

AGE DIFFERENCES IN THE EFFECT OF SOCIALLY MODELLED EFFICACY  
AND ATTRIBUTIONS ON SELF-EFFICACY AND PERFORMANCE

by

JANE H. MCEWAN

B.A., McMaster University, 1969

M.A., University of British Columbia, 1974

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT

ACCEPTED  
Y OF GRADUATE STUDIES OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

in the Department of Psychology

We accept this dissertation as conforming to the  
required standard.

DEC 29 1989  
DEAN  
[Redacted]  
Dr. David F. Hultsch

[Redacted]  
Dr. Michael A. Hunter

[Redacted]  
Dr. M. Honore France

[Redacted]  
Dr. Ronald A. Honde

[Redacted]  
Dr. Paul M. Baker

[Redacted]  
Dr. Brendan Rule

© JANE HNATIUK MCEWAN, 1989

University of Victoria

All rights reserved. This dissertation may not be reproduced  
in whole or in part, by mimeograph or other means, without  
the permission of the author.


Supervisor: Professor David F. Hultsch


ABSTRACT


This study examined how the cognitive performance of adult women could be influenced by socially modelled efficacy and causal attributions. A 2 X 3 independent groups design was employed, with two age groups and three modelling conditions. Female subjects were exposed to one of three peer models who expressed either efficacy and internal causality of task outcomes, or inefficacy and external causality. The model for the control group made no comments about efficacy or causality. Subjects then completed a logical-reasoning task. Those who experienced the positive model persisted longer on the task than did those in the control group. Hierarchical regression analyses showed that the interaction between the experimental manipulation and subjects' beliefs about their own intellectual efficacy and aging were modestly related to task performance.


Examiners:


  
Dr. David F. Hultsch

  
Dr. Ronald A. Hoppe

  
Dr. Michael A. Hunter

  
Dr. Paul M. Baker

  
Dr. M. Honore France

  
Dr. Brendan Rule

## Table of Contents

Abstract	ii
Table of Contents	iii
List of Tables	vii
Chapter I: Introduction	1
Chapter II: Background	4
Efficacy	4
Non-veridical efficacy expectations	7
Efficacy and performance	9
Efficacy and context	12
Efficacy during adulthood	14
Causal Attributions	16
Dimensionality of attributions	17
Accuracy of attributional reports	21
Attributions and behaviour	22
Attributional retraining	25
Locus of control	27
Age differences and attributions	30
Summary	33
Learned Helplessness	33
The belief component	36
Perceived control	38
Helplessness and aging	40
Observational Learning	41
Vicarious reinforcement	42
Vicariously learned effectiveness	44
Vicarious induction of helplessness	45
The helpless role	45
Vicariously learned noncontingency	46
Social comparison	47
Differences among studies	50
Elders and modelling	52
Age and Aging	56
Chronological age	56
Attitudes toward aging	58
Rationale for the Present Study	60

Chapter III: Method	62
Design	62
Subjects	62
Modelling Conditions	65
Dependent Variables	66
Task performance	67
Efficacy	68
Causal attributions	69
Ratings of task	70
Ratings of model	70
Personality and Attitudinal Measures	70
Personality as related to cognitive performance	70
Attitude toward aging	72
Procedure	73
Chapter IV: Results	75
Plan of the Analysis	75
Treatment of Missing Data	75
Comparability of Treatment Groups	76
Influences on Task Performance	77
Analysis of personality data	80
PIC and AOS questionnaires	80
Attributional ratings	82
Hierarchical regression equations	84
Selection and entry of predictors	85
Predicting efficacy	87
Predicting persistence	90
Predicting number-correct	95
Relationship among performance outcomes	95
Summary of regression results	97
Perceived Efficacy	98
Analysis of the "extra" variable	99

Perception of the Experimental Situation	100
Perception of the task	100
Perception of the model	101
Manipulation checks	101
Review of Key Findings	102
Chapter V: Discussion	104
Modelling Effect	104
Main effect on persistence	105
Mechanisms of the modelling effect	106
Efficacy	106
Task-relevant information	107
Effect of modelling on efficacy	107
Modelling and task achievement	108
Predicted age by treatment interaction	109
Effect of personality on efficacy and performance	110
Intellectual self-confidence	110
Attitude toward aging	111
Causal attributions	111
Relationships Among Performance Variables	111
Change in Efficacy	112
Age Differences	113
Review of Key Findings	113
Implications	114
Noncognitive influences on performance	114
The research setting	115
Competence and performance	116
Directions for Future Research	116
References	119
Appendices	137
Appendix A -- Modelling Transcripts	137
Appendix B -- Questions and Response Options for Measuring Efficacy	140

Appendix C -- Questions and Response Options for Attributional Ratings	141
Appendix D -- Questions and Response for Manipulation Checks	142
Appendix E -- Personal Data Form	143

## List of Tables

Table 1.	Demographic Characteristics of Subjects by Age Group	64
Table 2.	Means and Standard Deviations for Efficacy, Persistence, and Number-Correct, by Age and Modelling Condition	78
Table 3.	Means and Standard Deviations on Questionnaire Scores	81
Table 4.	Principal Component Analysis on PIC Questionnaire Scales	83
Table 5.	Correlations Among Personality Variables	86
Table 6.	Order of Forced Entry for Predictors in Regression Equations	88
Table 7.	Predicting Efficacy -- Predictors That Caused a Significant Increment in R-Squared	89
Table 8.	Predicting Persistence Using PIC Scores -- Predictors That Caused a Significant Increment in R-squared	91
Table 9.	Predicting Persistence Using AOS Scores -- Predictors That Caused a Significant Increment in R-squared	93
Table 10.	Predicting Persistence Using Attributional Ratings -- Predictors That Caused a Significant Increment in R-squared	94
Table 11.	Predicting Number-Correct -- Predictors That Caused a Significant Increment in R-squared	96

## Chapter I: Introduction

Many studies of adult cognition have found that non-cognitive factors are correlated with cognitive performance. These influences include personality factors such as locus of control (Lachman, Steinberg, & Trotter, 1987), emotional state (Cavanaugh & Murphy, 1986), and beliefs such as causal attributions (Mikulincer, 1986). Socio-environmental factors such as the expectations of other persons (Avorn & Langer, 1982) may also affect cognitive performance. These results suggest a holistic view of adult development in which cognition affects and is affected by personality and social context.

The process of intellectual aging does not occur in isolation. The older adult who solves intellectual or cognitive problems also exists in a social milieu and has a unique set of personal characteristics. Thus, to describe, explain, or modify functioning in the cognitive realm in a complete way, these other facets of persons and their environments must be taken into account. (Lachman, 1986c, p. 339).

The goal of the current study is to explore how performance on a cognitive task can be influenced by the individual's socially mediated beliefs about their competence and performance outcomes. This will be done with a view to drawing age comparisons within the adult life span.

This goal is logically consistent with the competence/performance distinction in human behaviour. As proposed by Flavell and Wohlwill (1969), a competence model represents what the person can do in an ideal environment, whereas a performance

model shows the individual's knowledge or skill under the conditions in which humans normally operate. Whereas competence explains the consistency of behaviour across situations, performance or activation/utilization explains variability in behaviour as a result of psychological processes and task or situational factors (Overton & Newman, 1982). The current study examines a performance model of cognitive task behaviour.

If an individual's cognitive performance can be improved by means other than direct training of skills, such as by manipulation of that person's emotional state or their beliefs about the situation, then we can assume that the demonstrated cognitive skill was already present and that the intervention facilitated its utilization. This would be particularly relevant to understanding age-related decrements in cognitive performance, and would support the assertion that such decrements are indicative of a widening gap between competence and performance (Bearison, 1974).

The current study attempted to influence performance on a cognitive task by altering subjects' beliefs about themselves and the performance situation. The two primary areas of interest were: the relationship between personality variables and performance, which was addressed by including measures of locus of control, attitude toward aging, and causal attributions about task outcomes; and the effect of interpersonal influences on performance, which was examined by providing a social model who portrayed task-relevant attitudes and causal attributions. Thus, the study investigated non-cognitive

influences on cognitive performance and is in keeping with the contextual approach to the study of aging.

The practical implications of this approach to cognitive aging are in the area of intervention. The social and attitudinal factors that affect the cognitive performance of older people may be more amenable to cost-effective intervention than are the biological and skill-related aspects of underlying competence.

## Chapter II: Background

In examining influences on cognitive task performance, this study touches on the areas of performance-related personality variables, learned helplessness, and observational learning. In this context, "personality" refers to beliefs that individuals hold about themselves (efficacy) and their circumstances (causal attributions). Both types of beliefs are important to our understanding of performance in achievement settings. The learned-helplessness construct draws upon these types of beliefs as moderators of the development of performance deficits following uncontrollable or aversive outcomes. Research on observational learning suggests that task-relevant beliefs and behaviours can be acquired via exposure to a social model.

### Efficacy

Of all the variables that can influence performance in achievement settings, much research attention has focused on subjects' beliefs about their own performance. These cognitions are seen as moderators of intellectual achievement behaviour, and include beliefs about the self's ability to produce the necessary behaviour and about the causes of experienced outcomes.

"Efficacy" refers to the self's ability to produce behavioural variations; it can be conceived as the self's ability to produce whatever behaviour is necessary in order to achieve desired outcomes. The sense of personal efficacy may include feelings of mastery with respect to the self or the environment, feelings of being able to

cope and adapt successfully, and feelings about effective social role performance. According to Bandura (1977a; 1981), who carried out much of the important work on efficacy, these feelings vary along three dimensions: (a) magnitude (level of difficulty with which the perceiver feels they can cope); (b) generality across situations; and (c) resistance to extinction. Perceived self-efficacy can influence a wide range of behaviours such as choice of situations and activities, task performance behaviours such as persistence, and inner events such as situational appraisals and emotional reactions (Bandura, 1977b, p. 199).

Efficacy expectation, which is an individual's belief in their ability to produce the necessary behaviour, can be distinguished from outcome expectation, which is an individual's belief that predictable contingencies will actually be applied when they produce the necessary behaviour. Strong belief in one type of expectancy does not always imply strong belief in the other type. For example, the individual could achieve a high rate of successful outcomes despite low perceived efficacy, when situational factors or luck produce a large number of desirable outcomes for them. Conversely, they could have high (and realistic) expectancies of their own efficacy, but achieve a low rate of successful outcomes when the environment does not reward their behaviour appropriately. Methodologically, it is difficult to separate the two constructs of efficacy and contingency, and much of the research on efficacy examines this construct with reference to achieved (contingent) outcomes.

Bandura (1977b) suggested that there are four sources of information contributing to one's efficacy beliefs -- "enactive" data (actual successes and failures), vicarious experience, verbal persuasion from credible others, and one's own level of emotional arousal. The impact of information from these sources will depend on how that information is cognitively appraised; thus, we must distinguish between information as conveyed by events, and information as appraised, processed, and integrated into efficacy judgments. Two cognitive processes act on these types of information in order to formulate judgments about efficacy (Bandura, 1981): (a) selective attention and (b) application of heuristics.

First, the informational cues are selectively attended to. Enactive information is acquired through selective attention to various aspects of success and failure experience. However, it is not always acquired accurately. If situational cues cause performance outcomes to be mis-perceived, or to be erroneously attributed to certain causal factors, or if personality variables such as mental set cause similar cognitive errors, then enactive information will be inaccurately perceived. For example, the individual might achieve a high score on a difficult cognitive task, but believe that their score is only average (mis-perception), or may believe that they were lucky or that the task was easy (mis-attribution). These biased beliefs may result from personality predispositions and mood (e.g., Alloy & Abramson, 1979), or they can be situationally induced (Langer, 1979).

Vicarious information is attended to in the same manner as enactive information. Through vicarious experience, the actor can acquire specific behaviours, attitudes, and information about the environment (how difficult the task is, what contingencies are in effect, and so on). Again, this information can be distorted through mis-perception and erroneous attributions. Persuasive communications and arousal information are also subject to these same cognitive distortions.

The second cognitive process in formulating efficacy judgments is the application of heuristics for integrating information and arriving at judgments about efficacy. Bandura (1981) felt that we probably use simple rules of thumb for doing this, because most people have difficulty integrating multi-dimensional information. Therefore, some types of efficacy information will be ignored or inaccurately weighted with reference to the individual's actual performance.

#### Non-Veridical Efficacy Expectations

"Expectations of personal efficacy do not operate as dispositional determinants independently of contextual factors." (Bandura, 1977b, p. 203). These contextual factors can exert a powerful influence on the acquisition of efficacy information and the formation of judgments, resulting in the misperception of competence where it does not actually exist (e.g., Langer & Roth, 1975), and in feelings of incompetence in the presence of actual success experiences (e.g., Langer & Benevento, 1978).

By manipulating the sequence in which subjects achieved 15 "wins" and 15 "losses" while guessing the outcome of a tossed coin, Langer and Roth (1975) were able to influence the subjects' self-rated ability to predict those outcomes. Subjects reported stronger feelings of efficacy as coin-toss-predictors after a sequence in which the wins were clustered near the beginning, than they did after a sequence with the wins clustered near the end. When asked how many correct predictions they had made, those with higher self-rated ability remembered significantly more successes than did the others, although all subjects had been given equal numbers of wins and losses (mis-perception of enactive information). Interestingly, subjects in all three of the experimental groups felt that their performance would improve with practice. This study demonstrates that environmental events can create the illusion of competence, even on a task for which "competence" does not exist.

The illusion of inefficacy was created by Langer and Benevento (1978), who pretested women subjects with a series of math problems, then assigned the labels of "boss" and "assistant" to each of the women working in pairs on an anagram task, with the actual task behaviours being counterbalanced across the label conditions (one person worked on the anagrams while the other person timed her). On a posttest of more math problems, the bosses showed improvement from the pretest, whereas the assistants' performance deteriorated. When asked "how well do you usually do on this type of task?", the bosses rated themselves as high, whereas the assistants rated themselves as

low, thus demonstrating the influence of social contextual factors on perceived efficacy.

### Efficacy and Performance

"When beset with difficulties, people who entertain serious doubts about their capabilities slacken their efforts or give up altogether, whereas those who have a strong sense of efficacy exert greater effort to master the challenges." (Bandura, 1982, p. 123).

A number of studies have shown that those individuals with high expectations of personal efficacy will work harder on tasks than will those with low expectations. This has been demonstrated for such diverse outcomes as memory performance (Lachman et al, 1987), anagrams (Davies & Yates, 1982) compliance with exercise regimens (Ewart, Taylor, Reese, & DeBusk, 1983; Ewart et al., 1986), muscular endurance (Weinberg, Gould, & Jackson, 1979; Weinberg, Yukelson, & Jackson, 1980), social behaviour (Kazdin, 1979), self-regulation of addictive behaviour (Condiotte & Lichtenstein, 1981), career choice (Hackett & Betz, 1981), recovery from agoraphobia (Bandura, Adams, Hardy, & Howells, 1980), and participation in social interaction (Both, Rubin, & Hymel, 1987).

The relationship between efficacy predictions and subsequent performance could occur for several reasons. For example, it could be due to accurate self-assessment, or to the ability to modify performance behaviour in accordance with predicted outcomes (a self-fulfilling prophecy), or to some other factor, perhaps a

personality trait, which is related to both self-assessment and performance.

When the relationship between efficacy and performance increases across trials, or is found to be greater for tasks on which subjects tend to do well (Lachman & Jelalian, 1984), this suggests that some element of "accuracy" is involved in subjects' predictions.

Longitudinal studies of cognitive ability and efficacy during adulthood (Lachman, 1983; Lachman & Leff, 1988) indicate that changes in efficacy are consequents, not antecedents, of changes in perceived intellectual functioning. However, this does not rule out the possibility that these changes in perceived efficacy could serve to enhance or limit subsequent task behaviour.

Some of the research on treatment of phobic avoidance demonstrates the close relationship between efficacy beliefs and subsequent performance. Snake phobics were given systematic desensitization (Bandura & Adams, 1977) and either enactive or vicarious treatment to increase their approach behaviour (Bandura, Adams, & Beyer, 1977). On post-treatment tasks they showed substantial congruence, ranging from 74% to 84%, between their stated efficacy and their actual performance on each task. Efficacy proved to be a stronger predictor of behaviour than was recent performance on the tasks, as has been demonstrated in other studies (Bandura, Reese, & Adams, 1982; DiClemente, 1981), indicating that the perceived efficacy can be a more powerful influence on subsequent behaviour than is actual efficacy.

Many of the Bandura et al. (1977) subjects showed partial mastery rather than complete mastery of all of the assessment tasks, suggesting that there were inter-individual differences among subjects who had mastered the same block of tasks, with respect to whether they mastered the next, more difficult, block. The finding that different efficacy expectancies can result from similar mastery experiences suggests that efficacy is multiply determined, and that individual cognitive processing is involved.

"Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active the efforts." (Bandura, 1977b, p.194). The role of intended effort in mediating between efficacy and performance was studied by Pyszczynski and Greenberg (1983). Using an ego-relevant cognitive task, they found that young women's efficacy beliefs (based on "practice" problems) were related to the amount of intended effort that the subjects reported they would expend on subsequent tasks. Those who believed their chances of success were low reported lower intended effort than did those who believed their chances were high. However, a major drawback of this study is that actual effort was not measured. Efficacy has also been found to be related to the level of goal-setting, and to goal commitment (Locke, Frederick, Lee, & Bobko, 1984).

### Efficacy and Context

Because efficacy beliefs are multiply determined and can be influenced by the social environment, it is important to consider the interpersonal context in which these beliefs are formed.

One aspect of this social context is the existence of negative stereotypes that include references to competence. For example, Bandura (1981) reviewed studies that show that young girls view themselves as less efficacious than boys on stereotypically male tasks. If this can occur with children and gender-role stereotypes, then it might also occur with other age groups and other stereotypes such as those based on age or on work roles (e.g., Langer & Benevento, 1978; Langer & Imber, 1979). "Given that stereotypes and social labels are in a sense simply summaries of cultural expectations, such expectations might be assumed to affect all members of the culture, including those about whom the labels are held." (Rodin & Langer, 1980, p. 13). In this case, those older adults who accept an age-related stereotype that includes incompetence might well believe that their efficacy is limited because of their age. Kuypers and Bengtson (1973) have suggested that the individual's sense of efficacy is a function of the kinds of social labelling and valuing which he experiences as he ages. Given the ageist nature of our social system, older individuals may be open to external influences that label and define them, and contain negative messages about efficacy.

A second aspect of the social context that could affect efficacy beliefs is the reaction of others to one's self. If we treat older adults as if they are incompetent (e.g., Avorn & Langer, 1982; see also Fazio, Effrein, & Falendar, 1981) or put them into a subordinate low-status role (Langer & Benevento, 1978; Langer & Imber, 1979), then this could affect the efficacy beliefs and behaviour of those adults. Research on social perception (Langer & Abelson, 1974; Snyder & Swann, 1978; Snyder, Tanke, & Berscheid, 1977) shows that the label which is applied to the target person will influence how we perceive and react to that person. Moreover, the labelled person will often provide behavioural confirmation of our expectations of them (Snyder, 1981; Snyder & Swann, 1978; Snyder, Tanke, & Berscheid, 1977), especially when they are uncertain of their self-concept (Swann & Ely, 1984). They will then perceive their own behaviour and may interpret it as a sign of internal disposition rather than of situational factors (Darley & Fazio, 1980). So, if we label older people in a way which implies incompetence, we may perceive them as such. They may then behave in a manner which confirms our perceptions, and ultimately may view their own behaviour as indicative of actual incompetence.

A third issue has to do with social comparison as a basis of efficacy judgments. According to social comparison theory (Festinger, 1954; Suls, 1977), the self is postulated to be relativistic in nature. Because uncertainty about the self is aversive, we make comparisons with other people when we lack

objective standards of performance and correctness. One of the functions of this process is to evaluate the self with respect to the relative desirability or relative amount of a particular attribute that we possess. As Suls and Mullen (1982) have pointed out, these comparisons can be temporal (comparing to one's previous accomplishments), or with similar others (one's age peers), or with dissimilar others (younger adults). By using these three different points of reference, one might end up with three different decisions about one's own efficacy. Comparisons with others who are apparently superior to one's self can lead to lowered efficacy and to reduction of actual effort expended on tasks (Weinberg, Gould, & Jackson, 1979; Weinberg, Yukelson, & Jackson, 1980).

