.70	.24	.06	.01

n=122

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

received learning points. Both were entered into the regression at the same time and produced a non-significant change in R^2, disconfirming both hypotheses. Next, all two-way interactions, including exploratory analyses, among the four variables were entered into the equation. H_{12} predicted an interaction between the conditions of pre-training information and symbolic coding. Results found that the interaction between pre-training information and symbolic coding was not significant, thereby disconfirming the hypothesis. Exploratory analyses for the other two-way interactions also produced non-significant results. Finally, all three-way interactions were entered into the equation. No significant interactions were discovered. The total variance accounted for by all the variables for self-efficacy was .06.

Quality. H_{13} stated that cognitive ability would have a positive effect on the quality of trainee's generated learning points (see Table 17). This hypothesis was not confirmed when entered into the regression equation first, producing a non-significant R^2. Next, learning was entered into the regression equation and produce a significant change in R^2 of .06, $p<.10$. H_{14} stated that individuals who received an advance organizer would generate learning points of higher quality than individuals who received background information. This hypothesis was also disconfirmed when entered into the regression equation, producing a non-significant change in R^2. Next, all two-way interactions,

Table 17

Regression Analysis Results on Quality: Study II

VARIABLE	Beta	R	R^2	R^2 Change
Step 1:				
Cognitive Ability (C)	-0.16	.13	.02	.02
Step 2:				
Learning (L)	-0.00	.28	.08	.06[a]
Step 3:				
Pre-training Info (P)	-2.78	.29	.08	.00
Step 4:				
C X L	0.26			
C X P	2.06			
L X P	2.22	.32	.10	.02
Step 5:				
C X L X P	-1.91	.33	.11	.01

n=63

a = p<.10
b = p<.05
c = p<.01

Note: Final Standardized Beta weights were used

including exploratory analyses, among the three variables were entered into the equation. H_{15} predicted an interaction between cognitive ability and training pre-information. Results found that the interaction between cognitive ability and pre-training information was not significant, thereby disconfirming the hypothesis. Exploratory analyses produced non-significant results for the other two-way interactions. Finally, the three-way interaction was entered into the equation. No significant change in R^2 was produced. The total variance accounted for by all the variables for quality was .11.

DISCUSSION

The purpose of the present study was to examine the effects of advance organizers and different methods of symbolic coding on training outcomes. The discussion is divided up into three sections. The first section provides a summary of the findings of the experiment, both those that were hypothesized and those that were exploratory in nature, and the implications of the results. The second section highlights some of the limitations of the study and the impact of those limitations on the results. The third section addresses future research directions.

Summary and Implications of Major Findings

Cognitive ability. In support of the hypotheses, the results found, with the exception of quality and self-efficacy, that cognitive ability was a significant predictor of retention and generalizability in study I and II, with individuals having higher cognitive ability scoring higher on these measures. This was expected as individuals with higher cognitive ability should be able to educe relations between concepts, and store and retrieve those relationships in and from memory more efficiently than individuals with lower cognitive ability. In addition, the relationship between the concepts would be more readily and accurately

retrieved by high cognitive ability individuals than by low cognitive ability individuals in situations such as the generalizability measure. The relationship between cognitive ability and quality of learning points generated was positive, but not significant as expected in the hypotheses.

The relationship between self-efficacy and cognitive ability was negative in both studies and significant in study I. These results could be due to individuals in the study having made self-efficacy judgments about their skill in assertive communication prior to receiving the training. Also, one's confidence in their ability to communicate assertively with other individuals might be different than cognitive ability. Individuals high on cognitive ability might spend more time being introspective and analytical and spend less time communicating assertively in social situations. Cognitive ability might affect the retention and generalizability of learned training material, but it might not affect one's perceptions of assertive communication skill, perceptions that might have been established before the training and might have been unchanged by the training. Alternatively, low ability individuals who undergo training may incorrectly assume that since they went through the training, they were effective at the skill of assertive communication. The simple exposure to training might have been perceived as sufficient for these individuals to attain the skill.

Pre-training information. The hypotheses concerning advance organizers stated that advance organizers would lead to greater amounts of retention and generalizability of training material, as well as increased levels of self-efficacy and quality of learning points generated. Hypotheses concerning interactions with symbolic coding postulated that advance organizers would be more beneficial for retention, generalizability, and self-efficacy in cases where individuals were provided with learning points. The study failed to confirm all of the above hypotheses. In addition, the interaction between cognitive ability and advance organizers was explored in the study. It was expected that individuals low in cognitive ability would receive more benefits from the advance organizers than individuals high in cognitive ability, who should be able to create organizing schemas on their own. These interactions were also non-significant.

These results raise a number of questions for the use and effectiveness of advance organizers. Several reasons could be offered for their ineffectiveness in this setting. First, the idea of, in this particular study, a jungle cat improving the learning of training material might have been unrealistic to the study participant. Even though the study's participants retained more advance organizer concepts (Mean = 1.93, SD = 1.17) than background information concepts (Mean = 1.23, SD = 1.02) after two weeks ($r=.30$, $p<.01$), the thought of a jungle cat improving

performance was not believable and, therefore, it is possible that the participants didn't apply it to the training material. Second, the advance organizer was preceded by instructions describing its usefulness. Individuals might have tried to apply the advance organizer and found difficulty in matching the concepts to the training material. This difficulty might have been compounded if the individual had a lower level of cognitive ability. Instead of matching the advance organizer to the training material, the individual might have spent too much time processing the advance organizer alone. Working memory might have used too many of its resources keeping the advance organizer in the working memory store as well as using resources in wondering why a jungle cat was presented, thereby, leaving fewer resources to process the new information or combine it with the advance organizer. Third, individuals might have had a well-formed notion as to what assertive communication is, and these preconceived concepts might not have been compatible with the advance organizer. Therefore, when asked to recall assertive communication information, the advance organizer, while still stored in memory, might not have been connected or retrieved with their preconceived notions. Fourth, even though the study was a revised version of behavior modeling, it still possessed a considerable amount of structure for the individual. Research has shown that advance organizers might not be as beneficial in training that is highly

structured (Mayer, 1979b). The training in this study might have had too much structure with the symbolic coding condition in which the participants had to actively process the training material over multiple occasions, thereby, limiting the advance organizer's usefulness. Finally, advance organizers have typically been used in education settings with the acquisition of textual information. The advance organizer and the material to be learned are both in a textual format in these settings. In this experiment, the advance organizer, like the educational setting, was presented in a text format while the material to be learned was in a skill-based format. While the direct reading text-to-reading text link may produce positive effects in educational settings, the incompatibility of the reading text-to-skill acquisition link in a training setting, such as this experiment, may produce difficulties due to learning in different domains. Learning textual material might not operationalize well into learning non-textual material, such as assertive communication skills in this experiment.

