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A CONTROL THEORY PERSPECTIVE ON TRAINING MOTIVATION

By

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ABSTRACT

A CONTROL THEORY PERSPECTIVE ON TRAINING MOTIVATION

By

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This research proposed a model of training motivation which was based on control theory, and then tested some of the relationships hypothesized by the model. A sample of 205 undergraduate introductory psychology students participated in a three-hour training session on how to use a word processing program on a microcomputer. Pretraining measures of trainees' knowledge of the training content and experience with similar skills, as well as their self-efficacy for learning the training, perceptions of their environments' favorability for using the skill, their motivation level for learning and their learning goals revealed significant correlations between self-efficacy and pretraining knowledge, experience, and motivational level, as well as between motivation level and environmental favorability and learning goals. Furthermore, discrepancies between learning goals and actual learning were found to be positively correlated with subsequent changes in trainees' self-efficacy, particularly for subjects who do not habitually attend to internal cognitive processes. Finally, while changes in motivation level were significantly related to changes in goals, no support was found for the hypothesized relationships

between motivation level changes and changes in self-efficacy and perceptions of environmental favorability. Limitations of the study, particularly related to unreliability in the measures used, are discussed, as well as suggestions for future research.

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INTRODUCTION

Recent estimates suggest that over $200 billion is spent annually to train the United States workforce (McKenna, 1990). Unfortunately, only 10 to 40 per cent of this training is still used one year later, suggesting that this money is inefficiently spent (Kelly, 1982; Newstrom, 1986). Growing concerns about how to increase the use of trained job skills are spurring greater interest in "the transfer problem," or how material that is trained transfers to the work setting (Michalak, 1981).

Positive training transfer is defined as the degree to which trainees apply the skills, knowledge, and abilities developed on a learned task to performance on the job (Baldwin & Ford, 1988; Newstrom, 1984; Wexley & Latham, 1981). While research on positive training transfer from one setting to another began quite early in this century (e.g. Thorndike & Woodworth, 1901), most of this research has focused on highly specific laboratory experimentation, thereby making generalizations to actual organizational settings quite difficult (Goldstein, 1986). Forecasted changes in labor demographics entering the twenty-first century (i.e. Johnston & Packer, 1987), however, highlight that we must improve our understanding of what affects training transfer and how industrial training can be enhanced to meet upcoming demands.

In their extensive review of research on training transfer, Baldwin and Ford (1988) identified three broad categories of training inputs that influence subsequent training outputs and conditions of transfer: trainee characteristics, training design, and work environment characteristics. Trainee characteristics include ability, personality variables, and motivation level. Training design consists of the training content, the sequence of that content, and the application of principles shown to stimulate learning (e.g. identical elements, stimulus variability, conditions of practice). Work environment characteristics refer to trainees' opportunities to use their new skills and the extent to which their use is supported. Baldwin and Ford's model proposes that trainee characteristics and work environments directly influence the generalization and maintenance (transfer) of learned skills, while these two inputs and training design indirectly impact transfer through their effects on the learning and retention of training content (training outputs; see Figure 1).

While Baldwin and Ford's model adequately categorizes previous research into the various factors thought to affect training transfer, neither the model nor the research it represents fully addresses the relationships among these variables as they individually and collectively impact transfer. In particular, how trainee characteristics, the extent to which trainees master training content (learning), and work environment characteristics interact to influence training transfer has not been adequately discussed. This predicament is primarily a result of inadequate knowledge about one key variable that is critical to applying newly trained skills on the job -- trainees'

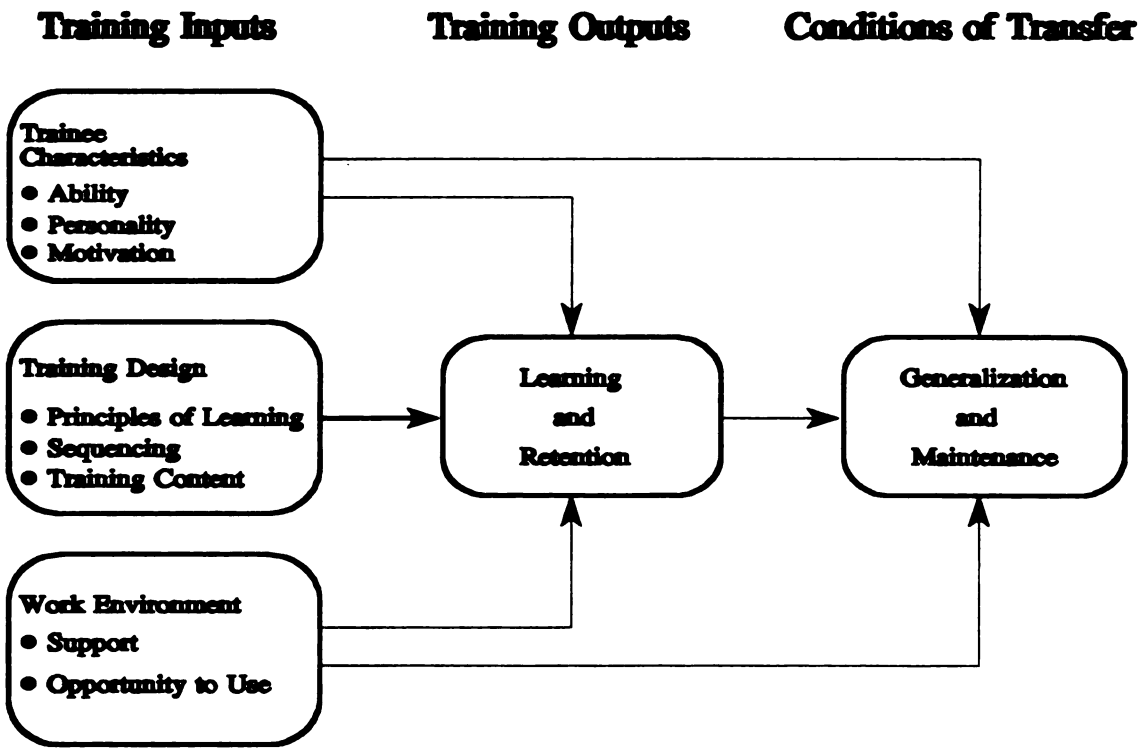

Figure 1. Baldwin and Ford's (1988) Model of Training Transfer.

motivation to learn and use them.

Motivation has typically been described as the set of psychological processes that cause the initiation, direction, intensity, and persistence of behavior (Campbell & Pritchard, 1976; Klein, 1989; Landy & Becker, 1987). A wide variety of motivational theories have developed over the last thirty years (e.g. attribution theory, Weiner, 1985; equity theory, Adams, 1965; expectancy theory, Vroom, 1964; goal setting, Locke, 1968). However, the fact that these theories rarely contradict and often augment each other suggests their synthesis under a metatheory, or framework that links existing theories (Campbell & Pritchard, 1976; Landy & Becker, 1987). In a metatheory of work motivation the current component theories would be delegated to the role of

middle-range theories (Pinder, 1984), and would describe motivation in specific situations. The integrated metatheory, on the other hand, would provide a more general description of motivation and would guide the refinement of the component theories (Klein, 1989).

Klein (1989) has proposed an integrated metatheory of work motivation based on control theory (Carver & Scheier, 1981a, 1981b). Grounded in Weiner's cybernetic model (Weiner, 1948), the basic unit of control theory is the feedback loop. This loop consists of: (a) a referent standard, such as a performance goal; (b) a sensor, or input function, that provides the system with information about its environment, including information about past behavior; (c) a "comparator," which detects differences between input information and the standard; and (d) an "effector," or output function, which either maintains current levels of behavior if there is no discrepancy between what is input and the standard, or seeks to change behavior to reduce differences between the standard and prior behavioral levels. When framed as a theory of behavior, control theory sees motivation as the process by which individuals attempt to reduce discrepancies between desired behavioral states (referent standards) and current behavior (Carver & Scheier, 1981a).

Though no known research has incorporated control theory into the organizational training literature, training motivation should operate similarly. Powers (1973) described learning as the process of reorganizing a control system, including changing its referent standard or goal. Consistent with this, training can be understood as the process by which trainers attempt to alter

trainees' standards for learning, behavior, and job performance. Standards for how much trainees expect to learn change as they are exposed to more information about the skill being trained and begin to experience its use. Behavioral standards for the quantity and quality of output change as trainees become more adept at performing the new skill. Standards for using and mastering these skills on the job change as trainees experience new levels of productivity using acquired skills. Several factors, however, can influence the extent to which training programs actually influence behavioral standards. First, the design of the training program itself, including how well new material is presented, the type and amount of practice allowed, and trainees' reactions to the program can influence the extent to which trainees' standards are altered. Second, characteristics of the trainees themselves, such as their perceptions about how likely it is that they can personally execute the behavior required to reach the desired or necessary level of performance (self-efficacy; Bandura, 1978, 1986) may affect trainees' internalized standards for their own performance. Finally, trainees' perceptions of their work environment, such as how likely they feel it is that they will have opportunities to use their new skills, the extent to which using the new skill is rewarded, and their perceptions about the climate for change in their work group (including support from supervisors) will influence whether trainees see changing their learning, behavioral, and performance standards as valuable.

Overview and Purpose

The overall goal of training is that the material presented will be used on the work site. The only way that this can occur is if trainees are motivated to learn the material and use it on their jobs. The following discussion examines how this occurs. In particular, the process by which perceived environmental characteristics and trainee ability and personality characteristics combine with training design factors to influence trainees' motivation is described. Once literature in each of these areas has been reviewed, a model of training motivation is developed. This model, based on control theory, seeks to describe the relationships among training design factors (e.g. principles of learning and training content) and trainees' perceptions of: (a) the extent to which their work environments encourage using new skills (support; Work Characteristics); (b) their task-related ability to perform necessary behaviors related to the trained skill (self-efficacy; a Trainee Characteristic); and (c) the extent to which they focus on internal states and standards (self-focus; another Trainee Characteristics). Furthermore, the proposed model describes how trainees' standards for one aspect of training (i.e. motivation to learn the training material) are linked to standards for other facets of the training process (e.g. learning standards and standards for overall job performance). Finally, a study designed to test some of the relationships proposed in the model is described.

Training Transfer Research

A great deal of research has been conducted on organizational training. Within this body of literature, research can be divided into three general areas:

needs assessment, training methods, and learning and transfer. The learning and transfer literature can be further subdivided into three more general factors that influence transfer: training design, work environment characteristics, and individual trainee characteristics. Each of these topics will be reviewed in the discussion that follows.

Training Design and Training Transfer

The largest body of research addressing training transfer has focused on incorporating principles of learning and instruction. These learning principles include identical elements, stimulus variability, teaching through general principles, and conditions of practice (Baldwin & Ford, 1988). Transfer will be improved, it is believed, by improving the quality and quantity of learning which occurs in the training setting. Examples of research within this approach will briefly be reviewed below.

Identical Elements

First proposed by Thorndike and Woodworth (1901), the theory of identical elements holds that positive training transfer will be maximized when stimulus and response elements between the training and transfer environments are identical (Osgood, 1949). Empirical laboratory research support for this hypothesis is mixed. In defense of identical elements, Lordahl and Archer (1958) examined the effect of practicing at one speed on a pursuit rotor device and then transferring this skill to another speed. They found that subjects whose practice speed was identical to the transfer speed performed better on the transfer task than did those subjects who practiced at either a

faster or slower speed. Similar results demonstrating the retention of motor and verbal behaviors have been demonstrated by Crafts (1935), Namikas and Archer (1960), and Underwood (1951; Duncan & Underwood, 1953). On the other hand, studies which do not support identical elements include those by D. Goldstein and Newton (1962) and Ammons, Ammons, and Morgan (1956). In particular, Ammons, Ammons, and Morgan (1956) found that positive transfer was maximized when moving from an easy training rotary pursuit task to a difficult transfer pursuit task.

Stimulus Variability

Stimulus variability refers to presenting and practicing skills in the training context using various relevant stimuli to maximize transfer (Ellis, 1965). In contradiction with strict identical elements theory, this approach suggests presenting several examples of the skill being taught so that trainees' are more likely to see the skill's applicability in a new situation. Support for this view can be found in at least two studies. In one, Wexley and McKellin (1987) found that learning to speed read using two sets of practice reading materials, the first formatted identically with the transfer materials (identical elements principles) and the second in a layout which was more difficult to read, was at least as effective at promoting transfer as was using training materials identical to the transfer materials alone. In the other study, Shore and Secrest (1961), observed that repeating a number of different examples a few times each throughout training enhanced learning more than using the same example repeatedly.

General Principles

Teaching not only applicable skills, but also the rules and theories associated with them represents the general principles approach to training (McGehee & Thayer, 1961). For example, Judd (1908) and Hendrickson and Schroeder (1941) demonstrated that teaching the principles of light refraction improved subjects proficiency in hitting underwater targets. Using a somewhat different approach, Fleishman (1972) analyzed a complex tracking task and found that spatial orientation was important early in the task, while multi-limb coordination was more important later. Using this information, Fleishman designed a program in which instructions and principles regarding spatial orientation were presented early in the training, while coordination was addressed later, when it was most appropriate.

Conditions of Practice

A number of training design issues address the conditions under which newly learned skills are practiced. These issues include massed versus distributed practice, whole versus part training, feedback about trainees' performance, and overlearning. Massed versus distributed practice addresses whether or not skills should be perfected over a number of practice sessions, or if it is better to become proficient through intensive, concentrated rehearsal. Research suggests that skills are generally retained longer when learned using distributed practice rather than massed practice (Briggs & Naylor, 1962; Digman, 1959; Naylor & Briggs, 1963). Performance on more difficult or

complex tasks, however, is better when brief distributed practice sessions are introduced only after massed practice sessions have occurred (Holding, 1965).

Whole versus part training refers to the size of the units practiced during the training session (Goldstein, 1986). In whole training, trainees practice the skill all at once rather than one step or procedure at a time, as in part training. Which method is preferable depends largely on the complexity of the task and how strongly the various components are related (Holding, 1965). Naylor and Briggs (1963) found that whole training is preferred when learners are highly intelligent, practice is distributed rather than massed, and the training material is highly interrelated, but not complex.

Knowledge of results, or feedback, has long been shown to be essential for learning in performance-oriented organizations (Ilgen, Fisher, & Taylor, 1979). Therefore, it is no surprise that the specificity and timing of feedback has been shown to be critical to determining training's effectiveness (Wexley & Thornton, 1972). Beginning with Thorndike's (1927) early studies, in which blindfolded subjects learned to draw lines of predetermined lengths and were given feedback as to whether their lines were within acceptable limits of that criterion, knowledge of results has repeatedly been shown to improve the quality of training. In fact, Komaki, Heinzemann, and Lawson (1980) clearly showed that training plus knowledge of results improved and contributed to the maintenance of safety training more than did training alone.

Overlearning refers to the process of providing trainees with continued practice far beyond the point when the task has been performed successfully to

ensure thorough learning of the task (McGehee & Thayer, 1961). Research indicates that substantial overlearning improves the subsequent retention of trained material (e.g. Gagné & Foster, 1949; Mandler, 1954). For example, Mandler (1954) showed that subjects who overlearned a motor task to a greater degree (pressing sequences of levers arranged in a spatial pattern) learned to pair old responses to new stimuli more quickly than did subjects with lower degrees of overlearning.

Sequencing and Relevance of Training Content

With the exception of Decker (1980, 1982), who studied the effects of different types of learning points on the generalization of skills taught in behavior modeling programs, little if any research supports the importance of particular sequencing of training content for training transfer. Until empirical evidence supports or refutes statements by researchers concerning the importance of sequencing and relevance (e.g. Gagné, 1962), musings about their importance remain unsubstantiated.

Work Environment Characteristics and Training Transfer

While a number of articles addressing this issue had appeared in practitioner journals emphasizing work environment characteristics' effects on training transfer (e.g. Eddy, Glad, & Wilkins, 1967; Ricks, 1979; Stark, 1986; Spitzer, 1982), relatively few empirical studies have addressed this issue. The most productive line of inquiry is that by Baumgartel and his associates (Baumgartel & Jeanpierre, 1972; Baumgartel, Reynolds, & Pathan, 1984; Baumgartel, Sullivan, & Dunn, 1978). Baumgartel, et al. conducted a number

of studies which suggest that managers in favorable organizational climates (supportive environments for innovation and risk taking, rational reward systems, freedom to set goals) are more likely to transfer training to the work setting. Consistent with this, Huczynski and Lewis (1980) discovered that such an environment was found most often when trainees worked for supervisors who were open to suggestions, encouraged free information exchange, and provided latitude as to how work actually got done. On the other hand, factors such as work overload and having to convince older people to change their work habits were found to impede transferring new skills. More recently, Ford, Quinones, Sego, and Sorra (1992) examined factors affecting the opportunity to performed trained tasks on the job. Survey responses from graduates of an Air Force technical training course and their supervisors indicated that work context factors, defined as supervisory attitudes towards the trainees and the level of support for trying new skills that trainees felt they received from coworkers, were significantly related to: (a) the number of trained tasks trainees performed in the work setting ("breadth", from a sample of 34 tasks out of a possible 99 identified job tasks), and (b) the types of tasks they had performed ("task type"; e.g., critical, complex, and/or difficult).

Additional environmental factors found to influence training transfer include the installation of pay and promotional systems consistent with trained skills (Hand, Richards, and Slocum; 1973), leader behavior (Fleishman, 1953; House, 1968), and organizational factors such as power, autonomy, and security (Miles, 1965). However, considering industrial and organizational

psychology's interest in organizational climate over the last two decades, it is surprising how research into how organizational factors influence training transfer has lagged behind. Hopefully this deficit will be increasingly addressed in the empirical literature.

Trainee Characteristics and Training Transfer

Relatively few empirical examinations of trainee characteristics which influence training transfer have been conducted. Research which has been linked to this area has focused on trainees' abilities and aptitudes, personality characteristics, and motivation.

Abilities and Aptitudes

With one known exception, training research which has focused on individual abilities and aptitudes has not investigated the link between these characteristics and training transfer as defined earlier (use of skills, knowledge, and abilities developed on a learning task to performance on the job). Rather, this research has primarily examined the link between learning and trainee success on early training tasks or training samples (e.g. Downs, 1970; M. Gordon & Cohen, 1973; McGehee, 1948); and the link between aptitude and individual trainability, especially when used as a selection method (e.g. M. Gordon & Kleiman, 1976; Robertson & Downs, 1979; Tubiana & Ben-Shakhar, 1982). The one known study which has investigated the relationship between ability and training transfer is that by Ford, Quinones, Sego, and Sorra (1992), described above. Here, Ford, et al. found that trainees' general cognitive ability (measured by Armed Services Vocational Aptitude Battery (ASVAB; United

States Department of Defense, 1984)) was positively related to the number of times they had performed any one of the 34 sampled tasks during the four months following training.

Understanding the relationship between ability, aptitude, and training performance is certainly important. It is at least as important, however, to examine how a trainee's ability level and performance on a trained skill influences his or her use of that skill on the job. Clearly, research on the relationship between trainee ability and training transfer is sorely needed.

Personality Factors

Personality factors' influence on transfer is another area which begs further research. Noe and Schmitt (1986), in a study of supervisory skills training among educational administrative personnel, found limited evidence of a relationship between locus of control (the extent to which he or she is likely to attribute work outcomes to himself or herself (internal) or other factors (external; Rotter, 1966)), and pretraining motivation and learning. No relationship was discovered, however, between locus of control and a composite measure of post-training motivation (post-training motivation to learn, motivation to transfer, and environmental favorability items). In addition, Miles (1965) found that personality factors such as ego strength, flexibility, and need affiliation affected trainees' participation during training, but not behavior in the work setting. In contrast to these studies, Baumgartel, Reynolds, and Pathan (1984) found that managers having an internal locus of control were more likely to transfer new knowledge to the work setting. Overall, while these few studies provide a

beginning, research on personality factors' effects on training transfer has been scarce, and that which does exist has been equivocal.

Motivation

Trainee motivation has received somewhat more research attention than has trainee ability or personality. Here, research has looked not only at what motivates trainees to learn training content but also at their motivation to transfer that training to the workplace. Each of these will be reviewed below.

Motivation to learn. Motivation to learn can be thought of as a trainee's specific desire to learn the content of a training program (Noe & Schmitt, 1986). While the relationship between learning and motivation would appear to be a fertile area for empirical research, an unexpectedly small number of studies in the organizational literature have examined this topic. In one early study, Ryman and Biersner (1975) found a significant positive relationship between trainees' confidence in successfully completing a Navy diving training program and their subsequent success in the class and the class dropout rate. Similarly, Eden and his colleagues (Eden & Ravid, 1982; Eden & Shani, 1982) discovered that trainees who expected to perform better in training (had high self-expectancies) actually did perform better than those with lower self-expectancies. In another vein, Tubiana and Ben-Shakhar (1982) found that motivation to succeed in training among military personnel was significantly related to training performance. Then, as mentioned previously, Noe and Schmitt (1986) found: (a) limited support for a relationship between trainees' locus of control and their pretraining motivation learning, and (b) that trainees

who were highly involved in their jobs were both more motivated to learn and more motivated to transfer supervisory skills to the work setting.

More recently, research on motivation to learn has focussed on the influence of situational characteristics, including choice to participate in training, on motivation and training outcomes. First, Hicks and Klimoski (1987) discovered that a trainee's perception that he or she has a choice whether or not to participate in a managerial training program was related to his or her motivation to learn and his or her subsequent learning in the program. Following a similar line of inquiry, Baldwin, Magjuka and Loher (1991) gave trainees the opportunity to choose which type of training they would prefer to receive from among a number of potential topics. They found that trainees who actually received their choice were more motivated to learn the content of the module than were trainees who either did not receive their module of choice or were not given any choice at all. Interestingly, however, there were no differences in actual learning among the group that received their choice and the group not given any choice. In contrast to these studies, Noe and Wilk (1993) and Mathieu, Tannenbaum, and Salas (1992) examined situational characteristics more generally. In an attempt to identify some factors which influence employees' choices to seek training opportunities, Noe and Wilk (1993) found that supervisors' and peers' support for the use of skills and attendance in training, as well as trainees' perceptions that their working conditions were favorable for taking part in development activities, were positively related to trainees' motivation to learn the training material and to use

the skills and knowledge obtained on their jobs. Similar results were reported by Mathieu, Tannenbaum, and Salas (1992) who, in addition to finding a marginally significant negative relationship between perceived situational constraints and training motivation, also found that reactions to training moderated the relationship between motivation to learn and actual learning. In this study, however, no direct relationship was identified between motivation to learn and learning outcomes.

Motivation to transfer. Motivation to transfer refers to trainees' desire to take what has been learned in the training setting and use it elsewhere, especially on the job site. Only a handful of studies have addressed this topic specifically. For instance, Noe and Schmitt (1986) found a significant relationship between trainees' reactions to previous assessment center evaluations of their administrative and interpersonal skills and their motivation to use these skills after receiving additional training on them. In addition, Huczynski and Lewis (1980) discovered that trainees who participated in training voluntarily and believed beforehand that the training would help them on their jobs were more likely to attempt to use trained skills on the job. On the other hand, Miles (1965) found that a desire for change in elementary school principals' job behavior was not related to their self-perceived change in interpersonal skills eight months after sensitivity training. Furthermore, Baumgartel and his associates discovered that trainees' intention to apply their training was positively related to job income (Baumgartel & Jeanpierre, 1972) and need for achievement (Baumgartel, Reynolds, & Pathan, 1984), while self-

perceived success at skill transfer after training was related to their belief in the training's value (Baumgartel, et al, 1984). Finally, Ford, Quinones, Sego, and Sorra (1992) detected a significant positive relationship between trainees' self-efficacy, defined as their expectation or confidence that they can successfully perform the task(s) at hand (Bandura, 1977), and the breadth and type of tasks they performed on the job.

While previous research investigated individual characteristics' influence on motivation, another group of studies has examined how training, supplemented by setting training-related goals, affects transfer. For example, Reber and Wallin (1984) found that goal setting increased safe job performance more than training alone, and that goal setting plus performance feedback resulted in even greater performance improvement than goal setting alone. Similarly, Wexley and his colleagues (Wexley & Nemeroff, 1975; Wexley and Baldwin, 1986) found that trainees assigned performance goals after being trained were significantly better at applying new skills than were members of a control group. In fact, Wexley and Baldwin (1986) compared the efficacy of three post-training treatments: participative and assigned goal-setting, and relapse prevention training. The relapse prevention model consists of a set of self-control strategies designed to facilitate the maintenance of behaviors learned in training by teaching trainees to understand and cope with tendencies to revert to less functional or dysfunctional pretraining behaviors. Wexley and Baldwin found that subjects in both assigned and participative goal setting treatments reported significantly higher levels of behavioral maintenance than

did those in either the relapse prevention training or control conditions. It should be noted, however, that the relapse prevention training provided in this study incorporated only five of the seven steps of the relapse prevention model outlined by Marx (1986), with these five being only partially applied (Major, 1990).

The relapse prevention strategy to facilitating training transfer was used in two additional studies by Marx and Karren (1988, 1990). In the first study, Marx and Karren (1988, cited in Marx & Karren, 1990) provided either relapse prevention training or post-training followup after an instructional skills seminar. Results indicated that trainees receiving relapse prevention training engaged in significantly more job-related behaviors (e.g. peer conferences and peer observations) than their non-relapse trained counterparts. Post-training followup, on the other hand, yielded no increase in positive transfer. Believing the lack of an effect for followup to be a result of procedural problems, Marx and Karren (1990) again tested the effects of relapse prevention training and post-training followup, this time using a 2 X 2 (relapse prevention X followup) design. Using multiple regression to analyze trainee's self-report data following a seminar on time management, Marx and Karren found a significant main effect for post-training followup (entered first in the equation), but no significant effects for either relapse prevention or the interaction term (relapse prevention X followup).

Summary. The research cited above indicates that, although a number of studies have examined trainees' motivation to learn and transfer trained

skills, this research has proceeded slowly and unsystematically. In particular, these studies have examined motivation in a piecemeal fashion; only a handful of individual trainee characteristics (e.g. job income, reaction to skill assessment, initiation of training) and only three techniques which could be integrated into program design: goal setting, relapse prevention training, and post-training followup; have been investigated. Which factors influence training motivation most--individual characteristics, work environment characteristics, or the amount of learning which takes place in training--need to be identified so that motivation can be explored in a more thorough, systems-oriented fashion.

Summary of Training Transfer Research

Existing training transfer research emphasizes the role of training design factors, while work and trainee characteristics have received considerably less attention. There is no doubt that improving knowledge and skill acquisition methods is beneficial, and issues relevant to training design have been well researched. However, even though a broad base of research supports the efficacy of applying learning principles to increase learning, the link to training transfer is less clear. Specifically, while training design research clearly makes a case that careful design increases learning in the training context, the design literature assumes that trained skills and knowledge will be transferred to the work setting; the mechanisms by which this transfer occurs are not addressed.

Research on trainee characteristics has only slightly increased our knowledge of training transfer. Only one known study has linked trainee ability to transfer, and the collective findings of studies that have examined the

relationship between transfer and personality factors have been ambiguous. That which we do know about trainee characteristics and training transfer focusses on motivation. Even this research, however, has not taken into account the motivational effects of trainee ability, and the impact of personality factors on motivation has only rarely been addressed. These issues have been discussed extensively elsewhere as affecting motivation (e.g. Bandura, 1977; Deci, 1976; White, 1959), but have not yet been examined as affecting training motivation.

Finally, research on work environment characteristics' effects on transfer has been only slightly more helpful. While studies of work characteristics have clearly shown that the propensity to transfer training increases in more favorable work climates, it is still unknown how this happens. In the view of interactional psychologists (e.g. Schneider, 1987), such an effect could occur because the work environment norms affect the individual's perception of his or her ability to use the tasks on the job. According to expectancy theorists (e.g. Porter & Lawler, 1968; Vroom, 1964), such environmental factors as rational compensation systems and the support of one's supervisor could increase a trainee's expectations that applying new skills will lead to desired outcomes. Whether one or both of these views accurately describe the effect of work environment characteristics on transfer is not yet known.

While training research clearly has made progress in explaining parts of the training enterprise, it clearly has a long way to go. In particular, this research has proceeded in a largely atheoretical fashion; variables thought to

affect learning and/or transfer have been pulled together in a somewhat haphazard fashion without an overarching reason for them to be related. As the studies reviewed here suggest, a comprehensive model for examining the processes by which trainees are motivated to learn and transfer training to the work setting is clearly needed. A basic component of this model should be an explanation of how training design, trainee, and work environment characteristics interact to affect a trainee's self-efficacy and its influence on motivation. Furthermore, this model should deviate from prior descriptions of training as a linear process in which training inputs interact in some unknown way and result in post-training outcomes. Instead, a comprehensive model of training motivation should address how interactions occurring during training affect training program outcomes. The next section describes a dynamic model, based on control theory, which addresses these two needs. First, control theory will be described in greater detail by examining one of the most comprehensive control theory model of work motivation to date, Klein's (1989) integrated control theory model. Then, building on this basic framework, a model for training motivation which incorporates individual, environmental, and training design characteristics will be developed.

Control Theory

As discussed earlier, control theory (or cybernetics, Weiner, 1948) is a general approach to understanding self-regulating systems (DeGregorio, 1990). Since its introduction to the psychological literature (Miller, Galanter, & Pribram, 1960), control theory has come to describe human motivation as arising from

cognitive and behavioral attempts to reduce discrepancies between desired internal cognitive or affective standards and actual or perceived states (Carver, 1979; Carver & Scheier, 1981a; Klein, 1989). The following discussion describes the basic components of control theory and their relevance for a model of training motivation.