#### Efficacy During Adulthood

The experience of efficacy may become more differentiated and domain-specific as we age. The biological aspects of normal aging could diminish some types of success experiences, such as athletic achievements, whereas the accumulated experience of a lifetime could enhance such abilities as social skills and wisdom. Lachman's work (1986a; 1986b) on the experience of personal control among elders suggests that one's sense of control over outcomes does indeed become more specific to the domain of endeavour as we age.

Our sense of efficacy may be challenged during the progression through adulthood. Rapid technological and social changes make new demands on our capabilities, and require that we develop new skills in order to cope with the world. Failure to keep up with these

changes could lead to lower perceived efficacy. In the occupational setting, we must compete with increasingly younger challengers, many of whom have more recent training and perhaps a more contemporary attitude toward the job. Also, normal age-related changes in physical and intellectual capacities may cause feelings of lowered self-efficacy. There is evidence that older adults have lower intellectual performance expectations than do younger adults (Hurlbut, 1988; Prohaska, Parham, & Teitelman, 1984; Willis & Schaie, 1986). These age differences could reflect actual changes in the individual's functioning (Lachman, 1983; Lachman & Leff, 1988), but could also reflect cohort differences in self-assessment.

Bandura (1981) and Kuypers and Bengtson (1973) have suggested that declines in perceived efficacy could lead individuals to curtail their range of activities, and to reduce the effort expended on those activities that are still attempted. The result could be reduced levels of enactive efficacy information and actual atrophy of unused skills, both of which could lead to further decreases in perceived efficacy. Individuals who over-estimate their efficacy could attempt activities which are well beyond their capability, and thereby experience repeated failures which would be demoralizing and could reduce their motivation to attempt other challenges.

Many studies have shown that efficacy beliefs can be influenced by social and contextual factors, and can be biased by misattribution of veridical information. Social and contextual factors could have a damaging effect on the perceived efficacy of older adults by

undermining self-esteem (Kuypers & Bengtson, 1973; Rodin & Langer, 1980), thus biasing the cognitive processes through which efficacy is judged. Moreover, these factors could also cause success experiences to be attributed to luck or situational characteristics, while failure experiences are attributed to irreversible age-related deterioration; the result would be that elders perceive themselves to be less competent than their performance indicates. Whether reductions in perceived efficacy are the result of actual experiences or are mis-perceptions resulting from the factors previously mentioned, they can have a damaging effect on the performance undertakings and outcomes of older individuals. The important point to remember is that it is one's beliefs about self-efficacy that appear to be associated with subsequent performance.

#### Causal Attributions

The frequent references to "belief" in the discussion of efficacy suggest that there is a strong cognitive element in the concept of efficacy. This cognitive element can be researched by examining the causal attributions that individuals make for their performance outcomes. Thus, attributions can be viewed as one means by which efficacy expectations affect subsequent behaviour. However, causal attributions are not the same thing as efficacy. They emphasize causality of outcomes, not just the self's ability to produce behavioural variations.

### Dimensionality of Attributions

Most of the research on causal attributions is in the area of achievement attributions. Weiner (1974; Weiner et al., 1971) proposed a 2 x 2 matrix for classifying and structuring the perceiver's explanations for achievement outcomes; the two orthogonal dimensions are locus of causality (internal or external) and stability of causal factors over time (stable or unstable). The four resulting cells contain attributions to ability (internal/stable), effort (internal/unstable), task characteristics (external/stable) and luck (external/unstable).

Although this taxonomy has been used extensively in research on attributional style and its relationship to subsequent behaviour, there is some question about whether the four cells (ability, effort, task, and luck) accurately reflect the subject's phenomenological experience. For example, effort may be perceived as either stable or unstable, and luck may be seen as either internal (intrinsic to the person) or external. In his more recent work, Weiner (1983) has suggested that a dimensional classification of attributions would allow for individual differences in phenomenological field. Depending on the individual's perspective, almost any cause could be perceived as stable, or as unstable. Previously, Miller and Norman (1979) suggested that the dimensions of causality are continuous rather than dichotomous, such that, for example, effort might be more stable than luck, but less stable than ability.

To examine the representational accuracy of Weiner's four cells, Ronis and his colleagues (Ronis, Hansen, & O'Leary, 1983) compared two systems of making attributional ratings. The "direct" method had subjects rate causes on the two dimensions of locus ("due to something inside/outside of myself") and stability ("due to something stable/unstable"), and the "indirect" method had subjects make attributions to the four causes used in the Weiner taxonomy, with scores for locus and stability being statistically derived from these attributions. They found modest correlations (ranging between .3 and .58) between the direct and indirect measures of locus, but no relationship between any of the four taxonomic cells and the direct measure of stability. This finding suggests that attributions made to the four specific causes are not necessarily the same as attributions made to the two dimensions of causality.

A related problem is that we do not understand how the dimensional characteristics of an attribution are related to that attribute's behavioural correlates. For example, if we find that subjects who make effort attributions subsequently work harder on a task than those who make ability attributions, is this because of the instability of effort, or its controllability, or some other quality which differentiates effort and ability?

There is some question about whether the two dimensions originally proposed by Weiner are the same as those conceptualized by naive psychologists in explaining success and failure. Falbo and Beck (1979) asked their subjects open-ended questions to obtain

attributions for why workers in various occupations would be successful or unsuccessful at getting their job done. The resulting 2,495 explanations were categorized according to the four cells used by Weiner, and separate multi-dimensional scaling was done on the explanations for success and on those for failure. Only 23% of the explanations could be classified into the four taxonomic cells. There was little correspondence between explanations for success and those for failure, and a three-dimensional factor-analytic solution accounted for most of the variance for each of the two outcomes. The authors concluded that people use different dimensions for explaining the causes of success and failure, and that there are basic asymmetries in how they process information about each outcome. However, a major criticism of this study is that the behavioural domain of interest was job performance, whereas Weiner's work focused on the domain of task (especially cognitive) achievement. Yet, the results do raise the possibility that each motivational concern has its own set of causal dimensions and beliefs.

During the past ten years, researchers have added dimensions to those of internality and stability. Variously, these are controllability, globality, or task importance, and all dimensions are hypothesized to be conceptually orthogonal. Weiner (1983; 1985) conceptualized the dimension of controllability as the extent to which causes are perceived to be under the actor's volitional control. For example, one person may feel that the amount of effort they expend on a task is determined by their personality structure

(and therefore not controllable by them), whereas another may feel that their effort is entirely a matter of conscious choice. Similarly, one may believe that luck is not controllable, whereas another insists that the use of appropriate charms and rituals will make it controllable.

Researchers in the area of learned helplessness use a different framework for studying attributions. They use attributions to explain and predict response deficits resulting from exposure to uncontrollable events (outcomes which are independent of the actor's behaviour). They accept the locus and stability dimensions of causality and add a third, that of globality/specificity (Abramson, Seligman, & Teasdale, 1978; Pasahow, West, & Boroto, 1982). This dimension describes whether causal factors affect a wide variety of outcomes, or are unique to the uncontrollable event, and determines whether expectancies resulting from one situation will transfer to other situations (Alloy, Peterson, Abramson, & Seligman, 1984). For example, if a student does poorly on a math test, he can decide that "this prof always gives unfair math tests" (external/stable/specific attribution) or that "all profs always give unfair tests" (external/stable/global attribution). For these researchers, the attribution predicts when expectancies of uncontrollability will occur, and those expectancies determine the occurrence of response deficits or behavioural outcomes (Abramson et al., 1978, p. 59).

Another possible dimension, that of task importance, was proposed by Miller and Norman (1979) based on their work with the

attributional model of learned helplessness. They proposed that if the task is perceived as important to the subject (for example, if it purports to measure intelligence), then we are more likely to find helplessness deficits than if the task is unimportant. The authors theorize that this dimension affects the magnitude of helplessness deficits.

Although these various dimensions are postulated to be orthogonal to one another, there is some question about their independence (Mikulincer, 1986; Peterson, Semmel, Von Baeyer, & Abramson, 1982). It may be worthwhile manipulating each dimension while holding the others constant, although trying to study each dimension as an isolated entity would lead to inconsistent relationships between attributions and helplessness to the extent that these exert a joint influence.

#### Accuracy of Attributional Reports

There has been much debate about the accuracy of our self-reported cognitive processes (e.g., Nisbett & Wilson, 1977; Sabini & Silver, 1981; Smith & Miller, 1978). Discussion has centred on the necessary and sufficient preconditions required to access and describe our causal thinking, on our awareness of both effective stimuli and our own inner processes, and on possible systematic biases in our reports. In a review of such biases, Greenwald (1980) identified two factors that can lead to erroneous attributional reports. "Cognitive conservatism" refers to the tendency to use whatever information is consistent with our pre-existing beliefs and

judgments (Nisbett & Wilson, 1977), and "beneffectance" refers to taking credit for success and denying responsibility for failure. Weary and Arkin (1981) suggest that causal judgments that are presented to others could be influenced by several social psychological factors, such as social norms or the presenter's interaction goals; for example, attributions could be used to protect or enhance the presenter's self-esteem (Snyder, Stephan, & Rosenfield, 1978).

### Attributions and Behaviour

There are two designs commonly used to study the relationship between attributions and behavioural outcomes -- correlation and manipulation.

In a typical study using the correlational design (e.g., Raps, Peterson, Reinhard, Abramson, & Seligman, 1982), subjects who differ on behavioural variables such as depression or task persistence are given a list of attributional statements and asked to endorse the appropriate ones. Alternatively, they may be asked open-ended questions about their experience of causality, and their responses are classified according to the taxonomy. The predominant finding is a modest relationship between individuals' beliefs about the causes of their success or failures, and their mood or behaviour (e.g., Andrews & Debus, 1978). Performance deficits, depression, and feelings of uncontrollability are associated with successes being attributed to external factors and with failures being attributed to lack of ability (Diener & Dweck, 1978; 1980). Attributions to stable

causes are associated with the expectancy that past outcomes will be repeated in the future, whereas attributions to unstable causes are not associated with this expectancy.

The pattern of internal/stable/global attributions for negative outcomes is associated with depression, whereas the same pattern for positive outcomes is associated with higher expectations of success and increased effort on tasks (Raps et al., 1982; Peterson et al., 1982; Seligman, Abramson, Semmel, Von Baeyer, 1979; Seligman & Schulman, 1986). Correlational studies of attributions and task performance with children have been especially compelling (Diener & Dweck, 1978; Dweck & Wortman, 1982), and research with adults has also shown that specific attributional patterns are associated with intellectual task performance (Lachman et al., 1987).

When experimental manipulation is used, subjects are given attributions for an experimentally manipulated uncontrollable situation, and subsequent response deficits are measured (e.g., Hanusa & Schulz, 1977; Pasahow, 1980). Subjects who are given attributions to strategy and effort typically outperform those who are given attributions to ability (e.g., Anderson, 1983). Those who are given internal/stable/global attributions for uncontrollable aversive outcomes are more likely than others to show subsequent behavioural deficits (e.g., Miller & Norman, 1981). A major drawback of this paradigm is that subjects might be given causal attributions that are inconsistent with their life experience, or with the structure of the experiment. For example, on a task on which success

is obviously effort-related, one group could be told that their success depends on luck. Although Festinger's (1954) consistency theory postulates that information that is inconsistent with one's own attitude is likely to be rejected, there is some evidence to suggest that an attributional manipulation can overcome pre-existing differences among subjects in attributional style (Anderson, 1983).

One weakness in the research on the attribution-behaviour relationship is that some subjects do not normally make spontaneous attributions (e.g., Diener & Dweck, 1978), and others only re-state their performance outcomes when asked for attributions (Hanusa & Schulz, 1977). The attributions that are elicited from subjects by questioning during research could simply be reactions to the experimenter's probing, or, they could be reactions to the subject's own performance, rather than causes of that performance (Covington & Omelich, 1979). Munton (1986) has suggested that rather than being distinct, stable mental entities, attributions are a product of interaction between person and environment. Thus, retrospective attributions can be different from those made at the time of the event (Moore, Sherrod, Liu, & Underwood, 1979).

Another weakness in many studies is that only one attribution is elicited or examined for each outcome. If behaviour is influenced by multiple attributions or by the pattern of attributions, we must allow for this when collecting data. The first or "most important" causal factor identified by subjects might not be the one which is statistically the most powerful predictor. Also, neither subjects

nor experimenters always distinguish between prior and immediate causes (Wortman & Dintzer, 1978). For example, two subjects may attribute their performance to their level of effort, which was determined by their ability ("I tried extra hard because I don't have much ability."); one would name "effort" as the causal factor, while the other would name "ability".

Despite these problematic areas in the research on attributions, we still find abundant evidence of a relationship between one's attributional beliefs/statements and task behaviour. This relationship is clearly seen in the research on attributional retraining.

#### Attributional Retraining

Research on attributional retraining focusses on providing the subjects with specific attributions that are intended to enhance behavioural outcomes. It is important to note that retraining studies do not attempt to engender realistic attributions, but only to teach those attributions believed to be useful in the achievement of specific outcomes. Many retraining studies are flawed (Forsterling, 1985) because either they use the same attributions for both success and failure (recall Falbo and Beck, 1979), or they examine only one outcome rather than both. Consequently, making any comparisons across studies is difficult. Intervention is usually task-specific and typically emphasizes to subjects that failure is due to lack of effort, which is an internal, unstable, and controllable cause. A wide variety of techniques have been used to

change subjects' attributions (see Forsterling, 1985, for a complete review). They include operant reinforcement of desired attributions, outright persuasion by the investigators, the provision of attribution-relevant information, and even mis-attribution (e.g., Weiner & Sierad, 1975).

Many dependent variables have been used in retraining studies. When attributions themselves are assessed as outcomes, the usual finding is that those which are specific to the task will change, but more generalized attributions do not change (e.g., Andrews & Debus, 1978; Fowler & Peterson, 1981).

Dependent variables such as changes in self-efficacy and in expectancy of success indicate that retraining is effective (e.g., Anderson, 1983; Schunk, 1982; 1983; 1984; Wilson & Linville, 1985). Measures of task persistence and achievement also yield positive results for attributional retraining (e.g., Anderson, 1983; Fowler & Peterson, 1981; Medway & Venino, 1982; Sowa and Burks, 1983; Wilson & Linville, 1985). Retrained subjects work harder at tasks, even at unsolvable problems, and achieve higher performance scores than do untreated subjects.

Attributional retraining can change expectancies of success and self-efficacy, and actual task behaviour, even if general attributional habits do not change. This suggests that one moderator of performance is the individual's beliefs about how their own characteristics and behaviour are causally related to specific

outcomes. It also suggests that this type of retraining is a potentially useful tool for enhancing cognitive performance.

### Locus of Control

One causal dimension -- that of controllability -- is related to the concept of locus of control, which has received a great deal of research attention.

The concept of Locus of Control (LOC) originated from research on how reinforcements could change expectancies (Rotter, 1954; 1966). At first, LOC was considered as an abstraction that was based on the individual's perception of causal sequences of events. However, following extensive research, LOC has come to be treated as a trait variable, with individuals being labelled as Internals and Externals according to their beliefs about control. "Internals" believe that they can control or influence the outcomes which they experience, whereas "externals" believe their outcomes are influenced by forces outside of themselves, such as luck, fate, or other people.

Locus of control may affect task outcomes through its relationship with mental ability, specific performance behaviours, and susceptibility to contextual influences.

There is a modest relationship between internality and psychometric mental ability (Brown & Granick, 1983; Lachman, Baltes, Nesselroade, & Willis, 1982; Powell & Centa, 1972; Tiffany, Tiffany, Camp, & Dey, 1984). This relationship increases when domain-specific measures of LOC are used (Lachman, 1986a; Lachman et al., 1982),

suggesting that the relationship is due to cognitive style or domain-specific behaviours rather than native ability.

A person who believes he can control his reinforcers will likely alter his behaviour in order to affect the occurrence of those reinforcers. However, if reinforcers are not perceived as controllable, then behaviour is unlikely to change in response to feedback or reinforcing events. Thus, internals and externals should have different styles of responding to cognitive tasks, and should make different attributions for their performance. (For reviews of the locus of control construct in relation to achievement behaviour and cognitive activity, the reader is referred to Ryckman, 1979, and Lefcourt, 1982). In general, internals appear to be more functional than externals in assessing the achievement situation, and in assimilating and utilizing the available information.

Internals make higher predictions of memory performance than do externals (Lachman et al., 1987), score higher on memory tasks (Dixon & Hultsch, 1983), and show positive changes in self-efficacy in response to task success (Lachman, 1983), suggesting that they view performance feedback as being relevant.

The nature of the task is also important in the relationship between locus of control and performance. In general, subjects are slower to learn a chance-determined task than a skill-determined one (Hiroto, 1974). Internals in particular make more errors on tasks they believe are chance-determined (Watson & Baumal, 1967), and have higher goals on tasks that are skill-determined (Betts, 1982).

Externals are more error-prone in the skill condition (Watson & Baumal, 1967). These results suggest that internals may experience a greater "person-environment fit" than do externals on skill-determined tasks -- greater congruence between their usual approach to tasks, and the structure of the particular task.

Internality has also been associated with factors indicative of general psychological well-being, such as self-efficacy (Sherer et al., 1982), self-esteem (Gergen & Gergen, 1986; Hunter, Linn, Harris, & Pratt, 1980; Knoop, 1981), life satisfaction, morale (Brown & Granick, 1983; Ryden, 1984) and lack of alienation (Knoop, 1981). The correlation between internality and these factors may increase with age (Knoop, 1981). The relationship with self-esteem is important because subjects with high self-esteem tend to show a self-serving attributional bias, whereas those with low self-esteem lack this bias. Moreover, like externals, subjects with low self-esteem tend to work harder on chance-determined tasks than on skill-determined tasks. (For a review of this literature, see Ickes & Layden, 1978). Externals are more influenced by subtle persuasion and prestigious sources of social influence than are internals (Lefcourt, 1976), although this may reflect a tendency to conform in order to be liked, rather than a tendency to look to others for information and advice (Spector, 1983).

### Age Differences and Attributions

Studies of adult age differences in attributions frequently find an effect for chronological age of either the perceived stimulus person or the attributor.

Studies of causal attributions made for the performance outcomes of a stimulus person (Banziger & Drevenstedt, 1982; Reno, 1979) have shown that the perceived chronological age of the stimulus person is a salient variable for making differential judgments concerning the causality of success and failure of that person. Typically, failures by older targets are attributed to age or to lack of ability, whereas failures by younger targets are attributed to lack of effort, and these effects are shown by both young and old subjects. In the absence of individuating information, we develop category-based expectancies about the target's behaviour, according to our knowledge about their membership in a particular reference group (Shaver, 1979). However, these studies have used an observer paradigm in which attributions are made for someone other than the self, and there is evidence that self-attributions may differ from other-attributions (Watson, 1982).

Studies in which elders make ascriptions for their own performance yield slightly different results. Lachman and McArthur (1986) had both young and older adult judges make attributions for their own performance outcomes and for those of either age-peers or non-peers. The outcomes covered a variety of cognitive, physical, and social domains. Elderly targets received significantly more

unflattering attributions for performance than did the young targets. However, attributions by the elderly for their own and age-peers' performance showed a more positive view -- ability was more likely to be a cause of good performance, than inability was of poor performance. These findings echo those of Lachman and Jelalian (1984), who reported that the elderly made internal/stable attributions for both their success and failure on a test on which that group as a whole did well, but showed the same self-serving attributional bias as did younger subjects on a test on which their group did poorly.