Symbolic coding. The hypotheses concerning symbolic coding stated that generating learning points would lead to greater amounts of retention and generalizability of the training material, as well as increased levels of self-efficacy over that of providing individuals with learning points. The results of the study failed to confirm the above hypotheses. In terms of retention, learning points provided had a significant effect on retention through a

mediator variable, learning. This was opposite to the hypothesis of generated learning points leading to an increased amount of retention. These results may have been the outcome of the fact that the retention measure was based upon the six learning points of assertive communication. The retention measure directly corresponded to the learning points for the individuals who received learning points, whereas the individuals who generated their own learning points might not have generated the exact six, or may have generated the learning points in their own terms which could have hindered their performance on the retention measure that might have been more specific to the learning points provided conditions.

Hypotheses concerning interactions with advance organizers postulated that advance organizers would be more beneficial for retention, generalizability, and self-efficacy in cases where individuals received learning points. These hypotheses were not confirmed by the study. It was proposed that the advance organizer would set up an accurate schema in which the training material could be linked in order to benefit those individuals who had been provided with learning points. The advance organizer, for reasons cited above (e.g., unrealistic, previous perception, working memory overload, etc.), was not effective in leading to higher levels of the dependent variable. This ineffectiveness prevented the generation of a facilitative schema for the individuals in the learning points provided

conditions. Exploratory hypotheses examined the relationship between symbolic coding and cognitive ability. It was expected that individuals who were low in ability and had to generate their own learning points would retain more information, be better able to generalize, and have higher levels of self-efficacy than low ability individuals who were provided with learning points. Non-significant results did not confirm these expectations.

Study Limitations

The limitations of this study are discussed in relation to: (1) pre-training information, (2) training material, and (3) dependent variable measures.

Pre-training information. In terms of this independent variable, there are two possible limitations with their use in this study. First, as stated above, the advance organizer of the jungle cat might have been too unrealistic for the individuals in the study. Even though they were provided with ample description about the function of advance organizers, the jungle cat story might have been difficult to apply to the learning of the training material. Perhaps a less novel advance organizer that was more in line with their expectations would have been more useful. For instance, a human example might have been perceived as more realistic to the participants and could have been connected to assertive communication information more easily than a jungle cat example. Second, even though the background information provided no helpful information in terms of the

content of the training material, the content might have been motivating to the participants of the study. By describing the definition of assertive communication along with its various uses, the participants might have been more motivated to learn the training material. Third, as stated above, using textual material to improve the retention of textual material might be beneficial in an educational setting, but its effects might not be as beneficial when learning takes place in a different domain, such as the acquisition of assertive communication skill in this experiment.

Training material. Another possible limitation was the use of assertive communication skills as the training material. Individual participants could have already had well-learned schemas concerning these skills, and new information in training might not have been as readily incorporated/connected to these structures. Using training material that was more unfamiliar to the participants or covarying out what knowledge they already possessed might have produced different results.

Dependent variable measures. In particular, the retention and the generalizability measures could have been a possible limitation in this study. The strong effect of the learning points provided condition on retention was due, in the most part, to the fact that the measure was based upon the six learning points of assertive communication. This could also have lead to the retention measure's

reliability being lower (alpha = .61) than desired. A retention measure that did not favor the learning points provided condition as much as this measure could have been more beneficial. Half the participants in study II received the learning points, while the other half generated their own. Creating a retention measure that did not favor the learning points provided conditions would be extremely difficult. A retention measure comparing participants' generated learning points to the ones they retained might get at this, but would require much effort in generating an individualized retention measure for each trainee. In addition, it would not guarantee that the individuals in the learning points generated condition would retain the correct information. The generalizability measure also had poorer reliability than desired with an interrater reliability of the mean rating of r = .64. With smaller effect sizes than the retention measure, the unreliability in the dependent variable reduces statistical power. Giving more than one scenario or providing more training to the raters might have improved this situation.

Directions for Future Research

Future research in this area could take several directions. First, the operationalization of advance organizers needs further examination. Using textual materials for an advance organizer might be beneficial when learning textual information, but when it is used in learning skills, a different domain, problems can arise in

the transfer of information (Bassok, 1990; Bassok & Holyoak, 1989). Also, the processing required for learning textual information is different than the processing required to learn a skill, thereby, weakening the transfer effect (Brooks, 1987). If the two were processed the same way, the processing of the second could serve as a stronger cue for the retrieval of information. These design problems need to be further explored and refined. For example, a skill-based advance organizer, rather than a textual one, might be more beneficial in training because trainees would be using the same domain, skill-to-skill, instead of a different one, text-to-skill. Until these operationalization issues involving advance organizers are further explored, one might postpone the use of advance organizers in the practice of skill-based training.

Second, the use of these cognitive mechanisms in structured training programs needs to be explored. Prior research has stated that advance organizers are not as effective when training is highly structured (Mayer, 1979b), such as behavior modeling. Future research needs to examine how these cognitive mechanisms operate in training programs that are already highly structured. Knowledge structures concerning the training material could be assessed prior to training. After training, the changes in these knowledge structures due to advance organizers or symbolic coding in training could then be assessed to see if advance organizers or different methods of symbolic coding produced changes.