Basic Components of Control Theory

According to control theory, the feedback loop is the fundamental building block of action (Klein, 1989; see Figure 2). In this loop, initial states, also viewed as the feedback system's environment, are assessed by the system's input function, or "sensor", and a signal containing this perceptual information is sent to a theoretical structure, the "comparator". The comparator compares the perceptual signal to the current point-of-reference, or "standard" (e.g. a goal), to determine the extent to which there are discrepancies between the two. Following this comparison, an "error signal" is sent to the system's other contact with its environment, the output function or "effector". If no discrepancy exists, the effector does not initiate any change in the system's relationship with its environment. On the other hand, if there is a difference detected between the perceptual signal and the standard, the error signal will activate the effector to change the environment so the error is reduced. This loop is considered to be a "negative feedback loop" because response to an error is to reduce the discrepancy (Powers, 1973).

Another early depiction of the negative feedback loop is embodied in the Test-Operate-Test-Exit (TOTE) unit, described by Miller, et al (1960; see

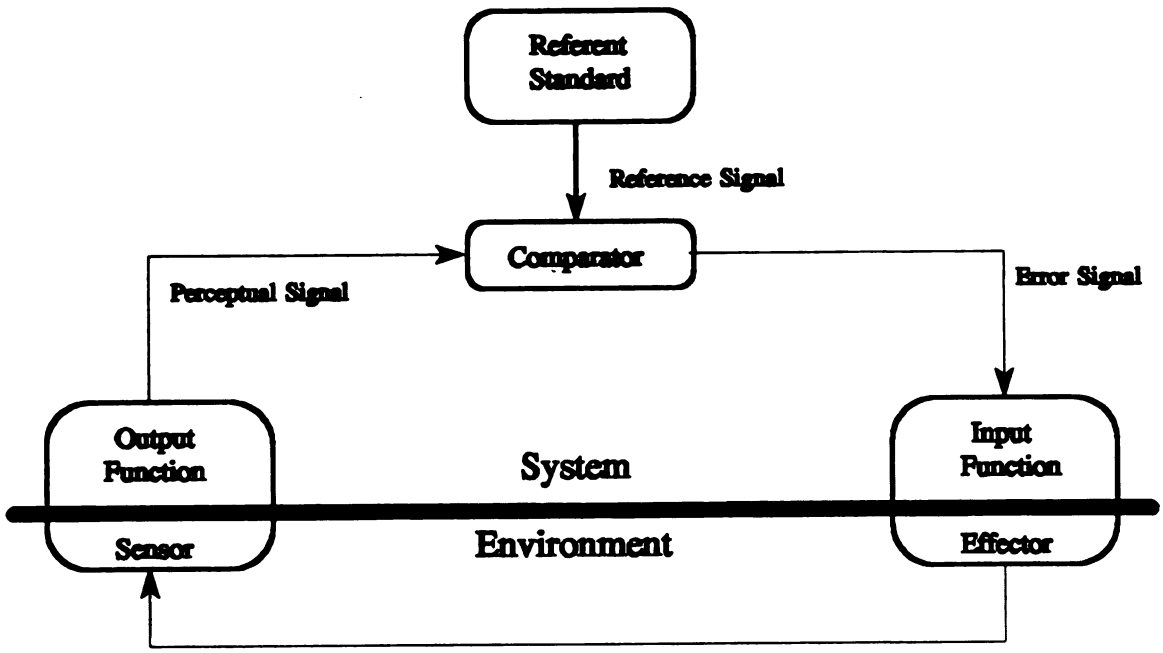

Figure 2. The simple feedback loop.

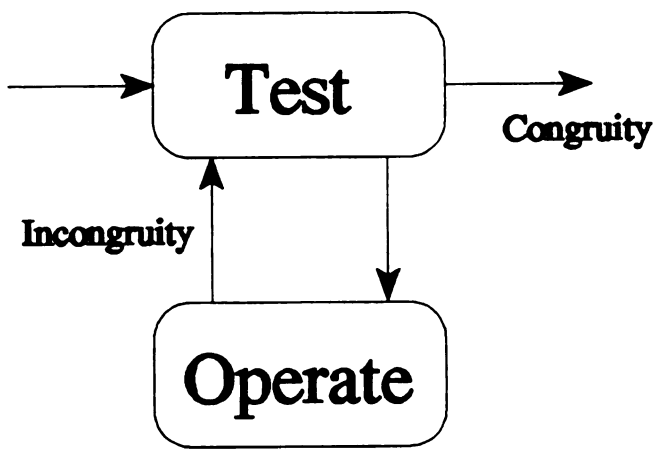

Figure 3. The TOTE unit. (Adapted from Miller, Galanter, and Pribram (1960).)

Figure 3). The TOTE model suggests that a signal carrying information regarding a current state, which is relevant and external to the TOTE unit, enters the test phase, where it is compared to a referent state or goal. If there is a discrepancy between the current external state and the referent state, some operation is necessary to bring the external state in line with the referent state. As the operation continues, testing is continued until there is no longer a discrepancy between the current state and the referent state. Once this test is "passed," control of the current signal exits from the TOTE unit and it resumes monitoring its environment for additional relevant signals. The basic control loop is at the foundation of control theory, and will therefore be the basis for the model that is developed.

Control Theory and Human Behavior

Building on the initial work by Weiner (1948), and Miller, et, al (1960), a number of theorists have extended control theory to more explicitly describe human behavior (e.g. Powers, 1973; Carver & Scheier, 1981a), and more recently to organizational behavior (e.g. Campion & Lord, 1982; Taylor, Fisher, & Ilgen, 1984; Hollenbeck & Williams, 1987; Klein, 1987, 1989). These applications of control theory and their relevance to training motivation will be discussed below.

Powers' Control Hierarchies and Theory of Learning

While negative feedback loops may describe simple behavior, they are less effective in characterizing complex behavior. One useful approach for explaining more complex human phenomena was presented by Powers (1973).

Beginning again with a simple feedback loop, Powers proposed that the human nervous system is comprised of a nine-level hierarchy of control systems. The lowest control system of the hierarchy consists of nerve endings (the input devices) and muscles and glands (the output devices). Subsequent levels deal with more and more complex perceptions and actions, such as sensation (second level), the sequential order among relationships (sixth level), and the choice of one set of principles versus another (ninth level; See Figure 4). This model is of particular interest because the output from each level is fed directly into the level below it, and output from lower levels subsequently are indirect inputs into higher-order systems.

Another important aspect of Powers' perspective on control hierarchies is his discussion of how learning occurs. In describing learning, Powers distinguishes between three types of phenomena that are commonly subsumed under the term learning: memory, problem-solving, and reorganization. Memory corresponds to being able to store some piece of information and then retrieve it at a later time. Problem-solving, on the other hand, consists of being able to correctly identify and run a "program" containing fixed lists of instructions suitable for the task at hand. In this type of learning, both memory and present-time inputs are important, but no actual changes in either information organization or in the programs take place; only the contingencies determining which program will be selected are changed. It is only through reorganization, or the process of modifying existing organizational parameters

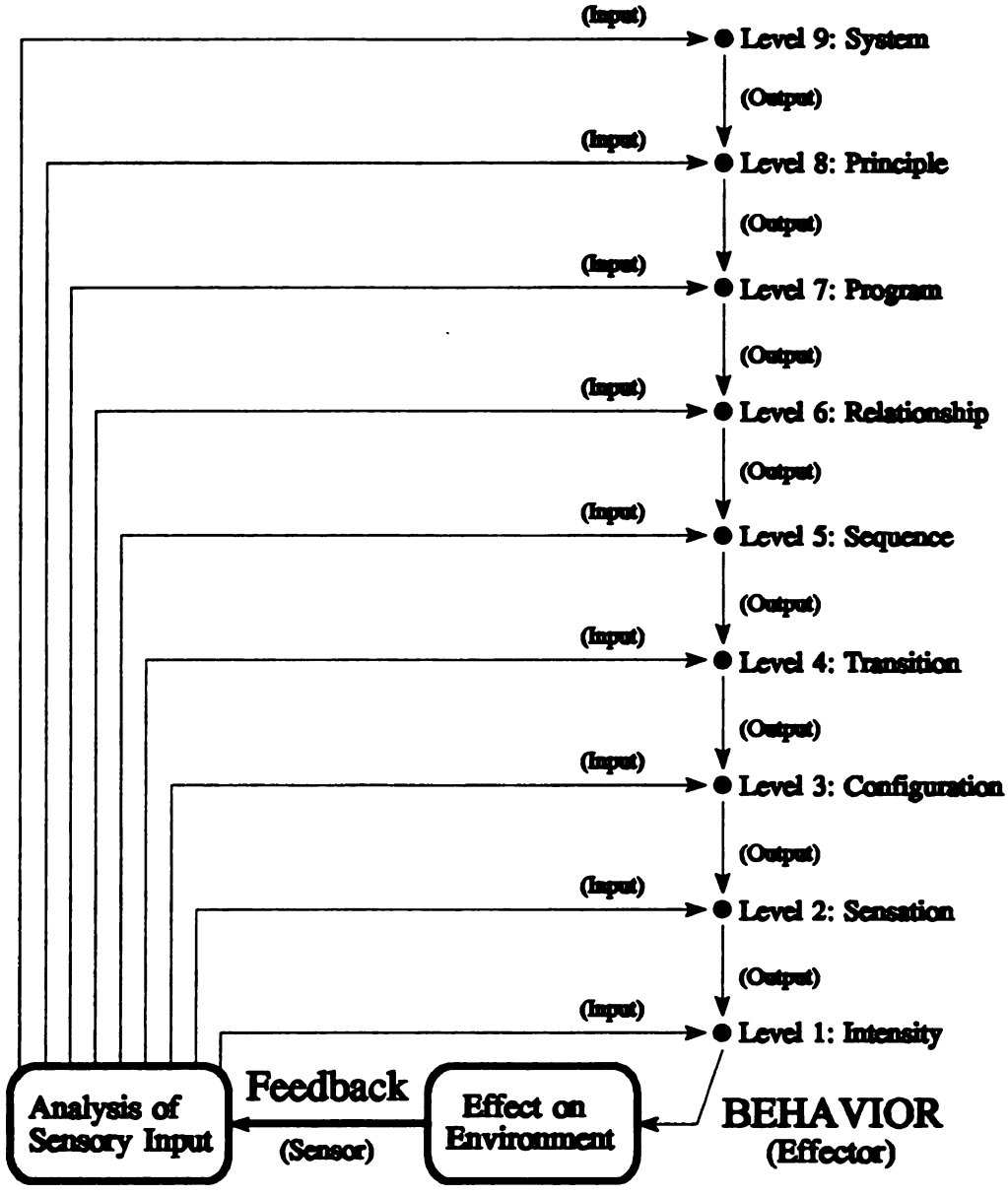

Figure 4. Powers' (1973) hierarchy of control loops.

of operations and choice points (i.e. systems), that these changes occur. This is why Powers describes reorganization to be the most essential type of learning.

But how does reorganization work? Powers proposes that reorganization is the product of a reorganizing system which acts to change and control the

arrangement of other systems. As in the model of control systems already described, the reorganizing system first senses the existing states of physical quantities intrinsic to the organism (i.e. the system's environment), and compares these to predetermined reference levels. If there is a difference between the signals carrying perceptions of the existing states and the reference levels, then an error signal is emitted by the comparator, which drives the output of the system. The ripple effect of this error signal and its effects on the other control systems in the organism serve to change those systems, whether it be to make their influence on the organism stronger, or to decrease their influence, perhaps to the point where they become dormant. This process continues until there is no difference between the perceived environmental states and the predetermined reference levels.

It is important to note that reorganization does not produce specific behaviors or change content in a system, but rather changes the parameters of the system and can result, for example, in changing the meaning of perceptual signals and therefore in changes in behavior. Furthermore, since the final product of reorganization is not a behavior but a system, this system "is capable of controlling sensed variables with respect to a variety of reference levels in a variety of situations involving different sources of disturbance" (Powers, 1973, p. 193). This means that the system is not restricted to being used only when one particular set of stimuli are present, but that it may also be activated in similar settings. This concept, then, mirrors the issue of skill transfer in the training literature.

Although Powers' examples primarily describe basic physiological systems, an example pertaining to the training setting may make this process clearer. Assume that an intermediate-level music student is attending a workshop on jazz music theory. In this case, the workshop is a "reorganizing system" which acts on the student's control systems pertaining to his or her musicality. At the beginning of the workshop, the student has some basic preexisting ideas and knowledge about music, for example he or she knows how to read music and play an instrument, can generally identify a jazz melody, and knows that there are different styles of jazz (See Figure 5, "Before"). Once the workshop starts, however, there is new information about jazz in the student's "environment". For instance, how melodies interact with harmonies in chords is explained, rules for how chords follow each other in "chord progressions" in different styles of jazz are presented, and how rhythms accentuate the melodies differently in these different styles is demonstrated.

This new information, however, does not fit in the student's preexisting control system for music; music has become much more complex. Up to this point, the student was primarily concerned with playing his or her notes correctly. Now, however, the student understands more about the underpinnings of jazz. He or she now knows to memorize typical chord progressions for different styles of jazz and recognizes when to choose which chord progression ("program") to play given a certain jazz style (problem-solving). But neither of these could occur without having taken the student's preexisting control systems for playing music and reorganizing them. For

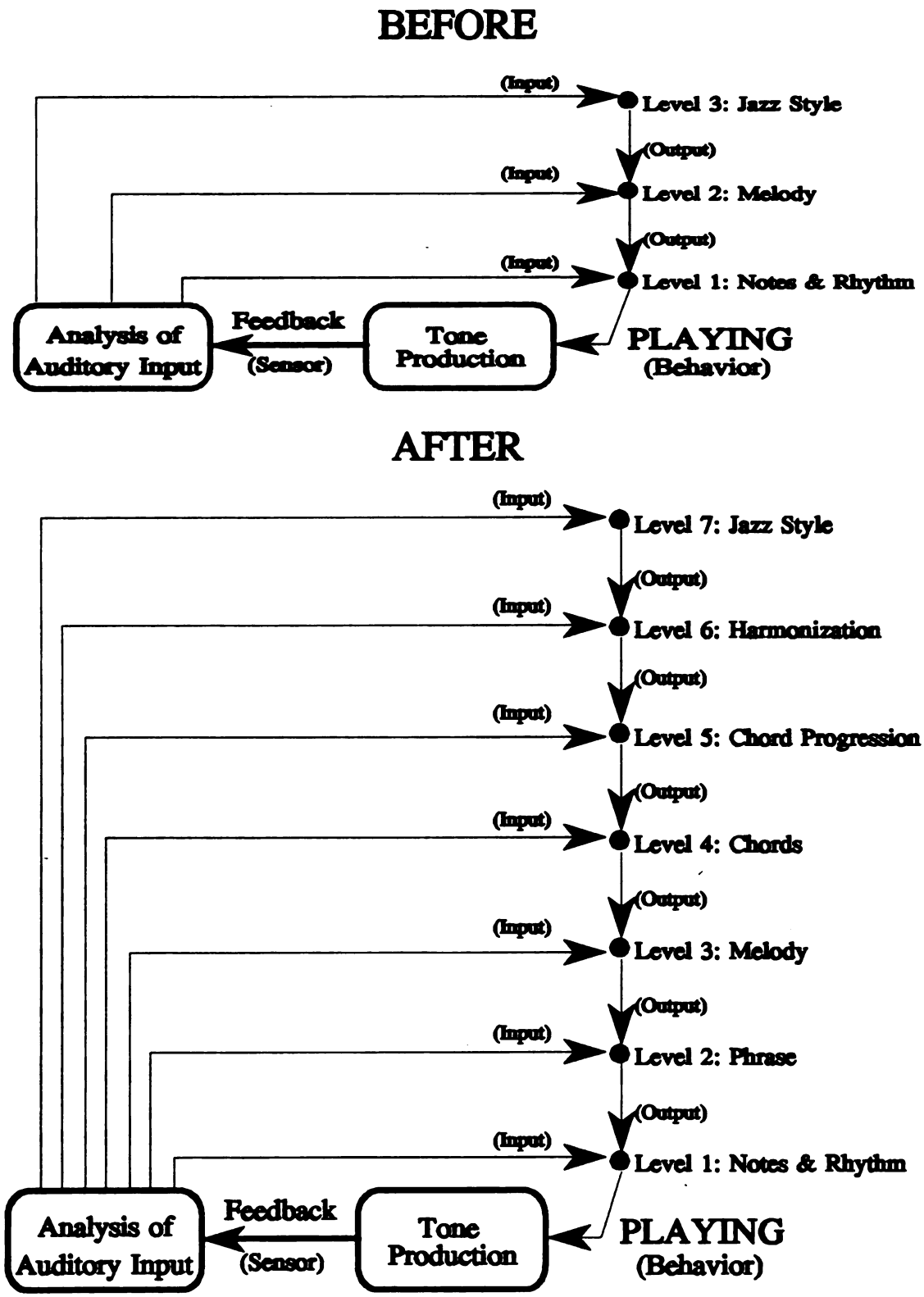

Figure 5. Reorganization of a musical control system through training.

example, a system which was previously dormant or nonexistent, playing a string of notes in a phrase, now comes to life hierarchically one level above the system for playing correct notes (see Figure 5, "After"). Further standards develop for systems reflecting playing a musical phrase which is consistent with the melody and chord progression which are harmonically consistent with the style of jazz being played. In addition, this system may then be applied (at least in part) to playing other types of music, such as classical, folk, or rock.

Applying Powers' concepts to the current discussion, a motivational hierarchy can be postulated to exist within the training process as well. An example of such a hierarchy is presented in Figure 6. Starting from the lowest level and working up, training content must be learned. Obviously, without basic learning trained knowledge and skills cannot be transferred from the training setting and training is in vain. Learning, however, implies that trainees are motivated to learn. Then, once the training content is learned, it may be used in (transferred to) the work setting. The extent to which training is effectively transferred, though, may be influenced by (and later influence) trainees' job performance standards. For instance, if their performance standards are generally low, it is probably easier to achieve these standards and it is less likely that using the trained skill will be necessary to reduce any discrepancy between the standard and job performance. Finally, job performance standards may be influenced by other, higher-order factors such as the desire to maintain certain types of relationships with family and/or coworkers, follow a certain career path, meet particular life goals or hold to a

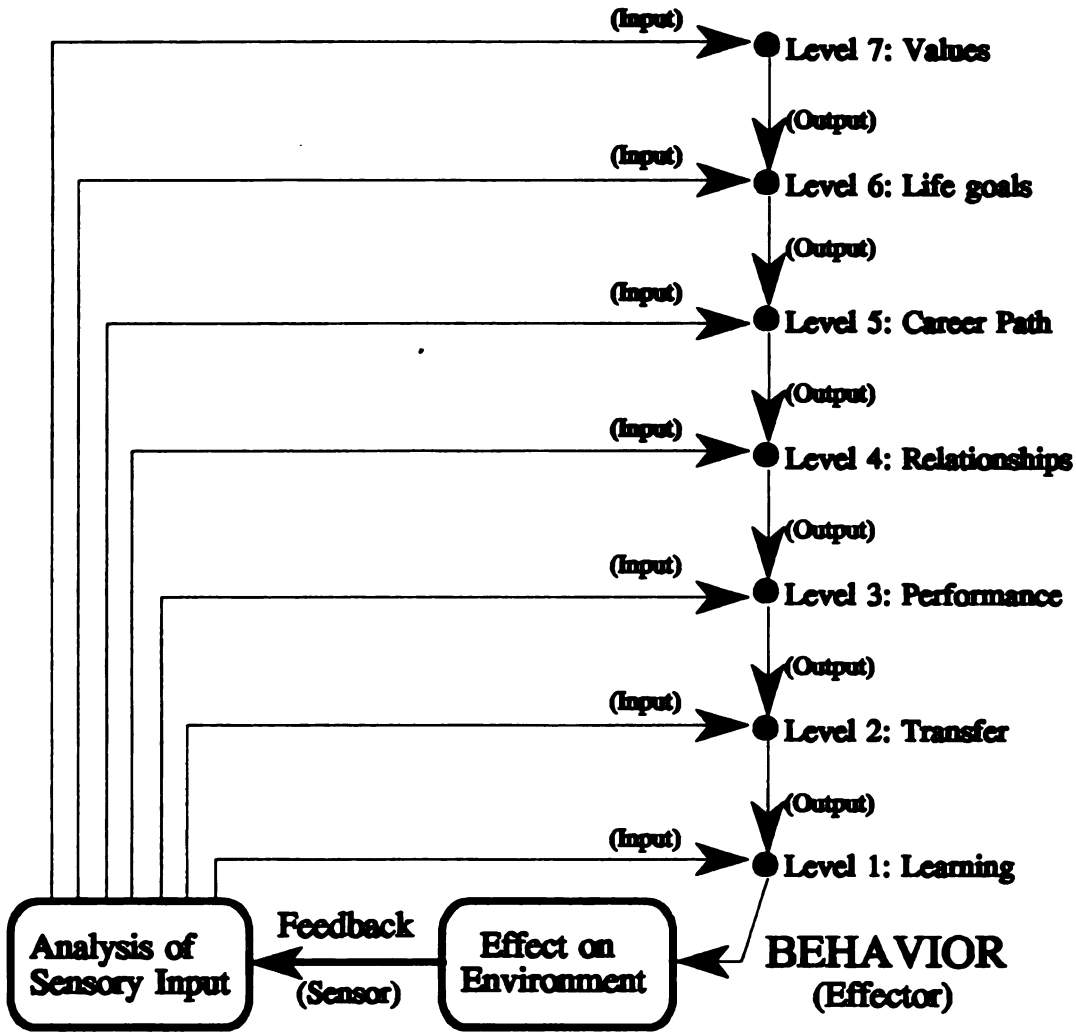

Figure 6. Potential Hierarchy of Training Standards.

set of personal values. As we see, Powers' concepts of control hierarchies and learning can be very valuable in developing a schema for studying the learning process during training. This may then be used to more systematically identify possible factors which may affect training motivation.

Carver and Scheier's Perspective

While Powers' (1973) model emphasized physiological implications, Carver and Scheier (Carver, 1979; Carver & Scheier, 1981a, 1981b) provided one of the first detailed application of control theory to psychological aspects of human behavior. Carver and Scheier viewed the control systems influencing behavior as having two primary elements: one cognitive, consisting of internal goals (referent standards) and the information matching those standards to inputs; and the other affective, originating from perceived discrepancies between inputs and standards. As described in earlier models, behavior is activated by the desire to reduce discrepancies between standards and inputs, but reactions to discrepancies may include dissatisfaction, anger, or frustration as well as cognitive changes in the standard (Carver & Scheier, 1981a).

According to Carver and Scheier's (1981a, 1981b) description of control theory, control processes primarily operate at the automatic, unconscious level. However, occasionally the automatic feedback loop is interrupted and the loop's components become more salient. When this occurs, Carver and Scheier suggested that an individual will reassess the likelihood of meeting the standard that is operating in that loop. This assessment involves processing the available information in the loop, and results in an "outcome expectancy," or a subjective estimate of the likelihood that the goal or standard can be attained given the nature of the situation and the available options (Carver, 1979; Carver & Scheier, 1981a). If one's outcome expectancy is high (i.e. the individual feels it is highly likely that conditions are favorable and that the standard can be

reached), it is likely that effort towards the standard will be renewed. If, on the other hand, the outcome expectancy is low, then withdrawal from the situation (either physically or cognitively) is more likely.

Carver and Scheier's proposition that one may react either cognitively or affectively to discrepancies with standards is important in the development of a control theory model of training motivation. Previous discussions have assumed that trainees were cognitively committed to learning the entire training content, and trainees' reactions to the program were assessed primarily to discern if some part of the training interfered with the learning process (cf. Alliger & Janak, 1989; Clement, 1982). Separating affective reactions to training from cognitive reactions effectively suggests that, though they may be associated, they are not necessarily causally or hierarchically related (i.e. Kirkpatrick's "hierarchical" model of training evaluation; Kirkpatrick, 1959a; 1959b; 1960a; 1960b; cf. Alliger & Janak, 1989; Hamblin, 1974; Newstrom, 1978). Carver and Scheier's perspective suggests that, although trainees may "react" poorly to the training program, they will not necessarily cognitively change their standards for learning, transfer, or job performance. Rather, they may maintain their current standard level(s) because, for example, factors in their work environments make the training valuable. Therefore, even though they are not pleased with the training itself, trainees may exert more effort to overcome affective obstacles if they feel that the effort expended is "worth it".

Control Theory Applied to Organizational Behavior

Similar concepts to those presented by Carver and Scheier have also been addressed in the organizational behavior literature. First, Lawler (1976) discussed the idea of control systems in organizations, focussing on how organizational control systems develop and on how they influence individual behavior. Organizationally-relevant, control-theory-based concepts were further developed by Lord and his colleagues (e.g. Campion & Lord, 1982; Lord & Hanges, 1987), who focussed on goal setting and the relationships among goal acceptance, goal specificity, goal difficulty, and performance. Taylor and her colleagues (e.g. Taylor, Fisher, & Ilgen, 1984) emphasized the feedback aspect of the control process, focussing particularly on the implications of whether or not feedback is monitored using automatic (unconscious) or controlled (conscious) processes. Hollenbeck and his colleagues (e.g. Hollenbeck, 1989; Hollenbeck & Brief, 1987; Hollenbeck & Williams, 1987) have extended control theory to studying individual reactions to work environments by highlighting three "core elements" of control theory: discrepancies in controlled quantities, outcome expectancies, and self-focus, or the extent to which they attend to internal states and standards. This perspective is similar to Carver and Scheier's model in that it emphasizes that the process described by the feedback loop operates only when individuals engage in self-focus. This is particularly important in the training setting, where awareness of one's current ability and knowledge levels is likely to optimize the learning of a new skill. The relationships among goals, feedback about progress towards meeting those

goals, and self-focus will be discussed during presentation of the training motivation model.

Klein's control theory model of work motivation. Recognizing the confusion and lack of scientific parsimony among existing motivational theories in organizational behavior, Klein (1989) integrated previous discussions of control theory in the social sciences (e.g. Campion & Lord, 1982; Carver, 1979; Carver & Scheier, 1981a, 1981b; Hollenbeck, 1989; Hollenbeck & Williams, 1987; Lord & Hanges, 1987; Taylor, Fisher, & Ilgen, 1984) to develop a metatheory of work motivation. This model, which synthesized both existing motivational and control-based theories using control theory principles, is shown in Figure 7. Beginning with a goal (or standard), this model suggests that: (a) goals influence behavior, (b) feedback provides information about the direction and magnitude of any discrepancy between goals and actual performance, and (c) a number of cognitive, affective, situational, and personality/individual difference characteristics determine the direction and extent to which goals are changed.

Initial attempts to test Klein's model have been generally supportive. Applying the model to undergraduate human resource management majors' goals for their grades on individual tests, their overall course grade, and their grade point average in their major, some of Klein's (1987) major findings were that: (a) force towards goal attainment (outcome expectancy X goal attractiveness; shown as the Subjective Expected Utility of Goal Attainment in the model) relates to goal choice and goal commitment, and changes in force

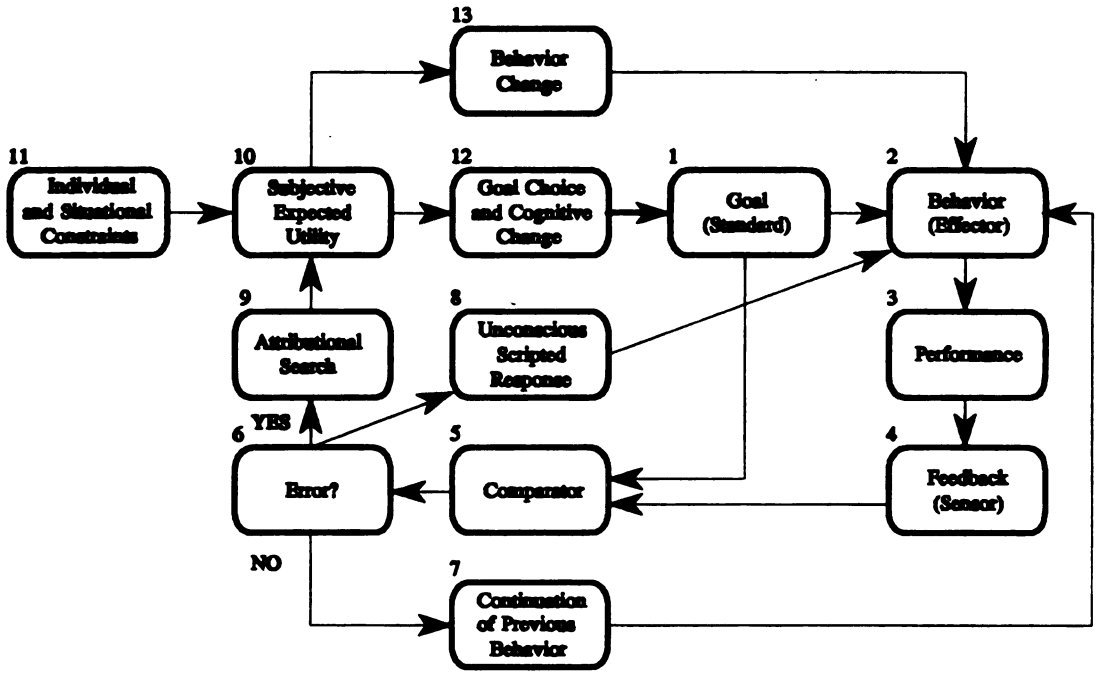

Figure 7. Klein's (1989) integrated control theory model of work motivation.

relate to changes in goals; (b) outcome expectancies decreased when performance fell short of the goal and increased when performance exceeded the goal; and (c) the force towards goal attainment at different hierarchical levels is positively related and that this relationship is, to a small degree, mediated by the attractiveness of the lower-level goal. This last finding Klein suggests is evidence that goals will be chosen and pursued to the extent that they are viewed as instrumental to the attainment of higher order goals.

