Chapter 3

PROPOSED MODEL

Given the results of the C&H study presented in Table 2.1, this dissertation argues that the model suffers from misspecification. Keith (1988) identifies *self-containment,* or the inclusion of all common variables that affect both the cause and the effect constructs in a model, as the final requirement in path analysis. Omission of relevant causal constructs in a model is known as misspecification. In the C&H study, several potentially relevant causal constructs are absent. More precisely, the model is based on the assumption that only *individual* factors (i.e. prior performance, self-efficacy, and outcome expectations) are the prevailing components of actual performance.   Individual factors, however, may not be enough. From decision making literature, Beach and Mitchell (1977) advocate that decision processes are a function of multiple criteria, whereby the solution reached by decision-makers is typically based on a set of evaluated cost/benefit analyses that are functions of the decision task and the decision maker (Einhorn & Hogarth, 1981).

As presented in Chapter 1, Figures 1.2, 1.3, 1.4 and 1.5 illustrate the model to be tested in this proposed study. Inherent in its design is a moderating variable, task complexity, which is explained in the sections that follow.

3.1 JUSTIFICATION FOR A TASK DIMENSION

The C&H model includes attributes that are inherent only to the decision maker. Intuitively, because decision making involves many of the same cognitive processes that

are employed in training (e.g. selection, retention, knowledge, ability, motivation, etc.), it follows that the training model should include task dimensions in addition to individual characteristics.

In the C&H study, task confounds exist throughout the experimental design and analysis. For example, the effects of behavior modeling were analyzed in four separate models: Lotus--Day 1, Lotus--Day 2, Word Perfect--Day 1, and Word Perfect--Day 2. Using these models, an attempt was made to compare the results of Lotus performance with WordPerfect performance to ascertain the effects of behavior modeling. Consequently, this comparison was confounded by the "nature" of the tasks involved. Support was found for behavior modeling on the Lotus tasks but not on the WordPerfect tasks.

For users of information systems who are familiar with WordPerfect and Lotus, it should be apparent that the two packages differ on many dimensions. Word processing involves concepts related to data entry and formatting, whereas spreadsheets involve data entry, formatting, computations, and a vast array of additional, and perhaps more complex, sub-tasks.

To isolate the cause of the inconsistencies in the C&H model, it is intuitively appealing to introduce a moderating variable into the model. That is, if behavior modeling has a significant positive effect in one situation and an equally significant negative effect in a different situation, then some unidentified construct is producing a moderating effect.

Fleishman (1982) suggests the inclusion of task dimensionality as one of several conditions that are known to affect human performance: "To generalize about conditions affecting human performance, we need to consider the properties of *tasks* as important constructs in psychological research and theory and in our conceptions of human work and achievement." [emphasis added]

In his development of a task-system taxonomy, Fleishman is insistent about the importance of considering the measurement and manipulation of task dimensions in the areas of "learning conditions and training methods:"

> Applying the "principles of learning" to training is quite difficult to achieve because there is insufficient information about the categories of human task performance within which different training methods are effective. The problem is to develop a classification system which will match those training techniques found effective with particular categories of skills.

Given the arguments above, it appears that the inclusion of a task dimension in the Social Cognitive Model for Computer Training provides an appropriate starting point for the selection of a moderating variable. As discussed previously, the nature of the tasks examined is a predominant confound in the C&H study. Defining the "nature" of the task, however, involves more than mere selection of an arbitrary task dimension. Word processing and spreadsheet skills differ on many dimensions; therefore, the choice of the specific task characteristic(s) to manipulate must be carefully selected and based strongly on theory as well as observation.

3.2 INCLUSION OF A TASK DIMENSION

Beach and Mitchell (1977) introduce seven task characteristics that are frequently measured and/or manipulated in cognitive studies: familiarity, ambiguity, stability, reversibility, significance, accountability, and time and/or money constraints. In addition to these properties, complexity is the task dimension that has been most often studied and operationalized in cognitive and information systems studies (Zigurs and Buckland, 1998).

3.2.1 Task Complexity

As shown in Table 2.1, C&H found that behavior modeling produced a significant positive effect on spreadsheet performance but had no effect on word processing performance. Further, behavior modeling exhibited a significant positive

effect on computer self-efficacy in the spreadsheet training, but showed a significant **negative** effect on self-efficacy in the word processing training. Intuitively, then, the results found in the C&H study reflect a need to consider a moderator which addresses the difficulty, or complexity, of tasks.

In addition to simple observation, Gist and Mitchell (1992) provide one of the most convincing arguments for including task complexity in the Social Cognitive model:

> The measurement of self-efficacy may be improved through attention to task complexity. Some evidence suggests that the predictive validity of self-efficacy for performance on complex tasks may be weaker than for performance on simple tasks (cf. Stumpf, Brief, and Hartman, 1987; Taylor, Locke, Lee, and Gist, 1984; Wood and Locke, 1987), probably reflecting lower accuracy in assessing task requirements and individual or situational resources or constraints for these tasks.

Gist and Mitchell imply that task complexity serves as a moderating variable between self-efficacy and performance. That is, at low levels of complexity, self-efficacy should exhibit a stronger relationship with actual performance. This seemingly counterintuitive argument is exhibited in the C&H study:

> Interestingly, a stronger relationship was found between self-efficacy and performance for WordPerfect than for Lotus. This may also be related to the issue of familiarity.   Since subjects were more familiar with writing tasks, their self-efficacy judgments would be more fully formed based on prior experiences. As a result, they might be expected to exert a higher degree of influence on performance.   (Compeau & Higgins, 1995)

Although C&H attributed this result to the task dimension known as familiarity, based on Gist and Mitchell's arguments, this result could be equally attributable to the complexity dimension. Thus, given these arguments, the first proposed modification to the C&H model is the inclusion of task complexity as a moderator, which is expected to affect the relationships between behavior modeling and performance, behavior modeling and computer self-efficacy, and self-efficacy and performance.

3.3 SUMMARY OF PROPOSED MODEL MODIFICATIONS

Given the results of the C&H study and the related literature that alludes to a moderating effect of task complexity on performance and self-efficacy, this dissertation examines the Social Cognitive model for computer training with the introduction of task complexity as a moderating variable. This moderator is predicted to affect the relationships between training methods and performance, training methods and self-efficacy, and self-efficacy and performance.