A study of manipulated causal attributions and their relationship to one's own performance after failure induction (Prohaska et al., 1984) compared two age groups of women across three conditions of causal ascription (ability, effort, or no ascription) and two conditions of feedback (25% correct, or no feedback). The authors found a facilitation effect for elders using effort attributions, such that this group performed better than did those in the "ability" and "no ascription" conditions. In contrast, the no-attribution condition yielded the highest performance for the younger adults. In the no-feedback condition, the younger subjects increased their effort whereas the elders decreased theirs. Thus, in the absence of information about their own achievement, younger subjects worked harder (perhaps assuming that they were effective) whereas older subjects reduced their effort (perhaps assuming that they were ineffective).

In general, these studies suggest that chronological age is a salient variable moderating attributions for causality of a target's outcomes, and that there may be cross-sectional differences between young and old adults in terms of how they ascribe causality to their own outcomes. Elders tend to use ability attributions for their outcomes, whereas younger subjects attribute their success to ability and their failure to lack of effort.

Studying attributional processes among elders is important because when individuals perceive age-related decrements in their own competence, they may use attributions to "explain" these changes. If these changes are attributed as being within the person, irreversible, and affecting most domains of life (attribution of negative outcomes to internal, stable, and global factors) the result could be poor morale, decreased task persistence, and consequently poorer performance. The research on efficacy and performance is consistent with this formulation. Studies reviewed thus far indicate that task performance is moderated by the subject's beliefs (either true or erroneous) about their ability and about how their outcomes are caused. The ease with which attributions can be altered, with consequent improvements in performance, suggests that belief systems are a fruitful area of research in cognitive intervention.

For older people, there may also be consequences of attributions in areas other than task performance. A non-cognitive aspect of retraining was shown by Rodin and Langer (1980), who provided non-age-related attributions for residents in a nursing home. The

residents' explanations for their own feelings and behaviour were refocussed onto plausible environmental factors; for example, they were told that "the floors are slippery -- even young people slip on them". The result of this intervention was that the treated residents showed improved health and sociability in comparison to untreated controls. Thus, attributions can affect the emotional and social areas of functioning as well as the intellectual.

### Summary

Studies reviewed thus far relate to three aspects of individuals' beliefs about their competence and about how their outcomes are controlled. Self-efficacy is the person's belief in their ability to produce behavioural variations. It is related to task performance, possibly as an accurate assessment of performance capability, or possibly as a self-fulfilling prophecy. Causal attributions are the cognitions that we use to explain the causality of our outcomes. These beliefs may vary on dimensions such as internality and stability, and they are related to performance variables including persistence and achievement. Locus of control refers to the person's beliefs about how their outcomes or reinforcers are controlled, and these beliefs, too, are related to task behaviour.

### Learned Helplessness

Having examined individuals' beliefs about their competence and about how their outcomes are controlled, we turn now to a phenomenon

in which these cognitions are associated with behavioural deficits -- that of learned helplessness.

The construct of learned helplessness was originally intended to explain response deficits occurring after a subject was exposed to uncontrollable aversive stimulation (Overmier & Seligman, 1967; Seligman & Maier, 1967). Subsequently, it has been expanded to include deficits resulting from uncontrollability of nonaversive events (noncontingency and unpredictability of outcomes), and from repeated failure experiences. The essence of the concept is that the "helpless" individual does not experience a predictable or controllable relationship between his behaviour (trying to avoid aversive stimuli, or trying to achieve success on a task) and its consequences.

In a typical study, subjects are given an induction task (usually either escape learning or problem-solving) on which they experience either failure or noncontingency between their behaviour and their outcomes. Then, they do a similar test task and their performance is evaluated for evidence of helplessness. Common dependent variables on the test task are response latency, number of correct responses, trials to criterion, and affective measures. After helplessness has been learned, there are typically three types of deficits observed (Maier & Seligman, 1976; Seligman, 1975): motivational deficits are indicated by slowness to initiate voluntary responses; cognitive deficits are shown by slowness in learning effective responses once contingency is restored; emotional deficits

include such symptoms as passivity and depressed affect. One problem in the research on helplessness is that the effect is usually treated as a unitary phenomenon, not as a heterogeneous group of deficits. Yet, it is possible for one type of deficit to occur in the absence of others. For example, Oakes and Curtis (1982) found that subjects in their noncontingent-outcome group showed impaired task performance but no affective reactions to the helplessness manipulation. Other types of responses to induced helplessness, such as aggression and increased striving for control of the situation, are also noted but they are inconsistent with the hypothesis of learned helplessness. For a discussion of these "reactance" outcomes, see Brehm (1966; 1972) and Wortman and Brehm (1975).

Because most studies of learned helplessness use exposure to either aversive events or repeated failure as the manipulated stimulus, this raises the question of whether the experimental effect results simply from exposure to undesirable outcomes. Yet, the same helplessness effect can occur when positive reinforcement is presented noncontingently (Buys & Winefield, 1982; Oakes & Curtis, 1982; Tennen, Gillen, & Drum, 1982), suggesting that noncontingency or uncontrollability of outcomes is an important antecedent of the helplessness effect. However, noncontingent positive outcomes do not always result in helplessness (Koller & Kaplan, 1978; Sergent & Lambert, 1979). The conflicting studies suggest that uncontrollability of outcomes is a sufficient cause of learned

helplessness, but that more research is needed to determine whether it is a necessary cause.

### The Belief Component

The key ingredient in the learned-helplessness hypothesis is that the expectation of noncontingency is what causes the response deficits. That is, subjects have experience or information indicating that there is no contingent relationship between their behaviour and subsequent outcomes (objective noncontingency), which generates an expectancy of future noncontingency, which in turn leads to response deficits. The theory has been developed to include additional cognitive elements with this three-stage model in an effort to explain the mechanism of helplessness. The reformulations by Abramson et al. (1978) and by Miller and Norman (1979) provide two additional cognitive elements, such that objective noncontingency leads to the perception of past and present noncontingency, which leads to attributions about the situation, which lead to the expectation of future noncontingency, which causes the deficits. The reformulation by Roth (1980) is essentially the same, but omits the attribution phase, so that perceived noncontingency leads directly to expectation of future noncontingency.

Although these models emphasize cognitive processes, the helplessness effect can occur when the subjects do not cognize the noncontingency between behaviour and outcomes (Oakes & Curtis, 1982; Sergent & Lambert, 1979). Such studies alert us to a common flaw in the helplessness research -- separate cognitive components of the

model are not adequately assessed (Alloy, 1982). Perception of contingency/noncontingency and expectations of future contingency are seldom tapped, and attributions are usually assessed only via a single question or the use of a restrictive taxonomy instead of by ratings on continuous dimensions.

In the reformulations that include attributions (Abramson et al., 1978; Miller & Norman, 1979), the attributions determine what type of expectation is formed, and thereby influence the type of deficits that occur. For example, an attribution to global factors predicts that expectations of noncontingency will recur even when the situation changes, but an attribution to specific factors predicts that the expectations will be particular to the current situation. An attribution to stable factors suggests that the expectations will recur across time, whereas an attribution to unstable factors suggests that the expectations will not necessarily recur.

If attributions were important moderators of the helplessness effect, then the deficits resulting from a helplessness manipulation should be preventable by altering the subject's attributions. Koller and Kaplan (1978) and Oakes and Curtis (1982) were able to prevent performance deficits by telling subjects that there had been no response-outcome contingency during the training phase of the study. Other researchers have achieved similar effects by giving subjects attributions to task difficulty (Wortman, Panciera, Shusterman, & Hibscher, 1975), to task effort (Diener & Dweck, 1978), and to environmental factors (Rodin & Langer, 1980).

### Perceived Control

Because control of reinforcement is a crucial concept in both locus of control and learned helplessness, we may expect that subjects with an external locus of control would be especially susceptible to helplessness manipulations, whereas internals would be more persistent (Haines, McGrath, & Pirot, 1980). For example, Hiroto (1974) found that externals were more impaired than internals on a helplessness induction using aversive (escapable or non-escapable) noise. However, the relationship between LOC and helplessness may vary with task and situational factors.

In a study by Pittman and Pittman (1979), two levels of helplessness were determined by the amount of noncontingent feedback given and the proportion of it that was negative. Internals in the low helplessness condition performed better than did internal controls, and their level of hostility was correlated with the number of correct solutions, thus suggesting a reactance effect. The low-helplessness externals were impaired in comparison to the external controls, suggesting a learned-helplessness effect, and although they showed hostility, as did the internals, it was not associated with improved performance. However, in the high helplessness condition, internals performed worse than externals and both groups performed worse than the controls. They also showed more depression, which was correlated with number of failures on the task.

In an extension of this study (Moore, Strube, & Lacks, 1984), externals showed no response to either the manipulation of control or

the presence of a successful social model. In contrast, internals who failed the induction task in the presence of the model performed better on the test task than did those who worked on the induction task alone. These two studies suggest that internals' reactions to manipulation of control are more complex than those of externals, and that they vary with task and situational factors. The findings are congruent with the diathesis/stress model (Seligman & Schulman, 1986), which proposes that the interaction of explanatory style and task outcomes will affect the likelihood of helplessness deficits.

Hirt and Genshaft (1980) used just one level of helplessness and found that internals showed more impairment than did externals. However, the internals also responded well to being immunized (pre-treated) with solvable problems. This immunization had no effect on the external subjects.

Just as the magnitude of the manipulation can interact with locus of control in affecting helplessness deficits, so can the nature of the test task. Cohen, Rothbart, and Phillips (1976) found that locus of control moderated the effect of noncontingency, so that externals but not internals were impaired when a task similar to the Stroop was used as the test task. However, this effect did not appear when a design-tracing task that involved problem-solving was used. The researchers varied the solubility of the test tasks and found that externals were impaired on soluble tasks, but not on insoluble tasks.

There are several methodological problems in the research on locus of control and learned helplessness that complicate the comparison of results among studies. A variety of instruments are available for assessing locus of control, and they do not necessarily yield congruent results. Moreover, despite evidence that the construct is multi-dimensional (Blau, 1984; Levenson, 1974; Watson, 1981), many researchers have used a unidimensional scale. (For a review of methodological problems in assessing LOC among adults, see McEwan, 1987).

Based on the research cited, internals should be more persistent than externals on a skill task, and less susceptible to a learned-helplessness manipulation as long as the amount of helplessness is not excessive.

#### Helplessness and Aging

Helplessness theory is relevant to the aging process because it is analogous to perceived loss of control over actual life situations and reinforcers. Changes in self-efficacy, and in contingencies applied by the social environment, could lead older individuals to believe that they are no longer effective in attaining their desired goals, and they may make internal/stable/global attributions for this perceived lack of control over their lives. If they regard themselves as incompetent and see this as an irreversible situation that will affect all domains of their life, then they will be likely to show the deficits characteristic of learned helplessness. At a practical level, these deficits could be expressed as decreased

motivation, lack of persistence on challenging tasks, and poor morale.

The real-world consequences of helplessness are likely to be more serious than the laboratory consequences, for a number of reasons. The helplessness-inducing situation occurs unexpectedly, the subject has not given informed consent to the procedure, and there is no option of withdrawing from the task. The consequences attached to the task outcome may be serious, and might have to be dealt with over a long period of time. Also, social others may be present who could offer evaluation or criticism of the subject's efforts.

As with the work on efficacy and attributions, we see the importance of individuals' beliefs about themselves and their relationship to the task situation, in influencing their behaviour. If they believe, either rightly or wrongly, that they cannot influence the situation in the desired direction, or that they cannot produce the necessary behaviour, the result is likely to be impaired performance. The work on learned helplessness shows that the environment can help to engender performance decrements by providing uncontrollable or repeated aversive experiences.

#### Observational Learning

Up to this point, the focus has been on enactive sources of information about efficacy, causality, and contingency. Yet, individuals can also base their expectations and beliefs on information acquired vicariously from other people.

Within social learning theory, "observational learning" refers to learning that occurs as a result of the subject observing either actual others or symbolic models such as the spoken and written word (Bandura, 1977a; 1986; Rosenthal & Bandura, 1978). It is distinct from enactive learning, which occurs as a result of the subject actually experiencing the learning situation themselves. The term "social modelling" refers to the presentation of the model to the subject.

There are several ways in which social modelling can influence individuals' subsequent behaviour (Bandura, 1986). First, it can help to acquire new behaviours that previously were not in the repertoire. Second, through "abstract modelling", the underlying principle for generating new behaviour can be extracted so that similar, but not identical, behaviour is produced when novel stimuli are given. Third, modelling can convey information about the nature of the task, hazards or difficulties associated with it, the predictability of environmental events, and the consequences that are likely to follow from the actor's behaviour. Modelling also serves to inhibit or disinhibit behaviour which was previously learned, and can serve as a discriminative cue to facilitate responding. Finally, it can suggest cognitive standards for the self-regulation of behaviour.

#### Vicarious Reinforcement

Just as actual reinforcement can result in the acquisition and modification of behaviour, so can vicarious reinforcement. This

effect is demonstrated by changes in an observer's behaviour as a function of witnessing consequences accompanying the performance of others (Bandura, 1971, p. 230). Numerous studies (e.g., Kazdin, 1981; for a review, see Bandura, 1986) have found that a rewarded model will be imitated more than a punished model, and that rewarded modelling is more powerful than modelling alone in changing behaviour.

Vicarious reinforcement serves three functions. First, it can be informative by showing the observer how to behave and indicating what contingencies will be applied to that behaviour. "Observed consequences are especially informative when there is much uncertainty about what behaviour is the most appropriate because the situation is unfamiliar or ambiguous." (Bandura, 1986, p. 299. See also Thelen, Dollinger, & Kirkland, 1979). It can also affect motivation, because the observer will act according to her anticipations of reinforcement. This motivational function depends on two cognitive processes -- outcome expectancies and efficacy expectancies. Observers expect to experience outcomes similar to the model if they show similar performance. However, this expectancy is pointless unless they also believe that they can produce the necessary performance. The third function is valuational and is demonstrated when the observers internalize the model's standards for their own behaviour (e.g., Bandura, 1976).

### Vicariously Learned Effectiveness

Behavioural competence can be both enhanced and diminished by social modelling of task performance and outcomes. Bandura (1977a) suggested several explanations for vicariously learned effectiveness: the observer (a) learns specific task-related behaviours and coping strategies, (b) sees the model being rewarded for effective behaviour such as persistence, or (c) experiences disinhibition of an appropriate response already in his repertoire. The observer could also adopt modelled attributions that are associated with enhanced task performance (Craske, 1985; Fowler & Peterson, 1981), or could show increased self-efficacy in response to modelled self-efficacy (Hurlbut, 1988).

In a study of phobic avoidance (Bandura et al, 1977), observers were yoked to participant models so that each observer received the same amount of (vicarious) exposure to desensitization treatment as their partner received actual treatment. Brief exposure to treatment resulted in small increases in level of self-efficacy (9%) and in the amount of approach to the phobic object (10%), while longer exposures resulted in larger increases (44% and 35% respectively). Observers showed a significant treatment effect in comparison to untreated controls.

A similar paradigm was used to study the vicarious learning of escape behaviour (Chartier & Friedlander, 1981), with subjects working in pairs consisting of an observer and a participant model. The observers whose models experienced contingent escape from

aversive noise showed facilitated learning on a similar test task, compared to those whose models were unable to escape. Controls, who were not pre-treated, performed similarly to the unescapable group.

Denney's work with older adults (Denney, 1974; Denney & Denney, 1974) showed that the strategies used on cognitive tasks could be altered by social modelling. Treated subjects switched to more effective and sophisticated strategies compared to their own prior performance (Denney, 1974), and compared to untreated controls (Denney & Denney, 1974). In both studies, the authors concluded that the model had served to cue the use of a previously-learned strategy rather than teaching a new strategy.

These studies indicate that effective behaviour can be learned vicariously and that enactive success is not necessary for learning to occur. Moreover, effectiveness can be learned through social modelling even when the model is symbolic and exists only within the observer's imagination (Bandura et al, 1980).

#### Vicarious Induction of Helplessness

The learned-helplessness effect can occur vicariously when the observer witnesses another person's experience with failure or uncontrollability of outcomes. Three theoretical explanations for this induction can be derived from the literature; they relate to role theory, social learning theory, and social comparison.

The helpless role. First, the helplessness deficits may be part of a learned role. Turkat's work on avoidance behaviour (1982; Turkat & Guise, 1983; Turkat & Noskin, 1983) suggests that social

models may show the observer how to respond to an unpleasant situation by withdrawing or adopting the "weak person" role. Alternatively, the helpless model may serve as a discriminative stimulus to cue the observer's expression of those previously-learned helpless behaviours that are part of the dependent role.

Vicariously learned non-contingency. Second, social learning theory offers an explanation that includes such cognitive elements as expectancies about efficacy and response outcomes. Three studies are commonly cited.

The observational learning of noncontingency was demonstrated by DeVellis, DeVellis, and McCauley (1978). Their female subjects worked in pairs (one model and one observer) on a button-pushing task on which outcomes were either contingent or non-contingent on the model's behaviour. A control group did not do the task. On the test task, using a hand-operated shuttle box, the control and contingency groups did equally well in terms of response latency and number of errors, whereas the non-contingency group did poorly. There were no significant differences in performance between models and observers, suggesting that the helplessness deficits of the non-contingency group were acquired through observation of the model.

Breen, Vulcano, and Dyck (1979) used a discrimination-learning problem to induce helplessness in undergraduate subjects. Of the four experimental groups, one received unsolvable problems plus feedback on their performance, one received solvable problems plus feedback, the vicarious group observed a model doing poorly on the

problems, and the control group had no exposure to the induction. On a post-test of anagram performance, the helplessness effect was found for response latency, trials to criterion, and number of failed solutions. The unsolvable and vicarious groups both performed poorly in comparison to the other two groups. For male subjects, the control group performed like the solvable group, whereas for female subjects the controls performed like the unsolvable group. These findings demonstrate that observing a model's failure depresses performance in much the same way as does actual failure.

Similar results come from Brown and Inouye (1978), who worked with male undergraduates. Three groups of subjects observed a model feign difficulty and failure on an anagram task while they also worked on the task themselves. One group was told that their competence on the task was similar to that of the model, one was told that they were superior to the model, and one was not given any comparative information. A control group did not observe the model. The "superior" group and the control group both performed well on a subsequent anagrams task, whereas the remaining two groups performed poorly. Again, vicarious induction of helplessness was demonstrated. This study is of particular interest because it suggests a third theoretical perspective on the helplessness effect -- that of social comparison.

Social comparison. According to this perspective, social modelling provides a standard of comparison against which the observers evaluate their own outcomes. Social learning theory

predicts that observers will simply adopt the model's behaviour, whereas the social comparison approach predicts that observers will experience vicarious helplessness only if they believe their performance or capacities to be similar or inferior to those of the model. Thus, beliefs about one's similarity to the model become a moderator of the helplessness effect. Studies consistent with this theoretical position are not as abundant as those within the social learning theory position, but they merit attention because their findings are radically different from those already cited.

Studies of vicarious partial reinforcement (e.g., Kerns, 1975; Paulus, Gatchel, & Seta, 1978; Paulus & Seta, 1975) show that observers of a successful model are less persistent on a difficult task than are observers of a relatively unsuccessful model. This suggests that the model's outcomes represent the level of success that observers "should" expect. If during their own performance they fall below this comparison level, they are more likely to give up. So, observation of a failing model should lead to enhanced performance, whereas observation of a successful model should lead to impaired performance. This was demonstrated (Paulus et al., 1978) with models who experienced either 90% or 0% success on an escape task. Impaired performance was shown by observers of the successful model, from the first trial of the test task. In this case, actual experience with the task had less influence on performance than did vicarious experience. These findings are consistent with research on

the use of partial reinforcement as an immunization against learned helplessness (e.g., Jones, Nation, & Massad, 1977).

If social-comparative processes operate when incompetence and failure are being modelled, then this would have implications for the performance of older subjects. Any negative stereotypes of older persons, especially those which include factors such as incompetence, low standards of achievement, or resignation to a low level of functioning, could be perceived as a standard of comparison for others to follow. Observers who feel similar or inferior to such models may respond by adopting unnecessarily low standards of achievement for themselves.