Extending the basic control system framework, the strength of Klein's model is its explanation of the relationships among constructs previously considered to be components of competing theories, such as the subjective

expected utility of goal attainment (expectancy theory, Porter & Lawler, 1968; Vroom, 1964), attributional search (attribution theory, B. Weiner, 1985), goals, goal choice, and cognitive change (goal theory, Locke, 1968; Locke, Shaw, Saari, & Latham, 1981), and individual characteristics (e.g. self-efficacy/social learning theory, Bandura, 1977, 1986). Furthermore, concerns highlighted by previous control theory perspectives are also addressed, such as the role of unconscious cognitive scripts, attributions, outcome expectancies, and cognitive and affective reactions to discrepancies.

While Klein's model provides a strong attempt at synthesizing previous motivational theories, there are also a number of ways in which it could be improved. First, Klein's model is silent regarding the role of one's self-focus, the extent to which one is likely to focus internally and therefore be aware of internal states (e.g. cognitions or affect; Carver & Scheier, 1981a; Hollenbeck, 1989). In distinguishing self-focus from Rotter's (1966) locus of control (self-focus does not address control), Carver and Scheier (1981a) postulate that habitual tendencies to focus either internally or externally influence the extent to which one's behaviors and attitudes are predictable using control theory. Therefore, the explanatory power of Klein's model would be greatly increased if self-focus were addressed in the model.

Perhaps more important, however, is the failure of Klein's model to specify the roles of situational and individual characteristics in his model. Situational characteristics, such as reward systems and social support, and individual characteristics, including one's actual ability and his or her

perceptions of task-specific ability (Hollenbeck & Brief, 1987; self-efficacy, Bandura, 1977; 1986) are very likely to be related to one's perceptions of a standard's attractiveness, and may also correlate with one's outcome expectancy. Furthermore, if there is a discrepancy between one's performance and the referent standard (goal), it is also likely that this will influence subsequent feelings such as personal efficacy and goal attractiveness. Klein's model does not account for these possibilities.

Summary

Control theory appears to be an intuitively appealing and logical description of human behavior. Changes in behavior, cognition, and affect can all be described and explored within this framework. Furthermore, control theory appears to be valuable as a meta-theory under which other theories describing specific aspects of human behavior and cognition may be subsumed, providing a bridge for comparing and contrasting specific features of each in an attempt to achieve scientific parsimony.

While control theory may sound quite mechanical, standards in human systems are quite malleable, and changes in these standards are included as one of several ways to reduce discrepancies (Lord & Hanges, 1987). In fact, though most decisions whether or not to change a standard involve rational choice which is bounded by one's simplified perception of reality (March & Simon, 1958), time constraints and the importance of the decision whether or not to change will influence the degree to which a decision is completely rational (Lord & Hanges, 1987). Furthermore, the standards of feedback

systems at one level can also be the means for reducing discrepancies in higher order feedback loops (Lichtenstein & Brewer, 1980; Carver & Scheier, 1981a, Powers, 1973), thus decreasing the direct, rigid predictability of behavior.

Keeping this in mind, Klein's (1989) model of work motivation is an attractive description of individual behavior in organizations, both because it was derived as an integration and extension of prior attempts to explain motivation and behavior and because initial attempts to empirically support its tenets have been successful. For these reasons, a model of training motivation which uses this control theory framework as its base will be described in the section which follows.

Control Theory and Training Motivation

Klein's (1989) integration of previous control theory perspectives synthesizes the previously splintered literature on motivation in general, and is particularly adept at describing the forces that might influence motivation in work settings. Therefore, even though the model was originally developed to explain and guide future research on goal setting, it may also be instrumental in explaining what occurs in training settings.

Advantages of a Control Theory Perspective

Consistent with Klein's (1989) integrated control theory model of motivation and Powers' (1973) description of learning, training can be thought of as the process through which trainees' standards for learning, transferring, and performing a skill are changed. At least three information sources are thought

to originate and/or influence changes in behavioral standards: (a) an individual's attitudes or values, (b) direct communication with others or observation of their performance (without becoming part of the individual's values), and (c) interactions among the standards in one's own control systems, such as between standards at two different hierarchical levels (Carver & Scheier, 1981a; Powers, 1973; Taylor, Fisher, & Ilgen, 1984). Limited by the extent to which trainees are aware of a particular skill's existence prior to training, they will possess a set of standards related to that skill. While these standards may be very unclear or even asymptote near zero prior to training, the training process is geared towards focussing trainees' standards for learning, transferring, and performing the skill and bringing them to optimal levels by the end of the training program. That is, by the end of training trainees should ideally: (a) master the how and why of the training program (learning); (b) be able and be motivated to use the skill in appropriately identified job situations; and (c) perform the skill at the level required by the situation. Trainers may attempt to influence standards in these areas by matching training strategy or strategies to the information source(s) thought to be most beneficial, such as providing opportunities for appropriate practice (interactions among one's own control systems), having trainees work in pairs or teams, observe experts perform the skill (direct/indirect communication with others), or by providing individualized instruction to meet specific needs (changing an individual's attitudes or values). Therefore, one advantage of a

control theory perspective on training is control theory's ability to cogently describe the training process.

A second advantage to a control theory model of training, especially of training motivation, is its ability to describe various hierarchies of training-related motivation within one model. Control theory assumes that multiple levels of control systems operate simultaneously, with the output of higher-order systems serving as the standards for subordinate systems (Powers, 1973). As described previously, this means that multiple levels of factors influencing training motivation, from one's personal values through desired career paths through motivation to learn and transfer the training, can all be explained comprehensively within one framework. Such a perspective, for example, may help explain the results of training motivation studies such as those by Mathieu, Tannenbaum, and Salas (1992), where they found that none of their hypothesized antecedents of training motivation (e.g. career planning, job involvement, assignment vs. choice to attend training, and situational constraints) were significantly related to trainees' measured training motivation in a proofreading training workshop. Since proofreading did not represent a critical job task for the trainees, nor was it important for their career advancement, perhaps trainees' higher-order goals influenced their perceptions of the workshop's value (i.e. they saw it as not very important) and thereby their motivation to learn.

Yet another benefit of applying control theory to organizational training is its ability to describe the possible relationships among the three training input

factors identified by Baldwin and Ford (1988): trainee characteristics, work environment characteristics, and training design. While Klein's (1989) model of work motivation does not sufficiently address these factors' specific roles, it does provide a foundation upon which a more specifically focussed model can be built. In particular, the processes by which one's standards (goals) affect performance, how discrepancies between performance and standards interact with perceptions of the workplace's environmental features, and how these variables influence the perception of attractiveness and outcome expectancies for subsequent goals is much more detailed than previous descriptions of training suggest.

Finally, the greatest advantage of a training motivational model based on control theory is its focus on the dynamics of the training process. Exemplified by Baldwin and Ford's (1988) model, training has previously been thought of as a linear process: a needs assessment is conducted to determine trainees' initial ability, personality, and motivational characteristics (Goldstein, 1986); trainees report to training and are instructed using various instructional design strategies; these strategies interact with trainee's personal and work environment characteristics; and training ends, with skill transfer the expected outcome. Accepting a control theory notion of the training process, however, more accurately portrays the flurry of activity which occurs during the training process. In particular, a control theory perspective assumes both: (a) that the levels of trainees' standards for learning, transfer, and performance are tested and potentially changed multiple times prior to, during, and after the training

session itself; and (b) that the arrangement of trainees' control systems is constantly changing through reorganization, presumably as trainees' cognitive systems move from those resembling novices to those of experts (cf. Anderson, 1982: Lesgold, 1984).

Implications of a Control Theory Perspective for Training

Viewing training motivation from a dynamic perspective yields at least two immediate implications for current training practice. First, the extent to which the development of trainees' training-related standards (e.g. goals for learning specific skills to a specific level of expertise) can be matched to individually appropriate training design factors may determine training effectiveness. For instance, though no known research has investigated the possibility, it seems likely that trainees who habitually attend to internal affective and cognitive processes (i.e. are self-focussed; Carver & Scheier, 1981a; Hollenbeck, 1989) are more likely to change their training standards through methods which emphasize the interactions among hierarchies in their own control systems than are trainees who are not self-focussed. Such a matching process is consistent with Campbell's (1988) belief that training does not only refer to imparting relevant information, but also to managing trainees' motivational processes.

Another implication of applying control theory to training is the suggestion of an additional criterion for training evaluation -- trainees' standards (goals) for learning, transferring, and performing their new skill. These goals could be measured both in the training and transfer settings. For the last 30 years, most

training evaluation has been guided by Kirkpatrick's (1959a, 1959b, 1960a, 1960b) taxonomy of training criteria: assessing trainees' reactions to training, the amount they learned, their ability to behaviorally perform the skill, and the monetary and/or performance improvement resulting from increased ability. In practice, however, trainers and training researchers have considered it exemplary if they evaluate their training programs on at least three of these criteria. For example, Alliger and Janak (1989) found that only three of 203 training studies they reviewed reported all four types of information, with five more studies collecting three types. One of the difficulties frequently cited for failure to measure more than two of the criteria (typically reactions and learning) is the problem of identifying appropriate measures of behaviors and performance. A control theory perspective of training suggests that trainees' standards for learning and using their training should also be relevant to training evaluation. These criteria should be at least as easy to measure as actual learning and reactions to training (e.g. through questionnaire format) and, because of their motivational focus, are potentially more valuable than learning and reactions for predicting transfer. Furthermore, measuring standards for transfer and performance in the transfer setting may provide valuable evidence of skill generalization and maintenance, particularly within the scope of work environment characteristics. Therefore, a control theory perspective of organizational training also suggests potential new, valuable criteria for training evaluation.

A Control Theory Model of Training Motivation

Based on the advantages and implications presented above and highlighting one type of training standard (learning), a meta-theoretical control theory model of training motivation is presented in Figure 8. As the model indicates, pretraining trainee characteristics, such as past experience with the same or similar tasks, directly influence trainees' self-efficacy for the task being trained. Subsequently, trainees' self-efficacy and their perceptions of their environments' favorability towards using the skill influence the motivational force behind their learning, most directly observable through its relationship with the

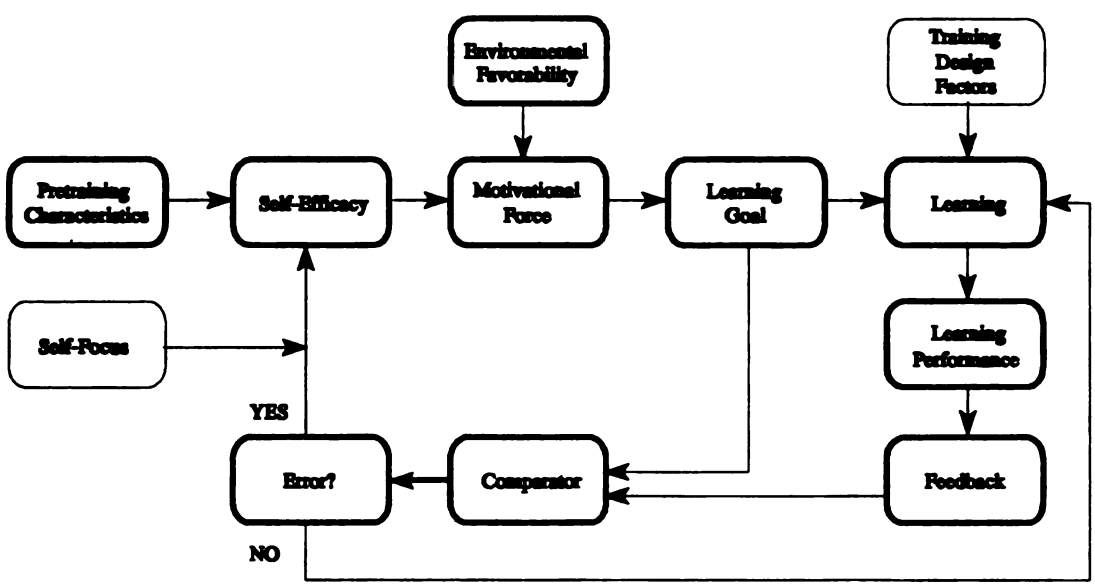

Figure 8. Control theory model of training motivation.

level of trainees' self-set learning goals. These learning goals, along with factors associated with the design of the training, are directly related to trainees' actual learning. Learning performance is personally assessed by trainees either while practicing the skill or through their performance on some type of paper and pencil test, and this feedback is compared to their original learning goal. If no discrepancy exists between their performance and the learning goal, they continue to assimilate additional material with the same effort or force with no change in affect. If, however, a discrepancy does exist, the magnitude and direction of this discrepancy will be positively related to changes in trainees' self-efficacy for learning additional material in the training program. Furthermore, the relationship between trainees' goal-performance discrepancies and changes in their self-efficacy will be moderated by the extent to which they habitually attend to internal standards and processes (self-focus; Carver & Scheier, 1981a; Hollenbeck, 1989). Changes in self-efficacy, as the model suggests, lead to subsequent changes in motivational force, learning goals, learning, etc., until the system reaches an equilibrium--a state where discrepancies between learning performance and learning goals no longer exist. For some, probably less-motivated trainees, an equilibrium threshold (level at which discrepancies are no longer detectable) may be reached while training continues. On the other hand, highly motivated trainees may never truly reach equilibrium, as each newly acquired skill or piece of knowledge inspires them to continue learning long after formal training ceases.

This perspective of training motivation demands a different view of training than currently espoused in the organizational research literature. While some initial approximations of a feedback loop-type system have appeared (e.g. feeding information about the content validity of a training program back into the design of subsequent training; Ford & Wroten, 1984), no current literature describes how trainees' pretraining experience, personality factors, perceptions of environmental characteristics, and training performance affect motivational standards for learning and transfer to the work setting. Furthermore, while initially based on Klein's (1989) integrated model of work motivation, the current model adds several constructs and retains only those aspects of Klein's model which appear to be especially relevant to the training context.

The proposed model's individual elements are described in the discussion which follows. However, because of the exploratory nature of this research, testing the entire model is beyond the scope of the current study. Therefore, particular attention will be paid to components in the model which are examined in this study and hypotheses will only be offered regarding one of the types of training standards previously discussed, trainees' standards or goals for learning the training content.

Pretraining Trainee Characteristics

In the current study, pretraining trainee characteristics refer primarily to: (a) trainees' experience with the skill being trained prior to the training program, and (b) their prior knowledge of the skill being trained. Where trainees have little experience with the task to be trained, initial knowledge is likely to be low.

On the other hand, when trainees have more experience with the same or similar tasks, initial knowledge is likely to be higher. Campion and Lord (1982) suggested that "initial goals will likely reflect the level of past performance and overall level of ability in similar tasks" (p. 271). Similarly, pretraining learning standards are likely to be related to pretraining experience with and knowledge about similar tasks. In the current study, these constructs are thought to be indirectly related through their relationships with trainees' pretraining self-efficacy and motivational force.

Self-efficacy

Self-efficacy, or one's belief in his or her own capability to perform a specific task (Bandura, 1977b; 1978), evolves as complex cognitive, social, linguistic, and/or physical skills develop through one's experiences (Bandura, 1982). This development occurs as individuals weigh, integrate, and evaluate self-relevant information to determine their competencies, and then use this information to regulate their choices and effort (Bandura, Adams, Hardy, & Howells, 1980). Self-efficacy is presumed to have three dimensions: magnitude, strength, and generality (Bandura, 1977a). Magnitude refers to the level of task difficulty a person believes he or she can perform successfully. Strength describes one's confidence in his or her assessment of magnitude. Generality indicates the degree to which the magnitude belief is universal across situations. These dimensions of self-efficacy influence what people choose to do, how much effort they expend, and how long they will persevere in the face of real or perceived obstacles (Bandura, 1982).

Bandura identified four types of information which influence self-efficacy: enactive mastery, vicarious experience, verbal persuasion, and physiological arousal. Enactive mastery, defined as repeated performance accomplishments (Bandura, 1982), has been shown to enhance self-efficacy more than the other types of information (Bandura, 1977,1982; Bandura, Adams, & Beyer, 1977). Mastery increases when gradual accomplishments build the skills, coping abilities, and exposure needed for effective task performance. When enactive mastery is not possible, vicarious experience, or modeling, may be beneficial, although slightly less influential (Bandura, 1977; 1986). Modeling has been shown to be most effective when the model is similar to the subject in terms of age, capability, and other personal characteristics (Bandura, 1977), he or she succeeds in using the skill after overcoming initial difficulty (Bandura, Adams, Hardy, & Howells, 1980; Kazdin, 1974), and when the modeled behavior produces clear outcomes or consequences (Bandura, 1977). Third, verbal persuasion can influence self-efficacy by convincing a person that he or she can perform a task. Though verbal persuasion may be successful in some situations, it is less effective than either modeling or mastery (Bandura, 1982). Unfortunately, it is the type of efficacy cue most often used in training settings. Finally, the effect of physiological arousal on self-efficacy perceptions depends on one's assessment of that arousal (Gist, 1987). If the arousal is interpreted positively, self-efficacy perceptions may increase. On the other hand, if the arousal is interpreted negatively as fear and the individual feels vulnerable to failure, self-efficacy may decrease.

A number of studies have found that self-efficacy is predictive of future performance. For example, Gist, Schwoerer and Rosen (1989) found that university managers higher in self-efficacy on a computer task performed better than those low in computer-related self-efficacy. In addition, Gist, Stevens, and Baretta (1991) demonstrated that initial self-efficacy was positively related to performance on a negotiation task not only immediately after training, but also after a delay of six weeks. Bandura and his associates (Bandura, 1977, 1982; Bandura & Adams, 1977; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980) have suggested that self-efficacy may be a better predictor of future performance than past performance. This relationship, however, appears somewhat more limited than Bandura suggested. For instance, Feltz (1982) found that as experience with a task increases, past performance becomes more predictive than self-efficacy. Furthermore, Locke, Frederick, Lee, & Bobko (1984) found that self-efficacy was a significant predictor of future performance if past performance was controlled. They also found that the correlation between self-efficacy and past performance was stronger than that between self-efficacy and future performance. In general, however, self-efficacy does appear to be correlated with future performance.

Part of self-efficacy's relationship to future performance may involve its effects on the choices one makes concerning settings and activities, skill acquisition, effort expenditure, and the initiation and persistence of coping efforts in response to obstacles (Bandura, 1982). For instance, Hill, Smith, and Mann (1987) found a relationship between undergraduate students' self-efficacy

for using computers and their choice to enroll in later computer classes. Similarly, Noe and Wilk (1993) concluded that self-efficacy perceptions had a significant impact on the extent to which health care, engineering, and financial service employees reported participating voluntarily in training and development activities. Looking at how self-efficacy relates to training transfer, Ford, et al (1992) discovered that the extent to which graduates of an Air Force technical training course performed the trained tasks in their subsequent duties ("breadth"; count of the 34 trained tasks actually used), as well as the type of tasks they performed (critical, complex, difficult) was significantly related to their self-efficacy for "performing the trained tasks and the confidence they had in attempting to solve difficult problems (Ford, et al; 1992)." These studies suggest that individuals with high self-efficacy are more likely to choose more challenging environments, engage in relatively more difficult task-related activities, and persist longer trying to cope with performance obstacles. On the other hand, if low self-efficacy individuals selected the same situation, they would likely attempt fewer coping strategies, give up more easily, and perform less well than their counterparts, and this poor performance would reinforce their already low self-efficacy (Bandura, 1977; Bandura & Schunk, 1981; Brown & Inouye, 1978; Gist, 1987). Therefore, an employee with low self-efficacy might be more likely to choose to remain in a dead-end position to avoid confronting threatening situations (Bandura, 1977; Gist, 1987).

Overall, evidence supports the assertion that self-efficacy is positively related to performance (e.g. Bandura, 1977, 1982; Bandura, Adams, & Beyer,

1977; Bandura & Schunk, 1981; Feltz, 1982: Gist, et al, 1989; Locke, et al, 1984). Furthermore, Hollenbeck and Brief (1987) found that self-perceptions of task-specific ability (self-efficacy) were positively related to the difficulty of self-set goals. In the training context, research evidence already suggests that training achievement will be greater if trainees believe they can master the training content (Bandura, 1982; Campbell, 1988; Kanfer & Gaelick, 1986; Frayne & Latham, 1987; Zimmerman, Bandura, and Martinez-Pons, 1992). Regarding motivation to learn, this suggests that trainees with higher self-efficacy related to learning the training content will be more motivated to learn. Such a relationship would be indicated by a significant correlation with one's motivational force, the next component in the model.

Motivational Force

Though control theory assumes that control processes for routine functions primarily operate at the automatic, unconscious level, occasionally the automatic feedback loop is interrupted and the loop's components become more salient. When this occurs, Carver and Scheier (1981a) suggest that an individual will reassess the likelihood of meeting the standard that is operating in that loop. This assessment involves processing the available information in the loop, and results in an "outcome expectancy," or a subjective estimate of the likelihood that the goal can be attained given the nature of the situation and the available options (Carver, 1979; Carver & Scheier, 1981a; Klein, 1989). This differs from self-efficacy in that outcome expectancy refers to one's overall assessment of success in meeting a goal, rather than just an assessment of

one's ability to meet it (Carver & Scheier, 1981a). Self-efficacy is one important factor which determines outcome expectancy, but environmental factors and knowledge of a behavior's consequences are also influential.

In the current context, a trainee's expectancy for training is his or her subjective estimate of how likely it is that he or she will be able to learn the training content, taking into account his or her own perceived mastery and environmental constraints. This differs subtly from the performance to outcome expectancy in expectancy theory (Lawler, 1973; Porter & Lawler, 1968; Vroom, 1964), which focusses on the utilitarian aspects of performance (either internally or externally rewarding). It also differs from outcome expectancies in Bandura's Social Learning Theory (Bandura, 1977, 1986), which refers to one's estimate that a given behavior will lead to specific outcomes (Bandura, 1977, p. 193).

Although previous control theory models explicitly included the role of outcome expectancies, it has been included in slightly different ways. Campion and Lord (1982), Carver and Scheier (1981a), Hollenbeck and Klein (1987), and Taylor, et al. (1984) all suggested that a goal's value (valence) or attractiveness plays a role in the control process. However, while Campion and Lord (1982) suggested that valences may impact motivation through their impact on goal commitment, Hollenbeck and Klein (1987) suggested that goal commitment is influenced by both expectancies and attractiveness. Then, testing this hypothesis, Klein (1987) found that, other things being equal, the subjective expected utility of a goal's attainment (cf. Edwards, 1961) is a multiplicative function of its attractiveness and the expectancy of attaining it.

In the current study, Klein's (1987, 1989) definition of Subjective Expected Utility has been retained, but the construct has been renamed Motivational Force to better describe its role in influencing behavior. Applying this concept to the training context, the attractiveness of using a skill will be tied to external rewards, such as pay, promotions, or productivity; internal factors, such as increased self-efficacy for improved skill performance, may increase attractiveness as well. Therefore, extrapolating Klein's (1989) goal setting model to the training setting suggests that trainees' motivational force for learning training content (attractiveness and outcome expectancy) should be positively related to: (a) the extent to which trainees believe they are capable of learning the training content (self-efficacy); and (b) the extent to which trainees believe their work environments look favorably upon learning the training content. Environmental influences on motivation are discussed further in the next section.

Environmental Favorability

The training literature reviewed previously highlights that work environment characteristics affect transfer. Further evidence suggesting the power of environmental influences on whether or not trained skills are transferred is provided by Manz, Adsit, Campbell, and Mathison-Hance (1988). While not explicitly examining transferred behavior, Manz, et al. explored the responses of over 3,000 managers to an open-ended question about hindrances they found when trying to perform trained skills on the job. These responses indicated that the top five hindrances to transferring training were all

related to external or organizational issues, such as lack of time for skill development because of other job demands, management's emphasis on short-term results, and being delegated responsibility without being given adequate authority. Consistent with this, Noe and Wilk (1993) determined that "employees' perceptions of the work environment - specifically social support from managers and peers for development activity and the type of working conditions that employees believe they face - influenced development (training) activity (p. 301)." Therefore, the current model suggests that work influences are directly related to the perceived value of the skill being trained. For instance, if a trainee's supervisor, colleagues, and/or the compensation structure within his or her company is very supportive of the skill being learned, it is more likely that he or she will perceive the skill as being valuable. Quite a number of possible environmental variables could influence the perceived value of training and subsequent commitment to standards for using a trained skill, including the social influence of coworkers' goals, the "publicness" of skill performance, and competition among coworkers or in the industry in general. However, given the current status of training transfer research, it is most logical to consider environmental variables previously shown to affect transfer. These include the supportiveness of trainees' work climates for change (Baldwin, Magjuka, & Loher, 1991; Baumgartel & Jeanpierre, 1972; Baumgartel, Reynolds, & Pathan, 1984; Baumgartel, Sullivan, & Dunn, 1978; Ford, et al, 1992), reward systems which are consistent with training goals (Hand, Richards, & Slocum; 1973), and opportunities to use the new skill in the face of

one's workload (Huczynski & Lewis, 1980; Ford, et al, 1992). Therefore, it is expected that trainees' motivational force to learn training content will be positively related to the extent to which their environments look favorably upon learning the trained skill.

Learning and Learning Performance

Learning refers to the extent to which training content is understood and mastered. In addition to the motivational factors and environmental factors delineated elsewhere in this discussion, learning is primarily impacted by the training design factors described earlier (e.g. training content, principles of learning, sequencing, etc.). Of importance in the current study, however, is the extent to which the content of the training program is, in fact, learned. Performance on a test of training content relative to the amount of material presented is not of particular interest in this research. Rather, the primary focus here is on the extent to which trainees' learning during training matches their learning goals. The role of learning goals in this model will be described below.

Learning Goals

During the last 25 years, a large amount of research has been conducted on goals and the goal setting process. Formally introduced to applied organizational settings by Locke (1968), goals are hypothesized to be the immediate precursors of behavior (Locke, Shaw, Saari, & Latham, 1981; Mento, Steele, & Karren, 1987). The use of specific, difficult goals have

produced consistent, positive effects on performance in a wide variety of settings (Locke & Latham, 1984).

A number of appropriate goals exist in the training setting. As previously mentioned, trainees may have goals regarding such issues as learning the concepts being taught, performance on training exercises, and transferring the trained skill back to the workplace. Furthermore, training goals may relate either to quality, such as assembling an error-free cabinet; or quantity, such as assembling 5 cabinets in the 30 minutes allowed for practice during the training session, even if there are a few errors. For example, Earley, Lee, and Lituchy (1991) found that trainees only benefitted from training in selecting strategies for estimating stock prices when they were either given a specific goal for performance, or were told to concentrate on learning as much as possible (a "learning goal"). In the current study, training goals refer to trainees' self-set standards for the amount of material they want to learn during specified time periods within the training session. As in the Earley, et al. (1991) study, this means that trainees set their own standards for judging their mastery of the training task.

A number of studies on goal setting have investigated the relationship between individual differences and self-set goals (e.g. Dossett & Becker, 1986; Hollenbeck & Brief, 1987; Hollenbeck & Williams, 1987; Locke, Frederick, Lee, & Bobko, 1984; Matsui, Okada, & Kakuyama, 1982). For instance, Hollenbeck and Williams (1987) found that performance was significantly related to an interaction between self-set goals, one's self-focus (or self-attention; cf.

Fenigstein, Scheier, & Buss, 1975), and the perceived importance of achieving the goal. In another study, Locke, et al. (1984) found that ability, past performance, and self-efficacy were major predictors of one's self-set goal, and that this goal was positively related to future performance. Similarly, Hollenbeck and Brief (1987) showed that individuals high in self-perceived task-specific ability (self-efficacy) set more difficult goals for themselves than did individuals low in self-perceived ability. In addition, they found that subjects who set their own goals were more motivated to pursue their goals than were subjects assigned goals regardless of individual differences. Finally, in two related studies Earley and Lituchy (1991) detected that personal (self-set) goals either completely (Study 1) or partially (Study 2) mediated the relationship between self-efficacy and performance.

Applying these findings to the current research highlights an additional advantage of the control theory model of training motivation: it can serve to integrate traditional learning and goal theories under one overarching meta-theory. The current model includes the key component of Bandura's learning theory, self-efficacy, as well as the key relationships espoused by goal setting theorists (goals/standards, performance, feedback; e.g. Earley, Erez, Latham, Locke). As presented in this model, the relationship between trainees' learning-related self-efficacy and the level of their learning goals are mediated by their motivational force for learning the training content.

Feedback, the Comparator, and the Detection of Error

Either during or after performing a task, an individual is provided or seeks out relevant feedback. As defined by Ilgen, Fisher, and Taylor (1979), feedback is a message an individual receives from a source which contains information about himself or herself. This message may originate from the task itself, from the individual himself or herself, or from others who are in a position to evaluate the individual's behavior, and is likely to affect performance (e.g. Martocchio & Webster, 1992). Furthermore, in addition to that feedback which is provided to the individual passively, feedback may also be sought out actively through monitoring or inquiry (Ashford & Cummings, 1983). Therefore, there is almost always some source of performance feedback available to the individual.

In control theory, performance feedback is compared to one's referent standard, and the extent to which a discrepancy exists (Error) is assessed (Miller, et al., 1960; Carver & Scheier, 1981a). This feedback may take on one of three forms (Carver & Scheier, 1981a). First, it may indicate that there is no discrepancy between the individual's performance and the referent standard. In this case, control processes within the current system maintain their present standard levels, as do systems which control other related aspects of the individual's behavior (e.g. processes regulating effort expenditure and/or the amount of time allocated to the task; Naylor, Pritchard, & Ilgen, 1980). In the second and third cases, however, performance is either above or below the referent standard. In these cases, action to reduce the discrepancy is initiated. For instance, affective reactions such as frustration (negative) or pride (positive)

may result in performance standards being changed (usually raised for discrepancies above the standard (goal) and lowered for discrepancies below the standard; Campion & Lord, 1982). This is likely to involve changing standards in other systems which influence performance (e.g. standards for effort and/or time). However, the extent to which the performance discrepancy is detected influences whether or not other processes are initiated (Taylor, Fisher, & Ilgen, 1984).