Finally, the interactive effects of cognitive ability with advance organizers need to be further explored. Results of previous research on advance organizers and cognitive ability are mixed (Luiten et al, 1980; Mayer, 1979b), and the results of this experiment, while not significant, tended to suggest that advance organizers might be more useful for individuals with higher levels of cognitive ability. Further research on the effects of these mechanisms on individuals with different levels of cognitive ability is needed, particularly if issues regarding the operationalization of advance organizers are further examined.

APPENDICES

APPENDIX A

Advance Organizer: Linkage to Learning Points

Learning Points	Advance Organizer Component
Nonverbal:	Eyes never leave its target; calm, steadfast manner
Self-Disclosure:	Doesn't invent reasons; honest; survival
Broken Record:	Persistent in its tracking; waits patiently and remains patient
Fogging:	Avoids obstacles, rocks, trees while tracking; doesn't get angry
Negative Assertion:	Instinctual; doesn't apologize for actions
Check for Closure:	Attacks jugular to guarantee the death of its prey

Advance Organizer: Paragraph

The jungle cat on the hunt is a quite a sight to behold. While ferocious, the jungle cat does not apologize for what it does. Hunting prey is instinctual and necessary for its survival as well as the survival of its kin, so it doesn't need to invent reasons why it hunts other animals. When the cat spots its prey, its eyes never leaves the target in a calm, steadfast manner. While tracking, many obstacles get in its way in terms of rocks and trees, but the cat waits patiently and remains persistent in its following. The jungle cat shows no anger at the obstacles, but continues to be persistent in its watch. At the attack, the cat goes for the jugular to ensure the death of its prey and to remove any doubts of what is going on. Both the predator and prey understand.

APPENDIX B

Background Information Paragraph

Definition-wise, the Concise Oxford Dictionary defines "assert" as to vindicate a claim to (rights); insist upon one's rights. Assertive communication techniques are a direct outgrowth of working with normal human beings, trying to teach them something about how to cope effectively with the conflicts and problems they have in living with each other. Not only will these techniques prove beneficial in managing conflict, but they can also give people a better understanding of what often happens when they feel at a loss in coping with one another. These techniques have been taught in a variety of settings including universities, outpatient clinics, training programs, and prisons to name a few.

APPENDIX C

Wonderlic Personnel Test

WONDERLIC

PERSONNEL TEST

FORM APT

NAME ..... Date .....
(Please Print)

READ THIS PAGE CAREFULLY. DO EXACTLY AS YOU ARE TOLD.
DO NOT TURN OVER THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.

PROBLEMS MUST BE WORKED WITHOUT THE AID OF A CALCULATOR
OR OTHER PROBLEM-SOLVING DEVICE.

This is a test of problem solving ability. It contains various types of questions. Below is a sample question correctly filled in:

REAP is the opposite of

1 obtain, 2 cheer, 3 continue, 4 exist, 5 sow ..... [5]

The correct answer is "sow." (It is helpful to underline the correct word.) The correct word is numbered 5. Then write the figure 5 in the brackets at the end of the line.

Answer the next sample question yourself.

Paper sells for 23 cents per pad. What will 4 pads cost? ..... [__]

The correct answer is 92¢. There is nothing to underline so just place "92¢" in the brackets.

Here is another example:

MINER MINOR — Do these words
1 have similar meanings, 2 have contradictory meanings, 3 mean neither the same nor opposite? [__]

The correct answer is "mean neither the same nor opposite" which is number 3, so all you have to do is place a figure "3" in the brackets at the end of the line.

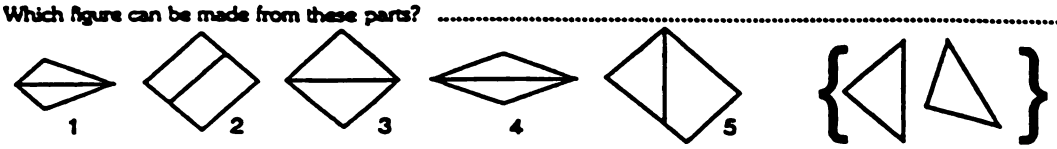
When the answer to a question is a letter or a number, put the letter or number in the brackets. All letters should be printed.

This test contains 50 questions. It is unlikely that you will finish all of them, but do your best. After the examiner tells you to begin, you will be given exactly 12 minutes to work as many as you can. Do not go so fast that you make mistakes, since you must try to get as many right as possible. The questions become increasingly difficult, so do not skip about. Do not spend too much time on any one problem. The examiner will not answer any questions after the test begins.

Now, lay down your pencil and wait for the examiner to tell you to begin!

Do not turn the page until you are told to do so.

1. The last month of the year is
   1 January, 2 March, 3 July, 4 December, 5 October ..... [___]
2. One number in the following series is omitted. What should that number be?
   100 97 94 ? 88 85 82 ..... [___]
3. Most of the items below resemble each other. Which one is least like the others?
   1 January, 2 August, 3 Wednesday, 4 October, 5 December ..... [___]
4. Which figure can be made from these parts? ..... [___]