The studies that find enhanced performance following exposure to a failing model could also be explained by reactance (Brehm, 1966; 1972; Wortman & Brehm 1975) instead of social comparison. It is possible that the observers feel threatened by the apparent failure or loss of control portrayed by the model, and react by putting out extra effort in order to exert control.

In an attempt to test both the social-learning and social-comparison explanations of vicariously induced helplessness, Chartier and Friedlander (1981) used female subjects working in pairs (participant-model and observer) on a task of escaping aversive noise. Dependent variables on the test task were response latency, trials to criterion, and number of failures to escape. In keeping with the social-learning approach, they found no difference in performance between models and observers, yet they did not find

evidence of learned helplessness. Instead, they found "learned effectiveness" as the contingency group out-performed both the controls and the non-contingency group.

Differences among studies. Why are there such discrepancies among the results of these studies (Breen et al., 1979; Brown & Inouye, 1978; Chartier & Friedlander, 1981; DeVellis et al., 1978; Paulus et al., 1978; Paulus & Seta, 1975)? It is difficult to compare these studies because their methodology varies widely. In some cases only males or females were paired with a same-sex model; in others both male and female subjects observed a male model but the interaction between subject and model gender was not examined. As Brown (1979) has found, males and females respond differently to the helplessness induction (also compare Brown & Inouye, 1978, and DeVellis et al., 1978). Interactions among subject gender, model gender, and gender-appropriateness of the task might account for these differences.

Based on the published reports, it is difficult to determine the most salient features of the modelling conditions -- were subjects aware primarily of how hard the model tried, or of what valence of outcomes the model experienced, or of whether the model's outcomes were contingent on their behaviour? Also, to what extent did subjects' attention focus on the model, and what instructions were they given about attending to the model and retaining information? Any of these factors could influence subjects' response to the test task.

Another difference among these studies is that in some designs, perceived similarity between subject and model was manipulated, with the result that the magnitude of the helplessness effect increased with perceived similarity, in both social-learning studies (Brown, 1979; Brown & Inouye, 1978) and in one of the social-comparison studies (Paulus & Seta, 1975). In the other studies, subjects were given little information about the model's characteristics and perceived similarity was not measured. In the absence of information from the experimenter, subjects may have assumed high or low similarity to the model, or they may have felt competitive with the model. There is evidence that perceived similarity between observer and model is an important variable in vicarious learning (Bandura, 1977b; Kazdin, 1974b; Rosenthal & Bandura, 1978;) and in social comparison (Suls, 1977).

Models who have specific attributes are more likely to be emulated than are others. These models compel attention (e.g., Yussen, 1974), are realistically similar to the observer (Brown, Brown, & Danielson, 1975), and behave in a plausible manner (Thelen & Kirkland, 1976). A model whose strategy appears to "make sense" is more likely to be emulated than is one whose strategy differs from the subject's beliefs or knowledge (McGivern, Levin, Ghatala, & Pressley, 1986). "Coping" models, who start out by portraying some of the observer's shortcomings and then gain competence through effort, are more effective than are "mastery" models, who display faultless performance from the start because of task ease or

pre-existing skill (e.g., Kazdin, 1973; Kazdin, 1974a). In studies of vicariously learned helplessness, there may have been significant differences in the attributes of the various models such that some were more likely to be emulated than others.

The nature of the tasks also varied across studies. It is possible that diverse tasks such as aversive escape and cognitive achievement will have different motivational effects on observers. No doubt, the test tasks also varied in difficulty, and this variable may have interacted with other procedural factors or subject characteristics. The importance of task difficulty was shown when it was crossed with the presence/absence of a successful model (Moore et al, 1984). Among subjects with an "internal" attributional style, those who were given an unsolvable task performed poorly when working alone but better when working with a successful model. In contrast, subjects with solvable tasks showed a social comparison effect and performed poorly when with the model.

#### Elders and Modelling

Most research on observational learning has included either grade school children or undergraduates. The few studies on adults demonstrate that, like other age groups, adults are influenced by social models.

The cognitive processes of adults can be modified through modelling. Denney (1974) gave subjects a free-classification task in which the stimuli were cutouts that varied in shape, colour, and size. Their responses were rated as either "design" (they

constructed a design with the cutouts) or "similarity" (they grouped the items according to one or more dimensions). Because the older subjects made fewer similarity responses than the younger subjects and used the size and shape dimensions less often (much as children did in previous research), the author suggested that they were showing regression to a previous style of functioning.

In this study, those who had not used similarity consistently were the subjects in a modelling experiment; half watched a model classify the cutouts according to shape and size, and a control group spent equal time looking at the stimulus items. Compared to their performance on the initial task, the modelling group showed an increase in the number of similarity responses and in the use of the size and shape dimensions. If elders' classification strategy really indicates psychological regression, then modelling appears to cue previously-learned behaviours which had not been expressed spontaneously during the first task.

Similar results were reported in a study of questioning strategy (Denney & Denney, 1974). Previous research on the Twenty-Questions task had found that elders ask more hypothesis-testing questions (eliminating just one item) and fewer constraint-seeking questions (eliminating an entire class of items). In this study, older subjects were exposed to either an exemplary model, who played the task game with them and asked constraint-seeking questions, or a cognitive-strategy model, who played the game and also verbalized their own strategy while asking constraint-seeking questions. On the

test task, both modelling conditions resulted in more use of constraint-seeking questions and a decrease in the number of questions needed for solution, compared to an untreated control group. The cognitive-strategy group also asked significantly more novel (un-modelled) questions, thus demonstrating an abstract modelling effect. Because the performance of both modelling groups was similar to that of middle-aged adults in previous research, the authors conclude that the more sophisticated strategy was within the subjects' repertoire, and that the modelling elicited it.

An attempt to modify response speed in elders by means of social modelling was not as successful (Denney, 1982). The experimenter modelled three different response speeds, which were the same as, faster than, and slower than the average for elders on a Matching Familiar Figures task. Paradoxically, those subjects in the slow condition responded faster than those in the standard condition. Although these results are not in the predicted direction, they still indicate a differential response to the modelling condition, and might be explained by reactance theory. It is interesting to note that women showed this effect more strongly than men; the experimenter was a woman in her early or mid-twenties (Denney, personal communication).

Results of a more subtle modelling presentation (Hurlbut, 1988) are also of interest. In this study, the model was presented via a brief narrative about a peer (same age and gender) who either succeeded or failed at the cognitive tasks that determined whether

she or he could enroll at university. Then, a task of reading comprehension and retention was presented. The actual task performance of older subjects was not affected by the modelling condition, but self-efficacy was influenced in the predicted direction. In contrast to the other studies on vicarious induction of performance deficits, this study used a symbolic model rather than a live or video-taped one. Also, the model's situation (attempting to enroll in university) was different from that of the subjects (volunteering for a research project), and subjects were told that they were working on tasks similar (but not identical) to those the model had completed. These factors, plus the fact that the modelling stimulus apparently did not deal with details of task performance, might have reduced the perceived similarity between subject and model, and thereby reduced any modelling effect on performance.

The work on vicariously learned effectiveness and helplessness points to the importance of social context as an influence on performance. In daily life, we are surrounded by an abundance of actual and symbolic models. From them, we can learn roles, attitudes, expectancies about ourselves and about outcomes, and task-relevant behaviours such as strategy or persistence. This vicarious information can at times be more powerful than enactive information in affecting our task performance, with the result that modelled efficacy, attributions, and task behaviour could either enhance or diminish our performance on cognitive tasks.

### Age and Aging

The studies cited thus far have demonstrated the effects on task performance of beliefs as efficacy and causal attributions, and environmental cues such as helplessness-inducing situations. Two individual-difference variables which may be correlated with task performance and which are relevant to age comparisons of behaviour within the adult life-span are discussed next.

#### Chronological Age

Age-related decrements in cognitive performance have been well documented (e.g., Horn, 1982b). Apart from the biologically determined aspects of these age differences, it is important to address the attitudinal, emotional, and social concomitants of aging. Although the research on efficacy, attributions, learned helplessness, and modelling, suggests that these variables affect performance in both young and old adults, they should not be expected to function in the same way during all parts of adulthood (e.g., Okun, 1980).

Cross-sectional age differences in self-efficacy and attributional patterns have been reviewed. The lower efficacy expectations of older subjects, plus the possibility of their making attributions that are correlated with impaired task performance, suggests that they should show performance decrements on cognitive tasks and that their belief system should be consistent with susceptibility to induced or modelled helplessness. A direct test of age-related susceptibility to learned helplessness was reported by

Jolley (1984), who found that after exposure to an insoluble task older subjects needed more time on a solvable test task than did younger subjects. In this study, solution time was corrected for base-line problem-solving speed.

Chronological age serves as an index of social as well as psychological processes. Within our society, old age is characterized by loss of role and status, role ambiguity, lack of suitable role models and reference groups, inadequate socialization to the amorphous status of being "old", and lack of normative guidance (Kuypers & Bengtson, 1973; Rosow, 1974; 1976; 1985). The consequences of these sociological factors may include reliance on external cues concerning appropriate behaviour and attitudes, negative feelings about one's efficacy, and reduced competence because of either adoption of a "helpless" role or atrophy of unused skills (Kuypers & Bengtson, 1973). However, it is possible that this picture is becoming less bleak as a result of recent social change (e.g., Atchley, 1985, p. 265).

The consequences of "Social Breakdown Syndrome" suggested by Kuypers and Bengtson (1973) could result in impaired task performance, dysfunctional attributions, or increased susceptibility to social modelling influences; the effects may be especially salient with difficult tasks. Some support for this speculation comes from Klein's (1972) work with both young and older adults. A Crutchfield apparatus was used to present a perceptual discrimination task with three levels of difficulty. There was no age difference when

subjects were tested alone, but an age effect was noted when they were tested in the conformity condition. This effect increased with task difficulty, suggesting that older subjects were more likely to conform than younger subjects when faced with a challenging task.

Chronological age is also an index of cohort and the broad social forces which may influence our values and attitudes. The impact of cohort membership on behavioural development has been demonstrated by a number of investigations in developmental psychology (e.g., Baltes, Cornelius, & Nesselroade, 1979; Elder & Rockwell, 1979). Because cohort and chronological age are confounded in cross-sectional studies, age differences in behaviour can be attributed to either one of these variables. Thus, finding that older subjects are more susceptible to social influence than younger ones (e.g., Bushman, 1984; Klein, 1972), could represent the effect of cohort rather than the developmental effect of chronological age.

#### Attitudes Toward Aging

Within our society, advanced age produces a stigmatized status; we hold stereotypically negative attitudes toward the elderly and toward the idea of advancing age (for reviews, see Green, 1981, and Lutsky, 1980). The research on "denial of aging" (e.g., Bultena & Powers, 1978) suggests that if advanced age were not a stigmatized status, then elders would not deny that they are "old". If stereotypes are summaries of cultural expectations, then these expectations should affect all members of the culture. Although the stereotypes of old age are not entirely negative (Schmidt & Boland,

1986), there is evidence that elders may accept some of the negative attitudes about their own age group (e.g., Perry & Slemple, 1980; Tuckman & Lorge, 1953).

To the extent that one's personal experience of aging is consistent with the stereotype, the stereotype will be seen as an accurate representation of reality. If the individual lacks appropriate socialization and role models to counter the stereotypical view (Rosow, 1974; 1976), then they may accept and play out the stereotypical age role. Those who accept an age-related stereotypic view of themselves may also adopt a belief system and attributional habits that are consistent with that stereotype. This would engender negative attributional processes such as viewing normal age-related changes as being inevitable, uncontrollable, and irreversible, and would have damaging consequences for self-esteem and self-efficacy (see Rodin & Langer, 1980).

According to the model of Social Breakdown Syndrome proposed by Kuypers and Bengtson (1973), once a susceptible individual has been inducted into the inefficacious role (sick, or useless, or dependent), they soon learn the behaviours appropriate to that role, lose their previous skills, and develop a negative identity that renders them more susceptible to negative social cues. Thus, those who have low self-esteem, poor morale, or a negative attitude toward their aging may be susceptible to negative models.

It makes intuitive sense that a social model whose attitudes are congruent with those of the perceiver will be more influential than a

model whose attitudes are dissonant with the perceiver's. If one's own aging is viewed as a time of diminished efficacy (Bandura, 1981), then a model who reports similar experiences of aging may be particularly influential. Also, if performance is believed to be indicative of global, stable deterioration which is beyond personal control, conformity to a model whose causal attributions are consistent with that attitude is a likely result.

There is some evidence that cognitive ability and positive attitude toward aging are correlated (Lachman et al, 1982). This presents a chicken-and-egg problem of whether negative attitudes and adoption of the inefficacious role engender performance deficits, or whether naturally occurring deficits predate changes in beliefs about performance. The latter mechanism has been supported by longitudinal studies of the relationship between cognition and efficacy in older samples (Lachman, 1983; Lachman & Leff, 1988). However, it is possible that once the naturally occurring decrements have been perceived by the individual, any ensuing negative beliefs and attributions serve to further depress performance. In this case, a negative attitude toward one's own aging could be interpreted as both effect and cause of performance decrements.

#### Rationale for the Present Study

The research cited here underscores the importance of personality and contextual factors as influences on cognitive performance. It has been shown that individuals' beliefs about their competence (self-efficacy) and how their outcomes are caused

(attributions) and controlled (LOC) are related to aspects of their task performance. There is also empirical evidence that these beliefs may be influenced by situational factors. The present study probes the relationship between these three aspects of competence and cognitive task performance.

The goal of the present study is to examine the effect of socially modelled efficacy and attributions on task performance. In keeping with the literature already cited, we can hypothesize that self-efficacy and causal attributions can be socially modelled, with a consequent effect on cognitive task performance. Subjects exposed to a confident model who makes effort-based attributions for task outcomes would be expected to show better task performance than those whose model lacks confidence and feels that outcomes are not controllable. Older subjects should be more susceptible to this manipulation than younger subjects. Locus of control and attitude toward aging are hypothesized to mediate the effect of the manipulation, so that subjects with an internal LOC and positive attitude toward aging should be less susceptible to the modelling treatment.

### Chapter III: Method

#### Design

The goal of the study was to alter performance on a cognitive task through social modelling. In order to compare two age groups on their response to the model, a 2 (age group) by 3 (modelling condition) independent groups design was used.

#### Subjects

Adults from two age groups (20 - 35 years and 60 - 81 years) were recruited from the community by means of advertisements on the community cable TV channel, ads in the daily newspaper, and posters in community centres and on the university campus. Additional older subjects were solicited from the subject pool of other psychological research projects, and additional younger subjects were recruited from undergraduate psychology classes.

All subjects were female. A single-sex sample was felt to be appropriate for the exploratory nature of the study. If both male and female subjects had been used, the sample would have had to be twice as large, and it would have been necessary to test for the interactions between model gender and subject gender. There were two reasons for using female subjects instead of males. First, in the older age group, women outnumber men and are therefore easier to recruit. In addition to this pragmatic consideration, a more substantive reason is that women are more likely than men to respond to modelled persistence and modelled helplessness (Breen et al., 1979; Craske, 1985). However, recent work on influenceability

(Maupin & Fisher, 1989) suggests that many of the studies which find females to be more conforming are methodologically flawed.

A total of 123 subjects was tested. Three of the older subjects were replaced because one was unable to understand the logical reasoning task, and two of them failed to complete one of the questionnaires. The final sample contained 20 subjects in each of the six cells of the design.

The subjects completed a brief personal data questionnaire (see Appendix E) that asked them about their age, marital status, educational attainment, occupation, and health. Demographic data summarizing these characteristics are presented in Table 1. The older subjects had a mean age of 68.9, and their average level of education was 13.4 years. The younger subjects had a mean age of 24.7, and 14.8 years of education.

The older sample was positively biased with respect to educational and occupational status. They averaged four more years of education and twice the participation rate in post-secondary education compared with their age peers who are in the work force (Canadian Government Publishing Centre, 1989). Occupationally, these subjects were over-represented in the professional occupations (28.3% versus approximately 19% for the census sample) and under-represented in the skilled occupations (36.7% versus approximately 46%) and in the semi-skilled and un-skilled occupations (6.7% versus approximately 15%). These findings suggest that the older sample is not typical of Canadians in that age group.

Table 1

Demographic Characteristics of Subjects by Age Group

Variable		Young	Old
Age	<u>M</u>	24.7	68.9
	<u>S.D.</u>	4.9	5.4
Years of education	<u>M</u>	14.8	13.4
	<u>S.D.</u>	1.7	2.2
Years since leaving school	<u>M</u>	9.5	44.1
	<u>S.D.</u>	6.4	15.6
Proportion who attended university		81.7%	26.7%
Marital status			
	Married	15.0%	55.0%
	Single	80.0%	1.7%
	Divorced, widowed, separated	5.0%	43.3%
Highest occupational classification			
	Professional	5.0%	28.3%
	Semi-professional	0.0%	23.3%
	Skilled	30.0%	36.7%
	Semi-skilled or unskilled	18.3%	6.7%
	Never employed	46.7%	5.0%
Self-rated health			
	Very Good	50.0%	26.7%
	Good	41.7%	58.3%
	Fair	8.3%	13.3%
	Poor	0.0%	1.7%
	Very Poor	0.0%	0.0%

Both groups of research subjects felt that their health was above average, although there was a significant difference between the two age groups on this variable ( $\chi^2(3, N = 120) = 7.62, p \ll .05$ ). Self-ratings of health have been shown to compare favourably with ratings made by physicians (LaRue, Bank, Jarvik, & Hetland, 1979).

#### Modelling Conditions

The experimental manipulation consisted of exposing each subject to one of three social models who expressed varying degrees of self-efficacy and who made different causal attributions for their performance on a cognitive task. Within each age group, subjects were randomly assigned to the three modelling conditions. This was done with the restriction that for each group of three subjects who were tested consecutively, one subject was assigned to each condition.

The models were presented using an audiotape. Younger subjects heard a 24-year-old female model, and older subjects heard a 65-year-old female model. Within each age group, the same model was used for all three conditions. Both models were blind to the actual purpose of the study at the time they recorded the tapes.

The taped model was presented in the guise of a previous subject -- "a woman in your age group who participated in this study a couple of months ago". Subjects were told that the audiotape would give them "an idea of what to expect with the problem-solving part of the experiment". The rationale was that it was "more realistic" for

them to hear the information from another subject than from the experimenter.

In each of the modelling conditions, the model briefly described the procedure for the upcoming task -- reading instructions, doing practice exercises, and making performance predictions -- and described four different problem-solving tasks. This descriptive material was identical in all three conditions. The conditions differed only in the model's comments about her self-efficacy and reasons for her task outcomes. In the Control condition, the model did not make any comments about her reactions to the tasks. In the Positive condition, the model expressed confidence in her ability and attributed her task outcomes to persistence. The Negative model expressed lack of confidence in her ability and attributed her task outcomes to luck and to inability. The only difference between age groups in wording of the text was in the Negative condition. The older model attributed her inability to her age ("maybe the questions are too hard for someone my age,") and the younger model was less specific in explaining her inability ("maybe the questions are too hard for someone like me"). Transcripts of the modelling stimuli are reproduced in Appendix A.

#### Dependent Variables

Three groups of variables that may demonstrate age and modelling effects were of particular interest: task performance, self-efficacy, and causal attributions. Task performance, the primary dependent variable of interest, was assessed by the amount of

time spent on the cognitive task and the number of items correctly answered. Perceived self-efficacy and causal attributions about task performance were included because they demonstrate age and modelling effects and may also mediate the effect of the modelling stimuli on subsequent task performance.

Two additional groups of variables served as validity checks on subjects' reactions to the experimental situation -- their assessment of the task, and of the model.