In the current study, the error which is assessed represents the difference between trainees' goals for learning training content and their performance on a test designed to measure their learning. Furthermore, these discrepancies are believed to affect subsequent standards, in part, through their relationships with subsequent self-efficacy. In particular, it is suggested that positive discrepancies (discrepancies above the standard) will be related to increased subsequent self-efficacy, while negative discrepancies will be associated with lower subsequent self-efficacy. Finally, the extent to which the effects of discrepancies between trainees' goals and performance affect subsequent control processes is largely dependent on an individual's level of self-focus (Carver & Scheier, 1981a; Hollenbeck, 1989).

Self-focus

While explaining necessary attentional requirements for the negative feedback loop to operate, Carver and Scheier (1981a) proposed that one's attention can be directed in two directions: inward toward the self, or outward toward the environment. When attention is directed toward the self, an

individual is said to be engaging in self-focus (Carver & Scheier, 1981a; Hollenbeck, 1989). In addition, Carver and Scheier postulate that habitual tendencies to focus either internally or externally influence the extent to which one's behaviors and attitudes are predictable using control theory. If an individual is highly self-focussed, he or she is more likely to be aware of the negative affect produced by discrepancies and is more likely to take action (cognitively or behaviorally) to alleviate it. On the other hand, if someone is low in self-focus, he or she is less likely to attend to self-regulation processes. Such an effect has been found in several studies (e.g. Carver, 1974; Gibbons, 1978; Carver & Scheier, 1981a; Hollenbeck & Williams, 1987; Hollenbeck, 1989). For instance, Hollenbeck and Williams (1987) found a three-way interaction such that the relationship between goal difficulty and performance was significantly higher when performance goals were salient and occurred in conjunction with high self-focus.

In regards to training, it is likely that individuals who are high in self-focus are more likely to react to internal processes resulting from discrepancies between their training goals and their performance. Therefore, because self-focus increases the likelihood that the consequences of goal-performance discrepancies (Error) will be detected, and goal-performance discrepancies are assumed to be positively related to changes in trainees' self-efficacy, self-focus should moderate the extent to which discrepancies between goals and performance are related to subsequent changes in an individual's feelings of task mastery (self-efficacy). No known studies have investigated the

relationship between self-focus and self-efficacy, nor the relationships among these constructs and goal-performance discrepancies.

Summary

The preceding discussion has described the components of the proposed meta-theoretical model of training motivation. While this model's balanced approach towards training motivation is significant, its most important contributions come from its description of training and training motivation as a dynamic, cyclical processes. First, the proposed model provides balance between more general control system processes, such as those described by Klein (1987, 1989), and individual and situational characteristics, such as self-efficacy and environmental favorability. This balance is important in suggesting an appropriate level of focus for initial research efforts based on control theory -- not too broad and not too microscopic. Such middle-focus control theory models are likely to be more effective at cultivating new theories of human and organizational behavior than would models which are either too specific or too general.

More important than its contribution to control theory, however, the proposed model significantly reframes what occurs in training and training motivation. Prior descriptions of training have typically taken a linear approach to the process: trainees have certain pretraining dispositions, they are taught the prescribed material and learn it, and then they (theoretically) use it on their jobs. Trainees' motivational levels remain relatively constant throughout this process, and the relationship between ability and motivation over time is not

addressed. The current model, on the other hand, emphasizes the cyclical and dynamic nature of training motivation. Trainees are believed to arrive at training with different goals concerning what they hope to achieve; these goals, along with their perceptions of their work environments, influence the force behind their learning; and performance within the training setting affects subsequent motivation and performance both inside and outside of training. In this way, the model suggests a change in how training processes should be viewed, especially processes involving training motivation.

The relationships among key components in the proposed model have been alluded to, if not directly stated, in previous discussions. The following section summarizes these relationships and proposes specific hypotheses which this research tests.

Summary and Hypotheses

Training transfer has been recognized as a widespread and expensive problem. Unfortunately, research investigating this problem has focused primarily on improving training design, which only indirectly impacts transfer by increasing trainees' ability to perform new skills, and on trainee and work environment characteristics, which are important factors, but not well understood. What is clearly needed to explain the transfer problem is an understanding of the processes involved in learning new skills and preparing to use them on the job.

Accepting Powers' (1973) description of learning and Klein's (1989) integrated control theory model of work motivation as a foundation, training can

be thought of as a process through which trainees' standards for learning, performing, and transferring trained skills are changed. These standards, which emerge as motivated behavior, are influenced by characteristics representing the categories of training inputs suggested by Baldwin and Ford (1988). These include trainee characteristics such as knowledge, experience, self-focus, and self-efficacy; training design characteristics; and work environment characteristics, such as social support for learning, using, and performing the skill; workload influences; and a reward system consistent with using the skill. These variables are subsequently related to the motivational force behind one's training standards, a multiplicative function of the standard's attractiveness and one's subjective estimate of the likelihood that meeting the standards can be accomplished given the nature of the situation. Finally, discrepancies between standards and their relevant performance levels are hypothesized to influence trainees' subsequent standards, initially through their relationship with trainees' self-efficacy.

The relationships in the model discussed so far may be conceptually and sequentially grouped into three phases: factors relating to pretraining learning goals, affective reactions to goal-performance discrepancies, and the relationship between affective changes and subsequent cognitive indices of motivation. Hypotheses relating to each of these phases are detailed below.

Phase I: Pretraining Goals for Learning

Trainees' pretraining goals for learning will largely be based on their experience with the same or similar tasks in the past (Campion & Lord, 1982).

However, the mechanisms which are involved in this process are not yet fully understood. Components from the meta-theoretical model which should shed light on trainees' goal levels include their pretraining experience and knowledge, their initial perceptions of task-related self-efficacy and environmental favorability for using the training, their motivational force, and their goals for learning the material. The relationships among these constructs are depicted in Figure 9. The general relationships this research addressed have already been discussed; formal hypotheses are summarized below.

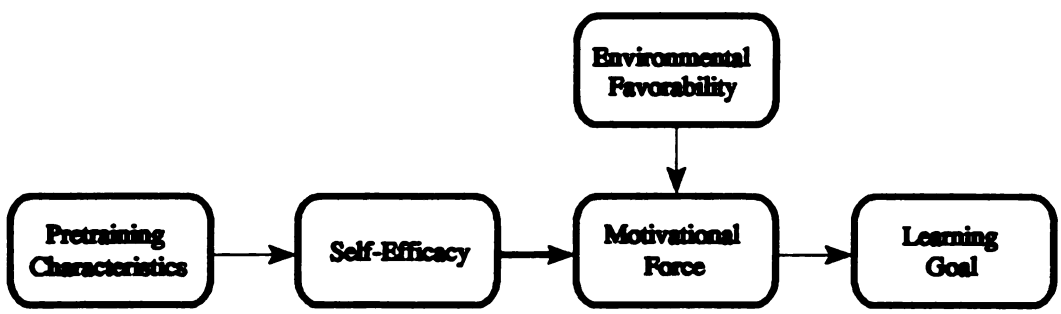

Figure 9. Model of Pretraining Goal Development.

The first relationships to be tested involve trainees' pretraining characteristics. It has been previously suggested that trainees' prior mastery of the skills being trained (or of similar skills) will be related to both their task-related efficacy perceptions and to the levels of their initial training goals. However, the existence of a number of intermediary relationships must be established before any relationships between pretraining experience and

knowledge on the one hand, and initial learning goals on the other, may be examined. Therefore, the following relationships are hypothesized:

Hypothesis 1a: Trainees' pretraining experience with similar content to that being trained will be positively related to their perceptions of learning-related self-efficacy.

Hypothesis 1b: Trainees' pretraining knowledge of the training content will be positively related to their perceptions of learning-related self-efficacy.

Hypothesis 2: Trainees' perceptions of learning-related self-efficacy will be positively related to their motivational force for learning that material.

Hypothesis 3: Trainees' motivational force for learning the training material will be positively related to the level of their self-set learning goals.

Hypothesis 4: The relationship between trainees' pretraining perceptions of learning-related self-efficacy and the level of their self-set learning goals will be mediated by the level of the motivational force behind their learning. (No direct relationship between trainees' self-efficacy and the level of their learning goals when the effects of motivational force are held constant is expected.)

Hypothesis 5a: The relationship between trainees' pretraining experience and the level of their initial self-set learning goals will be mediated by their perceptions of learning-related self-efficacy and their motivational force for learning the training content.

Hypothesis 5b: The relationship between trainees' pretraining knowledge of the training content and the level of their initial self-set learning goals will be mediated by their perceptions of learning-related self-efficacy and their motivational force for learning the training content.

In addition to the hypotheses regarding trainees' pretraining characteristics, relationships regarding environmental characteristics have also been discussed, and are addressed in the model. The following hypotheses address these relationships:

Hypothesis 6: Trainees' perceptions of their environments' favorability for using the training content will be positively related to their motivational force for learning the training content.

Hypothesis 7: The relationship between the perceived favorability of trainees' environments for using the training content and the level of their self-set learning goals will be mediated by their motivational force for learning the

training content. Perceived environmental favorability is not expected to be directly related to self-set learning goals.

Finally, the proposed model suggests examining the relationships among self-efficacy, motivational force, environmental favorability, and learning goals together. In particular, the extent to which motivational force mediates the relationship between trainees' perceptions of learning-related self-efficacy and their self-set learning goals may be influenced by how favorable they perceive their environments are for using the training content. In particular, trainees who feel they are encouraged to learn the new skill by factors in their environment may be more likely to have received some type of encouragement that they can learn it (development of self-efficacy through verbal persuasion). This would likely increase their belief that they could master the skill, and would be related to their learning goals even if they don't find it attractive (a component of motivational force). On the other hand, trainees who perceive their environments as less favorable may not have received reinforcement that they are capable to learn the new skill, and therefore the relationship between their learning-related self-efficacy and learning goals would be dependent on how attractive they find learning the skill and the extent to which they feel they can become proficient at it (motivational force). This suggests the following hypothesis:

Hypothesis 8: For trainees who perceive their environments as unfavorable, Motivational Force will completely

mediate the self-efficacy - learning goal relationship. On the other hand, Motivational Force will not completely mediate the self-efficacy - learning goal relationship for trainees who perceive their environments as favorable.

Phase II: Affective Reactions to Goal-Performance Discrepancies

Previous discussions concerning reactions to goal-performance discrepancies have indicated that these reactions may be either cognitive or affective (Carver & Scheier, 1981a). Following initial goals, the proposed meta-theoretical model next addresses affective reactions to discrepancies. There are three components of this model which directly bear on this question. These include the discrepancies themselves (represented as "Error?"), trainees' learning-related self-efficacy, and self-focus. The proposed relationships among these constructs are highlighted in Figure 10. The formal hypotheses which are implied in this figure are stated as follows:

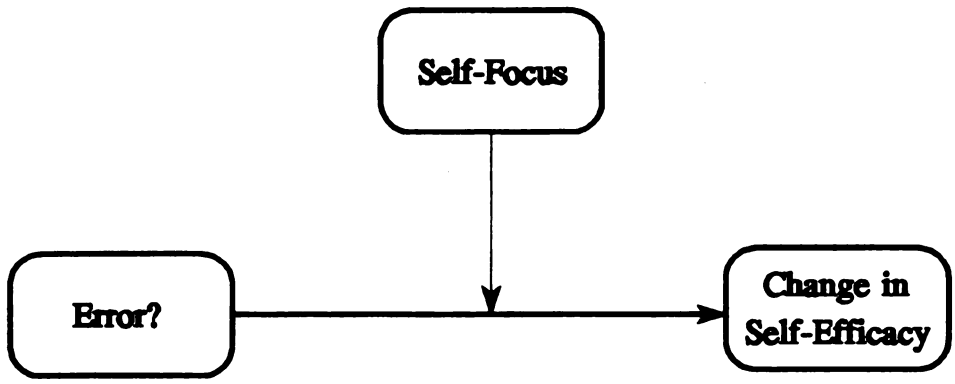

Figure 10. Model of Affective Reactions to Goal-Performance Discrepancies

Hypothesis 9: Discrepancies between trainees' self-set learning goals and their performance will be positively related to subsequent changes in their learning-related self-efficacy. When trainees' performance exceeds their goals, self-efficacy will increase. When performance does not meet their goals, subsequent learning-related self-efficacy will decrease.

Hypothesis 10: The relationship between performance-goal discrepancies and subsequent changes in trainees' learning-related self-efficacy will be moderated by the extent to which they habitually attend to internal processes (Self-Focus). Performance-goal discrepancies will be more positively related to changes in subsequent self-efficacy for trainees high in self-focus than for trainees low in self-focus, who will demonstrate little or no change in self-efficacy related to goal-performance discrepancies.

It is important to note that a number of elements included in the larger model, from Learning to the Comparator (elements 7 through 10), have not been included in the current discussion. The processes and constructs in this portion of the model are important to the functioning of the control system. However, since the current discussion focusses on relationships between discrepancies and trainees' affective reactions to them, the excluded elements

are only pertinent to the extent that they define the presence and magnitude of discrepancies between trainees' goals and their learning performance.

Phase III: The Effects of Affective Responses on Subsequent Motivation

The third set of relationships to be addressed attempts to illuminate the processes by which changes occurring during the training session dynamically influence trainees' motivation to learn. In their review of the self-efficacy literature, Gist and Mitchell (1992) suggested that individual differences exist in the proportion of self-efficacy that is stable vs. variable (situation-specific). The following hypotheses attempt to examine this issue and its ramifications more closely with respect to variability over the time of the training session. In particular, the following hypotheses address how changes in trainees' learning-related self-efficacy from their pretraining levels may be related to subsequent changes in their motivational force and learning goals. Trainees' perceptions about themselves, their work environments, and what they desire to accomplish may change during the course of training, and these changes may influence subsequent goals. The ability to explain such "ripple-effects" highlights one advantage of control systems for explaining dynamic human behavior. The specific relationships to be tested are presented graphically in Figure 11, and are stated below:

Hypothesis 11: Changes in trainees' learning-related self-efficacy will be positively related to changes in their motivational force.

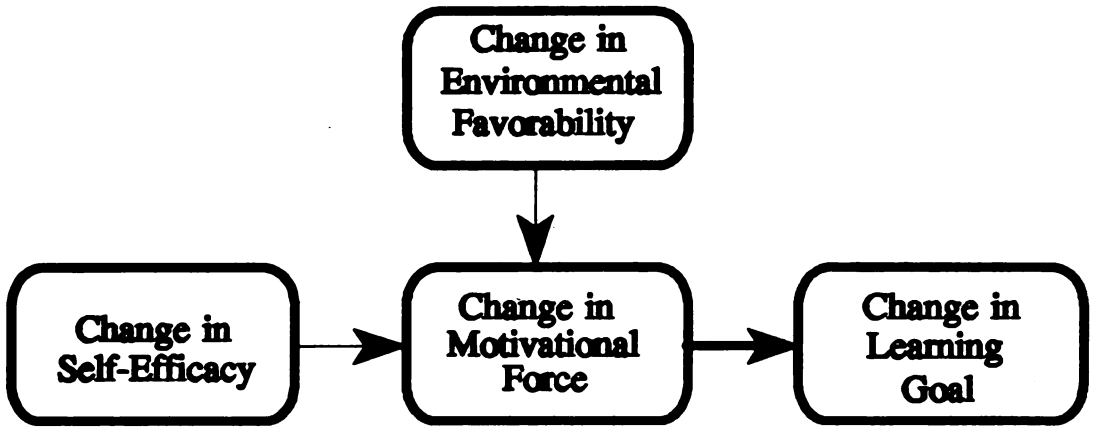

Figure 11. Model of Effects of Affective Responses on Subsequent Motivation.

Hypothesis 12: Changes in trainees' motivational force will be positively related to changes in the level of their self-set learning goals.

Hypothesis 13: The relationship between changes in trainees' learning-related self-efficacy and changes in the levels of their self-set learning goals will be mediated by changes in their motivational force. When changes in motivational force are held constant, there will be no relationship between changes in self-efficacy and changes in learning goal levels.

Hypothesis 14: Changes in trainees' perceptions of their environments' favorability for using the training content will be positively related to changes in their motivational force.

Hypothesis 15: The relationship between changes in trainees' perceptions of their environments' favorability for using the training content and changes in the levels of their self-set learning goals will be mediated by changes in their motivational force. A direct relationship between changes in perceived environmental favorability and changes in learning goal levels when changes in motivational force are held constant is not expected.

Finally, examining the relationships among changes in self-efficacy, motivational force, perceptions of environmental favorability, and learning goals together suggests that:

Hypothesis 16: Whether or not changes in motivational force mediate the relationship between changes in self-efficacy and learning goals will depend upon how favorable trainees perceive their environments to be regarding the trained skill. Changes in motivational force will not completely mediate the relationship between changes in self-efficacy and learning goals when trainees perceptions of their environments' favorability have remained constant or improved during training. Conversely, when trainees' perceptions of their environments have deteriorated

during training, motivational force will completely mediate the self-efficacy - learning goal relationship.

METHOD

Overview

The preceding hypotheses were tested during a training program conducted to teach undergraduate students how to use the WordPerfect computer word processing program. Before, during and after the training session, subjects were asked to complete a number of forms designed to assess their knowledge about using WordPerfect, their perceptions of their self-efficacy and their environment's favorability, their level of self-focus, their goals for learning the training material, and several demographic variables.

Subjects

Subjects for this study were undergraduate students enrolled in introductory psychology. To determine the number of subjects that were necessary, a power analysis was conducted (Cohen & Cohen, 1983). The substantive analysis requiring the greatest statistical power was that for Hypothesis 5, which examined possible mediation of the relationships between trainees' pretraining characteristics and initial learning goal relationship by motivational force and self-efficacy. Examining this relationship involved sequentially entering one term representing each of the potential mediating variables into a hierarchical regression equation, then examining whether

adding the variable representing the pretraining characteristic significantly explains an additional proportion of variance in learning goals. Assuming that the complete regression equation explains a moderate amount of variance (i.e. $\underline{R}^2 = .09$), that the final term (pretraining characteristic) explains an additional 5 percent of the variance in goals above that explained by the mediating variables (i.e. $\underline{sr}^2 = .05$), and desiring power of .80 at the alpha = .05 level suggests that at least 145 subjects were needed for this study. However, because of the exploratory nature of this research and the expected difficulty in detecting some of the hypothesized effects, 206 subjects were recruited. Among these 206, 123 were female and 82 were male, and their average age was 19.9 years. Technical problems with the computer system during one of the training sessions reduced the number of subjects for which there was complete data to 195. Data from the remaining 11 subjects were included up to the point where the session was abandoned (after the second data collection phase[1]). All subjects participating in this study were recruited from their classes through sign-up sheets, and received course credit for their participation. An additional pilot sample of 35 subjects was recruited to examine the psychometric properties of the various measures being used before their use in the main study.

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[1] Prior to the computer network's failure, there had been no complications in completing the training as planned. The failure occurred after the second data collection phase was completed and the second training phase was underway. Supervising personnel in the computer laboratory where the training was taking place were unable to correct the problem with the network. Therefore, trainees were informed about the goals of the study, given full credit for participating, and permitted to leave.

Training Task

In order to examine motivational processes in the training setting, training was conducted to teach participants how to use a computer word processing package. In the past, educational settings have shown to be beneficial for studying control theory processes (e.g. Campion & Lord, 1982; Klein, 1987), and computer training has been used to examine self-efficacy in a number of other studies (e.g. Gist, Schwoerer, & Rosen, 1989; Martocchio, 1992; Martocchio & Webster, 1990, 1992). Furthermore, it was assumed that the skill being trained was of varying degrees of perceived usefulness to participants because of differences in: (a) their past experience with computers, (b) their workloads, (c) knowledge of computer availability on the university's campus, and (d) the extent to which they felt that they could master computer use in the first place. Training content was developed based on the tutorial and learning materials provided by the program's publisher, as well as through training materials compiled by the university's computer center staff.

Procedures

Participants in this study reported in groups of four to sixteen ($\bar{x}$ = 12.9) to a room set up for computer training in the university's computer training center. Each subject had access to his or her own computer terminal. At the beginning of the session, trainees were informed of the general purposes of the study and their consent to participate in the study was obtained. A copy of the consent form is presented in Appendix A. Next, initial measures of trainees' experience and knowledge, expectations for the training (attractiveness,

outcome expectancy), perceptions of themselves (self-efficacy and self-focus) and their work environments, and their goals for learning the training material were assessed using a questionnaire. Table 1 lists the measures to be completed, when they were administered, and the sequence of training and measurement periods.

Measure	Pretraining Measures (T1)	Training1 (Basics)	Measures T2	Training2 (Advanced)	Measures T3
Pretraining experience (computer, typing, WP)	X				
Self-Focus	X				
Self-efficacy (Computer, software)	X		X		X
Environmental Favorability	X		X		
Learning Attractiveness	X		X		
Learning Outcome Expectancy	X		X		
Learning/Knowledge	X		X		X
% Learning Goal	X		X		

Table 1. Training and data collection sequence.

After the initial set of measures were collected, elementary word processing procedures were explained and demonstrated by the instructor (the researcher) using WordPerfect 5.1 for MS-DOS, and trainees were given an opportunity to practice. Skills which were discussed during this first training period included the features of the program's writing screen, the functions of various keys on the computer keyboard, creating output from the word

processor, and how to use basic commands to format a document. After trainees practiced using these skills, a test of how much they had learned about using the word processor during this section of the training was administered. Subjects were then given a 15-minute rest period, during which the learning measures were scored, and feedback on these measures was provided at the end of the break.

The second training section began similarly to the first -- the objectives of the second training section were stated and subjects' expectations for this section were assessed by questionnaire. Training content during this section represented more advanced concepts, such as use of the word processor's proofreading capabilities (spell checking, thesaurus); using the merge function to create merged letters and personalized mass mailings; and graphic presentation functions, such as creating graphic lines and importing graphics. After subjects had been provided an opportunity to practice the skills presented in this section, the learning measure was administered a final time. These were scored during a brief break period, and the results were provided to the subjects. Following this, the final attitudinal measures were administered. After these had all been collected, the study's overall goals were described, both orally and written form, and trainees' were given the opportunity to ask any questions they had about the study. A copy of the training materials used is provided in Appendix B. Appendix C contains the description of the study's goals which subjects received.

No experimental manipulations were involved in this study outside of the fact that subjects received educational input. Furthermore, the forms through which subjects' responses were collected (except the consent form) were coordinated by asking them to write the last four numbers of their social security numbers at the top of each questionnaire. This provided each subject's data with a unique identifier without making it possible for the experimenter to identify any individual subject's data.

Pilot Test

Because the analyses required to test the hypotheses in this study were based on multiple regression, the initial quality of the data set was of paramount importance. One way to improve the likelihood that the data collected in study are of the highest possible quality is to pilot the measures with a sample of subjects not involved in the actual study. A pilot of the current study was conducted using 35 subjects recruited from their introductory psychology classes. Subjects were exposed to both the procedures and measures which were intended to be used in the main study to examine the efficacy of each. Examination of the procedures used in the pilot study suggested very minor editorial revisions in the training guide. Means, standard deviations, and reliabilities of the measures administered were examined to: (a) check for variance in the measures, and (b) assess if the scales to be used in the study were of sufficiently high internal consistency reliability to be used in the main study (Cronbach's alpha of at least .70). The results of these

examinations are addressed in relation to their corresponding variables, discussed below.

Variables

Pretraining experience

Subjects' pretraining experience with computers, word processors, typing, and the specific program being taught in this study were assessed through a five-item measure designed to measure these factors, patterned after that used by Martocchio and Webster (1990). The individual questions comprising this scale are presented in Appendix D. Subjects rated these item on a scale from 1 (very low experience) to 5 (very high experience), meaning the possible range of scores on this scale was 5 to 25. Data from the pilot study indicated a mean of 13.29, a standard deviation of 3.66, and a range of scores from 6 to 24. The internal consistency reliability was found to be α = .82. No revisions to this scale were deemed necessary for its use in the main study.

Self-efficacy

Subjects' perceptions of their training-specific ability (self-efficacy) were obtained to examine subjects' beliefs that they had the capability to both perform tasks on the computer in general, and to learn the word processing package in particular. These variables were measured using a five-item scale adapted from Hollenbeck and Brief (1987). This scale was chosen because methods which require subjects to estimate the magnitude of their confidence (e.g. the type of scale used by Gist, 1989; Gist, Schwoerer, & Rosen, 1989; Locke, Frederick, Lee, & Bobko, 1984) may be unreasonably difficult to

complete when there is no prior experience with the task (cf. Martocchio & Webster, 1990; J. Martocchio, personal communication, November, 1990). Although perceptions of task-specific ability for using a computer may be highly correlated with perceptions of ability for learning a particular word processing package, it is possible that subjects with limited computer experience may feel generally confident about their ability to use a computer, but less confident about using a particular software program if they are unfamiliar with it. The extent to which these variables were correlated in the main study determined that it was necessary to statistically control for computer self-efficacy in analyses involving software-related self-efficacy.

Prior studies using this format to measure self-efficacy have yielded internal consistency reliabilities ranging from .88 to .95 (Hollenbeck & Brief, 1987; Martocchio & Webster, 1990). The scales for Software Learning Self-efficacy and Computer Self-efficacy which were used in this study are presented in Appendix E. These scales were administered at three time periods: pretraining, after the first training section, and after the training is completed. Data collected during the pilot study regarding these scales are presented in Table 2. Hypotheses 9, 10, and 13 through 16 involve change scores involving the self-efficacy measures. Therefore, means, standard deviations and ranges of these scores obtained during the pilot study are also presented in Table 2. These data overall reveal a minor amount of restriction in variance on these measures. Furthermore, while the reliability of each scale is

Table 2.

Means, Standard Deviations, and Reliabilities for Pilot Measures of Self-Efficacy[1].

Variable	Mean	Std. Dev.	Range	α
Computer Efficacy T1	14.31	3.42	8 - 23	.81
Computer Efficacy T2	14.37	2.59	9 - 22	.63
Computer Efficacy T3	15.49	2.88	9 - 23	.71
Software Efficacy T1	15.91	2.39	12 - 23	.73
Software Efficacy T2	16.69	2.14	12 - 21	.49
Software Efficacy T3	16.91	2.16	11 - 21	.60
Change in Computer Efficacy T2 - T1	0.06	2.77	-10 - 6	.28
Change in Computer Efficacy T3 - T2	0.77	2.35	-6 - 7	.57
Change in Computer Efficacy T3 - T1	1.17	2.84	-6 - 8	.40
Change in Software Efficacy T2 - T1	1.11	1.78	-3 - 5	.26
Change in Software Efficacy T3-T2	0.23	1.83	-4 - 4	.26
Change in Software Efficacy T3 - T1	1.00	2.30	-4 - 4	.34

[1] N = 35.

sufficient for the first administration, the decrease and subsequent increase in the reliabilities of the scales during the second and third administrations indicates some instability in their reliability. However, no changes in the scales' construction was deem necessary to increase their internal reliability prior to use in the main study.

An additional concern in the use of these scales, however, is highlighted by the low reliabilities for the changes in Software Efficacy and Computer Efficacy across time periods. There are two problems common to working with change scores. First, the reliability of change scores may be low despite high reliability in the initial and final scores used to calculate them (Cohen & Cohen, 1983). As a result, correlations involving change scores may be attenuated, sometimes making it difficult to detect statistical significance. This situation is further compounded when changes in one variable are correlated with changes in another variable. However, Rogosa, Brandt, and Zimowski (1982) point out that difference scores will have low reliability regardless of the precision with which the variables are measured because reliability decreases as measurement error increases.

A more important problem with change scores, according to Cohen and Cohen (1983), is that difference scores contain not only variance due to actual changes, but variance due to the value of the initial measure as well. To resolve this problem, they suggest using regressed change scores, that is partialling variance from the initial measure from the final measure. Rogosa, et al. (1982), however, pointed out that this method yields biased estimators of

change because all variance shared between the initial and final measure is partialled from the latter, while raw change scores are unbiased estimates regardless of the magnitude of measurement error. Considering this, regressed change scores were not employed in this study. Instead, because they represent unbiased estimates of change, the raw change scores among the efficacy scales were used despite their low reliability.

Self-focus

A 17-item measure of self-focus, called the Self-Consciousness Scale, was developed by Fenigstein, Scheier, and Buss (1975) to detect dispositional differences in the degree to which individuals focus their attention on themselves, rather than on the environment. Total self-focus is typically broken down into public self-consciousness, private self-consciousness, and social anxiety (Carver & Scheier, 1981a). Of these, private self-consciousness, or the tendency to attend to one's inner thoughts and feelings, most appropriately measures self-focus as described in the model. The ten items which constitute this scale are the first ten listed in Appendix F. Hollenbeck (1989) obtained an internal consistency reliability of .72 using this scale with a sample of retail salespeople. However, the factor structure of the Self-Consciousness Scale has not always been maintained. Therefore, Hollenbeck and Williams (1987) administered the entire 17-item measure, and observed an internal consistency reliability of .78. Table 3 presents the results from the pilot study relevant to Self-Focus. Furthermore, Private Self-Focus and Public Self Focus were correlated $r = .46$, $p \leq .01$. These data indicate that sufficient variance and

Table 3.

Means, Standard Deviations, and Reliabilities for Pilot Measures of Self-Focus[1].

Variable	Mean	Std. Dev.	Range	α
Total Self-Consciousness	61.39	7.51	49 - 77	.82
Private Self-Focus	34.49	4.82	26 - 48	.76
Public Self-Focus	26.83	3.95	19 - 35	.79

[1] N=35

reliability existed to justify using only the Private Self-Consciousness scale. However, because of the unstable history of this measure, the entire Self-Consciousness scale was administered in case these results changed in the main study.

Learning

Learning was measured by assessing subjects' answers to 22 fill-in-the-blank questions testing the training course content. These items asked subjects to describe such procedures as how to underline a word, retrieve a file, and check spelling. This test was administered before and after training, as well as after the first instructional session. Subjects' responses were scored as correct or incorrect by the researcher, and these scores were fed back to them after each test in order to provide ongoing feedback concerning: (a) the proportion of the training content they had mastered for the relevant training section, and (b) the proportion of the training content they had mastered overall. Since the primary purpose of this measure was to provide personal progress feedback to subjects, the introduction of instrumentation biases related to multiple administrations of the same measure were not deemed to be a problem. Means, standard deviations, and ranges on the learning measure for each administration are listed in Table 4. The learning measure is contained in Appendix G.