5. In the following set of words, which word is different from the others?
   1 Methodist, 2 Easter, 3 Lutheran, 4 Catholic, 5 Quaker ..... [___]
6. Look at the row of numbers below. What number should come next?
   8 4 2 1 1/2 1/4 ? ..... [___]
7. Assume the first two statements are true. Is the final one: 1 True, 2 False, 3 not certain? The violin is in tune with the piano. The piano is in tune with the harp. The harp is in tune with the violin. ..... [___]
8. A man's car traveled 16 miles in 30 minutes. How many miles an hour was it traveling? ..... [___]
9. Which word below is related to smell as chew is to teeth?
   1 sweet, 2 stink, 3 odor, 4 nose, 5 clean ..... [___]
10. A dealer bought some T.V's for $2,000. He sold them for $2,400, making $50 on each T.V. How many T.V.'s were involved? ..... [___]
11. Assume the first 2 statements are true. Is the final one:
    1 true, 2 false, 3 not certain?
    These boys are normal children. All normal children are active. These boys are active. ..... [___]
12. A train travels 300 feet in 1/2 second. At this same speed, how many feet will it travel in 10 seconds? ..... [___]
13. REMOTE is the opposite of
    1 secluded, 2 near, 3 far, 4 hasty, 5 exact ..... [___]
14. Lemon drops sell at 3 for 10 cents. How much will 1 1/2 dozen cost? ..... [___]
15. In the following set of words, which word is different from the others?
    1 armada, 2 band, 3 brood, 4 boy, 5 crowd ..... [___]
16. A boy is 6 years old and his sister is twice as old. When the boy is 10 years old, what will be the age of his sister? [___]
17. Arrange the following words so that they make a true statement. Then print the last letter in the last word as the answer to this problem.
    is world The round ..... [___]
18. Look at the row of numbers below. What number should come next?
    81 27 9 3 1 1/3 ? ..... [___]
19. Assume that the first 2 statements are true. Is the final statement:
    1 true, 2 false, 3 not certain?
    John is the same age as Sally. Sally is younger than Bill. John is younger than Bill ..... [___]
20. A rectangular bin completely filled, holds 900 cubic feet of lime. If the bin is 10 feet long and 10 feet wide, how deep is it? ..... [___]
21. Assume that the first 2 statements are true. Is the final statement:
    1 true, 2 false, 3 not certain?
    All red-headed boys are mischievous. Charles is red-headed. He is mischievous. ..... [___]
22. A watch lost 1 minute 18 seconds in 39 days. How many seconds did it lose per day? ..... [___]
23. Two of the following proverbs have the same meaning. Which ones are they? ..... [___]
    1. Many a good cow hath a bad calf.
    2. Like father, like son.
    3. A miss is as good as a mile.
    4. A man is known by the company he keeps.
    5. They are seeds out of the same bowl.
24. Two men caught 36 fish; X caught 5 times as many as Y. How many fish did Y catch? ..... [___]
25. Assume the first 2 statements are true. Is the final one: 1 true, 2 false, 3 not certain?
    All Quakers are pacifists. Some of the people in this room are Quakers. Some of the people in this room are pacifists. ..... [___]

26. One number in the following series does not fit in with the pattern set by the others.
What should that number be? 1/2 1/4 1/6 1/8 1/9 1/12 ..... [___]

27. Are the meanings of the following sentences: 1 similar, 2 contradictory, 3 neither similar nor contradictory?
Every pumpkin is known by its stem. Like father, like son. ..... [___]

28. Wire is 15 cents a foot. How many feet can you buy for a dollar? ..... [___]

29. Assume that the first 2 statements are true. Is the final statement: 1 true, 2 false, 3 not certain? Most business men are progressive. Most business men are Republicans. Some progressive people are Republicans. ..... [___]

30. If 2 1/2 yards of fabric cost $20, what will 3 1/2 yards cost? ..... [___]

31. In the following set of words, which word is different from the others?
1 faculty, 2 fleet, 3 flock, 4 friend, 5 force ..... [___]

32. A skirt requires 2 1/4 yards of material. How many can be cut from 45 yards? ..... [___]

33. Assume the first 2 statements are true. Is the final one: 1 true, 2 false, 3 not certain?
Bert greeted Alice. Alice greeted Lou. Bert did not greet Lou. ..... [___]

34. A clock was exactly on time at noon on Monday. At 2 P.M. on Wednesday, it was 25 seconds slow. At that same rate, how much did it lose in 1/2 hour? ..... [___]

35. Are the meanings of the following sentences: 1 similar, 2 contradictory, 3 neither similar nor contradictory?
Friends agree best at a distance. Friends are one soul in two bodies. ..... [___]

36. A side of beef weighs 250 lbs. The average daily beef consumption of a family is 1 2/3 lbs. How long will this beef last them? ..... [___]

37. Are the meanings of the following sentences 1 similar, 2 contradictory, 3 neither similar nor contradictory?
A new broom sweeps clean. Old shoes are easiest. ..... [___]

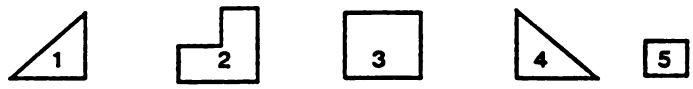
38. Our baseball team lost 9 games this season. This was 3/8 of all they played. How many games did they play this season? ..... [___]

39. Two of the following proverbs have similar meanings. Which ones are they? ..... [___]
1. You cannot make a silk purse out of a sow's ear.
2. He that steals an egg will steal an ox.
3. A rolling stone gathers no moss.
4. You cannot damage a wrecked ship.
5. It is the impossible that happens.

40. How many square yards are there in a floor which is 9 feet long by 21 feet wide? ..... [___]

41. Are the meanings of the following sentences: 1 similar, 2 contradictory, 3 neither similar nor contradictory?
A chip off the old block. A beggar's son struts like a peer. ..... [___]

42. Three of the following 5 parts can be fitted together in such a way to make a triangle.
Which 3 are they? ..... [___]



43. Are the meanings of the following sentences:
1 similar, 2 contradictory, 3 neither similar nor contradictory?
No honest man ever repented for his honesty. Honesty is praised and starves. ..... [___]

44. A soldier shooting at a target hits it 40% of the time. How many times must he shoot in order to register 100 hits? . [___]

45. In the following set of words, which word is different from the others?
1 colony, 2 companion, 3 covey, 4 crew, 5 constellation ..... [___]

46. For $2.40 a grocer buys a case of fruit which contains 12 dozen. She knows that two dozen will spoil before she sells them. At what price per dozen must she sell the good ones to gain 1/3 of the whole cost? ..... [___]

47. Assume that the first 2 statements are true. Is the final one: 1 true, 2 false, 3 not certain: Great men are ridiculed. I am ridiculed. I am a great man. ..... [___]

48. Three men form a partnership and agree to divide the profits equally. X invests $4,500, Y invests $3500 and Z invests $2000. If the profits are $1500, how much less does X receive than if the profits were divided in proportion to the amount invested? ..... [___]

49. Are the meanings of the following sentences: 1 similar, 2 contradictory, 3 neither similar nor contradictory?
Where there's a will there is a way. The gods sell everything for labor. ..... [___]

50. In printing an article of 30,000 words, a printer decides to use two sizes of type. Using the larger type, a printed page contains 1200 words. Using the smaller type, a page contains 1500 words. The article is allotted 22 pages in a magazine. How many pages must be in the smaller type? ..... [___]

APPENDIX D

Learning & Retention Scale

1. You are returning an item to a store because you do not want it. The clerk asks you why you do not want it. You should...

   a. Come up with a reason to speed up the process.
   b. Tell the clerk you just don't want it.
   c. Ask to see the clerk's superior.
   d. Keep the item to avoid an agonizing encounter.