### Task Performance

The current study attempted to modify cognitive task performance, and the realm of fluid intelligence (see Cattell, 1971, and Horn, 1978, for reviews of the fluid/crystallized distinction) was chosen for the main dependent variable due to the evidence of plasticity in functioning among older people (Baltes & Willis, 1982; Labouvie-Vief & Gonda, 1976). A further advantage was that fluid tasks are less affected by educational level than are crystallized tasks, thus reducing the possible confounds resulting from cohort differences in educational attainment (Horn, 1978).

One measure of fluid intelligence, logical problem-solving performance, was chosen as the dependent variable because of the age decrements reported in both longitudinal and cross-sectional studies (Arenberg, 1974; 1982; Denney, 1981-1982; 1982). These decrements are more likely when the task is unrelated to daily life situations (Denney & Palmer, 1980) and is unfamiliar or difficult (Cornelius,

1984). Logical reasoning tasks offer a choice of novel stimulus items that vary in difficulty.

The problem-solving task consisted of nine items selected from Test RL-4 in the Kit of Factor-Referenced Cognitive Tests (Ekstrom, French, Harman, & Dermen, 1976). This test taps logical reasoning and consists of code systems presented in the form of artificial languages that the subject uses for "translating" the stimulus items. The split-half reliability, calculated on a sample of young adults, is .69.

Two outcome variables were assessed -- achievement was reflected by the number of correct solutions, and persistence was operationalized as the amount of time spent on the task when subjects were not given a specific time limit. Task persistence is a component of fluid performance (Horn, 1978; 1982a) and is commonly used as an outcome measure in studying the relationship between attributions and performance (Forsterling, 1985).

#### Perceived Efficacy

Efficacy was assessed by a six-point Likert scale in response to the question "Compared to most people, how do you think you did (will do) on this task?" The anchors ranged from very poorly to very well (see Appendix B). In order to better assess the social modelling effect, the item was designed to tap social comparison rather than the absolute number of correct solutions. Efficacy was assessed both before (prediction) and after (postdiction) presentation of the reasoning task. At the time of predicting their performance,

subjects lacked actual experience with the task and would be likely to use the social model as a standard of comparison for evaluating themselves (Suls, 1977). If the absolute standard of comparison were available, they would have been less inclined to make social comparisons (Allen & Wilder, 1977). Another advantage of using a relative instead of absolute standard of self-evaluation was that it reduced any potential confounding between efficacy expectations and outcome expectations (Weisz, 1983). However, this social-comparative measure is different from the conceptualization of efficacy used by Bandura (1977a).

The experimenter made a procedural error in tapping the efficacy variable. After subjects had given their comparative efficacy predictions, 39% of them were then asked to give an absolute prediction -- "How many questions do you think you will get correct?" The effect of this error is discussed in the results section.

#### Causal Attributions

Four attributional dimensions of internality, globality, stability, and controllability, were drawn from the literature on attributions and performance (Abramson et al., 1978; Peterson et al., 1982; Weiner, 1983). Each subject rated the "cause" of her task performance on these dimensions using a seven-point Likert format (see Appendix C). The ratings were made both before and after completing the task.

### Ratings of Task

Considering the importance of task difficulty and unfamiliarity in age-related performance decrements (Cornelius, 1984), each of these dimensions was assessed by a single question using a Likert format (see Appendix D). Subjects were asked "How easy or how difficult was the problem-solving task which you just finished?", with anchors ranging from far too hard to far too easy. They were also asked "Was the task familiar to you, or was it strange?", with anchors ranging from very familiar to very strange.

### Ratings of Model

Because the degree of perceived similarity between self and the social model has been identified as one factor that influences the modelling effect, this perception was assessed by means of a Likert format. Subjects were asked "Do you feel that you are similar to, or different from, the woman whose comments you heard on the tape recording?", with anchors ranging from very similar to very different. In addition, subjects were asked "Did her comments influence the way you approached the problem-solving task?", with anchors ranging from yes, very much to no, not at all (see Appendix D).

## Personality and Attitudinal Measures

### Personality as Related to Cognitive Performance

In the absence of a Locus of Control (LOC) instrument which has been shown to have content validity across the adult life-span, it was necessary to select an instrument which favoured one of the two

age groups. Multi-dimensional and domain-specific measures of LOC are better predictors of behavioural outcomes for older subjects than are uni-dimensional and generalized instruments (Lachman, 1986a). Therefore, LOC was measured using multi-dimensional inventory that assessed the concept with respect to the cognitive domain. The Personality in Intellectual Contexts (PIC) inventory (Lachman, 1983; Lachman et al., 1982) was selected because its scales have a substantive focus on the domain of intellectual functioning and permit the contextual assessment of personal-ability relationships.

Three of its six scales were derived from Levenson's (1974) three LOC dimensions -- Internal, Chance, and Powerful Others -- and reflect beliefs about control of outcomes in the domain of cognitive performance. The remaining scales also were derived from "parent" transcontextual personality scales. The Achievement Motivation scale, derived from Jackson's (1974) Personality Research Form, measures the desire to accomplish cognitive tasks. The Anxiety scale was based on the State Anxiety Scale constructed by Cattell and Nesselroade (1974), and measures unease in intellectually oriented situations. The Morale scale, adapted from Lawton's (1975) Philadelphia Geriatric Center Morale Scale, reflects one's opinion about current level of intellectual functioning relative to the past.

The scales are each composed of 12 items, presented in a 6-point Likert response format with response options anchored by strongly agree and strongly disagree. Reliabilities (alpha coefficients) calculated on older subjects range from .76 to .91. The scales show

satisfactory convergent validity with their parent scales, and discriminant validity among themselves. Five-month retest stabilities range from .74 to .88, suggesting that the scales reflect trait properties.

#### Attitude Toward Aging

To assess attitudes toward aging, the Aging Opinion Survey (Kafer, Rakowski, Lachman, & Hickey, 1980) was used. It was developed on a sample of young to middle-aged subjects, most of whom were students or gerontological practitioners. Two of its three scales were employed for the current study. The Stereotypical Age Decrement scale reflects endorsement of the stereotypic view of aging as a deteriorative process for people in general, whereas the items on Personal Anxiety Toward Aging refer to individuals' feelings about their own aging. These scales are composed of 15 items each, presented in a 5-point Likert format anchored by strongly agree and strongly disagree. Reliabilities (alpha coefficients) calculated on samples of young adults are .78 for Stereotypic Decrement and .65 for Personal Anxiety.

Lack of conceptual equivalence of a construct across age groups has been identified as a potential problem in developmental research (Labouvie, 1980). This lack of equivalence could confound the meaning of the Aging Opinion Survey because older subjects would be responding to stimulus items that deal with their current stage of the life course, whereas younger subjects would see the items as referring to a stage which is 30 or 40 years in their future.

Therefore, when completing the AOS, the younger subjects were given instructions to project themselves into the future and to imagine that they were 65 years old. Although this method does not guarantee conceptual equivalence of the aging construct for both groups, it does represent an attempt at giving all subjects the same life stage, even if that stage is only imagined.

#### Procedure

All subjects were tested individually by the same female experimenter, who was not blind to either the experimental hypotheses or to the treatment manipulations. Each subject began by completing the Personal Data form, the PIC Inventory, and the AOS questionnaire. Then, she listened to the audiotaped model while reading a typed transcript of the tape.

Immediately after hearing the tape, the subject was told that she was about to be given one of the tasks which had been described by the model. She was not told which task she would receive. She was asked to name the major factor that would influence her performance on the task, and her reply was used as the "cause" of her anticipated task performance. She then rated this cause along four attributional dimensions. Next, she was given the instructions and two practice items for the task, and was encouraged to ask questions about the task and instructions. The experimenter reviewed the instruction sheet with any subject who did not get both practice items correct.

The subject then rated her anticipated performance ("compared to most people") on the upcoming task. When the task was given to the subject, she was told that the time limit was "very liberal" and that she should work at her own pace. If the subject was still working on the task after 30 minutes, she was told that it was time to stop. After completing the task, she again rated her anticipated performance, and was asked to name the factor that caused her to perform at that level. Her reply was used as the "cause" to which she assigned attributional ratings.

The subject then rated the task for difficulty and familiarity, and rated the model for similarity and perceived influence.

All subjects were then thanked for their participation and given the opportunity to ask questions about the study. Those in the Positive and Negative conditions were debriefed to ensure that any feelings or attitudes engendered by the experiment would not be generalized to other situations.

## Chapter IV: Results

### Plan of the Analysis

To prepare the data for analysis, values were estimated for the missing data points on the PIC and AOS questionnaire responses.

Analysis then proceeded in four phases.

The goal of the first phase was to determine whether, despite the random assignment of subjects to groups, there were any pre-existing demographic or personality (PIC and AOS questionnaire scores) differences among the treatment groups. The second phase examined influences on task performance. This phase tested the main hypothesis of the study, specifically that there would be age and modelling effects on the performance variables of efficacy, persistence, and number of correct solutions. The relationship between personality variables and these performance variables was examined to determine whether subjects' beliefs about themselves, about aging, and about causality, were related to their task performance. The third phase of the analysis looked for changes in self-efficacy from pre-test to post-test to determine whether experience with the task was related to changes in perceived efficacy. In the fourth and final phase, attention turned to subjects' reactions to the experimental situation. Age and modelling effects on subjects' perceptions of the task and model were examined.

### Treatment of Missing Data

Thirteen of the older subjects had omitted one or more questionnaire items. Out of 10,440 questionnaire data points for the

entire sample, these 34 missing points were spread across 24 of the PIC items and 6 of the AOS items. Multiple regression analysis was used to estimate missing data, employing the raw scores from each item's parent scale as predictors for the missing value. These derived values were used to replace the missing data. Because each of the questionnaire scales was designed to be internally consistent, it is argued that this approach is preferable to using the grand mean of each item as a substitute for the missing value.

#### Comparability of Treatment Groups

Although subjects were randomly assigned to treatment conditions, this did not guarantee that the treatment groups would be comparable on demographic and personality variables. To ensure that these variables were evenly distributed across conditions, comparisons were made among treatment conditions within each of the two age groups. One-way ANOVAS were used to compare the three treatment groups on chronological age, education level, and number of years since leaving school. Chi-square analyses compared the groups on self-rated health, job classification, and marital status. There were no significant ( $p \ll .05$ ) differences among the treatment groups on any of these variables.

To compare the treatment groups on the personality variables, one-way MANOVAS were conducted on the eight questionnaire variables -- Internality, Chance, Powerful Others, Achievement, Anxiety, Morale, Stereotypical Age Decrement, and Anxiety Toward Aging. The multivariate tests were non-significant for both age groups.

These results suggest that random assignment procedure successfully distributed these demographic and personality variables across treatment groups.

#### Influences on Task Performance

The main hypothesis of the study was that socially modelled efficacy and causal attributions would affect self-efficacy and task performance, and that older subjects would be more susceptible to this modelling effect than would younger subjects. To test this hypothesis, a 2 X 3 (Age by Treatment) MANOVA was performed on the efficacy, persistence, and number-correct variables. Cell means and standard deviations for these variables are shown in Table 2.

The multivariate test of the age effect was significant (Wilks' lambda = .455,  $F(3, 112) = 44.71$ ,  $p \ll .001$ ). Univariate tests for all three dependent variables were significant. Older subjects had lower levels of efficacy ( $F(1, 114) = 11.53$ ,  $p \ll .001$ ), spent about twice as long on the task ( $F(1, 114) = 84.48$ ,  $p \ll .001$ ), and had fewer correct answers ( $F(1, 114) = 25.29$ ,  $p \ll .001$ ) than the younger group. All three of these effects were significant beyond the .05 level when Dunn's  $t$  was used to correct for multiple comparisons.

The omnibus test for the treatment effect was significant (Wilks' lambda = .455,  $F(6, 224) = 2.80$ ,  $p \ll .01$ ), but only the univariate test for the persistence variable reached significance ( $F(2, 114) = 5.76$ ,  $p \ll .005$ ). A Scheffe test showed that subjects in the positive modelling condition spent significantly longer ( $p \ll .05$ ) on the task than did those in the control condition.

Table 2

Means and Standard Deviations for Efficacy, Persistence, and  
Number-Correct, by Age and Modelling Condition

Dependent Variable/ Age Group	Modelling Condition		
	Control	Positive	Negative
Efficacy			
Old	3.75 (1.29)	3.95 (0.60)	3.90 (0.91)
Young	4.30 (0.73)	4.60 (0.82)	4.20 (0.62)
Persistence (minutes)			
Old	14.83 (5.29)	20.19 (5.41)	15.93 (7.11)
Young	7.51 (3.73)	9.57 (2.96)	8.36 (4.87)
Number Correct			
Old	4.40 (1.54)	5.00 (2.03)	4.45 (1.50)
Young	6.85 (2.03)	6.45 (2.11)	5.95 (2.39)

The hypothesized Age by Treatment interaction was not significant. Normally, no further analyses would be done on this effect. However, because the persistence variable did show a treatment effect, statistical probes of the Age by Treatment interaction on persistence were performed. Scheffe tests showed that for older subjects, the positive and control groups differed at the .05 level, whereas neither of those groups differed from the negative group. With the young subjects, no two treatment groups were significantly different from each other.

Attention was then turned to the role of personality and attitudinal variables as potential influences on task performance. It was hypothesized that the variance in the three performance variables could be explained not only by the age and treatment factors, but also by the main effects of personality (PIC scores), attitude toward aging (AOS scores), causal attributional ratings, and by the interactions between the treatment manipulation and these individual-difference variables.

Hierarchical multiple regression analysis was used to examine this hypothesis, with efficacy, persistence, and number-correct as the criterion variables. Hierarchical regression was the method of choice because variable entry is driven by logic rather than by the data. This analysis will be treated in detail in subsequent sections.

### Analysis of Personality and Attitudinal Data

PIC and AOS questionnaires. Means and standard deviations for the PIC and AOS data are shown in Table 3. Based on previous literature, it was hypothesized that there would be age differences on these scores. MANOVA was used to test this hypothesis and it yielded a significant age effect (Wilks' lambda = .034,  $F(8, 107) = 13.28, p \ll .001$ ). Univariate tests for four of the eight questionnaire scales were significant. Older subjects scored higher on the Chance scale of the PIC ( $F(1, 114) = 8.60, p \ll .005$ ) and lower on the Morale scale ( $F(1, 114) = 29.65, p \ll .001$ ) than the younger subjects. They also scored lower on both of the AOS scales, Stereotypical Age Decrement ( $F(1, 114) = 5.03, p \ll .05$ ) and Age Anxiety ( $F(1, 114) = 28.46, p \ll .001$ ) than the younger subjects. When these statistics were corrected for the multiple comparisons by using Dunn's  $t$ , only the comparison involving the Stereotypical Age Decrement scale failed to reach significance at the .05 level.

Use of all six PIC scores in subsequent multiple-regression analyses would have resulted in an unacceptably large number of predictors relative to the number of subjects. Therefore, these variables were reduced by using principal components analysis with Varimax rotation. Because of the age differences on the scores, all scores were first transformed by subtracting the mean for each age group (Bentler, 1973), and the analysis was conducted on these deviation scores. The loading matrix for the PIC scores is shown in

Table 3

Means and Standard Deviations on Questionnaire Scores

Scale	Old	Young	<u>p</u>
Internal	63.9 (6.2)	64.9 (5.5)	NS
Chance	28.8 (8.7)	24.5 (7.1)	.005
Powerful Others	23.9 (8.1)	22.5 (7.0)	NS
Achievement	64.5 (5.4)	63.1 (5.4)	NS
Anxiety	26.7 (12.4)	27.4 (10.4)	NS
Morale	53.6 (12.8)	63.9 (6.8)	.001
Stereotypical Age Decrement	41.1 (10.5)	45.2 (9.6)	.05
Aging Anxiety	37.7 (8.0)	46.5 (10.2)	.001

Table 4. A single-factor solution emerged, accounting for 53% of the variance. This factor was named "Intellectual Confidence".

Because the AOS questionnaire had only two scales, these data were not reduced and the raw scale scores were entered as predictors in the subsequent regression analyses.

Attributional ratings. The first set of ratings of the four causal dimensions were collected after subjects had been exposed to the modelling treatment and before they worked on the task. To test the hypothesis that there would be both age and treatment effects on these ratings, a 2 x 3 (Age by Treatment) MANOVA was conducted on these data. The Age effect and Age by Treatment interaction were not significant. There was an overall treatment effect (Wilks'  $\lambda = .818$ ,  $F(8, 222) = 2.94$ ,  $p \ll .005$ ), with the univariate test on the Externality dimension being significant ( $F(2, 114) = 5.03$ ,  $p \ll .01$ ). A Scheffe test on the entire sample showed that the control group reported stronger external causality than the negative group ( $p \ll .01$ ) on this attributional dimension.

Use of the four attributional scores in the subsequent multiple regression analyses would have resulted in an unacceptably large number of predictors for the number of subjects. Therefore, as was done with the PIC scores, the attributional ratings were submitted to principal components analysis with Varimax rotation in order to reduce the number of variables. This yielded a two-factor solution accounting for 65% of the variance. Because simple structure was not achieved, this solution was suspect. A choice had to be made between

Table 4

Principal Component Analysis on PIC Questionnaire Scales

---

Scale	Factor 1 Loadings
Internality	.76
Chance	-.72
Powerful Others	-.73
Achievement	.62
Anxiety	-.70
Morale	.80

---

using these two (derived) factor scores as predictors, or selecting two of the raw attributional ratings to use as predictors. The decision was made to use the raw ratings instead of the derived scores.

A review of the literature suggested that of the four attributional dimensions, those of Externality and Controllability were the most likely to be related to task performance. Moreover, it made intuitive sense that these dimensions were reflective of subjects' beliefs about causality in the immediate performance situation, whereas the Stability and Globality dimensions reflected beliefs about causality in other situations. Accordingly, the Externality and Controllability ratings were chosen as predictors for the regression analyses.

#### Hierarchical Regression Equations

Hierarchical regression equations were run separately for each of the three performance variables -- efficacy, persistence, and number-correct. The low intercorrelations among these criterion variables suggest that they are conceptually distinct. Efficacy and persistence were correlated,  $r = -.27$ ,  $p \ll .001$ , but number-correct was not significantly correlated with either efficacy or persistence.

For each of these three criterion variables, three equations were run. One equation used the PIC factor scores as a predictor, one used the AOS scale scores, and one used the ratings of the Externality and Controllability causal dimensions. There were two reasons for entering these types of predictors in separate equations.

First, it was necessary to minimize the number of predictors relative to the number of subjects. More importantly, these three types of predictors are conceptually distinct because they represent self-confidence on specific intellectual tasks, generalized attitudes toward aging, and causality of outcome for one cognitive task. The correlations among the PIC factor scores, the AOS scales, and the Externality and Controllability attributional dimensions are shown in Table 5.

Selection and entry of predictors. As mentioned previously, it was important to minimize the number of predictors in each equation. This made it necessary to select only those predictor variables that were of the greatest theoretical interest to the study -- a contestable decision. The interactions between treatment and personality (PIC, AOS, and attributions), and potential age differences in these interactions, were germane to the goal of the study, and therefore were retained for the analysis. The Age by Treatment interaction had already been addressed by the MANOVA, and the Age by Personality interactions were omitted because of the stability of personality through the adult life span (e.g., Costa and McCrae, 1980).

Effect coding was used to generate vectors that represented the age and treatment effects and the interaction terms. Two demographic variables, education level and occupational classification, were entered as covariates in the first block of every equation. These variables have been shown to be related to performance on cognitive

Table 5

Correlations Among Personality Variables

Variable	2	3	4	5
1. PIC factor	-.34 **	-.29 **	.19 *	.18 *
2. Stereotypical Age Decrement	--	.59 **	-.10	-.04
3. Aging Anxiety		--	-.08	-.13
4. Externality			--	-.03
5. Controllability				--

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

tasks (Denney, 1982; Denney & Thiessen, 1983; Fozard & Nuttall, 1971). In the second block, three-way interactions among age, treatment, and PIC factor scores (or the AOS raw scores or the attributional ratings) were entered. In the third block, two-way interactions among treatment and PIC scores (or AOS scores or attributional ratings) were entered. Main effects of treatment were entered in the fourth block, followed by main effects of the PIC (or AOS or attributional ratings) in the fifth block, and the age variable in the sixth block.