Learning Attractiveness, Outcome Expectancy, and Motivational Force

As described earlier, motivational force represents the product of learning attractiveness and outcome expectancy. Because motivational force follows

Table 4.

Means, Standard Deviations, and Ranges for Pilot Learning (Knowledge) Measures in Percentages[1].

Variable	Mean	Std. Dev.	Range	α
Pretraining Knowledge Overall Content	38.05	15.04	18.18 - 77.27	.77
Pretraining Knowledge Section 1 Content	49.59	17.23	21.43 - 85.71	.76
Learning T2 Overall Content	60.39	11.75	36.36 - 86.36	.65
Learning T2 Section 1 Content	79.59	13.88	42.86 - 100.00	.55
Learning T3 Overall Content	77.14	13.02	40.91 - 100.00	.72
Learning T3 Section 2 Content	63.57	15.27	37.50 - 100.00	.51

[1] N = 35

directly from Klein's (1989) model of work motivation, the methods which were used to measure learning attractiveness and outcome expectancy mirror those Klein (1987) used to measure these variables. In particular, learning attractiveness was measured by asking subjects to rate how important or attractive it is for them to learn 0 - 100% of the training course content, divided into 10% increments, on a Likert-type scale from -3 (Extremely Unattractive) to +3 (Extremely Attractive). This is consistent with Vroom's (1964) conception of valence, which he felt should range from negative to positive, and provides information about subjects' attractiveness assessments at multiple levels of learning.

Outcome expectancy was measured using a similar procedure. Again following Klein (1987), subjects were asked to rate the chances in 100 that they would learn 0-100% of the course content, divided into 10% increments. To determine the Motivational Force score for each learning goal level, the outcome expectancy rating at each level was multiplied by its corresponding attractiveness rating. The outcome level with the highest computed motivational force score was taken as the level of motivational force for that individual at that time period. Examples of the measures described here are in Appendix H. The results of the pilot test regarding Motivational Force, as well as changes in Motivational Force to be used in testing Hypotheses 11 through 16, are presented in Table 5. These data indicate that adequate variance in Motivational Force existed in the pilot study, while there was somewhat less variance evident in the scores representing changes in Motivational Force.

Table 5.

Means, Standard Deviations and Ranges for Pilot Motivational Force Variables[1].

Variable	Mean	Std. Dev.	Range
Motivational Force Pretraining Overall	57.94	33.26	5 - 95
Motivational Force Pretraining Section 1	62.65	30.95	5 - 95
Motivational Force T2 Overall	52.58	33.64	5 - 95
Motivational Force T2 for Section 2	56.52	32.99	5 - 95
Change in Motivational Force T2 - T1 Overall	-4.85	22.79	-80 - 50
Change in Motivational Force T2 - T1 Sectional	-5.15	16.61	-60 - 10

[1] N = 35

Learning Goals and Learning-Goal Discrepancies

Trainees' self-set goals for the proportion of training content they expected to learn were assessed by asking them to report both the percentage of the concepts covered in the upcoming section and in the overall training program that they expected they would know at the program's conclusion. The item measuring the level of subjects' responses is presented in Appendix I.

While the actual level of subjects' self-set goals was itself important in this study, it was also necessary to have this information so that discrepancies between learning performance, or the percentage of the training content subjects had mastered, and learning goal levels could be assessed. Retaining the magnitude and sign of calculated discrepancies made it possible to assess these discrepancies' relationships with subsequent elements in the dynamic training motivation model (e.g subsequent effects on self-efficacy). Data collected during the pilot study regarding subjects' learning goals, learning-goal discrepancies, and changes in learning goals from pretraining to mid-training are summarized in Table 6. These data suggested slight to moderate restriction in variance on each variable at each time period.

Environmental Favorability

Subjects perceptions of their environments' favorability for learning and using the trained word processing skills were assessed using twelve statements about trainees' workload, the supportiveness of their peers and superiors towards learning both new skills generally and word processing in particular, and the extent to which there were rewards for them to learn these new skills.

Table 6.

Means, Standard Deviations, and Ranges for Pilot Goals and Learning-Goal Discrepancies[1].

Variable	Mean	Std. Dev.	Range
Pretraining Goal: Overall	79.80	15.42	30 - 100
Pretraining Goal: Section 1	84.51	16.00	25 - 100
Goal T2: Overall	77.66	15.79	45 - 100
Goal T2: Section 2	75.51	18.93	40 - 100
Change in Overall Goal: T2 - T1	-2.14	11.00	-35 - 30
Knowledge T2 - Goal T1: Overall	-19.41	16.74	-50.00 - 38.18
Knowledge T2 - Goal T1: Section 1	-2.47	18.03	-40.00 - 50.00
Knowledge T3 - Goal T2: Overall	-0.51	18.17	-40.10 - 40.91
Knowledge T3 - Goal T2: Section 2	-15.87	26.94	-75.00 - 40.00
Knowledge T3 - Goal T1: Overall	-2.66	17.27	-45.46 - 42.73

[1] N = 35

Subjects rated each statement on a 5-point Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This measure was completed during the first two measurement periods to detect any possible changes in trainees' perceptions as they became more familiar and more skillful with the material being presented. Means, standard deviations, ranges, and reliabilities for this scale, presented in Table 7, indicate a slight restriction in variance and adequate internal consistency reliability. This measure is provided in Appendix J.

Other Measures

Two demographic questions asking for subjects' gender and age were included to describe the sample more accurately and to check for any relationships these factors might have with the study's primary variables. Previous research has indicated that trainees' age is related to learning in computer training (Gist, Rosen, & Schwoerer, 1988), and gender is related to computer anxiety (Wilder, Mackie, & Cooper (1985).

Table 7.

Means, Standard Deviations, Ranges, and Reliabilities for Pilot Environmental Favorability Measures[1].

Variable	Mean	Std. Dev.	Range	α
Pretraining Favorability	47.60	7.09	30 - 59	.91
T2 Favorability	47.03	7.00	27 - 59	.90
Change in Favorability T2 - T1	-0.57	2.94	-9 - 6	.09

[1] N = 35

RESULTS

Descriptive Statistics and Scale Properties

Means, standard deviations, and zero-order correlations among the primary research variables in this study are presented Appendix K. As indicated in the table, statistically significant relationships were detected between the control variables Age, Gender, and the computer efficacy measures, and many of the primary constructs of interest in this study. Therefore, where their influence might unduly affect the interpretation of this study's results, these variables' effects were statistically controlled in the substantive analyses. Intercorrelations among the primary research variables with these control variables partialled will be reported as the results of each phase of the model are presented.

Means, standard deviations, ranges, and reliabilities for the Experience and Self-Focus (Total Self-Consciousness) scales, as well as for the multiple administrations of the self-efficacy (Computer Efficacy and Software Efficacy) and Environmental Favorability scales and their change scores are presented in Table 8, along with their means and standard deviations. Reliabilities for the scale scores were calculated using Cronbach's (1951) coefficient alpha index of internal consistency. Reliabilities for the change scores were calculated using

Table 8.

Means, Standard Deviations, Ranges, and Scale Reliabilities.

Variable	Mean	Std. Dev.	Range	α
Pretraining Experience	13.28	3.81	5 - 23	.82
Self-Focus	59.93	6.80	44 - 82	.72
Computer Efficacy T1	14.29	2.97	7 - 23	.70
Computer Efficacy T2	14.59	2.77	7 - 22	.66
Computer Efficacy T3	15.12	2.61	8 - 22	.61
Software Efficacy T1	15.96	2.36	9 - 24	.58
Software Efficacy T2	16.18	2.34	10 - 24	.62
Software Efficacy T3	16.61	2.49	10 - 25	.60
Environmental Favorability T1	45.03	5.28	27 - 59	.76
Environmental Favorability T2	44.22	5.71	30 - 60	.82
Change in Computer Efficacy T2 - T1	0.30	2.34	-8 - 9	.03
Change in Computer Efficacy T3 - T2	0.83	1.68	-4 - 7	-.83
Change in Computer Efficacy T3 - T1	1.12	2.48	-5 - 10	.14
Change in Software Efficacy T2 - T1	0.23	2.14	-5 - 6	.05
Change in Software Efficacy T3 - T2	0.44	1.70	-5 - 9	-.63
Change in Software Efficacy T3 - T1	0.65	2.44	-7 - 7	.20
Change in Environmental Favorability T2 - T1	-0.80	3.32	-12 - 8	-.17

the formula provided by Cohen and Cohen (1983; p. 69). As was present in the pilot test, each of the scales demonstrated some restriction in variance, as evident upon examination of the standard deviations. Furthermore, the reliabilities for the Computer Efficacy and Software Efficacy scales were once again unstable from one measurement to the next. These scales exhibited notably lower internal consistency indices in the main study than they did in the pilot study, to the point that their reliabilities are less than typically recommended for research purposes ($\alpha \geq .70$; Nunnally, 1978). Unfortunately, since an examination of the item-total correlations within these scales did not suggest appropriate improvements in their structure (i.e. deleting items with poor item-total correlations and questionable content similarity to increase reliability), the original versions of these scales were used in the substantive analyses. The Experience, Self-Focus, and Environmental Favorability scales, on the other hand, exhibited acceptable reliabilities, although those for Self-Focus and Environmental Favorability were somewhat lower than observed in the pilot study. Finally, the change scores exhibited the expected low (and in some cases negative) reliabilities common for these types of scores, confirming their unreliability.

Phase I

The focus of the analyses relevant to Phase I of this study concentrate on describing some of the factors involved in determining trainees' pre-training motivation. In particular, Phase I addresses the relationships among trainees' pre-training knowledge and experience, self-efficacy, motivation, learning goals,

and perceptions of their environments' favorability for using the training content. The following analyses were conducted to verify the existence of the hypothesized relationships among these constructs.

Control Variables

An examination of the zero-order correlations among the primary variables of interest in Phase I of this study (pretraining Knowledge and Experience, Software Efficacy, Environmental Favorability, Motivational Force, and Learning Goal) indicates the existence of several significant relationships. First, Age was significantly and negatively correlated with Pretraining Experience ($r = -.17$, $p \leq .05$), revealing that older subjects tended to have less experience with computers and word processing than did younger subjects. This is consistent with other studies that have measured these variables (e.g. Gist, Rosen, & Schwoerer, 1988; Martocchio & Webster, 1992). Second, subjects' gender ("Gender") was related to Environmental Favorability ($r = -.15$, $p \leq .05$) such that females perceived their environments to be more favorable for using the training material than did males. Finally, Computer Efficacy was positively and significantly correlated to several variables, including Experience, Learning Goal: Overall, and Pretraining Knowledge. The positive relationships between Computer Efficacy and Experience ($r = .62$, $p \leq .001$), as well as Pretraining Knowledge ($p = .26$, $p \leq .001$), indicated that subjects who had more experience with computer-oriented tasks and/or knew more about the training material before training had begun felt they were more likely to master learning how to use a computer. Similarly, the significant correlation between

Computer Efficacy and Learning Goal: Overall (r = .14, $p \leq .05$) suggested that trainees who felt more positively about the likelihood they could master using a computer also set higher goals for themselves regarding learning the training content. However, because the training in this research focussed on learning a particular software package rather than on increasing computer skills in general, Computer Efficacy's significant correlation with Software Efficacy (r = .50, $p \leq$ .001) necessitated controlling for its effects statistically in testing the Phase I hypotheses. The intercorrelations among the primary research variables with the control variables Age, Gender, and Computer Efficacy partialled are presented in Table 9.

Omnibus tests

To protect against large experimentwise Type I error, two omnibus tests were conducted. Using Learning Goal: Overall and Learning Goal: Section 1 as the dependent variables, the variables of primary interest in Phase I (Pretraining Knowledge, Experience Software Efficacy, Environmental Favorability, Motivational Force) were entered in the second step of two regression equations after the control variables (Age, Gender, Computer Efficacy). Results of these equations revealed that the primary research variables explained a significant proportion of variance in Overall and Section 1 learning goals above that explained by the control variables: R^2_{change} = .17, $p \leq$ .001, and R^2_{change} = .16, $p \leq .001$, respectively. With these significant omnibus tests, the threat of large experimentwise Type I error was diminished, and it

Table 9.

Correlations among Phase I Primary Research Factors with Age, Gender, and Computer Efficacy Partialled.

Variable	1	2	3	4	5	6	7	8	9
1. Experience									
2. Knowledge: Overall	.44								
3. Knowledge: Section 1	.44	.95							
4. Software Efficacy	.36	.17	.12						
5. Environmental Favorability	.19	-.02	-.03	.24					
6. Motivational Force: Overall	.07	.09	.08	.11	.25				
7. Motivational Force: Sect. 1	-.02	.10	.12	.04	.19	.87			
8. Learning Goal: Overall	.25	.14	.14	.21	.19	.33	.28		
9. Learning Goal: Sect. 1	.20	.15	.15	.14	.22	.33	.31	.72	

$.14 \leq |r| < .19$, $p \leq .05$; two-tailed
$.19 \leq |r| < .24$, $p < .01$; two-tailed
$|r| \leq .24$, $p \leq .001$; two-tailed

was then appropriate to conduct the pairwise comparisons necessary to test the hypotheses relevant to Phase I (Cohen & Cohen, 1983).

Substantive Analyses

Hypotheses 1a and 1b

Hypotheses 1a and 1b addressed the relationship between subjects' pretraining characteristics and their pretraining self-efficacy. Specifically, Hypothesis 1a stated that trainees' pretraining experience should be positively related to their perceptions of learning-related self-efficacy, while Hypothesis 1b predicted a positive relationship between pretraining knowledge and self-efficacy. These hypotheses were tested by partialling the effects of the control variables Age, Gender, and Computer Efficacy from the relationships between Pretraining Knowledge and Experience with Software Efficacy. As shown in Table 9, these partial correlations were statistically significant. The partial correlation between Experience and Software Efficacy was $r = .36$, $p \leq .001$. The correlation between Pretraining Knowledge and Software Efficacy was $r = .17$, $p \leq .01$, and between Pretraining Knowledge: Section 1 and Software Efficacy was $r = 12$, $p \leq .05$. Therefore, Hypotheses 1a and 1b were both supported.

Hypothesis Two

Hypothesis Two asserted that trainees' perceptions of learning-related self-efficacy would be positively related to their motivational force for learning the training material. This hypothesis was tested in two ways. First, the partial correlation between Software Efficacy and Motivational Force for learning the

training content overall was examined. This correlation was statistically significant, $r = .11$, $p \leq .05$, supporting Hypothesis Two. Second, to investigate if perhaps there were differences in the relationship between Software Efficacy and Motivational Force for the overall course content and between these two constructs related to just the first section of the training ("basic procedures"), the partial correlation between Software Efficacy and Motivational Force: Section 1 was inspected. This partial correlation indicated no statistically significant relationship between the two constructs, $r = .04$ n.s. Therefore, Hypothesis Two was only partially supported.

Hypothesis Three

Hypothesis Three addressed the relationship between Motivational Force and trainees' self-set goals for learning the training material. Consistent with previous research (e.g. Klein, 1987), the partial correlations presented in Table 9 indicate that Motivational Force was significantly correlated with Learning Goals both for learning the overall course content ($r = .33$, $p \leq .001$), and for learning the content of the first training section ($r = .31$, $p \leq .001$). These analyses demonstrate that Hypothesis Three was supported by the data.

Hypothesis Four

Hypotheses One through Three tested the bivariate relationships among trainees' Pretraining Characteristics and Software Efficacy, between their Software Efficacy and Motivational Force, and between their Motivational Force and their Learning Goals. Hypothesis Four examined the relationship between three of these constructs: Software Efficacy, Motivational Force, and Learning

Goals. Specifically, Hypothesis Four predicted that the relationship between trainees' pretraining perceptions of learning-related self-efficacy and the level of their self-set learning goals would be mediated by the level of their motivational force for learning the training content. Complete mediation suggests that the relationship between an antecedent or "exogenous" variable (Software Efficacy) and a subsequent "endogenous" variable (Learning Goal) is completely transmitted or conveyed through a third, "mediating" variable (Motivational Force) which intervenes between them. Assessing if such relationships exist is a two-step process (cf. James & Brett, 1984). First, significant relationships between each of these variables and the hypothesized mediator provide channels through which this relationship might be transmitted. If each of the relationships between these three factors is statistically significant, then the second step of the analysis is to partial variance associated with the mediating variable from the relationship between the exogenous and endogenous variables. This is typically accomplished using multiple regression, In the first step of a hierarchical regression, the endogenous variable is regressed on the mediation variable. Then, on the second step, the exogenous variable is added to the regression equation, and the statistical significance of the change in total variance explained between the two equations ($\underline{R}^2_{change}$) is assessed. Complete mediation exists if adding the exogenous variable does not significantly add to the amount of variance explained.

Hypotheses Two and Three confirmed the existence of statistically significant relationships between Software Efficacy and Motivational Force -

Overall, and between Motivational Force and Learning Goals, respectively. Furthermore, the partial correlations presented in Table 9 confirm the existence of a significant relationship between Software Efficacy and Learning Goal: Overall ($r = .21$, $p \leq .01$). Because these prerequisite relationships existed, a hierarchical regression analysis was conducted to examine if Motivational Force completely mediated the relationship between Software Efficacy and Learning Goals related to the overall course content. (The prerequisite significant correlation between Software Efficacy and Motivational Force: Section 1 was not significant (as discovered when testing Hypothesis Two), therefore a test for mediation related to Section 1 content was not performed.) First, the covariates for Phase I (Age, Gender, Computer Efficacy) were entered into the regression equation, which explained a significant amount of variance in Learning Goal: Overall ($R^2 = .04$, $F\ (3,200) = 2.80$, $p \leq .05$). Next, Motivational Force: Overall was added to the equation, producing another significant change in variance explained, $R^2_{change} = .10$, $F_{change}(1,199) = 24.24$, $p \leq .001$. Finally, Software Efficacy was added to the equation, which also produced a significant change in explained variance, $R^2_{change} = .03$, $F_{change}(1,198) = 6.66$, $p \leq .01$. This indicated that a significant relationship existed between Software Efficacy and Learning Goal even with Motivational Force partialled. Therefore, because Motivational Force only partially mediated the relationship between Software Efficacy and Learning Goal: Overall, Hypothesis Four was not supported.

Hypotheses 5a and 5b

Hypotheses 5a and 5b stated that the relationships between trainees' pretraining characteristics (Experience and Knowledge) and the level their initial self-set goals for learning the training material would be mediated by their perceptions of learning-related self-efficacy and their motivational force for learning the training content. One prerequisite for testing these hypotheses, however, is that Motivational Force mediate the relationship between Software Efficacy and Learning Goals. This was not the case, as shown by the lack of support for Hypothesis Four.

Furthermore, in order for Motivational Force to mediate the relationship between either Experience or Knowledge and Learning Goals, relationships must exist (i.e. statistically significant correlations) between Motivational Force and each of the other variables. These relationships were also not found to exist. As demonstrated in Table 9, neither Experience nor Pretraining Knowledge was found to be significantly correlated with Motivational Force. The correlation between Experience and Motivational Force: Overall was r = .07, n.s., and between Experience and Motivational Force: Section 1 was r = -.02, n.s. Likewise, the correlation between Knowledge: Overall and Motivational Force: Overall was r = .09, n.s.; and between Knowledge: Section 1 and Motivational Force: Section 1 was r = .12, n.s. Because the lack of these relationships indicated that Motivational Force could not transmit or convey shared variance between Learning Goals on the one hand, and either

Pretraining Knowledge or Experience on the other, Hypotheses 5a and 5b were not supported.

Hypotheses Six

Hypothesis Six addressed the relationship between trainees' perceptions of their environment's favorability for using the training content and their motivation for learning that content. Once again, because of possible difference between subjects' motivation for the overall training content and for learning just the content of the first training section, Environmental Favorability's relationships with both Motivational Force: Overall and Motivational Force: Section 1 were examined. The partial correlations given in Table 9 indicate that both of these correlations were statistically significant: $r = .25$, $p \leq .001$ between Environmental Favorability and Motivational Force: Overall; and $r = .19$, $p \leq .01$ between Environmental Favorability and Motivational Force: Section 1. Therefore, Hypothesis Six was supported.

Hypothesis Seven

Hypothesis Seven, similar to Hypothesis Four, involved testing a mediation relationship. Specifically, this hypothesis sought to establish that the relationship between trainees' perceptions of environmental favorability for using the training content and their self-set goals for learning that content is mediated by their motivation to learn it. As demonstrated in testing Hypothesis Three, Motivational Force is significantly related to Learning Goals, and Hypothesis Six confirmed that Environmental Favorability is significantly related to Motivational Force. The partial correlations presented in Table 9 demonstrate that

Environmental Favorability is also related to Learning Goals; the partial correlation between Environmental Favorability and Learning Goal: Overall was $r = .19$, $p \leq .01$; and between Environmental Favorability and Learning Goal: Section 1 was $r = .22$, $p \leq .01$. Therefore, because the correlations among all of the relevant constructs within each set (Overall and Section 1) were statistically significant, the hypothesis was tested using hierarchical regression. The results from these regressions are presented in Table 10.

In the first step of each hierarchical regression, Learning Goal was regressed on the control variables Age, Gender, and Computer Efficacy. Next, looking at just the equation for the set of Overall variables, Motivational Force: Overall was entered, resulting in a significant change in variance explained, $R^2_{change} = .10$, $p \leq .001$. Finally, Environmental Favorability was entered into the equation, but this did not result in an increase in explained variance for Learning Goal, $R^2_{change} = .01$, n.s. Therefore, in regards to overall motivation and goals, Motivational Force was found to completely mediate the relationship between Environmental Favorability and Learning Goals.

Before concluding definitively that Motivational Force mediates the Environmental Favorability - Learning Goal relationship, it was deemed prudent to investigate if perhaps the failure to detect a significant increase in explained variance in the last step of the hierarchical regression (when Environmental Favorability was entered) was due to Motivational Force explaining all of the variance in Learning Goal shared between it and Environmental Favorability. To test this, another hierarchical regression was performed, this time with

Table 10.

Hierarchical Regressions among Environmental Favorability, Motivational Force, and Learning Goals.

	Overall		Section 1	
Variable	ΔR^2	p	ΔR^2	p
1. Control Variables	.04	$\leq$ .05	.02	n.s.
2. Motivational Force	.10	$\leq$ .001	.09	$\leq$ .001
3. Environmental Favorability	.01	n.s	.03	$\leq$ .05

Environmental Favorability entered before Motivational Force. If shared variance were a problem in the first equation, then Motivational Force should not explain additional variance in Learning Goal in the second equation after Environmental Favorability was entered. Results of this analysis reveal, however, that adding Motivational Force to this second equation did explain additional variance in Learning Goal, $\underline{R^2}_{change} = .08$, $\underline{p} \leq .001$. Therefore, with regards to overall learning goals and motivational force, Hypothesis 7 was supported.

Results of the analyses pertaining to Motivational Force and Learning Goal for Section 1, however, were not as supportive. Although entering Motivational Force in the second step of the Section 1 analysis yielded a significant increase in explained variance ($\underline{R^2}_{change} = .09$, $\underline{p} \leq .001$), the addition of Environmental Favorability to the equation also increased explained variance ($\underline{R^2}_{change} = .03$, $\underline{p} \leq .05$). This indicated that Motivational Force did not completely mediate the relationship between Environmental Favorability and Learning Goal: Section 1. Taken with the results of the Overall hierarchical regression, however, Hypothesis Seven is at least partially supported.

Hypothesis Eight

Hypothesis Eight sought to test the relationships among self-efficacy, environmental favorability, motivation, and self-set goals. In particular, Hypothesis Eight stated that the extent to which Motivational Force mediated the relationship between trainees' Software Efficacy and Learning Goals is dependent on trainees' perceptions of their environments' favorability for using

the training content. To test this hypothesis, trainees' scores on the Environmental Favorability scale were examined, and those with scores equal to or above the median on this scale were identified as having "favorable" perceptions of their environments, while those below the median were identified as having "unfavorable" perceptions of their environments.

Table 11 presents the intercorrelations among Software Efficacy, Motivational Force, and Learning Goal for each of the Environmental Favorability groups. As with Hypotheses 4 and 7, the first step in testing for a mediation relationship is to insure that significant bivariate correlations exist among all of the pertinent variables. The correlations presented in Table 11, however, indicate that this was not the case within either the "favorable" or "unfavorable" Environmental Favorability groups. Within the "unfavorable" group, Software Efficacy was not significantly correlated with Motivational Force or Learning Goal at either the Overall or Section 1 levels. Within the "favorable" group, Software Efficacy was significantly correlated with Learning Goal: Section 1, but not with Motivational Force: Section 1, nor with either "Overall" variable. Therefore, because the prerequisite bivariate correlations among Software Efficacy, Motivational Force, and Learning Goals were not statistically significant, the proposed mediation relationship could not exist, and Hypothesis 8 was not supported.

Phase II

Phase II addressed the effects of discrepancies between self-set goals and actual performance on learning tests. Specifically, the impact of goal-

Table 11.

Partial Correlations Among Software Efficacy, Motivational Force and Learning Goals for "Favorable" and "Unfavorable" Environmental Favorability Groups[a].

	1	2	3	4	5
"Unfavorable" Environment Group[b]					
1. Software Efficacy					
2. Motivational Force: Overall	.03				
3. Motivational Force: Section 1	.00	.87***			
4. Learning Goal: Overall	.20	.31**	.30**		
5. Learning Goal: Section 1	.02	.34**	.32**	.78***	
"Favorable" Environment Group[c]					
1. Software Efficacy					
2. Motivational Force: Overall	.08				
3. Motivational Force: Section 1	-.01	.84***			
4. Learning Goal: Overall	.19	.33***	.24*		
5. Learning Goal: Section 1	.23*	.35***	.31***	.64***	

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; two-tailed

[a] Age, Gender, and Computer Efficacy partialled.
[b] N = 90.
[c] N = 115.

performance discrepancies on trainees' subsequent self-efficacy was the focus of this phase. Because of this study's design, it was possible to examine the hypothesized changes in self-efficacy across three time periods: between pretraining measurement and the mid-training measurement, between the mid-training measurement and the post-training measurement, and between the pretraining and post-training measurements.

Control Variables

As in Phase I, an examination of the zero-order correlations among the control variables and the primary variables in Phase II indicated several significant correlations. First, changes in trainees' Computer Efficacy was moderately and positively correlated with changes in Software Efficacy across all three time periods: $r = .36$, $p \leq .001$ between Time 1 and Time 2; $r = .43$, $p \leq .001$ between Time 2 and Time 3; and $r = .40$, $p \leq .001$ between Time 1 and Time 3. The consistency of these results seem to reflect that changes in these two constructs tend to occur in unison. In addition, the two demographic variables were also significantly correlated to Phase II variables. Age was negatively correlated with discrepancies between Overall Knowledge: Time 3 and Overall Goal: Time 2, indicating that younger trainees tended to learn more of the overall course content than their Time 2 goals would have predicted, while older trainees tended not to achieve the goal levels they had set for themselves. Gender, on the other hand, was negatively correlated with Change in Software Efficacy: T2 - T1, indicating that females (coded "1") were more likely to demonstrate larger positive or smaller negative changes in their

Software Efficacy after the first training session, while males (coded "2") were more likely to exhibit smaller positive or larger negative changes in Software Efficacy. Given the results of the these analyses, the following strategy was used for partialling control variables from the substantive analyses: (a) changes in Computer Efficacy were partialled at all three time periods for both Overall and sectional analyses; (b) Gender was partialled when examining changes between Time 1 and Time 2; and (c) Age was partialled for analyses between Time 2 and Time 3. Partial correlations among the primary constructs of interest during Phase II are presented in Table 12, grouped according to their appropriate time period.

Substantive Analyses

Hypothesis Nine

Hypothesis Nine addressed the relationship between performance-goal discrepancies and their effects on subsequent self-efficacy. Specifically, Hypothesis Nine predicted that discrepancies between trainees' self-set learning goals and their actual performance would be positively related to subsequent changes in their learning-related self-efficacy. This hypothesis was tested by looking at the partial correlations between Knowledge - Goal discrepancies across the three time periods and their corresponding changes in Software Efficacy. Using one-tailed tests (appropriate because a directional relationship was hypothesized), none of the five possible partial correlations was significant at the $p \leq .05$ level. However, closer examination of the data reveals that two

Table 12.

Partial Correlations Among Phase II Variables, Grouped According to Time Period.

	1	2	3	4
Changes between Time 1 and Time 2[a]				
1. Knowledge T2 - Goal T1: Overall				
2. Knowledge T2 - Goal T1: Section 1	.73***			
3. Self-Focus[d]	-.15*	-.20**		
4. Change in Software Efficacy	.10	.08	.01	
Changes between Time 2 and Time 3[b]				
1. Knowledge T3 - Goal T2: Overall				
2. Knowledge T3 - Goal T2: Section 2	.77***			
3. Self-Focus	-.12	.02		
4. Change in Software Efficacy	-.02	.03	.05	
Changes between Time 1 and Time 3[c]				
1. Knowledge T3 - Goal T1: Overall				
2. Self-Focus	-.12			
3. Change in Software Efficacy	.10	.04		

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; two-tailed

[a] Gender and Change in Computer Efficacy partialled.
[b] Age and Change in Computer Efficacy partialled.
[c] Change in Computer Efficacy partialled.
[d] Self-Focus was only measured at Time 1, but was involved in analyses across all three time periods.

partial correlations were marginally significant: between the Knowledge Time 2 - Goal Time 1: Overall discrepancy and Change in Software Efficacy between Time 1 and Time 2 (r = .10, p = .09); and between the Knowledge Time 3 - Goal Time 1: Overall discrepancy and Change in Software Efficacy between Time 1 and Time 3 (r = .10, p = .09). Therefore, although Hypothesis 9 was not supported in the strictest sense, there does appear to be some evidence of the predicted relationship.