2. Which of the following statement is most in line with assertive communication?

   a. You should try to keep goodwill when dealing with others.
   b. When others make logical statements you should agree with them.
   c. You have the right to your own behavior, thoughts, and emotions.
   d. You should always offer reasons for what you want.

3. Which of the following nonverbals are the most important for effective assertive communication.

   a. Domineering stance.
   b. Steady eye contact.
   c. Changing voice tone.
   d. Expressive hand motions.

4. In your communication with a salesperson, the salesperson tells you that you are being illogical in your request for a replacement part. How would you respond?

   a. "Listen, don't give me any slack, just give me the part."
   b. "I am not being illogical, and I want my part."
   c. "How do you think I am being illogical?"
   d. "That may be so, but I still want my part."

5. You have been rightly accused of making an error at work. How should you respond to the person.

   a. Give reasons why you made the error.
   b. Admit to making the error.
   c. Apologize for making the error and promise to make it up for them.
   d. Deny the error.

6. When dealing with a person who is sidetracking your requests, it is best that you...

   a. Give more reasons.
   b. Use a more official approach.
   c. Continue to be persistent.
   d. Work out a compromise.

7. Which of the following can be detrimental to assertive communication.

   a. Self-disclosure of information.
   b. A calm, repetitive voice.
   c. Accepting manipulative statements.
   d. Refusing to accept a compromise.

8. You are trying to get a refund from the sales clerk, when he tells you that there is nothing he can do. What would be the best way to respond?

   a. Continue to be persistent in your request to him.
   b. Insist on getting your refund.
   c. Ask him who can help you and ask to see them.
   d. Change your voice tone to get him to give you a refund.

9. When ending a conversation, it is important that...

   a. You make sure you have obtained a two-way understanding of the outcome.
   b. You make sure you have obtained what you originally wanted.
   c. You make sure you have not hurt their feelings.
   d. You make sure you have avoided all manipulations.

10. When returning a defective shoe, the store manager tells you that the factory that manufactures the shoe, won't take it back the shoe. What would you say?

    a. "How do I get in contact with the factory to get a new shoe."
    b. "Can't you just trade shoes with me here?"
    c. "What am I supposed to do with this shoe?"
    d. "I bought the shoe from you, and I want a refund."

11. Even if you have communicated assertively, it could prove unsuccessful if you do not...

    a. Continue to be persistent in your dealings.
    b. Dominate the proceedings of the conversation.
    c. Make sure the other person understands the decision.
    d. Compromise at the end of the conversation.

12. When asked to provide a reason for returning an auto part, which of the following responses would be most appropriate.

    a. Invent reasons that the salesperson will accept.
    b. Be honest about your feelings.
    c. Tell the salesperson that it is not any of their business.
    d. Ask to see their manager.

13. When assertively communicating with someone who is trying to manipulate you, it is important to...

    a. Use softer statements to win them over.
    b. Use an authoritarian style to communicate.
    c. Come up with new reasons to persuade them.
    d. Continue to be persistent in your request.

14. When a person tries to manipulate you in your conversation by attacking and insulting you verbally, you should...

    a. Admit there may be some truth in their statement, but it doesn't change your mind.
    b. Inform them that they are getting off the topic.
    c. Try to manipulate them back into the original conversation.
    d. Through voice inflection, take back the control of the conversation.

15. If your feelings get exposed in a conversation, you should make sure that you...

    a. Apologize for them, but continue to be persistent.
    b. Retaliate for losing control of your emotions.
    c. Try to find out what the other person's feelings are.
    d. Recognize them, instead of denying them.

16. If you were watching an individual assertively communicate, which of the following aspects would be associated with effective nonverbal skills.

    a. A changing voice tone.
    b. A steady voice tone
    c. An aggressive voice tone.
    d. An official voice tone.

17. The use of "I" statements in assertive communication can be...

    a. Detrimental because they are too revealing.
    b. Detrimental because they avoid the topic.
    c. Positive because they are honest feelings.
    d. Positive because they lighten up the conversation.

18. When returning an item, the salesperson insults you saying that you must be stupid to want to bring back the part. How would you respond?

    a. "What do you mean when you say I'm being stupid?"
    b. "Maybe you're right, but I still want to return the part."
    c. "Let's stop with the name-calling, and give me the refund."
    d. "I don't care what you think, I want my money back."

19. Which of the following is a successful technique in dealing with manipulative statements?

    a. Critical attack
    b. Sarcasm
    c. Aggressiveness
    d. Acknowledgement

20. To ensure that you have communicated assertively, you should always...

    a. Continue to emphasize your point to the other person.
    b. Check for closure with the other person.
    c. Stop the conversation when you have won the person over.
    d. Draw up a written contract with the other person.

APPENDIX E

Reproduction Role-Play Scoring Scale

Please rate each subject on the accuracy of reproduction of each of the 12 statements. Also, please observe the subject's overall nonverbal behavior (i.e., eye-contact and voice consistency) and record an overall rating at the end.

Scale is:

7 =	Outstanding reproduction	(90% of actual words & sequencing)
=	Good reproduction	(75%)
4 =	Average reproduction	(50%)
=	Poor reproduction	(25%)
1 =	Very poor reproduction	(Less than 10% or no reproduction)

Subject: Good Morning

Matt: Good Morning

(1) Hi, my name's . I brought my car in a couple of days ago to get my brakes worked on under warranty and when I got my car back the brakes squealed really loudly and I really don't want brakes on my car that squeal.