Because the order in which predictors are entered can affect the extent to which a given variable appears to cause an increase in R-squared, two orders of entry were used in each equation. The first order was that already described, whereas the second order was the reverse sequence of blocks 2 through 6. This method permitted testing two important variables -- age and the three-way interactions among age, treatment, and PIC (or AOS or attributional ratings) -- at two different points in the entry sequence. Those variables that exert a significant effect on R-squared regardless of their order of entry merit particular attention.

The order of entry for predictors is summarized in Table 6.

Predicting efficacy. The results of these equations are summarized in Table 7. When the PIC factor scores were used to predict efficacy, the equation yielded an adjusted R-squared of .22 ( $F(10, 109) = 4.34, p \ll .0001$ ). Significant increments in R-squared were found for the PIC factor score and the age variable, showing

Table 6

Order of Forced Entry for Predictors in Regression Equations

Block	Variables entered
1	education level, occupational classification
2	three-way interaction among agegroup, treatment, and PIC (AOS, attributions)
3	two-way interaction between treatment and PIC (AOS, attributions)
4	treatment
5	PIC (AOS, attributions)
6	agegroup
1	education level, occupational classification
2	agegroup
3	PIC (AOS, attributions)
4	treatment
5	two-way interaction between treatment and PIC (AOS, attributions)
6	three-way interaction among agegroup, treatment, and PIC (AOS, attributions)

Table 7

Predicting Efficacy -- Predictors That Caused a Significant  
Increment in R-squared

Predictor	R2 change	F change	signif change	adj R2	<u>b</u>
<u>PIC equation</u>					
agegroup	.053	6.832	.010	.066	-.267
main effect	.133	19.667	.001	.196	.317
<u>AOS equation</u>					
agegroup	.071	9.086	.003	.066	-.336
<u>Attribution equation</u>					
agegroup	.054	6.832	.010	.066	-.267

that these two variables were significantly related to efficacy independent of their relationships with other predictors.

When AOS scores were entered, the adjusted R-squared was .07 ( $F(15, 104) = 1.56, p \ll .10$ ). The only significant increase in R-squared was due to the age variable. The equation which used attributional ratings of Controllability and Externality yielded similar results, with an adjusted R-squared of .09 ( $F(15, 104) = 1.82, p \ll .05$ ). Again, only the age variable caused a significant increase in R-squared.

These results suggest that age and PIC factor scores are significantly related to efficacy, whereas AOS scores and the causal dimensions of Controllability and Externality are not related to efficacy.

Predicting persistence. Entering the two covariates, education level and occupational classification, in the first block yielded an adjusted R-squared of .19 ( $F(2, 117) = 15.37, p \ll .0001$ ).

The results of using the PIC variable as a predictor are shown in Table 8. This equation gave an adjusted R-squared of .47 ( $F(10, 109) = 11.38, p \ll .0001$ ). The age and treatment variables caused significant increases in R-squared regardless of when they entered the equation. The significance of the two-way and three-way interaction terms varied with the order of entry.

The two-way interaction between treatment and PIC showed that subjects with higher scores on the PIC spent longer on the task in the Positive modelling condition, whereas those with mid-range and

Table 8

Predicting Persistence Using PIC Scores -- Predictors That Caused a Significant Increment in R-squared

Predictor	R2 change	F change	signif change	adj R2	<u>b</u>
education and occupation	.208	15.371	.001	.195	-.818 -1.080
3-way interaction	.043	3.328	.039	.225	-1.993
treatment	.052	4.240	.017	.276	2.055 -1.700
agegroup	.186	41.440	.001	.466	3.926
education and occupation	.208	15.371	.001	.195	-.818 -1.080
agegroup	.201	40.683	.001	.399	4.087
treatment	.028	5.204	.007	.435	-1.490 2.063
2-way interaction	.028	3.057	.051	.455	1.413

Note. Two-way interaction is between treatment and questionnaire variable. Three-way interaction is among age, treatment, and questionnaire variable.

low scores on the PIC did not respond differentially to the model. The three-way interaction among treatment, PIC, and age, showed that among the older subjects, those with low PIC scores were most persistent in the Control condition whereas those with mid-range and high PIC scores were most persistent in the Positive condition. The young subjects with mid-range PIC scores were least persistent in the Control condition and most persistent in the Positive condition, whereas those with high and low PIC scores behaved similarly across all three conditions.

The results of using the AOS scores as predictors are shown in Table 9. This equation gave an adjusted R-squared of .46 ( $F(15, 104) = 7.77, p \ll .0001$ ). The only variable that caused a significant increase in R-squared regardless of when it entered the equation was the age variable. The importance of the variables' order of entry into the equation was shown by three groups of predictors -- main effects of the AOS scores, treatment, and the two-way interactions.

Subjects who scored low on the Aging Anxiety scale of the AOS were more persistent than those who scored high. The two-way interaction showed that those low scorers worked longest in the Positive condition, whereas those with mid-range and high scores did not respond differentially to the modelling.

The results of using attributional ratings as predictors are shown in Table 10. This equation gave an adjusted R-squared of .42

Table 9

Predicting Persistence Using AOS Scores -- Predictors That Caused a Significant Increment in R-squared

Predictor	R2 change	F change	signif change	adj R2	<u>b</u>
education and occupation	.208	15.371	.001	.195	-.818 -1.080
2-way interaction	.064	2.591	.041	.268	-2.115 1.675
Aging Anxiety	.051	4.408	.015	.312	-2.205
agegroup	.136	29.921	.001	.460	3.623
education and occupation	.208	15.371	.001	.195	-.818 -1.080
agegroup	.206	40.683	.001	.399	4.087
treatment	.039	4.207	.017	.447	-1.433 1.825

Note. Two-way interaction is between treatment and questionnaire variable.

Table 10

Predicting Persistence Using Attributional Ratings -- Predictors  
That Caused a Significant Increment in R-squared

Predictor	R2 change	F change	signif change	adj R2	<u>b</u>
education and occupation	.208	15.371	.001	.195	-.818 -1.080
agegroup	.206	40.638	.001	.399	4.087
treatment	.046	4.776	.010	.430	2.032 -1.452

( $F(15, 104) = 6.80, p \ll .0001$ ). The only variables which caused a significant increase in R-squared were age and treatment.

The equations to predict persistence showed that age and treatment manipulation were significantly related to the amount of time spent on the task. The interaction between PIC scores and treatment showed that subjects who were high on intellectual self-confidence worked longest in the Positive condition, but that there were age differences in the interaction between personality and treatment. Subjects who scored low on Aging Anxiety spent longer on the task than did others, and this effect was increased for those in the Positive condition. Neither attributional ratings nor the interactions involving them were related to persistence.

Predicting number-correct. The results of these equations are summarized in Table 11. The equation to predict this criterion from PIC factor scores yielded an adjusted R-squared of .17

( $F(10, 109) = 3.47, p \ll .0005$ ). When AOS scores were used as predictors, the equation gave an adjusted R-squared of .21

( $F(15, 104) = 3.12, p \ll .0005$ ). When attributional ratings were used, the adjusted R-squared was .15 ( $F(15, 104) = 2.36, p \ll .01$ ).

In all three equations, age was the only variable which showed a significant relationship to the criterion, and neither personality nor its interactions were significant.

#### Relationship Among Performance Outcomes

In keeping with the review of the literature, it was expected that efficacy beliefs would affect the amount of persistence on the

Table 11

Predicting Number-correct -- Predictors That Caused a Significant Increment in R-squared

Predictor	R2 change	F change	signif change	adj R2	<u>b</u>
<u>PIC equation</u>					
agegroup	.140	19.879	.001	.164	-1.052
<u>AOS equation</u>					
agegroup	.137	20.716	.001	.211	-1.154
<u>Attribution equation</u>					
agegroup	.140	19.879	.001	.164	-1.067

task. In addition, it was hypothesized that the length of time spent on the task would affect the number of correct solutions achieved. To test these relationships, and to determine whether efficacy and persistence accounted for any variance beyond that which was accounted for by the other predictors, the efficacy variable was added as the final predictor in the three equations for the persistence variable. Then, efficacy and persistence were added as the final predictors in the three equations for the number-correct variable.

The addition of efficacy as a predictor of persistence did not cause a significant increment in R-squared.

The addition of efficacy as a predictor of number correct caused a significant increment in R-squared in the equation which used PIC factor scores, yielding an adjusted R-squared of .21 ( $F(12, 107) = 3.90, p \ll .0001$ ). This indicates that perceived efficacy was significantly related to task achievement, independent of its correlation with other predictors in the equation. When the persistence variable was entered as a predictor of number correct, it did not cause a significant increase in R-squared.

#### Summary of Regression Results

In reviewing the regression equations, we find that age was the most consistent predictor of the criterion variables. The equations to predict persistence showed interactions between personality and treatment, as subjects who scored high on the PIC factor and low on Aging Anxiety showed more differential response to the model than did

other subjects. Age differences in this interaction appeared when the PIC was used as a predictor, as older low-PIC subjects worked longer in the Control condition whereas younger low-PIC subjects did not respond differentially to the model. Old high-PIC subjects worked longer in the Positive condition, whereas young high-PIC subjects were equally persistent in all conditions. Ratings on the causal attributional ratings were not significantly related to efficacy, persistence, or number-correct.

Some predictors caused a significant increment in R-squared when entered early in the equation, but not when entered later. There are two statistical explanations for this. One is that when there are zero-order correlations between some predictors, this reduces the amount of unique variance available for the late-entering predictor in the pair. The other explanation is that each predictor which enters the equation reduces the numerator of the  $F$  ratio by adding to the degrees of freedom in that term. Therefore, if a late-entering predictor fails to cause a significant increment in R-squared, it does not necessarily mean that the predictor is unrelated to the criterion.

#### Perceived Efficacy

Efficacy was measured both before and after subjects worked on the task. To determine whether experience with the task influenced perceived efficacy, a 2 X 3 X 2 (Age by Treatment by Time) ANOVA was conducted on the efficacy data, with the repeated efficacy measure serving as a within-subjects factor. The younger subjects scored

significantly higher on efficacy ( $F(1, 114) = 19.65, p \ll .001$ ) than the older subjects, and the level of perceived efficacy dropped from pre-test to post-test ( $F(1, 114) = 40.84, p \ll .001$ ) for both age groups.

#### Analysis of the "Extra" Variable

As mentioned previously, absolute efficacy predictions (subjects predicted how many test items they would answer correctly) were collected from about one third of the subjects as a result of experimenter error.

To test the null hypothesis that this variable was randomly distributed across the cells of the design, a chi-square analysis was run. The results were non-significant.

A more important question was whether the collection of this variable had influenced subsequent experimental measures. To examine this question, the variable was treated as a design factor in the experiment, and a  $2 \times 3 \times 2$  (Age by Treatment by Extra Variable) MANOVA was run on all subsequent measures. Thus, the dependent variables in the MANOVA were persistence, number correct, social-comparative efficacy postdictions, the four post-test attributional ratings, and the subjects' perceptions of the task and of the model.

None of the multivariate tests were significant. However, a post-hoc examination of the eleven univariate tests for the main effect of the extra variable revealed three significant findings. Subjects who had responded to the extra item reported higher efficacy

post-dictions ( $F(11, 88) = 4.62, p \ll .05$ ), and higher scores on the post-test ratings of the Generality dimension of causality ( $F(11, 88) = 6.34, p \ll .05$ ) and on the Stability dimension ( $F(11, 88) = 3.89, p \ll .05$ ). When Dunn's  $t$  test was applied to these three findings to correct for the multiple comparisons, none of them reached the .05 level of significance.

#### Perceptions of the Experimental Situation

Subjects' reactions to the experimental setting and stimuli were examined to provide information on the psychological context in which the data were collected.

#### Perception of the Task

An age effect was hypothesized for task ease and familiarity, such that older subjects would find the task to be harder and less familiar than would the younger subjects. A treatment effect was also hypothesized, such that the negative group would find the task to be harder. To test these predictions, task ease and familiarity were the dependent variables in a 2 X 3 MANOVA, which yielded an age effect (Wilks' lambda = .926,  $F(2, 103) = 4.11, p \ll .05$ ). Univariate tests showed this effect to be significant ( $p \ll .05$ ) for both dependent variables. On a 7-point Likert scale, older subjects rated the task's ease at 2.95, whereas the younger subjects rated it at 3.50. Task familiarity was rated at 2.68 by the older subjects, and 3.42 by the younger ones. The predicted treatment effect was not significant.

It was predicted that task familiarity would be correlated with perceived task ease. This was modestly supported by the Pearson correlation calculated on all subjects,  $r = .29$ ,  $p \ll .001$ .

#### Perception of the Model

It was hypothesized that there would be a negative correlation between perceived similarity to the model and denial of having been influenced by the model. A treatment effect was also predicted, such that the positive condition would report greater similarity to the model than would the negative condition. No age effect was hypothesized.

The Pearson correlation between perceived similarity and denial of influence was  $r = -.23$ ,  $p \ll .01$ . Similarity and denial-of-influence were the dependent variables in a 2 X 3 MANOVA, which yielded an age effect (Wilks' lambda = .871,  $F(2, 103) = 7.61$ ,  $p \ll .001$ ). The univariate test was significant for perceived similarity ( $F(1, 104) = 15.19$ ,  $p \ll .001$ ), with elders feeling more similar to the model than did younger subjects. There was also a treatment effect, (Wilks' lambda = .870,  $F(4, 206) = 3.73$ ,  $p \ll .01$ ), with the univariate test for similarity being significant at  $p \ll .005$ . A Scheffe test showed that the positive group felt significantly more similar to the model ( $p \ll .01$ ) than did the negative group.

#### Manipulation Checks

Immediately before being debriefed, subjects were asked whether they thought the model was credible, and whether they felt there was

another purpose to the study other than the one that had been explained to them.

Although none of the subjects stated that the model was simply not credible, one of the older subjects and five of the younger ones expressed some reservations about her credibility. Two of the young subjects in the Positive condition questioned the genuineness of the model's enthusiasm for the task. Three of those in the Negative condition felt that the model lacked self-esteem, and two of these asked whether she had been reading from a script rather than speaking spontaneously.

None of the older subjects suspected an ulterior purpose for the study. Nine of the younger subjects commented that because it was a "psychology experiment" they were probably blind to its actual purpose. These women had been recruited from undergraduate psychology classes, but none were accurate in guessing the experimental hypotheses or the nature of the manipulation.

#### Review of Key Findings

This study attempted to manipulate task performance by providing subjects with a social model. Age differences in efficacy and performance were evidenced by older subjects reporting lower perceived efficacy, spending longer on a logical reasoning task, and achieving fewer correct solutions on the task. A second major influence, but only on task persistence, was the provision of a social model; subjects who were exposed to a confident model spent longer on the task, but did not achieve higher scores as a result. A

third influence on persistence was personality as represented by intellectual self-confidence and anxiety about aging. Subjects with low Aging Anxiety scores worked longer than others and were more responsive to the Positive model. Similarly, older subjects with high PIC scores were most responsive to the Positive model, whereas young subjects with mid-range PIC scores were most responsive to that model. There was no main effect on persistence for PIC scores.

## Chapter V: Discussion

The current study investigated the effect of personality and social modelling on cognitive performance in younger and older adults. The main hypothesis was that cognitive task performance would be influenced by the provision of social models who portrayed either high self-efficacy and effort-based causal attributions, or low self-efficacy and externally based causal attributions. It was also hypothesized that older subjects would be more responsive to this modelling than would younger subjects. The role of subjects' personality and beliefs -- locus of control, attitude toward aging, and task-relevant causal attributions -- as possible influences on task performance was also explored. The data partially supported the hypotheses by revealing a modelling effect on task persistence, and indicated that interactions between personality and the modelling treatment influenced this outcome variable. A more detailed account and interpretation of these results are presented in the following sections.

### Modelling Effect

The data partially supported the hypothesized modelling effect. The group that heard the positive model spent significantly longer on the task than the group that heard the control model. Although the difference between the positive and negative conditions was in the predicted direction, it was not statistically significant. The hypothesized Age by Treatment interaction was not supported.

### Main Effect on Persistence

Clearly, the positive group showed a modelling effect. We can take the control group's performance as a baseline against which the modelled groups can be compared. Vicarious partial reinforcement would be shown if both modelled groups worked harder on the task than did the control group. There was no evidence of this, although both the positive and negative models claimed to have answered some problems wrong and some right. Vicariously learned helplessness would be shown by depressed performance in the negative group, and vicariously learned effectiveness would be shown by enhanced performance in the positive group. The data are consistent with the latter interpretation, as is the finding that the positive group felt more similar to the model. Vicariously learned effectiveness has previously been demonstrated in adults (Denney, 1974; Denney & Denney, 1974; Chartier & Friendlander, 1981).

In the older age group, subjects in the negative and control conditions did not differ with respect to persistence on the task. One possible explanation for this is that the negative group rejected the model and therefore proceeded as if they had not been exposed to any model. This interpretation, and the negative group's report of less similarity to the model, are consonant with the vicarious learned-effectance effect. Several reasons can be offered for this postulated rejection. The subjects may have felt that the model's expressed attitudes were inconsistent with their own personal beliefs about themselves (Festinger, 1954) or about the task situation (e.g.,

McGivern et al, 1986). Or, perhaps the negative model was simply not credible.

#### Mechanisms of the Modelling Effect

There are two possible explanations for how the modelling treatment resulted in increased persistence for the positive group. Exposure to the model may have modified subjects' beliefs about their efficacy, or may have given them useful information about how to proceed with the task.

Efficacy. The positive model expressed belief in her ability to master challenges in general and the reasoning task in particular. We may speculate that the subjects adopted the modelled sense of efficacy, with a consequent effect on their task behaviour. However, there are two arguments against this proposed mechanism. First, there was no treatment effect on the efficacy variable (compare to Hurlbut, 1988), and second, the addition of efficacy to the regression equation to predict persistence did not cause a significant increment in the adjusted R-squared. This finding contradicts other studies (e.g., Bandura & Adams, 1977) which found efficacy to be a significant predictor of performance behaviour. Statistical reasons for this lack of significance in the current study were discussed in a previous section. In the current study, efficacy was measured by a single item based on social comparison. If multiple items had been used, or if subjects had predicted the actual score that they expected to achieve, efficacy may have shown a significant relationship to persistence.

Task-relevant information. The positive model's comments related to the controllability of her task outcomes. In effect, she told the subjects that there was a contingent relationship between task persistence and success, and she implied that her persistence was intentional. Subjects may have treated these comments as useful information about controllability and contingency of outcomes, and then acted in accordance with this information.

The positive model identified persistence as her strategy on the task, and subjects may have learned that persistence is the appropriate strategy to use. The negative model said that she did not find a useful strategy, and the control model said nothing about strategy. If the positive-group subjects interpreted the model's comments as indicative of task success, then this would be a vicarious reinforcement effect (e.g., Thelen et al, 1979) as subjects perceived the model to have obtained reinforcement by using the specified strategy.

#### Effect of Modelling on Efficacy

The mean efficacy scores differ in a manner consistent with the modelling effect, but the differences are not statistically significant. This is in contrast to a similar study by Hurlbut (1988), who found a modelling effect on efficacy but not on task performance. Two explanations can be advanced for this lack of a treatment effect on efficacy as measured by social comparison. One is that this variable is related to subjects' long-standing beliefs about themselves, such as self-esteem, and therefore is not likely to

be modified by something as brief, symbolic, and subtle as the modelling stimuli. The significance of the PIC factor scores in the regression equation to predict efficacy suggests that this aspect of efficacy has some relationship to the intellectual aspect of personality.

The other explanation is that the treatment groups reported similar levels of efficacy but for different reasons. The positive group, which felt significantly more similar to the model than did the negative group, would have shown a modelling effect whereas the negative group would have felt superior to the model and shown a social-comparison effect. If this were the case, we would expect the control group to score lower on efficacy than the other groups. An inspection of the cell means shows a non-significant tendency in this direction for the older subjects.