Hypothesis Ten

Hypothesis Ten sought to describe the relationship between goal-performance discrepancies and changes in self-efficacy more precisely than Hypothesis 9. In particular, Hypothesis 10 sought to establish that the relationship between Knowledge-Goal discrepancies and changes in subsequent Software Efficacy was moderated by trainees' level of Self-Focus. It was predicted that the form of this relationship would be such that Knowledge-Goal discrepancies would be more positively related to changes in subsequent Software Efficacy for trainees high in Self-Focus than for trainees low in Self-Focus, who would demonstrate little or no change in self-efficacy related to goal-performance discrepancies. Detecting this relationship involved using moderated multiple regression to examine the interaction effects of Knowledge-Goal discrepancies and Self-Focus on changes in subjects' Software Efficacy (Stone & Hollenbeck, 1984). This procedure included three steps. First, the relevant control variables for each equation were entered in the first hierarchical step of a regression in which Change in Software Efficacy

served as the dependent variable. In the second step, Self-Focus and the relevant Knowledge-Goal discrepancy were entered. Finally, in the third step of the regression, a variable representing the interaction between discrepancies and Self-Focus was entered (computed by multiplying Self-Focus by the relevant discrepancy), and the statistical significance of the change in total variance explained between the final two steps was examined. A significant change in variance explained would suggest that an interaction existed, supporting the hypothesized moderation.

The results of the hierarchical regressions necessary to test Hypothesis 10 with the data from this study are presented in Table 13. While the interaction between discrepancies and Self-Focus were only marginally significant in explaining additional variance in Change in Software Efficacy T2 - T3: Overall and T1-T3 ($\underline{R}^2_{change}$ = .01, $\underline{p}$ =.07; and $\underline{R}^2_{change}$ = .02, $\underline{p}$ = .07, respectively), the interaction between Self-Focus and Knowledge T3 - Goal T2: Section discrepancy did explain a statistically significant amount of additional variance in Change in Software Efficacy T3 - T2. This indicates that some support does exist for Hypothesis 10. This interaction, however, did not exhibit the expected effect. As depicted in Figure 12, the interaction between Self-Focus and the Knowledge Time 3 - Goal Time 2: Section 2 discrepancy indicates that Knowledge-Goal discrepancies and changes in Software Efficacy are more positively related for trainees lower in Self-Focus than for high Self-Focus trainees. This was the opposite effect as that which was hypothesized. Overall, however, there does appear to be evidence of an interaction between

Table 13.

Hierarchical Regressions Testing Interaction of Knowledge-Goal Discrepancies and Self-Focus on Change in Software Efficacy.

	Overall		Section	
	R^2	ΔR^2	R^2	ΔR^2
Changes in Software Efficacy: T1 - T2[a]				
1. Control Variables	.14***	.14***	.14***	.14***
2. Discrepancy, Self-Focus	.15***	.01	.15***	.00
3. Discrepancy X Self-Focus	.16***	.00	.15***	.00
Changes in Software Efficacy: T2 - T3[b]				
1. Control Variables	.19***	.19***	.19***	.19***
2. Discrepancy, Self-Focus	.19***	.00	.19***	.00
3. Discrepancy X Self-Focus	.21***	.01	.22***	.02*
Changes in Software Efficacy: T1 - T3[c]				
1. Control Variables	.16***	.16***		
2. Discrepancy, Self-Focus	.17***	.01		
3. Discrepancy X Self-Focus	.19***	.02		

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$

[a] Gender and Change in Computer Efficacy partialled.
[b] Age and Change in Computer Efficacy partialled.
[c] Change in Computer Efficacy partialled.

Performance-Goal discrepancies and Self-Focus in predicting subsequent changes in Software Efficacy, as proposed in Hypothesis 10. The nature of this interaction, however, did not match that which was predicted.

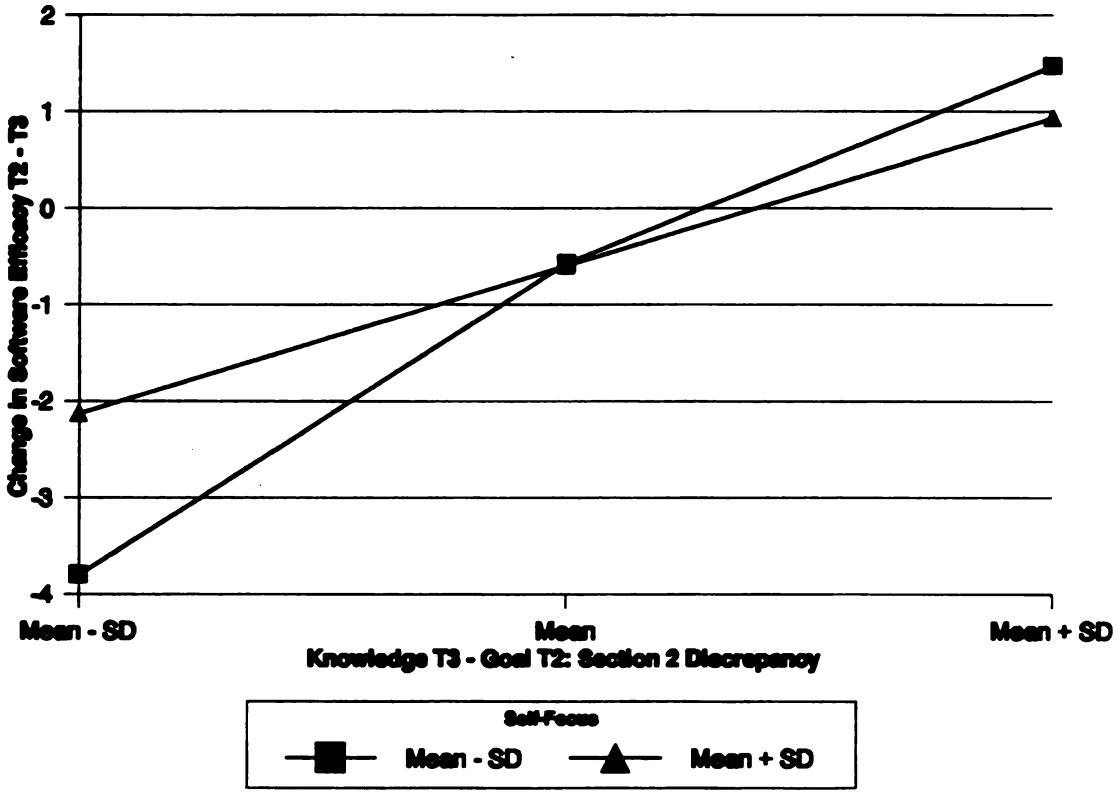

Figure 12. Interaction between Self-Focus and Knowledge T3 - Goal T2: Section 2 Discrepancy.

Phase III

The analyses in Phase III sought to describe the mechanisms involved in changes in trainees' learning goals over time. Specifically, Phase III attempted to identify how changes in trainees' self-efficacy, motivational force for learning the training material, and perceptions of their environments' favorability for using the trained skill were related to changes in their learning goals. The design of this study allowed for testing the relationships among changes in these

constructs between two time periods: Time 1 (pretraining) and Time 2 (mid-training). The results of these analyses are described below.

Control Variables

Statistically significant relationships were once again detected between the primary variables of interest in Phase III and the control variables. As demonstrated in Phase II, a significant negative correlation was detected between Gender and Change in Software Efficacy T2-T1, $r = -.16$, $p \leq .05$. This suggested that females experienced larger changes in their Software Efficacy than did male participants. In addition, Change in Computer Efficacy was significantly correlated with changes in Software Efficacy ($r = .36$, $p \leq .001$), Environmental Favorability ($r = .24$, $p \leq .001$), and both overall ($r = .14$, $p \leq .05$) and sectional ($r = .16$, $p \leq ,05$) goals. Therefore, these control variables were partialled from the relationships examined in Phase III. The intercorrelations among the variables under study in Phase III are presented in Table 14.

Omnibus Tests

As in Phase I, two omnibus tests were performed to protect against the threat of inflated experimentwise Type I error. In the first test, Change in Learning Goal: Overall was regressed on changes in Software Efficacy, Environmental Favorability, and Motivational Force: Overall after entering the control variables into the equation. Similarly, in the second equation Change in Learning Goal: Section 1 - Section 2 was regressed first on the control variables, followed by changes in Software Efficacy, Environmental

Table 14.

Correlations among Phase III Primary Research Factors with Gender and Change in Computer Efficacy Partialled.

Variable	1	2	3	4	5	6
1. Change in Software Efficacy						
2. Change in Motivational Force: Overall	.00					
3. Change in Motivational Force: Sectional	-.06	.62***				
4. Change in Environmental Favorability	.27***	.03	.01			
5. Change in Learning Goal: Overall	.11	.18*	.09	.04		
6. Change in Learning Goal: Sectional	.02	.17*	.23**	-.05	.57***	

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$

Favorability, and Motivational Force: Section 1 - Section 2. In both cases, the primary variables of interest explained significantly more variance in Changes in Learning Goal that the control variables alone: $\Delta R^2 = .07$, $F_{change}(3,191) = 2.99$, $p \leq .05$; and $\Delta R^2 = .04$, $F_{change}(3,188) = 3.96$, $p \leq .01$, respectively. Because these omnibus tests were statistically significant, it was then appropriate to examine the bivariate relationships among the variables of interest (Cohen & Cohen, 1983).

Hypothesis Eleven

Hypothesis Eleven addressed the relationship between changes in trainees' learning-related self-efficacy and changes in their motivational force for learning the training content. Specifically, it was hypothesized that Software Efficacy would be positively correlated to Change in Motivational Force. As we see in Table 14, however, this was not the case. The partial correlation between Software Efficacy and Change in Motivational Force: Overall was $r = .00$, n.s.; and between Software Efficacy and Change in Motivational Force: Sectional was $r = -.06$, n.s. Therefore, Hypothesis 11 was not supported.

Hypothesis Twelve

Hypothesis Twelve examined the relationship between changes in Motivational Force and changes in trainees' learning goals. Consistent with previous research (Klein, 1987), changes in Motivational Force were positively correlated with changes in Learning Goals: $r = .18$, $p \leq .01$ between Change in Motivational Force: Overall and Change in Learning Goal: Overall; and $r = .23$,

$p \leq .001$ between Change in Motivational Force: Section and Change in Learning Goal: Section. Therefore, Hypothesis 12 was supported.

Hypothesis Thirteen

Hypothesis Thirteen sought to describe the relationships among three constructs addressed in Phase III: change in self-efficacy, change in motivational force, and change in learning goal. In particular, Hypothesis 13 stated that the relationship between Change in Software Efficacy and Change in Learning Goal would be mediated by Change in Motivational Force. As a prerequisite for testing this hypothesis, however, significant correlations must exist between each pair of variables in the analysis. In this study, this was not the case. While a significant correlation did exist between Change in Motivational Force and Change in Learning Goal (Hypothesis 12), Table 14 indicates that there were not significant correlations between Change in Software Efficacy and the other two variables. This means that testing for mediation was inappropriate, and that Hypothesis 13 was not supported.

Hypothesis Fourteen

Hypothesis Fourteen suggested that changes in trainees' perceptions of their environments' favorability would be positively related to their motivational force for learning the training content. This hypothesis was tested between Change in Environmental Favorability and both Change in Motivational Force: Overall and Change in Motivational Force: Sectional. As indicated in Table 14, neither of these relationships were statistically significant, with the partial

correlations computed as r = .03, n.s.; and r = .01, n.s. This indicates that Hypothesis 14 was not supported.

Hypotheses Fifteen

Hypotheses Fifteen sought to describe more fully the relationships among the variables presented in Phase III. Specifically, Hypothesis 15 proposed that the relationship between changes in trainees' perceptions of their environments' favorability for using the training content and changes in the levels of their self-set learning goals would be mediated by changes in their motivational force. Just as with testing Hypothesis 13, a prerequisite for testing Hypothesis 15 was that significant correlations exist among each of the variables under investigation. As shown in Table 14, this condition was not met. That is, significant correlations were not detected between Change in Environmental Favorability and either Change in Motivational Force or Change in Learning Goal (overall or sectional). Therefore, since the proposed mediation analyses for Hypotheses 15 were dependent on the presence of significant bivariate relationships which were not detected, Hypotheses 15 was not supported.

Hypothesis Sixteen

Hypothesis Sixteen sought to extend the line of inquiry begun in Hypothesis 15. Specifically, Hypothesis 16 proposed that Change in Motivational Force's mediation of the relationship between Change in Software Efficacy and Change in Learning Goal was dependent on whether or not

trainees perceptions of their environments' favorability had increased or decreased during training.

To test this hypothesis, trainees were assigned to either an "improved" or "declined" group based on whether or not their perceptions of their environments' favorability for using the training had improved or declined over the course of the training session. Then, as with all of the mediation hypotheses, it was necessary to first examine the bivariate relationships among the variables involved in the mediation relationship. The partial correlations among Change in Software Efficacy, Change in Motivational Force, and Change in Learning Goal within each of the Environmental Favorability groups are presented in Table 15. These correlations demonstrated that Changes in Software Efficacy were not correlated with changes in either Motivational Force or Learning Goals within either of the groups. Therefore, since the absence of significant correlations among these three variables precluded the possibility that Change in Motivational Force could mediate the relationship between Change in Software Efficacy and Change in Learning Goal within either the "improved" or "declined" perception groups, Hypthesis 16 was not supported.

Table 15.

Partial Correlations Among Change in Software Efficacy, Change in Motivational Force and Change in Learning Goals for "Increased" and "Decreased" Change in Perceptions of Environmental Favorability Groups[a].

	1	2	3	4	5
"Declined" Perception Group[b]					
Change in:					
1. Software Efficacy					
2. Motivational Force: Overall	-.08				
3. Motivational Force: Section 1	-.16	.62***			
4. Learning Goal: Overall	.10	.12	.01		
5. Learning Goal: Section 1	-.01	.18	.22*	.58***	
"Improved" Perception Group[c]					
Change in:					
1. Software Efficacy					
2. Motivational Force: Overall	.11				
3. Motivational Force: Section 1	.04	.64***			
4. Learning Goal: Overall	.10	.29**	.19		
5. Learning Goal: Section 1	.04	.18	.25*	.57***	

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; two-tailed

[a] Gender and Change in Computer Efficacy partialled.
[b] N = 105.
[c] N = 100.

DISCUSSION

In the research described here, a theoretical model was proposed which described the processes through which training motivation changes over time. This model depicted training as a dynamic process in which trainees' motivation is initially affected by their: (a) previous exposure and knowledge of the training task; (b) self-efficacy for being able to successfully master the training task; (c) perceptions of their normal work environments' favorability for using the training content; and (d) assessments of the attractiveness of the training and the likelihood that they would achieve desired levels of learning. As training progresses, this model suggested that discrepancies between trainees' initial learning goals and the actual levels of learning they are able to achieve influence their affective estimates of their ability to master the material. Finally, the model implied that changes in these estimates of task mastery, as well as changes in perceptions of their environments' favorability, are related to changes in subsequent motivational force, and through this changes in future learning goals.

The analyses performed to test the relationships predicted in the model were conducted in three phases. The first phase addressed those constructs in the model dealing with trainees' pretraining characteristics, perceptions,

motivation, and goals. The analyses in Phase II dealt with trainees' affective reactions to discrepancies between their goals for learning the training material and the amount of material they had actually learned. Finally, the Phase III analyses attempted to identify how changes in self-efficacy and environmental perceptions influenced motivational force and subsequent changes in goals.

Summary of Results

Phase I

The hypothesized relationships among trainees' pretraining characteristics, perceptions, motivation, and goals which were tested in Phase I are represented in Figure 13. For the most part, the bivariate relationships hypothesized in Phase I of this study were supported by the data. As expected, trainees' pretraining knowledge of the training content and amount of experience with similar tasks was significantly related to their self-efficacy. This is consistent with Bandura's (1982, 1986) description of how self-efficacy develops. In particular, trainees who had previous experience with the same or

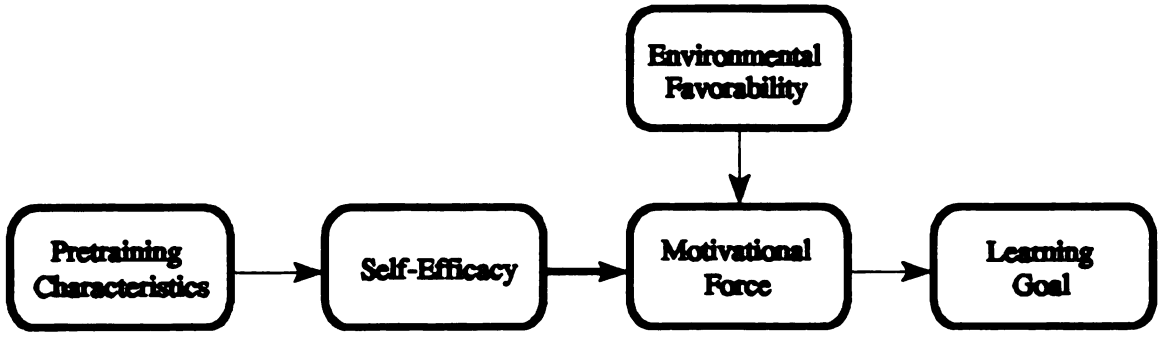

Figure 13. Model of Pretraining Goal Development.

similar training content were more likely to have already experienced some level of enactive mastery with the trained skill. On the other hand, trainees with less experience or knowledge about the task were more likely to have lower levels of self-efficacy, and these levels were more likely due to less influential sources of self-efficacy development, such as vicarious experience or verbal persuasion. Second, trainees' self-efficacy was found to be positively related to their motivational force for learning the training content. This implies that as trainees' belief in their ability to master the material increases, their drive to learn increases. On the other hand, when trainees don't feel assured of mastering the training, the combination of the training's lower perceived attractiveness and their lower expectations for learning the training content motivate them less to learn. But trainees' self-efficacy is not the only factor in determining their level of motivation; trainees' perceptions of their environments' favorability for using the computer skill were also positively related to their motivational force. If trainees saw their environments as being amenable to using the word processing training, they were more motivated to learn it. On the other hand, trainees who didn't perceive that use of the word processing skill was supported in their normal environment were less motivated to learn it. Finally, these data corroborated the results of other studies (e.g. Klein, 1987), which have found that level of motivational force is positively related to self-set learning goals.

The extent to which the multivariate hypotheses proposed in Phase I were supported, however, was not as great. To begin with, the lack of support

for the mediating role of Motivational Force in the relationship between Software Efficacy and Learning Goal indicated that the overall model proposed for the relationships among the Phase I constructs is in need of revision. This result also suggests that self-efficacy and motivational force have differential influences in predicting learning goals. This could be important in reconciling Bandura's social cognitive theory with goal-related models, including those based on control theory (for a discussion of the relative merits of social cognitive theory compared to control theory, see Powers, 1991 and Bandura, 1991). Regarding the mediated relationship between Environmental Favorability and Learning Goals, the results were mixed. Motivational Force was found to mediate the relationship between Environmental Favorability and trainees' overall learning goals, but not for their Section 1 goals. This inconsistency may simply indicate a difference in error variance between these two analyses, or it may suggest that the relationships among Environmental Favorability, Motivational Force, and Learning Goals have different characteristics at one hierarchical level (Overall learning) than they do at another (Section 1 learning). Finally, because the necessary bivariate correlations among Software Efficacy, Motivational Force, and Learning Goals were not present in either group when subjects were categorized based on perceptions of their environments' favorability, the proposition that Environmental Favorability influence whether or not Motivational Force serves as a mediator could not be supported. Overall, then, while there was broad support for the bivariate hypotheses proposed in Phase I, the hypothesized

mediated relationships were only partially supported, and the lack of full support for the these hypotheses invalidated attempts to describe the more complex relationships proposed.

Phase II

The relationships proposed in Phase II of this study addressed the effects of goal-performance discrepancies on subsequent affective reactions. The model which describes these relationships is presented again in Figure 14.

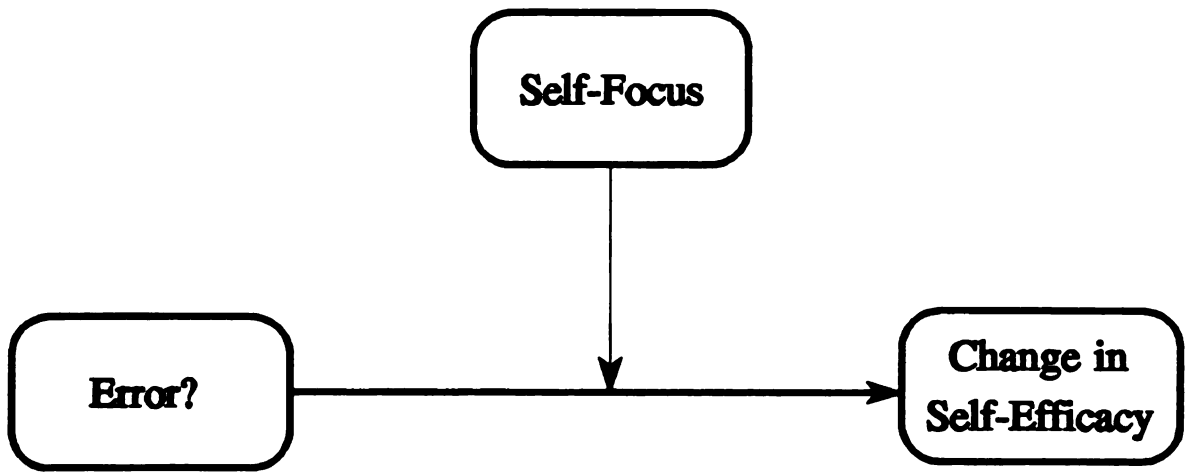

Figure 14. Model of Affective Reactions to Goal-Performance Discrepancies

Most likely because of the introduction of analyses involving change scores, the results of the analyses in Phase II were less conclusive than those in Phase I. While none of the bivariate correlations between goal-learning discrepancies and changes in self-efficacy were statistically significant at the traditional levels, the marginally significant partial correlations indicate that the proposed relationships may actually exist. Some limitations present in this study, however, may have made their detection more difficult. One possible

explanation is the lack of reliability in the measures of Software Efficacy, and the corresponding lack of reliability in the Software Efficacy change scores. Given these low reliabilities, it is possible that the correlations between discrepancies and changes in self-efficacy were attenuated. For example, correcting for attenuation due to unreliability in the change score Software Efficacy T3 - T1 yields a corrected correlation with the Knowledge T3 - Goal T1: Overall discrepancy of approximately r = .31. Therefore, further research with more reliable measures may better support the discrepancy - change in self-efficacy relationship proposed here.

Somewhat stronger evidence was found supporting the proposed moderation of the discrepancy - self-efficacy relationship by trainees' level of self-focus. Specifically, a statistically significant interaction term, indicating that Self-Focus moderated the relationship between Goal-Knowledge discrepancy and Change in Software Efficacy was found for sectional changes between Time 2 and Time 3. In addition, marginally significant interaction terms were found when analyzing Time 2 - Time 3 Overall and Time 1 - Time 3 Overall regressions. These results suggest that the extent to which trainees' self-efficacy changes during training is, at least partially, influenced by the salience of the differences between trainees' goals and their actual progress towards meeting those goals, and this salience is influenced by the extent to which trainees' habitually focus on internal processes. Surprisingly, however, the relationship between discrepancies and Changes in Software Efficacy was more positive for trainees' low in Self-Focus than for those high in Self-Focus. One

possible explanation for this may be that trainees high in Self-Focus were already aware of their level of software proficiency prior to training, and therefore were better able to set realistic goals for how much they would know at the end of the training. Trainees lower in Self-Focus, on the other hand, may have made more inaccurate estimates of their mastery than higher Self-Focus trainees. This would suggest that their subsequent assessments of self-efficacy were likely to reflect more extreme changes than those for more highly self-focussed trainees. Once again, further research with more reliable measures of self-efficacy (and therefore changes in self-efficacy) will likely provide more dependable evidence of this effect.

Phase III

The hypotheses proposed in Phase III sought to investigate the relationships among changes in trainees' self-efficacy, motivation, goals, and perceptions of environmental favorability during the course of the training session. The model which depicted the expected relationships is shown in Figure 15.

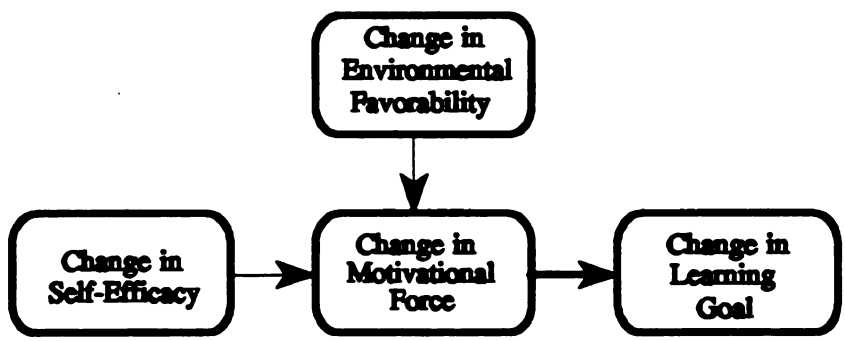

Figure 15. Model of Effects of Affective Responses on Subsequent Motivation.

Besides confirming that changes in motivational force are positively correlated with changes in goal level, the hypotheses proposed in Phase III were not supported. Although the existence of the bivariate relationships among them were confirmed in Phase I, changes in Motivational Force were not related to either changes in Software Efficacy or changes in perceptions of Environmental Favorability in Phase III. Once again, unreliability in the change scores, as well as some range restriction, may be responsible for the lack of support for these hypotheses. It appears, then, that if the hypothesized relationships do exist, their detection is likely to depend on improved measures of these constructs.

Limitations of the Current Study

A number of limitations, primarily related to the measures used, may have influenced the results of this study. First, as previously addressed, the internal consistency reliability of the Computer Efficacy and Software Efficacy scales were substantially below the level typically considered necessary for research purposes (i.e. $\alpha \geq .70$; Nunnally, 1978). The lack of reliability in these scales (particularly in the Software Efficacy scale) likely exacerbated further the unreliability in the computed change scores, leading to attenuated correlations (Cohen & Cohen, 1983). These attenuated correlations, then, increased the likelihood of Type II errors in this study. Unfortunately, the reliabilities of these scales in the pilot study, as well as of similar scales used in other studies (e.g. Hollenbeck & Brief, 1987; Martocchio & Webster, 1992) did not warn of potential problems in their use. Therefore, an improvement in the self-efficacy

measures would probably increase the confidence with which conclusions could be drawn from these results.

Another issue exists, however, with the multiple measures of self-report data in this study. This problem relates to the existence of alpha, beta, and gamma change in the subjects' responses, addressed as a problem in the organizational interventions by Golembiewski, Billingsley, and Yeager (1976). Alpha change refers to observed differences between a pretest and a posttest that are due to true change in the construct of interest. Beta change refers to a case in which true (alpha) change is confounded by a recalibration of the rating scales used to measure the construct of interest by raters as they respond. Gamma changes refers to respondents' reconceptualization of the construct of interest; that is, their personal understanding of the construct being measured changes between measurements (Arvey & Cole, 1989). It is possible that the instability in the reliabilities within the self-efficacy measures across the three time periods indicate that the measures are not each measuring the latent construct the same way. Most likely, this would indicate the existence of beta change. For example, it could be that trainees initially believed they could easily master using the word processing program, and indicated that in their responses to the first Software Efficacy measure. After completing the first section of training, however, perhaps trainees now understood better what was necessary to master the program, and therefore changed how they interpreted what it meant to "master" it. These changes would have been reflected in changes in their self-efficacy ratings, but may not have actually indicated a real

change in their level of self-efficacy, only a change in how they reported that level. Therefore, changes in how respondents interpreted the response scales across the three time periods may have led to limits in the detection of the hypothesized effects. Future research may want to address this issue by implementing techniques such as those suggested by Zmud and Armenakis (1978), Terborg, Howard, and Maxwell (1980), or Schmitt (1982).

There are a number of additional limitations which may have played roles in the results of this study. First, since many of the measures were administered multiple times, respondents' scores may have been influenced by statistical regression effects (Cook & Campbell, 1979). That is, changes in subjects' responses across time periods may have nothing to do with changes in their "true score" for variable being measured (e.g. learning, goals or self-efficacy), but other distractors such as room temperature or noise may have kept them from responding accurately (i.e. changes in error). Secondly, factors related to the subjects who volunteered for this study may have influenced their training outcomes. For instance, it is possible that the range restriction noted on many of the primary measures were due to possible homogeneity in the type of subjects who volunteered to participate. It may be that these volunteers were more likely to be people who thought they could learn about computers easily, or were more in need the somewhat generous number of course credits they received for participating (six credits instead of the one or two given in most studies; determined by the length of time required for participation). In addition, it is possible that the self-efficacy of students in the population from

which this sample was drawn is not as efficacious for skill mastery as the general population as a whole. Another research study examining self-efficacy within the same student population from which this sample was drawn was conducted concurrently with the present study. In this other study, no relationship was found to exist between self-efficacy and skill performance (R. Albrecht, personal communication, March 18, 1994). Since this is one of the most consistent relationships in self-efficacy research, failure to find this relationship may indicate that this student population in some way differs from the population at large. In any case, the subjects in this study were all university undergraduates, where use of the training itself may or may not directly impact upon their success outside of the training setting. Conducting a similar study in a setting where the tangible consequences of learning performance are more salient may produce somewhat different (and probably more distinguishable) results. Finally, because there was no experimental manipulation in this study and all of the analyses were correlational in nature, the interpretation of causal direction in these results, especially among the bivariate relationships within one time period, is ambiguous. Although the theoretical model proposed that self-efficacy influences levels of motivational force, for example, the actual direction of this influence may just as well be reversed. Only with tightly designed, controlled, randomized experiments can the directional influence among the variables of interest be better understood.