1 2 3 4 5 6 7

Matt: Well, I'm sorry but there's really nothing we can do about that. Those are standard brakes and quite often they squeal that way.

(2) Well, I am sure they might squeal that way from time to time, but when I brought my car in here the brakes didn't squeal and when I got it back they did. I really don't want brakes on my car that squeal.

1 2 3 4 5 6 7

Matt: As I said before, really there is nothing we can do about that.

(3) Could you tell me the name of your service manager and where I might find him?

1 2 3 4 5 6 7

Matt: I am the service manager here, my name is .

(4) Well, , I don't know much about brakes or why they might squeal but all I know is when I brought my car in here everything was fine in terms of the squealing and when I get it back they're squealing and I don't want brakes on my car that squeal they way

1 2 3 4 5 6 7

Matt: Well, , do you have a work receipt on this?

(5) Yes I do, right here (hands over work receipt)

1 2 3 4 5 6 7

Matt: (Reading work receipt) It says here this work was done last Wednesday. Why didn't you bring this to our attention last Wednesday or Thursday.

(6) Maybe I should have, but my car is here now and I want brakes on my car that don't squeal.

1 2 3 4 5 6 7

Matt: It also says that the brake cylinders on all four wheels were replaced. Here's what probably happened. The mechanic probably found a bit of brake fluid leaking on the brake shoes and decided to replace all four cylinders. It's something he didn't have to do, but something we like to do to insure our customers driving safety. And by the way, you weren't charged for it.

(7) Well, I am sure what you are saying is true. But when I brought my car in here the brakes didn't squeal. It's that simple. When I got my car back they did squeal. I don't want my car in that condition.

1 2 3 4 5 6 7

Matt: As I mentioned, these are replacement brakes that the factory provides us. They are much harder and better than the original brakes. Consequently, they might squeal a little bit.

(8) I really don't doubt that you might have trouble from time to time with your factory replacements, but I don't see that as my problem. What I brought my car in here the brakes didn't squeal and now they do. I want brakes on my car that don't squeal.

1 2 3 4 5 6 7

Matt: But these are brand new brakes that we installed for nothing. We didn't have to do it, we did it as a courtesy to you. We just like to take care of our customers driving safely.

(9) Well, that is very courteous on your part. But, like I said before, I don't want my car having squealy brakes.

1 2 3 4 5 6 7

Matt: C'mon! If we put the original brakes back on your car they won't last half as long as the new brakes we just installed. Does that make any sense?

(10) I can understand your feelings, and maybe I'm not making any sense -- maybe this isn't a rational decision -- these brakes might last longer but I don't want them on my car if they are going to squeal that way.

1 2 3 4 5 6 7

Matt: Can you leave the car with me this afternoon?

(11) If I do will you fix my brakes?

1 2 3 4 5 6 7

Matt: If you leave the car with me, I'll make sure the brakes get fixed.

(12) When can I get my car back?

1 2 3 4 5 6 7

Matt: We'll have your car by 10:00 tomorrow morning.

Subject: That would be great. I really appreciate your help.

Nonverbal Reproduction
Accuracy Scale: 1 2 3 4 5 6 7

7 = Outstanding	(Maintained steady eye contact & voice throughout)
= Good	(Only a few minor exceptions of ineffective non-verbals)
4 = Average	(A mix of effective and ineffective non-verbals)
= Poor	(Few cases of effective non-verbals)
1 = Very Poor	(Ineffective non-verbals throughout)

Overall Rating: 1 2 3 **4** 5 6 7 .

APPENDIX F

Generalization Role-Play

Instructions:

You work in a fast-food restaurant (i.e., McDonalds, Burger King, etc.) and have the next two days off according to this week's schedule. The next two days are week days and you have made only tentative plans. However, you do not feel you should work the next two days even though your plans are only tentative. You are to refuse to work as the boss requests in the most effective assertive manner. The trainer will role-play your boss.

Generalization Role-Play Scoring Scale

Please rate each of the subject's eight responses with respect to his/her use of the appropriate assertive skills. Behavioral anchors for a level 7, 4, & 1 responses are provided below each of the experimenter's verbal cues.

SCENARIO

Boss: Hi (subject name). Greg is sick and I need someone to cover for me tomorrow morning.

(1) 1 2 3 4 5 6 7

7 = Oh, I am sorry to hear Greg is sick, but I was scheduled off the next two days and won't be available tomorrow (or have tentative plans).

4 = Uh, no I really can't help you out this time, I have plans.

1 = I am sorry but I can't work, this is Greg's and your problem.

Boss: Why is it something important like a doctor's appointment.

(2) 1 2 3 4 5 6 7

7 = No, it's nothing serious. I just have some tentative plans (Ok to say what they are i.e. with friends or whatever), was scheduled off, and won't be available tomorrow.

4 = No, but it wouldn't be right for me to reschedule my plans. I can't come in.

1 = I'm sorry. But like I said, I can't do it. Or, yes it is something like a Doctor's appointment. Or something where they diffuse the reason and don't start with I.

Boss: Can't you call it off. I really need you tomorrow.

(3) 1 2 3 4 5 6 7

7 = I am sure you do. But I was scheduled off, made some plans and just will be unavailable tomorrow.

4 = No, I made plans and cannot come in (perhaps gives different reason)

1 = No. I'm sorry but that's your problem and Greg's problem.

Boss: Wow, you are leaving me in a bad situation (subject name).

(4) 1 2 3 4 5 6 7

7 = That may be. I can see you're in a bad situation. But I was scheduled off, made plans and won't be available tomorrow.

4 = No, I can't come in but the situation isn't that bad anyway. Couldn't you get (other name) to work or perhaps talk to Greg -- he is your problem.

1 = I'm sorry you are in this spot. But it is not me that is leaving you in this situation and I won't come in because (any new reason).

Boss: Well, that's pretty unreliable (subject name), who am I going to get to work?

(5) 1 2 3 4 5 6 7

7 = It may seem unreliable to you and I am not sure who you might get to work. But I was scheduled off and since I have made plans I just won't be available tomorrow.