#### Modelling and Task Achievement

In contrast to other studies of modelling and task performance in adults (Denney, 1974; Denney & Denney, 1974) there was no treatment effect on task outcome. Perhaps the task taps an aspect of cognitive performance which is difficult to modify without the use of direct instruction or practice. No aspects of the modelling stimuli, outside of the positive model's references to persistence and controllability of outcomes, could reasonably be expected to cause an increase in performance scores on a task of this sort.

### Predicted Age by Treatment Interaction

The simple hypothesis of an Age by Treatment interaction was not supported. Although identical psychological processes may have affected the behaviour of both age groups, we must ask whether the experiment failed to detect the hypothesized interaction, and whether the hypothesis was too simplistic.

The age difference in perceived similarity to the model suggests that the design may have been confounded by a lack of modelling-stimulus equivalence across age groups (Labouvie, 1980). Although both groups heard an age-peer model and both models spoke much the same words, the models and the concepts which they conveyed may have had differential importance and believability for the two age groups. The only difference between the transcripts for the age groups was in the comment about the questions being "too hard for someone my age" (old subjects) or "too hard for someone like me" (young subjects). This difference may be responsible for the age difference in perceived similarity to the model. However, the age difference in perceived similarity would have made the Age by Treatment interaction more plausible.

A more important issue concerns the role of personality factors as moderators of the treatment effect. Because the experimental manipulation was subtle, individual differences in personality and beliefs may have influenced how subjects responded to the model. The data are consistent with this formulation.

Effect of Personality on Efficacy and Performance

This issue was examined by regression analysis. The hierarchical regression equations used design factors (agegroup and treatment), personality variables, and the interactions between personality and treatment to predict the three performance variables.

Intellectual self-confidence. The PIC variable was modestly related to efficacy, and interacted with the treatment manipulation to affect task persistence. The lack of a main effect of PIC scores on persistence is in contrast to findings of other studies (Bandura, 1977b; 1982; Pyszczynski, & Greenberg, 1983). The interaction between treatment and PIC showed that subjects with high PIC scores were most responsive to the Positive model, whereas others showed less differential response to the manipulation. Among older subjects, the Control condition was the most facilitating for low-PIC subjects, whereas the Positive condition was most facilitating for mid-range and high-PIC subjects. In comparison, Prohaska et al (1984) found that for this age group, the effort-attribution condition was more facilitating than the no-attribution condition. In the current study, the low-PIC elders appear to have either ignored or been demoralized by the Positive and Negative models. These findings suggest that the impact of the modelling stimulus varied as a function of personality, and that age was a moderator of this effect. Thus, the simple hypothesis of an Age by Treatment interaction was not sufficient to describe the situation.

Attitude toward aging. Neither of the AOS scales was related to efficacy. The relationship between Aging Anxiety and persistence partially confirmed the model of Social Breakdown Syndrome (Kuypers & Bengtson, 1973), in that subjects who showed less personal anxiety about their own aging were more persistent. The Treatment by Personality interaction showed that these low scorers were most responsive to the Positive model, whereas other subjects showed less differential response to the manipulation. Thus, with both PIC and AOS scores, subjects who appeared to have positive feelings about themselves and their capacities were most likely to respond to the Positive model.

Causal attributions. In contrast to the findings of other researchers (Lachman et al, 1987), attributional ratings did not show any significant relationship to the three performance variables. This lack of effect could be attributed to biases in subjects' reports (e.g., Greenwald, 1980; Weary & Arkin, 1981). Another potential explanation is that because the subjects named their perceived causes in an open-ended response format, each was rating a different referent.

#### Relationships Among Performance Variables

In this phase of the analysis, the efficacy variable was added to the regression equations as a predictor of persistence, and both efficacy and persistence were added as predictors of achievement. Because these two predictors were added in the final blocks of the equations, the large number of predictors already in the equations

would make it difficult for those in the final blocks to cause any significant increment in R-squared.

The result of greatest interest here is the equation which used PIC factor scores and efficacy to predict the number-correct variable. Although efficacy entered the equation as the 16th variable, it still made a significant contribution to the variance independent of the other predictors. A possible interpretation is that both efficacy and achievement on this type of task are related to some aspect of the self, perhaps general intellectual ability. Or, it could be that efficacy is an honest reflection of actual performance capacity. Other researchers (Lachman & Jelalian, 1984) have found that the relationship between efficacy and task performance increased for those tasks on which subjects did well. In the current study, the modest relationship between efficacy and achievement may indicate that subjects found the task to be quite hard. This idea is supported by the low ratings on task ease.

#### Change in Efficacy

Although the modelling stimuli did not affect efficacy, actual experience with the task exerted an effect and caused efficacy to decrease. This finding is consistent with the subjects' low ratings of task ease. It is also in keeping with longitudinal studies (Lachman, 1983; Lachman & Leff, 1988) which report that long-term changes in efficacy are consequences, not antecedents, of changes in intellectual performance.

### Age Differences

The age differences on the three main dependent variables are in keeping with other research on cognitive aging. They suggest that the older subjects had less confidence in their intellectual ability than did the younger ones, and that they performed less well.

The lower efficacy scores of the older sample are consistent with other studies (e.g., Hurlbut, 1988; Prohaska et al, 1984). This age difference may result from cohort-related factors such as educational level, self-esteem, or style of self-assessment. Alternatively, it could indicate age-related changes in self-esteem or in performance expectations. Lachman's work (1983) suggests that changes in perceived efficacy are consequents, not antecedents, of decrements in cognitive performance.

Elders spent twice as long on the task as did the younger subjects. This finding is consistent with the age-related behavioural slowing which has been documented (Birren, Woods, & Williams, 1980), and could also be interpreted as indicating either greater cautiousness or increased persistence (e.g., Horn, 1982a) on the part of these subjects. The elders' lower achievement scores are consistent with the drop in fluid intelligence which is reported during late adulthood (Horn, 1982a; 1982b).

### Review of Key Findings

This study attempted to manipulate task performance by providing subjects with a social model. Age differences in efficacy and performance were shown by the older subjects' reporting lower

perceived efficacy, spending longer on a logical reasoning task, and achieving fewer correct solutions on the task. Task persistence was the only outcome variable that showed a treatment effect; subjects who were exposed to a confident social model spent longer on the task, but did not achieve higher scores as a result. Another influence on persistence was the interaction between the modelling condition and personality variables as represented by intellectual self-confidence and by attitudes toward aging. Subjects who felt positively about themselves and their capacities responded to the positive model, whereas those who had mid-range and lower scores on the PIC and AOS questionnaires did not respond differentially to the modelling stimuli. The triple interaction among age, treatment, and intellectual self-confidence suggests that task persistence can be influenced in complex ways by subject characteristics and situational cues.

### Implications

#### Noncognitive Influences on Performance

This study showed that performance, specifically persistence on a cognitive task, can be influenced by environmental and personality variables. If persistence is affected by social or situational cues, then any tasks on which persistence is a factor in achieving success may be biased by characteristics of the performance setting. As well, subjects' beliefs about themselves may interact with these situational cues. Thus, cognitive performance may reflect both

non-cognitive aspects of the subject, and the interaction between the subject and the environment.

### The Research Setting

These ideas should alert us to potential confounding variables within the laboratory. Although the exact mechanism by which the modelling effect occurred has not been identified, it does seem plausible that the subjects' beliefs, expectations, or task strategies were influenced by exposure to the modelling stimuli, and that task behaviour was subsequently affected. If subjects are tested conjointly in the laboratory, some individuals could serve as unintended peer models for the group and thus affect the task behaviour of others. In the current study, the modelling treatment was subtle yet it still exerted an effect. In other research settings, we do not know whether one subject's off-hand comments about their own participation would constitute a vicarious experience for another subject.

Subject behaviour can also be influenced by the experimenter's expectancies (for reviews, see Rosenthal, 1976; 1980). As experimenters, we might inadvertently establish particular expectancy sets in research subjects or give clues as to appropriate strategies, which would then influence performance behaviour. The work on behavioural confirmation in social interaction (Snyder & Swann, 1978; Snyder et al, 1977; Swann & Ely, 1980) suggests that our expectations of subjects could be conveyed through our interactions with them. We would do well to monitor our casual "rapport-building" interactions

with subjects, and to be conscientious when preparing written materials for them.

#### Competence and Performance

If this study had used a task on which persistence were a factor in achieving high scores, then the positive group would likely have shown higher scores than the other groups. Assuming that the treatment groups were similar in terms of actual competence, we would then have varying discrepancies between what the subjects are capable of, and what they actually achieve in a task situation. This suggests that the gap between competence and performance on cognitive tasks can be manipulated.

This possibility is of direct relevance to the field of cognitive aging because it suggests that some of the age-related decrements in performance may be ameliorated by manipulation of non-cognitive variables. Intervention of this type may prove to be cost-effective in comparison to interventions which emphasize direct instruction and practice.

#### Directions for Future Research

The finding that older subjects did respond to the modelling stimuli suggests that social learning cues are one potential means of modifying behaviour in this age group. Considering that the bulk of the research on social modelling has been conducted on children or young adults, it seems appropriate to explore the dynamics of modelling in the elderly. Several characteristics of models and of observers have been identified as moderators of the modelling effect

(see Bandura, 1986, for a review), and it would be valuable to look for adult age differences in these moderators.

The present investigation suggests that particular attention should be paid to subject characteristics such as locus of control, self-confidence, or self-acceptance. These are the concepts embodied by the PIC inventory and the Aging Anxiety scale of the AOS, and which interacted with the treatment manipulation.

With respect to replicating and extending this study, two aspects of external validity need to be addressed.

First, the use of a single-sex design gave logistic simplicity at the expense of not being able to answer a substantive question about whether there are gender differences in the observed treatment effect. Therefore, it is important to replicate this study with a sample of men. Until that is done, we do not know whether the findings are applicable to adults in general, or only to women.

Second, the findings pertain to just one task, whose nature is very different from the intellectual tasks confronting adults in daily life. Performance on this sort of task may have no relevance at all for daily intellectual functioning. The study should be replicated by using other types of cognitive tasks, including some drawn from daily life, such as those involving working memory. It would also be necessary to vary task characteristics such as difficulty, relevance, and implications of success and failure.

For example, the task could ask subjects to learn how to operate a calculator by reading a set of instructions. The level of

difficulty would vary with the simplicity and clarity of the instructions, and with the type of calculations (e.g., simple sums or mortgage payments) required. Task relevance could be enhanced by telling subjects that this type of task is a good indicator of intelligence, and the implications of success or failure could be manipulated by telling subjects that later they will be expected to teach a confederate how to operate the calculator.

## REFERENCES

- Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. Journal of Abnormal Psychology, 87, 49-74.
- Allen, V. L., & Wilder, D. A. (1977). Social comparison, self-evaluation, and conformity to the group. In J. M. Suls & R. L. Miller (Eds.). Social comparison processes: Theoretical and empirical perspectives (pp. 87-208). Washington: Hemisphere.
- Alloy, L. B. (1982). The role of perceptions and attributions for response-outcome noncontingency in learned helplessness: A commentary and discussion. Journal of Personality, 50, 443-479.
- Alloy, L. B., & Abramson, L. Y. (1979). Judgment of contingency in depressed and non-depressed students: Sadder but wiser? Journal of Experimental Psychology: General, 108, 441-485.
- Alloy, L. B., Peterson, C., Abramson, L. Y., & Seligman, M. E. P. (1984). Attributional style and the generality of learned helplessness. Journal of Personality and Social Psychology, 46, 681-687.
- Anderson, C. A. (1983). Motivational and performance deficits in interpersonal settings: The effect of attributional style. Journal of Personality and Social Psychology, 45, 1136-1147.
- Andrews, G. R., & Debus, R. L. (1978). Persistence and the causal perception of failure: Modifying cognitive attributions. Journal of Educational Psychology, 70, 154-166.
- Arenberg, D. (1974). A longitudinal study of problem-solving in adults. Journal of Gerontology, 29, 650-658.
- Arenberg, D. (1982). Changes with age in problem-solving. In F. I. M. Craik & S. Trehub (Eds.). Advances in the study of communication and affect: Vol. 8. Aging and cognitive processes (pp. 221-235). New York: Plenum.
- Atchley, R. C. (1985). Social forces and aging. Belmont, CA: Wadsworth.
- Avorn, J., & Langer, E. J. (1982). Induced disability in nursing home patients: A controlled trial. Journal of the American Geriatric Society, 30, 397-400.

- Baltes, P. B., Cornelius, S. W., & Nesselroade, J. R. (1979). Cohort effects in developmental psychology. In J. Nesselroade & P. Baltes (Eds.). Longitudinal research in the study of behavior and development (pp. 61-87). New York: Academic Press.
- Baltes, P. B., & Willis, S. L. (1982). Plasticity and enhancement of intellectual functioning in old age: Penn State's Adult Development and Enrichment Project (ADEPT). In F. I. M. Craik & S. Trehub (Eds.). Advances in the study of communication and affect: Vol. 8. Aging and cognitive processes (pp. 353-389). New York: Plenum.
- Bandura, A. (1971). Vicarious and self-reinforcement processes. In R. Glaser (Ed.). The nature of reinforcement (pp. 228-278). New York: Academic Press.
- Bandura, A. (1976). Self-reinforcement: Theoretical and methodological considerations. Behaviorism, 4, 135-155.
- Bandura, A. (1977a). Social learning theory. Englewood Cliffs: Prentice-Hall.
- Bandura, A. (1977b). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.
- Bandura, A. (1981). Self-referent thought: A developmental analysis of self-efficacy. In J. H. Flavell & L. Ross (Eds.). Social cognitive development: Frontiers and possible futures (pp. 200-239). Cambridge: Cambridge, University Press.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37, 122-147.
- Bandura, A. (1986). Social foundations of thought and action. Englewood Cliffs, N.J.: Prentice-Hall.
- Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavior change. Cognitive Therapy and Research, 1, 287-310.
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. Journal of Personality and Social Psychology, 35, 125-139.
- Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. Cognitive Therapy and Research, 4, 39-66.

- Bandura, A., Reese, L., & Adams, N. E. (1982). Microanalysis of action and fear arousal as a function of differential levels of perceived self-efficacy. Journal of Personality and Social Psychology, 43, 5-21.
- Banziger, G., & Drevenstedt, J. (1982). Achievement attributions by young and old judges as a function of perceived age of stimulus person. Journal of Gerontology, 37, 468-474.
- Bearison, D. (1974). The construct of regression: A Piagetian approach. Merrill-Palmer Quarterly, 20, 21-30.
- Bentler, P. M. (1973). Assessment of developmental factor change at the individual and group level. In J. R. Nesselroade & H. W. Reese (Eds). Life-span developmental psychology: Methodological Issues (pp.145-174). New York: Academic Press.
- Betts, E. (1982). Relation of locus of control to aspiration level and to competitive anxiety. Psychological Reports, 51, 71-76.
- Birren, J. E., Woods, A. M., & Williams, M. V. (1980). Behavioral slowing with age: Causes, organization, and consequences. In L. W. Poon (Ed.). Aging in the 1980's: Psychological Issues. Washington: American Psychological Association.
- Blau, G. J. (1984). Brief note comparing the Rotter and Levenson measures of locus of control. Perceptual and Motor Skills, 58, 173-174.
- Both, L., Rubin, K., & Hymel, S. (June, 1987). Self-efficacy and social interaction in the elderly. Paper presented at the meeting of the Canadian Psychological Association, Vancouver, B.C.
- Breen, L. J., Vulcano, B., & Dyck, D. G. (1979). Observational learning and sex roles in learned helplessness. Psychological Reports, 44, 135-144.
- Brehm, J. W. (1966). A theory of psychological reactance. New York: Academic Press.
- Brehm, J. W. (1972). Responses to loss of freedom: A theory of psychological reactance. Morristown, N.J.: General Learning Press.
- Brown, B. R., & Granick, S. (1983). Cognitive and psychosocial differences between internal and external locus of control aged persons. Experimental Aging Research, 9, 107-110.

- Brown, I., Jr. (1979). Learned helplessness through modelling: Self-efficacy and social comparison processes. In L. C. Perlmutter & R. A. Monty (Eds.), Choice and perceived control (pp. 107-120). Hillsdale: Erlbaum.
- Brown, I., Jr., & Inouye, D. K. (1978). Learned helplessness through modelling: The role of perceived similarity in competence. Journal of Personality and Social Psychology, 36, 900-908.
- Brown, R. D., Brown, L. A., & Danielson, J. E. (1975). Instructional treatments, presenter types, and learner characteristics as significant variants in instructional television for adults. Journal of Educational Psychology, 67, 391-404.
- Bultena, G. L., & Powers, E. A. (1978). Age identification and reference group orientation. Journal of Gerontology, 33, 748-754.
- Bushman, B. J. (1984). Perceived symbols of authority and their influence on compliance. Journal of Applied Social Psychology, 14, 501-508.
- Buys, N. J., & Winefield, A. H. (1982). Learned helplessness in high school students following experience of non-contingent rewards. Journal of Research in Personality, 16, 118-127.
- Canadian Government Publishing Centre (1989). The nation: Population and dwelling characteristics. Ottawa: Author.
- Cattell, R. B. (1971). Abilities: Their structure, growth, and action. Boston: Houghton Mifflin.
- Cattell, R. B., & Nesselroade, J. R. (1974). The state-trait anxiety battery (STAB). Champaign, Ill.: Institute for Personality and Ability Testing.
- Cavanaugh, J. C., & Murphy, N. Z. (1986). Personality and metamemory correlates of memory performance in younger and older adults. Educational Gerontology, 12, 385-394.
- Chartier, G. M., & Friedlander, S. (1981). Vicariously and directly learned helplessness and effectiveness. Journal of Personality, 49, 257-270.
- Cohen, S., Rothbart, R., & Phillips, S. (1976). Locus of control and the generality of learned helplessness in humans. Journal of Personality and Social Psychology, 34, 1049-1056.

- Condiotte, M. M., & Lichtenstein, E. (1981). Self-efficacy and relapse in smoking cessation programs. Journal of Consulting and Clinical Psychology, 49, 648-658.
- Cornelius, S. W. (1984). Classic patterns of intellectual aging: Test familiarity, difficulty, and performance. Journal of Gerontology, 39, 201-206.
- Costa, P. T., & McCrae, R. R. (1980). Still stable after all these years: Personality as a key to some issues in adulthood and old age. In P. B. Baltes & O. G. Brim (Eds.), Life-span development and behavior, vol. 3 (pp. 65-102). New York: Academic Press.
- Covington, M. V., & Omelich, C. L. (1979). Are causal attributions causal? A path analysis of the cognitive model of achievement motivation. Journal of Personality and Social Psychology, 37, 1487-1504.
- Craske, M. L. (1985). Improving persistence through observational learning and attribution retraining. British Journal of Educational Psychology, 55, 138-147.
- Darley, J. M., & Fazio, R. H. (1980). Expectancy confirmation processes arising in the social interaction sequence. American Psychologist, 35, 867-881.
- Davies, F. W., & Yates, B. T. (1982). Self-efficacy expectancies vs. outcome expectancies as determinants of performance deficits and depressive affect. Cognitive Therapy and Research, 6, 23-35.
- Denney, N. W. (1974). Classification abilities in the elderly. Journal of Gerontology, 29, 309-314.
- Denney, N. W. (1982). Attempts to modify cognitive tempo in elderly adults. International Journal of Aging and Human Development, 14(4), 239-254.
- Denney, N. W. (1982). Aging and cognitive changes. In B. B. Wolman & G. Stricker (Eds.). Handbook of developmental psychology (pp. 807-827). Englewood Cliffs: Prentice-Hall.
- Denney, N. W., & Denney, D. R. (1974). Modelling effects on the questioning strategies of the elderly. Developmental Psychology, 10, 458.
- Denney, N. W., & Palmer, A. M. (1981). Adult age differences on traditional and practical problem-solving measures. Journal of Gerontology, 36, 323-328.