Implications of the Current Study

The results from this study imply that added attention be paid to at least three dimensions of the training enterprise. One implication of this research relates to the finding that trainees' perceptions of their environments' favorability was related to their motivation to learn. This suggests that, for trainees to be motivated to learn in training, participation must be consistent with factors outside of training, including workload, support from supervisors and peers, and rewards for participation. It is not enough that the environment objectively support training; trainees must also believe that this is the case. Therefore, consistency between training and objective and subjective aspects of the work environment plays a crucial role in the extent to which trainees are motivated to learn. Another implication of this study relates to the finding that trainees' pretraining self-efficacy was positively related to their motivation to learn, and well as to their subsequent learning goals and actual learning. This suggests that training will be most effective when trainees believe they can master the training content before training starts. To increase these beliefs, these data suggest that trainees have at least some prior knowledge of the material to be trained, as well as experience with similar tasks. One way to insure that trainees have the appropriate levels of experience and knowledge necessary to maximally benefit from instruction requires assessing if they meet predetermined prerequisites for participating in the current training (S. Yelon, personal communication, September 8, 1987). If they do not understand concepts basic to the material to be trained, then they will most likely be

frustrated and feel "over their heads" fighting through more difficult material. Therefore, anything that can reasonably be done to prepare trainees to believe they are appropriately prepared for participating in a particular training sequence should be done. Finally, the most important outcome of this study is that it demonstrates the malleability of self-efficacy. Even within a short, three hour training session, these data demonstrate that the extent to which trainees meet or exceed their self-set training goals affects their subsequent learning-related self-efficacy. This supports Gist and Mitchell's (1992) assertion that some part of self-efficacy is variable. Furthermore, since it appears that trainees high in self-focus may set more realistic goals for themselves, treatments which increase self-focus and realistic goal setting related to the training at hand may yield improvements in trainees' self-efficacy, and therefore their motivation to learn. This study, then, provides valuable guidance in at least three areas which should be addressed in improving the training enterprise.

Directions for Future Research

This study provides an initial model of how control theory may explain the motivational processes involved in training. While this research provided a valuable initial attempt at testing some of the parts of this model, future research which replicates and extends the key principles of this work could greatly enhance our understanding of how trainees' motivation changes from the point that they report for training, through the training program's duration, as they try to apply the training upon their return to the workplace, and as they use

the trained skill throughout their careers. Such research could begin with replicating the main features of the current study with improved measures of self-efficacy. As described previously, the lack of reliability in several of the central measures used here may have resulted in erroneous results. In particular, increased reliability in the original measures would likely help to decrease unreliability in the change scores, although this would most likely continue to of some concern. In general, however, such a replication should provide a better indication if Type II error really was as prevalent as the attenuated correlations in this study seem to suggest.

A second area in which additional research may yield beneficial results is in comparing the relative effects of trainees' self-focus and their task focus. For instance, Gardner, Dunham, Cummings, and Pierce (1987a, b) dichotomized focus of attention as being directed either "on-the-job" or "off-the-job" rather than towards "self" or "other'. While including measures of such a dichotomy was not deemed completely appropriate given the sample used in this study, investigating the effects of various individual differences in focus of attention in the training setting within a control theory framework would clearly aid in understanding better these influences on trainees' motivation.

Another area in which future research may improve our knowledge about trainees' motivation is by investigating the efficacy of using trainees' learning goals and goals for transfer as criteria in training evaluation. It is not sufficient that training only impart objective knowledge. It must also shape trainees' attitudes about their own skills and about their ability to successfully implement

those skills when appropriate situations arise. There is more than ample evidence that goals, especially self-set goals, are positively related to performance. Therefore, we can expect that trainees with higher goals for using training in their workplace will also demonstrate improved performance after training. Goals, however, have never been used as a criterion for evaluating the effectiveness of a training program. Instead, trainees' reactions to the program and amount that they have learned in training are the most common outcome measures, primarily because of the difficulty in identifying appropriate measures of behaviors and performance (Alliger & Janak, 1989). Goals for applying training in the workplace, while not direct measures of subsequent performance, do have the advantage over reaction and learning measures in that they address the future, after training, instead of the past, or what has occurred during training. Therefore, future research should examine the efficacy of adding trainees' goals for transferring training to the list of traditional training effectiveness criteria.

One final suggestion for future research is that it should address training motivation within a multi-level, control theory-based framework. While this suggestion may be less concrete than the suggestions given above, this strategy may be more productive in the long run because it provides a systematic approach to studying training, which has been lacking thus far. Looking at training within the context of not only the organization's goals and structures, but also within the context of trainees' values and abilities (overall as well as job and task-related), would make it possible to methodically investigate

the dynamic impact of each system's unique characteristics on the training process separately, as well as the influence of their interaction. Therefore, adopting a multi-level, control theory model of training and training motivation would yield an organized, systematic research plan within which future studies could operate.

Conclusion

The focus of this research was to outline and conduct initial investigations into a model of training motivation based on control theory. This model described trainees' initial motivational level as being influenced by a number of factors. First, trainees' previous knowledge of the training content and experience with similar tasks were found to be related to their feelings that they could master the training task ("self-efficacy'). These feelings of self-efficacy, as well as trainees' perceptions that their environments were favorable for using the trained skill, were related to their motivational level for learning the training material. Motivational Force was, in turn, related to the goals that trainees set for themselves for learning the training content. In addition to these finding, limited evidence was discovered suggesting that discrepancies between trainees' learning goals and their actual learning performance were related to changes in their subsequent self-efficacy, and the strength of this relationship was based on the extent to which trainees reported habitually attending to internal (cognitive) processes. Finally, changes in trainees' motivational force were found to be positively related to changes in their learning goals, but not to changes in either their perceptions of environmental

favorability or their self-efficacy. These findings are believed to have implications for conducting both training programs themselves and research on the training process. Integral to implementing these suggestions is the adoption of a view of the training process which is consistent with control theory.

APPENDICES

APPENDIX A

Consent form

Computer Training Study

This study is designed to assess how people's reactions during training affect their subsequent learning in the training setting. In this study, you will be asked to do a number of things. First, you will be asked a few questions about yourself, including some basic information about your experience with computers and word processors. Following these beginning questions, you will receive training on how to use a computerized word processor, and will be asked to complete several questionnaires about what you have learned. The entire session should last approximately three hours.

Your participation in this research is completely voluntary. Therefore, you may discontinue your participation at any time; there will be no penalty or recrimination. In addition, all information you provide will be kept in the strictest confidence. Your answers will be kept anonymous, and will be accessible only to the experimenter, David McKellin. Furthermore, there can be no guarantee of beneficial effects as a result of this study. Finally, while your data may be combined with that of others in a summary report, your data will not be distributed in any way in which it can be identified individually as yours. If you have any questions about this study after this session, please contact David McKellin at 353-9400 during business hours.

Please acknowledge that you understand and agree to the terms of this research by reading the statement below and then complete the blanks at the bottom of the page.

Subject's statement

I agree to participate in this Computer Training Study. In understand that I will be asked to fill out several questionnaires regarding myself, and will receive training on how to use a computerized word processor. Furthermore, I understand that my participation is voluntary, that I may discontinue my participation at any time without recrimination, that my answers will be kept confidential, that there is no guarantee of any beneficial effects, and that my responses will not be distributed in any way in which they can be identified as mine.

Signature _____ Date _____

Print name _____

APPENDIX B

Training Guide

By the end of this session, you will know how to:

- Access WordPerfect on an IBM-compatible microcomputer.
- use the various keys on the keyboard to move around in your document.
- retrieve a document and preview it to the screen, send it to a printer, or save it back to disk.
- format text using underline, bold, different sized type.
- format a page using tabs, indents, line spacing, and margins.
- proofread a document using the spell check, thesaurus, and word count features.
- create personalized mailings and address labels using mail merge.
- add graphics to your document.

Section One: Basic Commands

By the end of this section, you will know how to:

- **Access WordPerfect on an IBM-compatible microcomputer.**
- **use the various keys on the keyboard to move around in your document.**
- **retrieve a document and preview it to the screen, send it to a printer, or save it back to disk.**
- **format text using underline, bold, different sized type.**
- **format a page using tabs, indents, line spacing, and margins.**

WordPerfect is a very powerful word processing package for IBM-compatible microcomputers. Even though it is a powerful program, WordPerfect is also very easy to learn how to use. This workshop is designed to help you learn many of the commands and techniques you need to create effective documents using WordPerfect. These techniques range from being able to move around on a page to setting margins and spacing to importing graphics into your document.

The workshop today will be divided into two sections. During the first section, basic commands for formatting and moving around in a document will be introduced. After this, the second section will address more advanced techniques, such as creating a personalized mass mailing using the merge function, and using tables and graphics to get your message across.

Accessing WordPerfect

If your computer is not already turned on, please make sure there are not any "floppy disks" in either disk drive, and turn on the computer and monitor. When the computer is ready to use (or "booted up"), you should see a prompt in the upper left corner of the monitor which looks like:

C:\>

The hard disk drive inside the computer is divided into a number of directories. The directories operate similarly to file folders in a file cabinet, each of which contains a number of individual files. The individual files necessary to run WordPerfect are found in one of these directories. You will need to access this directory before you can run WordPerfect.

To access the directory containing the WordPerfect files, type:

CD WP51 and press **RETURN**.

This sets the default or automatic directory on the C: drive to C:\WP51.

To start WordPerfect, type:

WP and press **RETURN**.

The program will initially present the WordPerfect logo screen, then the screen will clear. You will now have a blank text screen except for the flashing **Cursor** in the upper left corner of the screen and the **Status Line** in the lower right corner. The position of the cursor is where text will appear when you type. The status line at the bottom of the screen tells you where the cursor is in the document (i.e. what page it is on, how far from the top and left side of the page).

The Keyboard

One of the first things to master when learning a new software package is how the various keys on the keyboard are used. There are three basic types of keys on the keyboard which must be understood: the **typing** keys, the **cursor control** keys, and the **function** keys.

The typing keys

The typing keys are the keys you use to type words and numbers when you write. They also include the **Shift** keys, the **Backspace** key, the **Enter** or **Return** key (marked either way on some keyboards), and the **Tab** key. Hold the shift key down to capitalize letters or words as you type. Pressing the backspace key deletes the letter or space immediately to the left of the cursor on the screen.

The return key inserts a **Hard Return** in the document, or a place where text on the line ends and the cursor moves to the beginning of the next line. This is different from a **Soft Return**, which WordPerfect inserts automatically at the end of a line when no more text will fit on it.

The tab key moves the cursor to the next **Tab Stop**, or pre-defined place on the line where you want to line up text. For example, most paragraphs are indented 1/2 inch from the left margin. By setting a tab stop at 1/2 inch from the left, the cursor will automatically move in 1/2 inch when you press the tab key at the beginning of the line. Most documents use tab stops every 1/2 inch from the left margin. If you need to change where the tab stops are in a document you are writing, consult the WordPerfect manual.

The cursor control keys

The cursor control keys are the keys on the "numeric keypad" to the right of the typing keys. These include the **Arrow** keys, the **Home** key, the **End** key, the **PgUp/PgDn** ("Page Up/Page Down") keys, and the **Ins** ("Insert") and **Del** ("Delete") keys.

The arrow keys move the cursor in the direction that the key points. For example, to move the cursor to the left, press the left arrow key. To move a few spaces left, hold the left arrow key down until you get to your destination.

The **Home** key is used together with the arrow keys to move the cursor larger distances in the document. For instance, pressing the Home key twice (**Home Home**) and then the **Down Arrow** key moves the cursor to the end of the document. Similarly, pressing **Home Home Up Arrow** moves the cursor to the beginning of the document, **Home Home Left Arrow** moves it to the left side of the line the cursor is

on, and **Home Home Right** moves the cursor to the far right side of the line. It is far easier to move the cursor to the right end of the line by pressing the **End** key.

As you type in WordPerfect, you will notice that what you type moves up the page, leaving space for more text at the bottom of the screen. When you have typed as much as can be printed on one page, WordPerfect inserts a **Page Break**, and the text which follows continues on the next page. The PgUp key is used to move the cursor "up" to the top of the previous page in your document. Similarly, the PgDn key to moves the cursor "down" in the document, to the top of the next page.

The last two cursor control keys are the **Del** and the **Ins** keys. As you might suspect, pressing the **Del** key will delete whatever is highlighted by the flashing cursor. This is usually best for deleting one or two letters at a time. The **Ins** key works quite differently. WordPerfect supports two "typing modes": Insert and Typeover. In insert mode, letters are inserted at the cursor's location as you type. In typeover mode, new letters replace, or "type over" existing letters as you type. WordPerfect is normally in insert mode.

Function Keys

The function keys are the keys numbered either F1 - F10 or F1 - F12 on your keyboard. On some computers these keys will be on the left side of the keyboard, while others will have them along the top of the keyboard. All of the commands that will be discussed in this workshop will work with either keyboard setup.

In WordPerfect, the function keys are used to access many of the procedures you will want to use to create your document. These include functions like saving a document, bolding or underlining words, and exiting the program.

Because WordPerfect has more features than can be handled by the function keys alone, additional features are accessed by using the function keys in combination with three other keys: the **Shift** key, the **Alt** ("alternate") key, and the **Ctrl** ("control") key. By first holding down the shift, Alt, or Ctrl key and then pressing one of the function keys, you can access additional procedures, such as printing, adding graphics, or formatting pages. If there is a plastic "template" on your computer, you will notice that there are four colored words listed next to each function key.

RED: The function listed on top means that you hold the **Ctrl** key down while pressing the function key.

GREEN: The second function requires holding the **Shift** key while pressing the function key.

BLUE: In the third position are commands that are accessed by first holding down the **Alt** key and pressing the function key.

BLACK: The bottom word refers to the base function of the key -- that is, what will happen if you press the function key alone.

Throughout this workshop, function key commands will be written as **Ctrl-F8**, **Alt-F9**, and **Shift-F7** which describe the key combinations you should use.

For example, assume you want to retrieve a document that has been saved on a disk. You will notice that the word Retrieve is printed next to the **F10** key, and is third from the bottom of the list. Therefore, holding the **Shift** key and pressing **F10** will allow you to retrieve the document.

After working on the document you want to save your changes and exit WordPerfect. WordPerfect automatically asks you if you want to save your document each time you exit the program. So, after pressing **F7 (Exit)**, you will first be asked if you want to save the document. If you type a **Y** (Yes), you will be asked to give the file a name. This file name can be **up to 8 characters long**, and can include a **three character extension** after the file name, but the file name and extension **must be separated by a period (.).**

e.g. letters.fil
resume.jan
todo.lis

After typing the file name and pressing **Return**, WordPerfect will ask if you want to leave WordPerfect. If you are done using WordPerfect, type a **Y** (Yes). If you want to return to WordPerfect to work on another document (just need to clear the screen), type **N** (No). If you decide that you want to return to work on the document you just saved, press the **F1** key. This means that you want to **Cancel** your last action, or "cancel leaving WordPerfect."

Exercise 1

This exercise is designed to let you practice:

- retrieving a document,
- moving around the document using the cursor control keys, and
- saving the document and clearing the screen.

1. a. Insert the floppy disk you have been given labeled "WordPerfect Training Research Disk" into the top disk drive on your computer. Close the latch on the disk drive.

   b. Retrieve the document "Exercise.1" from the disk:

   Hold down the **Shift** key and press **F10**.
   When asked: "Document to be retrieved:", type **a:exercise.1**

2. Practice using the cursor control keys to move around the document. Be sure you have used the following keys and key combinations several times:

   Arrow keys
   End Key
   PgUp/PgDn
   Home-Arrow key combinations: **Home Home Up**
   Home Home Down
   Home Home Left
   Home Home Right

3. Add some text to the end of the document:

   a. At the bottom of the last page of the document, type:

   This is the page of the document.

   b. Move the cursor under the **p** in **page** and type the word **"last"**. Be sure to include the space after the **t**.

4. Save the document with your changes and clear the screen:

   a. Press **F7** and type **Y** to save the document.
   b. When asked "Document to be saved:," type **a:finish.1** as the file name.
   c. When asked "Exit WordPerfect?", press **N** to clear the screen and stay in WordPerfect.

Formatting Text on a Page

When creating and editing a document in WordPerfect there are two general types of information you put into the document: the text of the document and formatting codes that control the appearance of the document on the screen and when it prints. The normal text screen, which is what you see on your screen most of the time, does not show the formatting codes when they are inserted into the document.

In all but the most basic uses of WordPerfect, the formatting codes are a necessary part of using the program. It is important for you to know how they work and to be able to view them as needed. To see the formatting codes, you use the **Reveal Codes** function. When in the Reveal Codes mode, the screen is split horizontally. The upper portion of the screen is a shortened version of the normal text screen and the bottom portion is the Reveal Codes screen. When you no longer need to view the formatting codes, you turn off the Reveal Codes mode and the full screen is returned to normal text operation.

During this portion of the workshop, let's turn on the Reveal Codes function to see the formatting codes as you enter them. To do this:

Press: **Alt-F3** (reveal codes) to turn on the Reveal Codes mode.

The screen is split by the *tab ruler*. The triangles in the tab ruler show where the tab stops are set. The brace ({) at the left end indicates where the current left margin is set and the brace (}) at the right indicates the current right margin. Because we have not typed any text yet, both portions of the screen are now blank except for the Status Line above the tab ruler and a message in the Reveal Codes screen that says

Press Reveal Codes to restore screen

This means that Reveal Codes will stay in effect until you turn it off by again pressing **Alt-F3**.

WordPerfect provides a large number of options for formatting your text. Today, we will concentrate on a few of the most frequently used options. These are: **margins, line spacing, indents, underlining, bolding, and changing font sizes.**

Margins and Line Spacing

The first two decisions you will need to make when deciding how to format your document regard the margins and the line spacing. Most papers you write for class will have 1 inch margins on the left and right, as well as at the top and bottom of the page. Also, many professors prefer that papers be double-spaced so they are easier to read. On most computers, WordPerfect is set up to begin with these dimensions as "defaults," or the basic setup when you start the program. However, some people set

up their versions of WordPerfect differently. Therefore, let's begin typing a document and include these codes so that our document formats the way we want wherever we print it. With Reveal Codes on, you will be able to see the codes as you enter them.

1. Press **Shift-F8** to bring up the Format Menu in WordPerfect. This menu provides four options:

   1 - Line
   2 - Page
   3 - Document
   4 - Other

Choosing one of these options brings up another menu of functions available in that format category. *Line format* functions include **line spacing** and **Margins right/left**, among others. *Page format* functions include **Margins top/bottom**, **center page (top to bottom)**, and **page numbering**. The *Document* and *Other* menus include advanced functions we will not address in this workshop.

To set the left and right margins and line spacing:

1. Press **1 or L** for the Line Format menu.

The Line Format menu displays nine different functions that can be used to format a line of text. Today we are interested only in options **6 (Line Spacing)**, **7 (Margins)**, and **8 (Tab Set)**. Let's first set the Line Spacing to double-spacing.

1. Press **6** or **L (Line Spacing)**. The cursor will underline the current line spacing (1).

2. Press **2** and press **Return** to change the spacing from single to double-spacing.

The Line Spacing will now be set at 2. To check if this has happened, press the **F7** key to return to the text/Reveal Codes split screen. While you won't see anything new in the text portion of the screen, you will see **[Ln Spacing:2]** in the Reveal Codes screen.

Now let's set the margins and tab stops.

1. Press **Shift-F8** to bring up the Format menu.

2. Press **1** or **L** to display the Line Format menu.

The right and left margins are probably already set at 1 inch on your machine. However, this will not always be the case. To be sure that your document is always formatted with one inch margins, these codes need to be entered into your document.

To do this:

3. Press **7** or **M**. The cursor will flash under the 1" for the Left margin. Press **1** and **Return** to set the Left margin. The cursor will now flash under the 1" for the Right margin. Again press **1** and **Return** to set the Right margin. The cursor will now flash under the **0** next to the **Selection:** message at the bottom of the screen.

Now that the margins and line spacing are set, press the F7 (Exit) key to return to the text/Reveal Codes screens. Notice that there are now codes for both the line spacing and margin settings in your document. These will be saved with your document so it will be formatted the same way if you edit it later on another computer.

Centering and Bolding Text

Now that the margins and spacing for your paper are set, it's time to set up your title page. In this section, we will learn how to center the title page top-to-bottom, and how to center the title left-to-right across the page.

Centering a page top-to-bottom is easy in WordPerfect. Rather than figuring out what the dimensions of the page are and what line your title should be on, you can automatically center the page by going into the **Page Format** menu and selecting **Center Page**. To center text on the page:

1. The code for centering the page must be the first code on the page. Use the Reveal Codes screen to move the cursor to the top of your page. In this case, the **[Ln Spacing:2]** code should be highlighted. (If you had a multiple-page document and wanted to center a page other than the first page, the code or space following a page break code, either **[HPg]** or **[SPg]**, should be highlighted in the Reveal Codes screen.)

2. Press **Shift-F8** to bring up the Format menu.

3. Press **2 or P** to bring up the Page Format menu.

At the top of the menu, you will see that the first option says "Center Page Top to Bottom", followed by "No". You need to change the "No" to "Yes".

4. Press **1** or **C**. The cursor will flash under the N for "No", and "Yes" will appear in parentheses next to it.

5. Press **Y** to change the Page Center to Yes.

6. Press **F7** ("Exit") to return to the text screen.

Once your page is centered, you will want to center and type your title. Centering text is done by first giving the command to center, then typing the text. Furthermore, you may want your title to stand out on the title page by using larger type and bolding it.

1. Press **Shift-F6**. The cursor will now be centered on the line.

2. Press **Ctrl-F8** to increase the size of the type "font". At the bottom of the screen, you will see 6 options for type changes, including Size, Appearance, Temporary Font, Base Font, Print Color, and Other.

3. Press **1** or **S** to select Size. This will bring up a series of size options. Press **L** for Large. The text you type will appear large until you reselect this option to turn Large off.

4. Press **F6** to Bold the text you are about to type. The text you type will appear bolded until you reselect this option to turn Bold off.

5. Type the title of your paper: **What I Have Learned About WordPerfect**. Press **Return** and notice that the cursor returns to the left margin.

6. Press **Shift-F6** again and **type your name.**

7. To turn Bold off, press **F6** again. To turn Large off, press **Ctrl-F8**, and **6 (Normal)**.

Now that you have your title page, you need to get to the next page to begin your paper. Rather than pressing Return over and over to get to the bottom of the page, you can "force" a page break or a **"Hard Page"**:

Press **Ctrl-Return** to insert a Hard Page. You will see a **[HPg]** code appear in the Reveal Codes screen, and a double line will run across the screen. Note that the page will still be centered even if it appears to have only two lines of print on it.

Underlining and Indenting Text

It is customary to repeat the title of your paper at the top of the second page of your paper, just above where the text starts. Usually, you will underline and center the title left-to-right on the second page, and leave some extra space after the title before beginning the body of the paper. To do this:

1. Press **Shift-F6** to center the title.

2. To underline the title, press **F8** and type the title: **What I Have Learned About WordPerfect**. Press **F8** again to turn off the underline. Notice the **[Center]** and **[Und][und]** codes in the Reveal Codes screen.

3. Press **Return** twice to leave space under the title. Notice that the cursor returns to the left margin.

After writing a page or two of text, let's suppose you want to list the main principles you learned about WordPerfect. Since you want these points to stand out from the rest of the text, you will want to number the points, and indent the text. For example, the instructions in this workshop have been numbered and indented. To do this:

1. Press **F4** to indent the number.

2. Type **1.**

3. Press **F4** to indent the text from the number. Type the following text to see how the indent works:

   I have learned that the indent feature can be used to make lists stand out from the rest of the text.

The advantage of using an **indent** instead of a **tab** is that everything you type will be indented from the margin until you press **Return**.

View Document and Printing

One of the major advantages of WordPerfect is the ability to view how your printed document will look before actually printing it. View Document displays the document with the top and bottom margins in place, and with all other formatting options you may have selected. The purpose of View Document is to allow you to scan the document layout on the screen before you go to the trouble of printing it. This reduces your stress because you can make sure the document is formatted the way you want it, and it also saves paper and time because you won't have to print just to see how everything looks.

The View Document and Print features are found under the Print Menu. To access this menu:

Press **Shift-F7**.

This menu has two sections: Print and Options. The Print section has seven numbered items and the Options section has six lettered items. If you need more explanation on how to use these options, please refer to the appropriate sections of the WordPerfect reference manual.

We will now use the View Document feature, Option 6 on the Print Menu.

Press: **6** to select the View Document option.

While the document is being prepared for preview, the message "Please wait" is displayed.

You can view the page in some detail by pressing **1** to view the document at **100%** of its printed size, or **2** to view it at **200%** of its size. Pressing **3** will show you the **Full Page** mode. This gives you a full view of the page the cursor is on. You will not be able to read the text on this page; its purpose is to show what it will generally look like when you print. mode. Pressing **4** will give you the same amount of detail as Full Page, except that facing pages will be displayed.

Press **F7 (Exit)** to exit the View Document mode.

For our purposes, we will not print the document. If you were going to **print** your entire paper, you would press **Shift-F7**, and **1 (Full Document)**.

Exercise 2

The document displayed on the next two pages has been formatted using the procedures described between pages 7 and 12. These include centering, bolding, changing the font size, underlining, and indenting. You will reproduce the document yourself, including all of the formatting displayed. The left and right margins for this particular document have been set at 1.5" each. The title size is Very Large. **Use View Document to check your work. Do not print the document.**

Before continuing with this exercise, you will need to clear your screen. To do this:

1. **Press F7 (Exit).**

2. **Type N (No) when prompted to "Save Document?"**

3. **Type N (No) when asked "Exit WordPerfect?"**

When you have finished reproducing the document, save it and exit WordPerfect. To do this:

1. **Press F7 (Exit).**

2. **Type Y (Yes) when prompted to "Save Document?"**

3. **Type "a:exercise.2" when prompted "Document to be Saved?"**

4. **Type Y (Yes) when prompted "Exit WordPerfect?"**

You will then be returned to the DOS prompt. If you are done before the rest of the class, please spend your time reviewing the commands you have learned in this section. When everyone is finished, there will be a group activity.

Please proceed with the exercise.

The Camping Trip

by

Billy Shaak Speare

The Camping Trip

This summer my friend Robert Browning and I went camping in the Sherwood Forest. It is a beautiful, historic park. The Queen herself has gone camping there, although we were not fortunate enough to meet her.

We made certain that we had all the gear needed for a week's stay:

1. tent
2. blankets
3. food
4. bows and arrows to defend ourselves against the bears and lions, and
5. a map.

The bears and lions learned to fear our bows and arrows and they stayed away. We had a very good time.

THE END

Section Two: Advanced Commands

By the end of this session, you will know how to:

- **proofread a document using the spell check, thesaurus, and word count features.**
- **create personalized mailings using mail merge.**
- **add graphics to your document.**

Now that you have been introduced to some of WordPerfect's most used commands, it's time to move on to some more advanced concepts. In this section, we will discuss some more advanced procedures that you may find useful. All of the possible variations of these procedures will not be covered. Rather, the intent of this section is to provide an introduction to what is possible with WordPerfect.

Word Count and Spell Check

One of the major advantages of using a computerized word processor is the ability to check your spelling electronically. In addition, many word processors have built-in procedures for counting the number of words in a document and some type of an electronic thesaurus. These features mean that your documents will be spelled correctly, you will know if you meet your assignments' length requirements, and you will not have to repeat the same word over and over.

To see how these features work:

1. Type **WP** to restart WordPerfect.

2. Press **Shift-F10** and retrieve the file **a:spelldoc.1**. We will use this document as a demonstration.

The Spell Check and Word Count features are listed on the same WordPerfect menu. To access the Spell menu:

3. Press **Ctrl-F2**.

You will now see six options appear at the bottom of the screen:

1 Word
2 Page
3 Document
4 New Sup. Dictionary
5 Look Up
6 Count

The Word and Page options allow you to check the spelling of the word and page the cursor is on, respectively. The Document option will check the spelling in the entire document that you are currently editing. The Count option will count the number of words in your document.

Let's start by counting the number of words in the document on your screen.

4. Press **C** or **6** to count the number of words. When WordPerfect is done counting, the number of words are listed at the bottom of the screen. Press the **space bar**.

WordPerfect has returned to the Spell Check menu at the bottom of the screen.

5. Press **D** or **3** for **Document**. WordPerfect will now check the spelling of the document.

In the current document, the word "extraordinary" is misspelled. On the bottom of the screen, the correct spelling is listed next to "a". Press "a" to correct the spelling in the document.

Next, "Nissho Iwai" and "Reebok" are not found in the WordPerfect spelling dictionary because they are names, even though they are spelled correctly. Press **2** so that WordPerfect will **Skip** each name throughout the rest of this spell check.

6. Now that the Spell Check is done running, press **F7** to return to the document.

Thesaurus

Next, let's see how the on-line thesaurus works.

At the top of Page Two is the word "interest". Since this word is used quite a bit in this document, let's see if there is another word that will fit as well.

1. Move the cursor so that it is under "interest".

2. Press **Alt-F1**.

A column of words which are synonymous to "interest" are listed on the lower portion of the screen. For our purposes, option **I, holding** will fit very well. To replace "interest" with "holding":

3. Press **1** for **Replace Word**.

4. Press the letter **I** for "holding".

WordPerfect replaces the word in your document and returns you to the text screen. One point to remember: WordPerfect does not detect whether or not you are using the

plural form of a word. Therefore, if you are replacing a word in its plural form with something else, you will probably have to change the singular to the plural.

Merging

The **Merge** function is very useful for personalized mailings, labels, etc. We will look at a simple personalized mailing. Two documents must be created for a mailing: the **primary file** consists of the letter and the **secondary file** consists of the addresses divided into **fields**. The primary file will have **field codes** which pull information from the secondary file. The secondary file's fields must be consistent so that the same kind of information is pulled for each letter. For example, if Field 1 in the primary document is a person's name, it must be the first field in each address in the secondary document.