4 = Who have you tried? There are a lot of people who might be able to work if you call them.

1 = It is not unreliable -- it's not my problem.

Boss: I don't understand the deal this time (subject name), you have always been available before.

(6) 1 2 3 4 5 6 7

7 = That's true, I have been. But this time I made plans during my scheduled off time and I won't be available tomorrow.

4 = I know and I think it is someone else's turn.

1 = I'm sorry but even though I have always covered for you in the past I can't this time (gives new reason or adds to old). This time pick on somebody else.

Boss: If you help me out, I could see that you get Saturday and Sunday off.

(7) 1 2 3 4 5 6 7

7 = I am sure you would and I appreciate the offer. But the plans I have made are for the days I was originally scheduled off (including tomorrow) and I won't be available then.

4 = But my plans are not for those days -- they are for tomorrow and the next day, when I was scheduled off.

2 = Sorry, but I can't do it.

1 = You would? So I could have the weekend if I come in? Well in that case...

Boss: Greg may be sick for a while, do you think you could help me out in the days after tomorrow.

(8) 1 2 3 4 5 6 7

7 = That's very possible. I certainly want to help out when I can and I have always tried to fill in the past. It just happened that this time I had already made plans and couldn't be available. So if Greg is going to be sick for awhile just let me know and I will try to help out by covering his shifts when I can. Just let me know as soon as you know the situation.

4 = Well, maybe. It depends on what I have going at that time.

1 = I doubt it. I cover up for people too much. This is Greg's problem.

Boss: Well, OK, I guess I will just have to get somebody else this time.

Nonverbal Reproduction
Accuracy Scale: 1 2 3 4 5 6 7

7 = Outstanding	(Maintained steady eye contact & voice throughout)
= Good	(Only a few minor exceptions of ineffective non-verbals)
4 = Average	(A mix of effective and ineffective non-verbals)
= Poor	(Few cases of effective non-verbals)
1 = Very Poor	(Ineffective non-verbals throughout)

Overall Rating: 1 2 3 **4** 5 6 7

APPENDIX G

Assertive Communication Self-Efficacy Items

Confidence on a scale of 1-9 (not at all - totally)

1. I am capable of looking directly at the focal person and speaking clearly and to the point.

   1 2 3 4 5 6 7 8 9

2. I am capable of being honest about my feelings and needs and accepting responsibility for them.

   1 2 3 4 5 6 7 8 9

3. I am capable of being persistent in a request or answer.

   1 2 3 4 5 6 7 8 9

4. I am capable of accepting sidetracking statements without changing my feelings.

   1 2 3 4 5 6 7 8 9

5. I am capable of acknowledging and accepting my feelings and faults without apologizing for them.

   1 2 3 4 5 6 7 8 9

6. I am able to check for closure and two-way understanding of outcome or compromise.

   1 2 3 4 5 6 7 8 9

Overall ranking:

1 2 3 4 5 6 7 8 9

APPENDIX H

Quality of Learning Points Scale

Please rate each subject on the accuracy of reproduction of each of the six learning points. First, match the learning points generated by the subject with the provided learning points that are most similar in content. Second, rate the accuracy of the learning points in terms of quality and content to the its match. Finally, record an overall rating of the quality at the end.

Scale is:

7 =	Outstanding quality	(90% of the concept)
=	Good quality	(75%)
4 =	Average quality	(50%)
=	Poor quality	(25%)
1 =	Very poor quality	(Less than 10% or none of the concept)

1. Look directly at the focal person with head erect. Speak clearly and to the point with no dramatic changes in voice tone.

   1 2 3 4 5 6 7

2. Use **Self-Disclosure** (be honest about your feelings and needs and accept responsibility for them. Use "I" statements). Avoid fabricating "better" reasons for your feelings.

   1 2 3 4 5 6 7

3. Use **Broken Record** (be persistent in a request or answer with calm repetition). Avoid softening statements, qualifiers, temper, or trying to give more persuasive reasons for your feelings.

   1 2 3 4 5 6 7

4. Use **Fogging** (acceptance of manipulative or sidetracking statements by calmly acknowledging the probability that there may be some truth in the statement but this does not change your feelings). Avoid sarcasm, aggression, critical attacks.

   1 2 3 4 5 6 7

5. Use **Negative Assertion** (acknowledge and accept your feelings and faults without apologizing for them). Avoid angry denials, retaliation, name calling.

   1 2 3 4 5 6 7

6. Check for **Closure** and two-way understanding of outcome or compromise.

   1 2 3 4 5 6 7

Overall Rating: 1 2 3 4 5 6 7

APPENDIX I

Positive Dealer Problem Script

Model = Scott

Scott: Good Morning

Ty: Good Morning

Scott: Hi, my name's Scott Snell. I brought my car in a couple of days ago to get my brakes worked on under warranty and when I got my car back the brakes squealed really loudly and I really don't want brakes on my car that squeal.

Ty: Well, I'm sorry Mr. Snell but there's really nothing we can do about that. Those are standard brakes and quite often they squeal that way.

Scott: Well, I am sure they might squeal that way from time to time, but when I brought my car in here the brakes didn't squeal and when I got it back they did. I really don't want brakes on my car that squeal.

Ty: As I said before, really there is nothing we can do about that.

Scott: Could you tell me the name of your service manager and where I might find him?

Ty: I am the service manager here, my name is Ty.

Scott: Well, Ty, I don't know much about brakes or why they might squeal but all I know is when I brought my car in here everything was fine in terms of the squealing and when I get it back they're squealing and I don't want brakes on my car that squeal that way.

Ty: Well, Mr. Snell, do you have a work receipt on this?

Scott: Yes I do, right here (hands over work receipt)

Ty: (Reading work receipt) It says here this work was done last Wednesday. Why didn't you bring this to our attention last Wednesday or Thursday.

Scott: Maybe I should have, but my car is here now and I want brakes on my car that don't squeal.

Ty: It also says that the brake cylinders on all four wheels were replaced. Here's what probably happened. The mechanic probably found a bit of brake fluid leaking on the brake shoes and decided to replace all four cylinders. It's something he didn't have to do, but something we like to do to insure our customers driving safety. And by the way, you weren't charged for it.

Scott: Well, I am sure what you are saying is true. But when I brought my car in here the brakes didn't squeal. It's that simple. When I got my car back they did squeal. I don't want my car in that condition.

Ty: As I mentioned, these are replacement brakes that the factory provides us. They are much harder and better than the original brakes. Consequently, they might squeal a little bit.

Scott: I really don't doubt that you might have trouble from time to time with your factory replacements, but I don't see that as my problem. When I brought my car in here the brakes didn't squeal and now they do. I want brakes on my car that don't squeal.

Ty: But these are brand new brakes that we installed for nothing. We didn't have to do it, we did it as a courtesy to you. We just like to take care of our customers driving safely.

Scott: Well, that is very courteous on your part. But, like I said before, I don't want my car having squealy brakes.

Ty: C'mon! If we put the original brakes back on your car they won't last half as long as the new brakes we just installed. Does that make any sense?

Scott: I can understand your feelings, and maybe I'm not making any sense -- maybe this isn't a rational decision -- these brakes might last longer but I don't want them on my car if they are going to squeal that way.

Ty: Can you leave the car with me this afternoon?

Scott: If I do will you fix my brakes?

Ty: If you leave the car with me, I'll make sure the brakes get fixed.

Scott: When can I get my car back?

Ty: We'll have your car by 10:00 tomorrow morning.

Scott: That would be great. I really appreciate your help.

APPENDIX J

Negative Dealer Problem Script

Scott = Model

Scott: I had my brakes fixed under warranty here a few days ago and now the brakes squeal loudly.

Ty: There's nothing we can do about that. Those are the standard brakes and they often squeal that way.

Scott: I don't think all standard brakes squeal -- I've had them before, and so have friends who had them and they didn't squeal. It's embarrassing to have loud squealing brakes.

Ty: Sir, we really can't do anything about that.

Scott: You'd better or I will be talking to your service manager.

Ty: I am the service manager, and my name is Ty.

Scott: Well, Ty, I am sorry and don't want to create a big hassle but I know that things don't always get done perfectly in these garages and I think something is up with the way my brakes squeal now. They didn't squeak when I brought them in, you know.

Ty: Do you have the work receipt?

Scott: Yes, I do and the lazy mechanic that worked on it is standing right over there. I took him two days over schedule, you know.

Ty: It says the repair was done last Wednesday morning. You should have brought it back either Wednesday or Thursday. We can't be sure the repairs are the cause of the squealing brakes.

Scott: Look, I am sorry I didn't have time to bring it in right away. I probably should have but I had other commitments at my sales office that took priority. Isn't there some way I can get my brakes fixed so they don't squeal? My boss says I should do something about it.

Ty: It also says on the work sheet that the brake cylinders were leaking and were fixed. So here's what happened. The mechanic probably found a little brake fluid on the brake shoes and decided to replace them to give you better brake performance. He didn't have to, but we like to make sure each car we repair is completely safe for our customers. By the way, we didn't charge you for it.

Scott: Well, I don't know what really happened, but my brakes squeal now and its loud and irritating, you should hear them.

Ty: Well, as I mentioned, you have the standard replacement brakes that the factory provides us. Believe me they are harder and last longer than the original ones on your car. Consequently, they may squeal a little.

Scott: Would you like squealing brakes on your car. My girlfriend hates it.

Ty: These are brand new brakes that we installed on your car for nothing. We didn't have to do that, we did it as a courtesy to you. We just like to take care of our customer's driving safety.

Scott: Maybe you're right, but what about putting my old brakes back on, they didn't squeal.

Ty: Come on buddy, if we put the original brakes back on your car they won't last half as long as the new ones. That doesn't make sense.

Scott: Don't give me that, nothing in this situation makes any sense - new brakes squealing more than old brakes. I think the mistake I made was bringing it here.

Ty: In the long run, you'll thank us -- now is there anything else we can help you with.

APPENDIX K

Learning Points

1. Look directly at the focal person with head erect. Speak clearly and to the point with no dramatic changes in voice tone.

2. Use **Self-Disclosure** (be honest about your feelings and needs and accept responsibility for them. Use "I" statements). Avoid fabricating "better" reasons for your feelings.

3. Use **Broken Record** (be persistent in a request or answer with calm repetition). Avoid softening statements, qualifiers, temper, or trying to give more persuasive reasons for your feelings.

4. Use **Fogging** (acceptance of manipulative or sidetracking statements by calmly acknowledging the probability that there may be some truth in the statement but this does not change your feelings). Avoid sarcasm, aggression, critical attacks.

5. Use **Negative Assertion** (acknowledge and accept your feelings and faults without apologizing for them). Avoid angry denials, retaliation, name calling.

6. Check for **Closure** and two-way understanding of outcome or compromise.

APPENDIX L

Pilot Testing Results

The following are the overall interrater reliabilities for the reproduction and generalizability scale used by Baldwin (1992).

Reproduction = .94 Generalizability = .82

The following are the item interrater reliabilities for the reproduction and generalizability scale used in the pilot test (n=30). Care was taken to identify the problems with the lower reliabilities, and standards for coding were set with the raters.

Reproduction		Generalizability	
Item #	rel.	Item #	rel.
1	.67	1	.80
2	.79	2	.53
3	.92	3	.54
4	.78	4	.46
5	.86	5	.66
6	.38	6	.52
7	.47	7	.65
8	.64	8	.77
9	.64	9	.61
10	.64	10	.72
11	.88		
12	.83		
13	.62		
14	.38		

The alpha for self-efficacy in the pilot test = .87

The alpha for the retention measure in the pilot test = .56. It was determined that the sample size was too small (n=30) to make any strong judgments about the scale. However, some items (#3, #4, #6, #8, #13, #16, #18) had difficulty values above .85, so the distractors were modified in an attempt to lower the p-values. The scale in Appendix D represents the revised scale.

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