Primary Document

When creating the primary file, you must insert the codes and number them. To do this press **Shift-F9** (Merge Codes). Then press **1 or F** for "Field" and it will ask you to **Enter Field:**. Simply number the fields as you go along. In this way, you can insert the full name, company name, and address at the top of the letter, insert the name "Mr. Doe" in the salutation, and refer to the person's name and the company's name in the letter (primary file).

The primary file must have the fields identified by number so that the fields from the secondary document move to the right places. For our purposes, we will have four fields: the person's full name, the company name, the address, and the shortened person's name ("Mr. Doe") used for the salutation. On the following page is an example which is named **a:primary.fil** on the disk:

{FIELD}1~
{FIELD}2~
{FIELD}3~

Dear {FIELD}4~:

The mayor of Happytown would like to invite you to a dinner celebrating Happytown's centennial. We are inviting the leaders of this community to acknowledge their contributions to our town's success. Your company, {FIELD}2~, has added to the happiness and well-being of our citizens.

{FIELD}4~, we would consider it an honor to have you attend our dinner on February 14, 1991 at 7:00 p.m. Please let us know if you will be attending.

Thank you again for your contributions to our community and we look forward to seeing you at the dinner.

Sincerely yours,

Ms. Joan Smiley
Mayor of Happytown

Secondary File

When you create the secondary file, at the end of each field simply press **F9 (END FIELD)**. This will automatically make it return as well. When you have entered the record, end the address by pressing **Shift-F9 and 2 or E to End Record**. This will create a Hard Page, allowing you to start entering the next address. In this way, you can divide your address file into the four fields. The following is how the address file will look, and we have named this document **a:secondar.fil** on the disk:

Mr. John Doe**{END FIELD}**
XYZ Company**{END FIELD}**
1234 Sunnyvale Lane
Happytown, CA 98765**{END FIELD}**
Mr. Doe**{END FIELD}**
{END RECORD}

Ms. Elizabeth Johns**{END FIELD}**
ABC Company**{END FIELD}**
5678 Smile Street
Happytown, CA 98765**{END FIELD}**
Ms. Johns**{END FIELD}**
{END RECORD}

To merge, you must be sure the screen is cleared: use **F7 (Exit)** to exit the document: **Y (Yes)**, but do not exit WordPerfect: **N (No)**.

To merge the two documents, please do the following:

1. Press **Ctrl-F9 (Merge/Sort)**.

2. Select **1 or M** to **Merge**.

3. It will then ask you for the name of the **Primary File:** which you will type in as **a:primary.fil** and hit **Return**.

4. It will then ask you for the name of the **Secondary File:** which you will type in as **a:secondar.fil** and hit **Return**. At that point, you will get a message in the lower left-hand corner **"Merging"** and soon your completed letters will appear.

When you merge files, you can either print the letters right away or save the final merged document. For our purposes, please press **F7** and exit the document without saving it.

Graphics

The last topic we will cover in this workshop is how to include graphics to get your message across. There are two types of graphics we will work with today: creating a horizontal graphic line and importing a graphic file. These two graphic types are particularly useful when creating advertising fliers or newsletters.

Let's begin by typing a title for the newsletter using Very Large type.

1. Press **Shift-F6** to center the title.

2. Press **Ctrl-F8**, **S** or **1**, and **V** or **6** to select the Font Menu, Size, and Very Large, respectively.

3. Type **The WordPerfect Newsletter**.

4. Press the **right arrow key** to end the very large print size.

5. Press **Return** twice to leave space under the title.

Horizontal Graphic Line

Now let's add a horizontal graphic line. To access graphics in WordPerfect:

6. Press **Alt-F9**.

This will bring up the graphics menu at the bottom of the screen. The option we want is Option 5 - Line.

7. Press **5** or **L** to access the Create Line menu.

Since we will be **Creating** rather than **Editing** a horizontal line:

8. Press **1** or **H** to pull up the **Graphics: Horizontal Line** menu.

This menu lets you change the characteristics of the graphics line. For our purposes, we will leave these settings as they are. To accept these settings:

9. Press **Return**.

You will not see anything on your screen. To confirm that the line has been created, you can either check **Reveal Codes** or use **View Document**.

10. Press **Alt-F3** to see the code for the horizontal graphics line. Press **Alt-F3** again to exit Reveal Codes.

11. Press **Shift-F7, then 6** to see the page in the View Document mode. Press **F7** (Exit) to return to the text screen.

Now that you have created a graphics line, let's leave some space between the line and the body of the newsletter.

12. Press **Return** twice.

Importing a Graphic File

Next, we will import a graphic image into the newsletter. Creating your own graphics can be done with a number of graphic software packages, such as DrawPerfect, Harvard Graphics, and PC Paintbrush. Creating your own graphics and converting them to the format that WordPerfect can read is beyond the scope of this workshop. If you would like to know more, consult the WordPerfect reference manual.

Fortunately, there are also a number of graphics that come with WordPerfect. These graphics are all in what is known as WPG format (WordPerfect Graphics Format). All graphics file that you import into WordPerfect must either be created using this format, or converted to this format using a program supplied with WordPerfect.

In order to import a graphic into WordPerfect, we must first create and define a "**figure**". To do this, we must again bring up the graphics menu.

1. Press **Alt-F9** to access the graphics menu.

2. Press **F** or **1** to select **Figure**.

3. Press **C** or **1** to **Create** the figure.

This will bring up the **Definition: Figure** menu. This menu allow you to enter the filename of the file to import, write a caption which will appear with the figure, place the figure on the page, define its size, and edit the placement of the graphic within the figure box. Let's define the **filename** for our graphic, set its **horizontal position** and **size**, and **edit** the figure to change its **scale**.

4. Press **F** or **1** to enter the Filename and type: **a:news.wpg** and press **Return**.

5. Press **H** or **7** to set the Horizontal Position. Another menu will appear at the bottom of the screen. Press **F** or **4** for Full so the graphic will take up the full page.

6. Press **S** or **7** to change the Size. Press **B** or **3** to set Both the height and width. For the Width, press **6** and **Return**. For the Height, type **5** and press **Return**.

Finally, let's Edit the graphic to see how it looks within the figure box.

7. Press **E** or **9** to access the Graphics Edit screen. After a few seconds, the graphic will be drawn in the box in the middle of the screen, and an edit menu will appear at the bottom of the screen.

The graphic's scale is set in percent relative to the size it is now. To change the scale of the graphic relative to its current size:

8. Press **S** to get the scale dimensions. Type **105** for the X Scale and press **Return**. Type **105** for the Y Scale as well, and press **Return**. The graphic will be redrawn on the screen after a few seconds. Make sure that the graphic fits within the graphics box.

At this point we are done editing the graphic.

9. Press **F7** twice to return to the text screen.

As with the graphics line, you will not see the graphic on your text screen. However, you will see a line across the screen, with **FIG 1** at the left side. This lets you know that the graphic has appeared. To see the graphic, use the View Document function.

10. Press **Shift-F7**, then **6** to view the document. You will now be able to how the graphic looks on the screen.

11. When you are done, press **F7** to return to the text screen. Exit the document so you can begin a new document.

When you finish this exercise, please review the principles and procedures we have discussed in this workshop.

APPENDIX C

Developing a Theory of Training Motivation

The study in which you have just participated has been designed to study how motivation to learn changes during the course of training. In the past, most theories of training have assumed that trainees' motivation to learn the training content stays the same throughout the training program. The current study, however, is an attempt to see if trainees' motivation changes while they learn, and if learning during the early stages of training affects motivation to learn later in training.

This research is based on a model of behavior known as control theory. Control theory suggests that people have various standards or goals for how they want or expect to behave. Actual behavior reflects either peoples' attempts to meet their standards, or they may change their standards (either higher or lower) depending on their success at meeting their goals. This is similar to how a thermostat works in a house. If you want it warmer, you can turn the temperature on the thermostat up. Then, the thermostat works to meet the standard that has been set.

No manipulations or deceptions have been used in this study. Furthermore, while there has been no guarantee, hopefully you have been able to learn something useful and have enjoyed doing it. If you would like to learn more about using WordPerfect, the Computer Information Center can provide more information about courses offered through the Computer Center. If you are interested in learning more about control theory, researchers Charles Carver and Michael Scheier (1981) have written an excellent book, Attention and Self-Regulation: A Control Theory Approach to Human Behavior, published by Springer-Verlag.

Thank you very much for your participation in this study. If you have any questions about this research, please feel free to call Dave McKellin at 3-9400 during business hours.

APPENDIX D

Pretraining Experience Measure

Using the scale below, please rate your current skill level using the following equipment or skills.

1	2	3	4	5
Very low	Low	Moderate	High	Very High

____ 1. Typing on a keyboard, including a typewriter or computer keyboard.

____ 2. Using a computer terminal attached to a remote mini- or mainframe computer.

____ 3. Using a microcomputer (e.g. an IBM personal computer or a MacIntosh).

____ 4. Using a computer word processing package (e.g. Microsoft Word, WordPerfect).

___ 5. Using WordPerfect software to write a document on a computer.

APPENDIX E

Self-efficacy Measures

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

Software Self-Efficacy

___ 1. I have mastered how to learn WordPerfect procedures.

___ 2. I find it difficult to learn new WordPerfect procedures.

___ 3. I am certain that I can learn how to use new WordPerfect procedures.

___ 4. It is just not possible for me to learn new WordPerfect procedures at the level I would like.

___ 5. I think that my performance in learning WordPerfect procedures could be improved substantially.

Computer Self-efficacy

___ 1. I have mastered how to use a microcomputer.

___ 2. I find it difficult to use a microcomputer.

___ 3. I am certain that I can use a microcomputer well.

___ 4. It is just not possible for me to use a microcomputer at the level I would like.

___ 5. I think that my performance in using a microcomputer can be improved substantially.

APPENDIX F

Self-focus

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

___ 1. I'm always trying to figure myself out.
___ 2. Generally, I'm not very aware of myself.
___ 3. I reflect about myself a lot.
___ 4. I'm often the subject of my own fantasies.
___ 5. I never scrutinize myself.
___ 6. I'm generally attentive to my inner feelings.
___ 7. I'm constantly examining my inner motives.
___ 8. I sometimes have the feeling that I'm off somewhere watching myself.
___ 9. I'm alert to changes in my mood.
___ 10. I'm aware of the way my mind works when I work through a problem.
___ 11. I'm concerned about my style of doing things.
___ 12. I'm concerned about the way I present myself.
___ 13. I'm self-conscious about the way I look.
___ 14. I usually worry about making a good impression.
___ 15. One of the last things I do before I leave my house is look in the mirror.
___ 16. I'm concerned about what others think about me.
___ 17. I'm usually aware of my appearance.

APPENDIX G

Learning Measure

The following questions ask about using WordPerfect on an IBM-compatible computer. Read each question carefully and print the appropriate information NEATLY in the blank provided. If you do not know the answer to a particular question, do not guess.

1. The blinking space which shows where you are on a page is called the _____.
2. The bottom line of the screen which has document information is called the _____.
3. To move around the document, whether up and down or side to side, you use the _____ keys.
4. To move up the document a page at a time, you use the _____ key.
5. To move immediately to the far right on a line, you use the _____ key.
6. When you have finished a paragraph and want to move down one line to start the next paragraph, you use the _____ key.
7. The keys on the left side (or along the top) of the main keyboard which are used to give commands are called _____ keys.

To get more variations from the keys which give commands, three keys are used in combination with them. These three are:

8. _____,
9. _____, and
10. _____.

11. To erase a few letters of what you have written, it is easiest to use the _____ key.
12. Before printing a file, it is a good idea to use the _____ function to make sure that everything is set up correctly.
13. If you want to make a list stand out in a document, you can use the _____ function.
14. To avoid using the same word over and over, you can use the _____ to find a substitute word which means the same thing.
15. To avoid spelling mistakes you should use the _____ function.
16. To make sure that your paper is the right length for an assignment, you can use the _____ function.
17. By listing addresses to be combined with a letter, you are creating the _____ file.
18. The process of creating a personalized mailing by combining two files is known as _____.
19. When working on a newsletter, you may wish to insert a graphic to separate the title from the body. This graphic is called a _____.
20. By using the _____, you can make the title of your paper larger.
21. To insert a graphic into your document, you must first define the _____.
22. To make sure your graphic fits in the box, you can change the _____.

APPENDIX H

Learning Attractiveness and Outcome Expectancy

-3	-2	-1	0	1	2	3
Extremely Unattractive			Neither Attractive nor Unattractive			Extremely Attractive

Learning Attractiveness

Please indicate how important or attractive it is to you to learn the following proportions of the overall content being taught in this course. That is, all things considered, how good would you feel about demonstrating that you have learned the following percentages of the overall course content?

How attractive is learning:

0 - 10% of the course content? _____ 51 - 60% of the course content? _____

11 - 20% of the course content? _____ 61 - 70% of the course content? _____

21 - 30% of the course content? _____ 71 - 80% of the course content? _____

31 - 40% of the course content? _____ 81 - 90% of the course content? _____

41 - 50% of the course content? _____ 91 - 100% of the course content? _____

Please indicate how important or attractive it is to you to learn the following proportions of the content being taught in this section of the course. That is, all things considered, how good would you feel about demonstrating that you have learned the following percentages of the content of this section of the course?

How attractive is learning:

0 - 10% of the section content? _____ 51 - 60% of the section content? _____

11 - 20% of the section content? _____ 61 - 70% of the section content? _____

21 - 30% of the section content? _____ 71 - 80% of the section content? _____

31 - 40% of the section content? _____ 81 - 90% of the section content? _____

41 - 50% of the section content? _____ 91 - 100% of the section content? _____

Outcome Expectancy

0 = No chance at all
25 = A slight chance
50 = A 50/50 chance
75 = A good chance
100 = Completely certain

Please indicate below what you think your chances are of learning each percentage level of the overall content in this course. For each question, write down a number between 0 and 100 which best describes what you think the probability is of your learning at least that proportion of the total course content.

What are the chances in 100 that you will learn:

at least 10% of the course content? _____	at least 60% of the course content? _____
at least 20% of the course content? _____	at least 70% of the course content? _____
at least 30% of the course content? _____	at least 80% of the course content? _____
at least 40% of the course content? _____	at least 90% of the course content? _____
at least 50% of the course content? _____	100% of the course content? _____

Please indicate below what you think your chances are of learning each percentage level of the content of this section of the course. For each question, write down a number between 0 and 100 which best describes what you think the probability is of your learning at least that proportion of the content of this section of the course.

What are the chances in 100 that you will learn:

at least 10% of the section content? _____	at least 60% of the section content? _____
at least 20% of the section content? _____	at least 70% of the section content? _____
at least 30% of the section content? _____	at least 80% of the section content? _____
at least 40% of the section content? _____	at least 90% of the section content? _____
at least 50% of the section content? _____	100% of the section content? _____

APPENDIX I

Learning Goal

Please write down a number between 0 and 100 which represents the percentage of the content in this WordPerfect training which you realistically hope to learn. That is, at the end of this training, how much of the overall content of this course do you hope you will know.

____ % of the course content

Please write down a number between 0 and 100 which represents the percentage of the content in this section of the WordPerfect training which you realistically hope to learn. That is, at the end of the section on basic commands, what proportion of the basic commands covered in this course do you hope you will know.

____ % of the content in this section

APPENDIX J

Environmental Favorability

1	2	3	4	5
Strongly Disagree		Neither Disagree nor Agree		Strongly Agree

___ 1. My workload will make it difficult for me to use this training.

___ 2. Friends and colleagues think that this type of training is important.

___ 3. There are external rewards for me to learn this material (e.g. money, course credit).

___ 4. The people I interact with think that learning new skills is useless.

___ 5. Friends and colleagues can be counted on to help me develop my new skills.

___ 6. I will receive recognition and praise if I use these skills in my work.

___ 7. People around me encourage me to learn new things.

___ 8. I have many opportunities to use the skills I am learning in this training.

___ 9. Using this training will help me get ahead in my work.

___ 10. Professors and/or others I do work for support learning these type of skills.

___ 11. Overall, I am in a good position to use what I am learning in this training.

___ 12. The skills presented in this training will be relatively useless for me.

APPENDIX K

Zero-Order Correlations Among Measures

Measures	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Control Variables														
1. Age	19.87	1.95	1.00											
2. Gender	1.40	0.49	.17	1.00										
3. Computer Efficacy: Time 1	14.29	2.97	-.09	.04	1.00									
4. Computer Efficacy: Time 2	14.59	2.77	-.04	-.06	.67	1.00								
5. Computer Efficacy: Time 3	15.42	2.61	-.03	-.06	.60	.80	1.00							
6. Change in Computer Efficacy: Time 2-Time 1	0.30	2.34	.06	-.12	-.47	.34	.19	1.00						
7. Change in Computer Efficacy: Time 3-Time 2	0.49	2.69	.00	.01	-.12	-.38	.25	-.29	1.00					
8. Change in Computer Efficacy: Time 3-Time 1	1.12	2.48	.07	-.13	-.54	.09	.35	.76	.40	1.00				
Pretraining (Time 1) Variables														
9. Experience	13.28	3.81	-.17	.04	.62	.49	.44	-.21	-.09	-.27	1.00			
10. Knowledge: Overall	34.69	13.67	-.09	.01	.26	.31	.28	.04	-.11	-.04	.50	1.00		
11. Knowledge: Section 1	47.09	17.48	-.05	.02	.26	.29	.28	.01	-.07	-.04	.50	.95	1.00	
12. Software Efficacy	15.96	2.36	-.02	.04	.50	.57	.50	.04	-.14	-.05	.55	.27	.23	1.00
13. Environmental Favorability	45.03	5.28	-.07	-.15	.12	.15	.04	.03	-.14	-.07	.22	.02	.01	.26
14. Motivational Force: Overall	59.78	27.18	.02	.03	.03	.04	.00	.02	-.09	-.03	.07	.10	.09	.12
15. Motivational Force: Section 1	59.73	27.65	.02	.03	.06	.07	.05	.00	-.04	-.01	.02	.11	.13	.06
16. Learning Goal: Overall	78.11	16.85	.02	-.12	.14	.11	.08	-.05	-.15	-.18	.27	.17	.16	.25
17. Learning Goal: Section 1	84.09	16.33	.02	-.09	.09	.07	.04	-.03	-.11	-.11	.20	.17	.16	.16
18. Self-Focus	59.93	6.80	-.11	.00	-.01	-.03	-.04	-.02	-.02	-.04	-.02	-.02	-.04	-.02

Measures	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Control Variables															
1. Age															
2. Gender															
3. Computer Efficacy: Time 1															
4. Computer Efficacy: Time 2															
5. Computer Efficacy: Time 3															
6. Change in Computer Efficacy: Time 2-Time 1															
7. Change in Computer Efficacy: Time 3-Time 2															
8. Change in Computer Efficacy: Time 3-Time 1															
Pretraining (Time 1) Variables															
9. Experience															
10. Knowledge: Overall															
11. Knowledge: Section 1															
12. Software Efficacy															
13. Environmental Favorability	1.00														
14. Motivational Force: Overall	.25	1.00													
15. Motivational Force: Section 1	.19	.87	1.00												
16. Learning Goal: Overall	.22	.33	.27	1.00											
17. Learning Goal: Section 1	.24	.33	.31	.72	1.00										
18. Self-Focus	.24	.15	.13	.13	.15	1.00									

Measures	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Mid-Training (Time 2) Variables														
19. Knowledge: Overall	61.58	10.29	-.07	-.11	.24	.33	.24	.09	-.22	-.07	.35	.50	.42	.28
20. Knowledge: Section 1	83.81	11.49	-.03	-.12	.17	.30	.23	.14	-.19	.02	.27	.34	.33	.21
21. Knowledge: Section 2	22.69	14.53	-.09	-.06	.24	.24	.15	-.02	-.18	-.16	.32	.49	.38	.25
22. Knowledge T2-Goal T1 Discrepancy: Overall	-16.52	18.09	-.06	.05	.00	.08	.07	.09	.00	.12	-.04	.13	.09	-.07
23. Knowledge T2-Goal T1 Discrepancy: Section 1	-0.28	17.63	-.03	.01	.03	.13	.11	.12	-.02	.11	.00	.07	.06	-.01
24. Software Efficacy	16.18	2.34	-.04	-.10	.39	.73	.67	.37	-.14	.27	.40	.28	.25	.58
25. Environmental Favorability	44.22	5.71	-.05	-.17	.07	.22	.14	.17	-.13	.08	.15	.02	-.01	.19
26. Motivational Force: Overall	58.28	27.43	-.02	.03	.05	.12	.05	.07	-.13	.01	.06	.13	.10	.15
27. Motivational Force: Section 2	57.51	27.65	-.04	-.01	.06	.12	.04	.06	-.17	-.03	.02	.12	.11	.15
28. Learning Goal: Overall	76.40	16.13	.06	-.06	.21	.28	.26	.08	-.09	.01	.26	.28	.27	.32
29. Learning Goal: Section 2	73.45	19.08	.02	-.02	.19	.31	.28	.12	-.09	.08	.25	.27	.26	.36
Post-Training (Time 3) Measures														
30. Knowledge: Overall	78.56	13.02	-.12	-.20	.29	.39	.30	.09	-.16	-.03	.36	.40	.37	.26
31. Knowledge: Section 2	63.14	19.57	-.12	-.15	.23	.30	.25	.07	-.10	-.01	.32	.37	.36	.25
32. Knowledge T3-Goal T2 Discrepancy: Overall	1.98	16.83	-.15	-.11	.01	.01	-.02	.00	-.03	-.03	.01	.01	-.01	-.13
33. Knowledge T3-Goal T2 Discrepancy: Section 2	-10.68	22.45	-.12	-.11	.05	.00	-.01	-.06	-.01	-.07	.07	.07	.07	.09
34. Software Efficacy	16.61	2.49	-.01	-.07	.39	.63	.76	.25	.16	.35	.38	.19	.19	.49
Change Variables: Time 2-Time 1														
35. Software Efficacy	16.61	2.49	-.03	-.16	-.12	.17	.19	.36	.00	.34	-.17	.01	.02	-.46
36. Environmental Favorability	-0.80	3.32	.02	-.06	-.05	.15	.18	.24	.01	.24	-.08	.02	-.01	-.08
37. Motivational Force: Overall	-1.31	18.12	-.05	-.02	.05	.14	.10	.10	-.09	.06	.00	.06	.05	.06
38. Motivational Force: Section 2-Section 1	-1.85	21.46	-.07	-.05	.02	.12	.00	.11	-.19	-.02	.01	.02	-.01	.12
39. Learning Goal: Overall	-1.71	13.94	.04	.08	.07	.19	.21	.14	.06	.22	-.02	.12	.12	.08
40. Learning Goal: Section 2-Section 1	-10.64	17.79	.01	.06	.13	.27	.26	.16	.01	.18	.09	.13	.13	.24

Measures	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Mid-Training (Time 2) Variables															
19. Knowledge: Overall	.06	.14	.16	.18	.26	-.04	1.00								
20. Knowledge: Section 1	.06	.16	.18	.13	.23	-.10	.87	1.00							
21. Knowledge: Section 2	.03	.05	.06	.18	.19	.05	.74	.32	1.00						
22. Knowledge T2-Goal T1 Discrep.: Overall	-.17	-.23	-.17	-.83	-.53	-.15	.40	.38	.25	1.00					
23. Knowledge T2-Goal T1 Discrep.: Section 1	-.18	-.21	-.17	-.59	-.77	.20	.33	.43	.03	.74	1.00				
24. Software Efficacy	.12	.07	.04	.18	.13	-.02	.36	.32	.25	.04	.09	1.00			
25. Environmental Favorability	.82	.23	.20	.22	.23	.25	.08	.08	.06	-.16	-.16	.24	1.00		
26. Motivational Force: Overall	.17	.78	.73	.29	.28	.10	.19	.19	.10	-.16	-.14	.10	.17	1.00	
27. Motivational Force: Section 2	.13	.73	.70	.27	.26	.07	.20	.19	.13	-.14	-.12	.08	.15	.93	1.00
28. Learning Goal: Overall	.19	.34	.30	.64	.57	.08	.35	.32	.24	-.40	-.32	.37	.22	.40	.35
29. Learning Goal: Section 2	.19	.32	.25	.48	.50	.00	.35	.35	.20	-.25	-.24	.39	.17	.37	.35
Post-Training (Time 3) Measures															
30. Knowledge: Overall	.08	.16	.20	.18	.31	-.01	.78	.80	.44	.30	.25	.38	.09	.15	.16
31. Knowledge: Section 2	.13	.16	.20	.17	.31	.05	.62	.59	.40	.21	.11	.33	.10	.17	.17
32. Knowledge T3-Goal T2 Discrep.: Overall	-.13	-.21	-.15	-.50	-.32	-.10	.25	.30	.07	.62	.50	-.07	-.15	-.27	-.22
33. Knowledge T3-Goal T2 Discrep.: Section 2	-.04	-.11	-.02	-.28	-.17	.03	.23	.22	.13	.40	.31	-.05	-.06	-.14	-.14
34. Software Efficacy	.08	.12	.13	.17	.17	.00	.24	.25	.14	-.01	.01	.76	.20	.11	.08
Change Variables: Time 2-Time 1															
35. Software Efficacy	-.15	-.06	-.03	-.07	-.04	.01	.08	.12	.00	.12	.11	.45	.06	-.06	-.08
36. Environmental Favorability	-.18	.01	.05	.03	.02	.04	.06	.04	.06	.01	.01	.22	.42	.01	.04
37. Motivational Force: Overall	-.12	-.31	-.18	-.04	-.07	-.07	.12	.10	.08	.09	.12	.10	-.08	.35	.32
38. Motivational Force: Section 2-Section 1	-.09	-.16	-.38	.01	-.07	-.09	.09	.05	.10	.04	.10	.11	-.06	.26	.39
39. Learning Goal: Overall	-.05	.00	.02	-.46	-.22	-.07	.19	.23	.06	.54	.35	.21	.00	.12	.07
40. Learning Goal: Section 2-Section 1	-.02	.04	-.01	-.15	-.38	-.14	.14	.16	.04	.22	.46	.30	-.02	.14	.14

Measures	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Mid-Training (Time 2) Variables																
19. Knowledge: Overall																
20. Knowledge: Section 1																
21. Knowledge: Section 2																
22. Knowl. T2-Goal T1 Discrep.: Overall																
23. Knowledge T2-Goal T1 Discrep.: Sect. 1																
24. Software Efficacy																
25. Environmental Favorability																
26. Motivational Force: Overall																
27. Motivational Force: Section 2																
28. Learning Goal: Overall	1.00															
29. Learning Goal: Section 2	.81	1.00														
Post-Training (Time 3) Measures																
30. Knowledge: Overall	.36	.35	1.00													
31. Knowledge: Section 2	.34	.33	.89	1.00												
32. Knowl. T3-Goal T2 Discrep.: Overall	-.69	-.54	.43	.36	1.00											
33. Knowledge T3-Goal T2 Discrep.: Sect. 2	-.42	-.57	.47	.59	.77	1.00										
34. Software Efficacy	.36	.38	.34	.33	-.09	-.04	1.00									
Change Variables: Time 2-Time 1																
35. Software Efficacy	.05	.03	.13	.09	.06	.04	.28	1.00								
36. Environmental Favorability	.08	.00	.03	-.03	-.05	-.04	.23	.33	1.00							
37. Motivational Force: Overall	.13	.11	.02	.04	-.11	-.05	.01	.04	.05	1.00						
38. Motivational Force: Section 2-Section 1	.09	.17	-.04	-.04	-.11	-.18	-.03	-.01	.04	.63	1.00					
39. Learning Goal: Overall	.38	.36	.22	.20	-.22	-.16	.24	.14	.06	.19	.10	1.00				
40. Learning Goal: Section 2-Section 1	.35	.61	.10	.07	-.29	-.46	.26	.06	-.01	.18	.24	.58	1.00			

Measures	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Additional Change Variables														
41. Software Efficacy: Time 3-Time 2	0.44	1.70	.04	.05	.04	-.10	.18	-.16	.43	.14	.00	-.14	-.08	-.07
42. Software Efficacy: Time 3-Time 1	0.65	2.44	.01	-.11	-.08	.10	.29	.21	.30	.40	-.16	-.09	-.04	-.46
43. Knowledge T3-Goal T1 Discrepancy: Overall	0.17	19.08	-.10	-.03	.01	.12	.14	.13	.02	.13	-.01	.09	.08	-.06

$.14 \leq |\, r \,| \leq .18$, $p \leq .05$, two-tailed
$.18 \leq |\, r \,| < .22$, $p \leq .01$, two-tailed
$|\, r \,| \leq .22$, $p \leq .001$, two-tailed

Measures	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Additional Change Variables															
41. Software Efficacy: Time 3-Time 2	-.04	.10	.15	-.02	.05	.03	-.16	-.12	-.16	-.08	-.12	-.28	-.04	.02	.02
42. Software Efficacy: Time 3-Time 1	-.16	.02	.08	-.09	.00	.03	-.04	.04	-.13	.07	.03	.22	.03	-.03	-.06
43. Knowledge T3-Goal T1 Discrepancy: Overall	-.14	-.18	-.12	-.74	-.41	-.13	.37	.44	.11	.91	.67	.09	-.14	-.16	-.15

Measures	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Additional Change Variables																
41. Software Efficacy: Time 3-Time 2	.01	.00	-.04	.02	-.04	.01	.42	-.23	.01	-.14	-.20	.04	-.04	1.00		
42. Software Efficacy: Time 3-Time 1	.04	.04	.09	.10	.03	.05	.54	.73	.30	-.05	-.14	.17	.05	.49	1.00	
43. Knowledge T3-Goal T1 Discrep.: Overall	-.33	-.20	.53	.45	.73	.57	.09	.16	-.02	.03	-.03	.51	.16	.00	.14	1.00

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