- Denney, N. W., & Thiessen, M. (1983). Determinants of cognitive abilities in the elderly. International Journal of Aging and Human Development, 16(1), 29-41.
- DeVellis, R. F., DeVellis, B. M., & McCauley, C. (1978). Vicarious acquisition of learned helplessness. Journal of Personality and Social Psychology, 36, 894-899.
- DiClemente, C. C. (1981). Self-efficacy and smoking cessation maintenance: A preliminary report. Cognitive Therapy and Research, 5, 175-187.
- Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. Journal of Personality and Social Psychology, 36, 451-462.
- Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: II. The processing of success. Journal of Personality and Social Psychology, 39, 940-952.
- Dixon, R. A., & Hultsch, D. F. (1983). Metamemory and memory for text relationships in adulthood: A cross-validation study. Journal of Gerontology, 38, 689-694.
- Dweck, C. S., & Wortman, C. B. (1982). Learned helplessness, anxiety, and achievement motivation: Neglected parallels in cognitive, affective, and coping responses. In H. W. Krohne & L. Laux (Eds.). Series in clinical and community psychology: Achievement, stress, and anxiety (pp. 93-125). New York: Hemisphere.
- Elder, G. H., Jr., & Rockwell, R. C. (1979). The life-course and human development: An ecological perspective. International Journal of Behavioral Development, 2, 1-21.
- Ekstrom, R. B., French, J.W., Harman, H. H., & Dermen, D. (1976). Manual for kit of factor-referenced cognitive tests. Princeton: Educational Testing Service.
- Ewart, C. K., Stewart, K. J., Gillilan, R. E., Kelemen, M. H., Valenti, S. A., Manley, J. D., & Kelemen, M. D. (1986). Usefulness of self-efficacy in predicting overexertion during programmed exercise in coronary artery disease. American Journal of Cardiology, 57, 557-561.
- Ewart, C. K., Taylor, C. B., Reese, L. B., & DeBusk, R. F. (1983). Effects of early post-MI exercise testing on self-perception and subsequent physical activity. American Journal of Cardiology, 51, 1076-1080.

- Falbo, T., & Beck, R. C. (1979). Naive psychology and the attributional model of achievement. Journal of Personality, 47, 185-195.
- Fazio, R. H., Effrein, E. A., & Falendar, V. J. (1981). Self-perceptions following social interaction. Journal of Personality and Social Psychology, 41, 232-242.
- Festinger, L. (1954). A theory of social comparison processes. Human Relations, 7, 117-140.
- Flavell, J. H., & Wohlwill, J. F. (1969). Formal and functional aspects of cognitive development. In D. Elkind & J. H. Flavell (Eds.). Studies in cognitive development; Essays in honor of Jean Piaget (pp. 67-120). New York: Oxford University Press.
- Forsterling, F. (1985). Attributional retraining: A review. Psychological Bulletin, 98, 495-512.
- Fowler, J. W., & Peterson, P. L. (1981). Increasing reading persistence and altering attributional style of learned helpless children. Journal of Educational Psychology, 73, 251-260.
- Fozard, J. L., & Nuttall, R. L. (1971). GATB scores for men differing in age and socioeconomic status. Journal of Applied Psychology, 55, 372-379.
- Gergen, M. M., & Gergen, K. J. (1986). The discourse of control and the maintenance of well-being. In M. M. Baltes & P. B. Baltes (Eds.). The psychology of control and aging (pp. 119-138). Hillsdale: Erlbaum.
- Green, S. K. (1981). Attitudes and perceptions about the elderly: Current and future perspectives. International Journal of Aging and Human Development, 13, 99-119.
- Greenwald, A. G. (1980). The totalitarian ego: Fabrication and revision of personal history. American Psychologist, 35, 603-618.
- Hackett, G., & Betz, N. E. (1981). A self-efficacy approach to the career development of women. Journal of Vocational Behavior, 18, 326-339.
- Haines, P., McGrath, P., & Pirot, M. (1980). Expectations and persistence: An experimental comparison of Bandura and Rotter. Social Behavior and Personality, 8, 193-201.
- Hanusa, B. H., & Schulz, R. (1977). Attributional mediators of learned helplessness. Journal of Personality and Social Psychology, 35, 602-611.

- Hiroto, D. S. (1974). Locus of control and learned helplessness. Journal of Experimental Psychology, 102, 187-193.
- Hirt, M., & Genshaft, J. (1980). Immunization and reversibility of cognitive deficits due to learned helplessness. Personality and Individual Differences, 2, 191-196.
- Horn, J. L. (1978). Human ability systems. In P. B. Baltes (Ed.). Life-span development and behavior, vol.1. (pp. 211-256). New York: Academic Press.
- Horn, J. L. (1982a). The theory of fluid and crystallized intelligence in relation to concepts of cognitive psychology and aging in adulthood. In F. I. M. Craik & S. Trehub (Eds.). Advances in the study of communication and affect: Vol. 8. Aging and cognitive processes (pp. 237-278). New York: Plenum.
- Horn, J. L. (1982b). The aging of human abilities. In B. B. Wolman (Ed.). Handbook of developmental psychology (pp. 847-870). Englewood Cliffs, N.J.: Prentice-Hall.
- Hunter, K. I., Linn, M. W., Harris, R., & Pratt, T. C. (1980). Discriminators of internal-external locus of control orientation in the elderly. Research on Aging, 2, 49-60.
- Hurlbut, N. L. (1988). Influence of vicarious experience on self-efficacy and learning of senior adults. Canadian Home Economics Journal, 38, 137-141.
- Ickes, W., & Layden, M. A. (1978). Attributional styles. In J. H. Harvey, W. Ickes, & R. F. Kidd (Eds.). New directions in attributional research: Vol. 2 (pp. 119-152). Hillsdale: Erlbaum.
- Jackson, D. N. (1974). Personality research form manual. Goshen, New York: Research Psychologists Press.
- Jolley, J. M. (1984). The relationship between self structure, adaptability and age. Academic Psychology Bulletin, 6, 95-103.
- Jones, S. L., Nation, J. R., & Massad, P. (1977). Immunization against learned helplessness in man. Journal of Abnormal Psychology, 86, 75-83.
- Kafer, R. A., Rakowski, W., Lachman, M., & Hickey, T. (1980). Aging Opinion Survey: A report on instrument development. International Journal of Aging and Human Development, 11, 319-333.
- Kazdin, A. E. (1973). Covert modelling and the reduction of avoidance behaviour. Journal of Abnormal Psychology, 81 87-95.

- Kazdin, A. E. (1974a). Effect of model identity and fear-relevant similarity on covert modelling. Behavior Therapy, 5, 624-635.
- Kazdin, A. E. (1974b). Covert modelling, model similarity, and reduction of avoidance behaviour. Behavior Therapy, 5, 325-340.
- Kazdin, A. E. (1979). Imagery elaboration and self-efficacy in the covert modelling treatment of unassertive behavior. Journal of Consulting and Clinical Psychology, 47, 725-733.
- Kazdin, A. E. (1981). Vicarious reinforcement and punishment processes in the classroom. In P. S. Strain (Ed.), The utilization of classroom peers as behavior change agents. (p. 129-153). New York: Plenum.
- Kerns, C. D. (1975). Effect of schedule and amount of observed reinforcement on response persistence. Journal of Personality and Social Psychology, 31, p. 983-991.
- Klein, R. L. (1972). Age, sex, and task difficulty as predictors of social conformity. Journal of Gerontology, 27, 229-236.
- Knoop, R. (1981). Age and correlates of locus of control. Journal of Psychology, 108, 103-106.
- Koller, P. S., & Kaplan, R. M. (1978). A two-process theory of learned helplessness. Journal of Personality and Social Psychology, 36, 1177-1183.
- Kuypers, J. A., & Bengtson, V. L. (1973). Social breakdown and competence: A model of normal aging. Human Development, 16, 181-201.
- Labouvie, E. (1980). Identity vs. equivalence of psychological measures and constructs. In L. Poon (Ed.). Aging in the 1980's (pp. 493-502). Washington: American Psychological Association.
- Labouvie-Vief, G., & Gonda, J. N. (1976). Cognitive strategy training and intellectual performance in the elderly. Journal of Gerontology, 31, 327-332.
- Lachman, M. E. (1983). Perceptions of intellectual aging: Antecedent or consequence of intellectual functioning? Developmental Psychology, 19, 482-498.
- Lachman, M. E. (1986a). Locus of control in aging research: A case for multi-dimensional and domain-specific assessment. Psychology and Aging, 1, 34-40.

- Lachman, M. E. (1986b). Personal control in later life: Stability, change, and cognitive correlates. In M. M. Baltes & P. B. Baltes (Eds.). Psychology of control and aging (pp. 207-236). Hillsdale: Erlbaum.
- Lachman, M. E. (1986c). The role of personality and social factors in intellectual aging. Educational Gerontology, 12, 339-344.
- Lachman, M. E., Baltes, P. Nesselroade, J. R., & Willis, S. L. (1982). Examination of personality-ability relationships in the elderly: The role of the contextual (interface) assessment mode. Journal of Research in Personality, 16, 485-501.
- Lachman, M. E., & Jelalian, E. (1984). Self-efficacy and attributions for intellectual performance in young and elderly adults. Journal of Gerontology, 39, 577-582.
- Lachman, M. E., & Leff, R. (1988). Beliefs about intellectual efficacy and control in the elderly: A five-year longitudinal study. Unpublished manuscript, Brandeis University.
- Lachman, M. E., & McArthur, L. Z. (1986). Adulthood age differences in causal attributions for cognitive, physical, and social performance. Psychology and Aging, 1, 127-132.
- Lachman, M. E., Steinberg, E. S., & Trotter, S. D. (1987). Effects of control beliefs and attributions on memory self-assessments and performance. Psychology and Aging, 2, 266-271.
- Langer, E. J. (1979). The illusion of incompetence. In L. C. Perlmutter & R. A. Monty (Eds.). Choice and perceived control (pp. 301-313). Hillsdale, N.J.: Erlbaum.
- Langer, E. J., & Abelson, R. P. (1974). A patient by any other name... Clinician group difference in labelling bias. Journal of Consulting and Clinical Psychology, 42, 4-9.
- Langer, E. J., & Benevento, A. (1978). Self-induced dependence. Journal of Personality and Social Psychology, 36, 886-893.
- Langer, E. J., & Imber, L. G. (1979). When practice makes imperfect: Debilitating effects of overlearning. Journal of Personality and Social Psychology, 37, 2014-2024.
- Langer, E. J., & Roth, J. (1975). Heads I win, tails it's chance: The effects of sequence of outcome on the illusion of control. Journal of Personality and Social Psychology, 32, 951-955.

- LaRue, A., Bank, L., Jarvik, L., & Hetland, M. (1979). Health in old age: How do physicians' ratings and self-ratings compare? Journal of Gerontology, 34, 681-691.
- Lawton, M. P. (1975). The Philadelphia Geriatric Center morale scale: A revision. Journal of Gerontology, 30, 85-89.
- Lefcourt, H. M. (1976). Locus of control: Current trends in theory and research. Hillsdale, N.J.: Erlbaum.
- Lefcourt, H. M. (1982). Locus of control: Current trends in theory and research. Hillsdale: Erlbaum.
- Levenson, H. (1974). Activism and powerful others: Distinctions within the concept of internal-external control. Journal of Personality Assessment, 38, 377-383.
- Locke, E. A., Frederick, E., Lee, C., & Bobko, P. (1984). Effect of self-efficacy, goals, and task strategies on task performance. Journal of Applied Psychology, 69, 241-251.
- Lutsky, N. S. (1980). Attitudes toward old age and elderly persons. In C. Eisdorfer (Ed.). Annual review of gerontology and geriatrics: Vol. 1 (pp. 287-336). New York: Springer.
- Maier, S. F., & Seligman, M. E. P. (1976). Learned helplessness: Theory and evidence. Journal of Experimental Psychology: General, 105, 3-46.
- Maupin, H. E., & Fisher, R. J. (1989). The effects of superior female performance and sex-role orientation on gender conformity. Canadian Journal of Behavioural Science, 21, 55-69.
- McEwan, J. H. (1987). Perceived control among older adults: A review of major issues. Unpublished manuscript, University of Victoria.
- McGivern, J. E., Levin, J. R., Ghatala, E. S., & Pressley, M. (1986). Can selection of an effective memory strategy be induced vicariously? Contemporary Educational Psychology, 11(2), 170-186.
- Medway, F. J., & Venino, G. R. (1982). The effects of effort feedback and performance patterns on children's attributions and task persistence. Contemporary Educational Psychology, 7(1), 26-34.
- Mikulincer, M. (1986). Attributional processes in the learned helplessness paradigm: Behavioral effects of global attributions. Journal of Personality and Social Psychology, 51, 1248-1256.

- Miller, I. W., III., & Norman, W. H. (1979). Learned helplessness in humans: A review and attribution-theory model. Psychological Bulletin, 86, 93-118.
- Miller, I. W., III., & Norman, W. H. (1981). Effects of attributions for success on the alleviation of learned helplessness and depression. Journal of Abnormal Psychology, 90, 113-124.
- Moore, B. S., Sherrod, D. R., Liu, T. J., & Underwood, B. (1979). The dispositional shift in attributions over time. Journal of Experimental Social Psychology, 15, 553-569.
- Moore, J., Strube, M. J., & Lacks, P. (1984). Learned helplessness: A function of attributional style and comparative performance information. Personality and Social Psychology Bulletin, 10, 526-535.
- Munton, A. G. (1986). Learned helplessness, attribution theory, and the nature of cognitions: A critical evaluation. Current Psychological Research and Reviews, 4(4), 331-348.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. Psychological Review, 84, 231-259.
- Oakes, W. F., & Curtis, N. (1982). Learned helplessness: Not dependent upon cognitions, attributions, or other such phenomenal experiences. Journal of Personality, 50, 387-408.
- Okun, M. A. (1980). The role of non-cognitive factors in the cognitive performance of older adults. Contemporary Educational Psychology, 5, 321-345.
- Overmier, J. B., & Seligman, M. E. P. (1967). Effects of inescapable shock upon subsequent escape and avoidance responding. Journal of Comparative and Physiological Psychology, 63, 28-33.
- Overton, W. F., & Newman, J. L. (1982). Cognitive development: Competence-activation/utilization approach. In T. M. Field, A. Houston, H. C. Quay, L. Trol, & G. E. Finley (Eds.). Review of human development (pp. 217-241). New York: Wiley.
- Pasahow, R. J. (1980). The relation between an attributional dimension and learned helplessness. Journal of Abnormal Psychology, 89, 358-367.
- Pasahow, R. J., West, S. G., & Boroto, D. R. (1982). Predicting when uncontrollability will produce performance deficits: A refinement of the reformulated learned helplessness hypothesis. Psychological Review, 89, 595-598.

- Paulus, P. B., Gatchel, R. J., & Seta, J. J. (1978). Enhancement and reduction of task performance by psychological modeling. Personality and Social Psychology Bulletin, 4, 126-130.
- Paulus, P. B., & Seta, J. J. (1975). The vicarious partial reinforcement effect: An empirical and theoretical analysis. Journal of Personality and Social Psychology, 31, 930-936.
- Perry, J. S., & Slep, S. R. (1980). Differences among three adult age groups in their attitudes toward self and others. Journal of Genetic Psychology, 136, 275-279.
- Peterson, C., Semmel, A., Von Baeyer, C., & Abramson, L. (1982). Attributional style questionnaire. Cognitive Therapy and Research, 6 287-299.
- Pittman, N. L., & Pittman, T. S. (1979). Effects of amount of helplessness training and internal-external locus of control on mood and performance. Journal of Personality and Social Psychology, 37, 39-47.
- Powell, A., & Centa, D. (1972). Adult locus of control and mental ability. Psychological Reports, 30, 829-830.
- Prohaska, T. R., Parham, I. A., & Teitelman, J. (1984). Age differences in attributions to causality: Implications for intellectual assessment. Experimental Aging Research, 10, 111-117.
- Pyszczynski, T. & Greenberg, J. (1983). Determinants of reduction in intended effort as a strategy for coping with anticipated failure. Journal of Research in Personality, 17, 412-422.
- Raps, C. S., Peterson, C., Reinhard, K. E., Abramson, L. Y., & Seligman, M. E. P. (1982). Attributional style among depressed patients. Journal of Abnormal Psychology, 91, 102-108.
- Reno, R. (1979). Attribution for success and failure as a function of perceived age. Journal of Gerontology, 34 709-715.
- Rodin, J., & Langer, E. J. (1980). Aging labels: The decline of control and the fall of self-esteem. Journal of Social Issues, 36(2), 12-29.
- Ronis, D. L., Hansen, R. D., & O'Leary, V. E. (1983). Understanding the meaning of achievement attributions: A test of derived locus and stability scores. Journal of Personality and Social Psychology, 44, 702-711.

- Rosenthal, R. (1976). Experimenter effects in behavioral research. New York: Irvington.
- Rosenthal, R. (1980). Replicability and experimenter influence: Experimenter effects in behavioral research. Parapsychology Review, 11 (3), 5-11.
- Rosenthal, T. L., & Bandura, A. (1978). Psychological modeling: Theory and practice. In S. L. Garfield & A. E. Bergin (Eds.). Handbook of psychotherapy and behavior change: An empirical analysis. 2nd ed. (pp 621-658). New York: Wiley.
- Rosow, I. (1974). Socialization to old age. Berkeley: University of California Press.
- Rosow, I. (1976). Status and role change through the life-span. In R. H. Binstock & E. Shanas (Eds.). Handbook of aging and the social sciences (pp. 457-482). New York: Van Nostrand Reinhold.
- Rosow, I. (1985). Status and role change through the life cycle. In R. H. Binstock & E. Shanas (Eds.), Handbook of aging and the social sciences, 2nd ed. (pp. 62-93). New York: Van Nostrand Reinhold.
- Roth, S. (1980). A revised model of learned helplessness in humans. Journal of Personality, 48, 103-133.
- Rotter, J. B. (1954). Social learning and clinical psychology. New York: Prentice-Hall.
- Rotter, J. B. (1966). Generalized expectancies for internal vs. external control of reinforcement. Psychological Monographs, 80, whole number 609.
- Ryckman, R. M. (1979). Perceived locus of control and task performance. In L. C. Perlmutter & R. A. Monty (Eds.). Choice and perceived control. (pp. 233-261). Hillsdale: Erlbaum.
- Ryden, M. B. (1984). Morale and perceived control in institutionalized elderly. Nursing Research, 33(3), 130-136.
- Sabini, J., & Silver, M. (1981). Introspection and causal accounts. Journal of Personality and Social Psychology, 40, 171-179.
- Schmidt, D. F., & Boland, S. M. (1986). Structure of perceptions of older adults: Evidence for multiple stereotypes. Psychology and Aging, 1, 255-260.

- Schunk, D. H. (1982). Effect of effort attributional feedback on children's perceived self-efficacy and achievement. Journal of Educational Psychology, 74, 548-556.
- Schunk, D. H. (1983). Ability vs. effort attributional feedback: Differential effects on self-efficacy and achievement. Journal of Educational Psychology, 75, 848-856.
- Schunk, D. H. (1984). Sequential attributional feedback and children's achievement behaviors. Journal of Educational Psychology, 76, 1159-1169.
- Seligman, M. E. P. (1975). Helplessness: On depression, development, and death. San Francisco: Freeman.
- Seligman, M. E. P., Abramson, L. Y., Semmel, A., & Von Baeyer, C. (1979). Depressive attributional style. Journal of Abnormal Psychology, 28, 242-247.
- Seligman, M. E. P., & Maier, S. F. (1967). Failure to escape traumatic shock. Journal of Experimental Psychology, 74, 1-9.
- Seligman, M. E. P., & Schulman, P. (1986). Explanatory style as a predictor of productivity and quitting among life insurance sales agents. Journal of Personality and Social Behavior, 50, 832-838.
- Sergent, J., & Lambert, W. E. (1979). "Learned helplessness" or "learned incompetence"? Canadian Journal of Behavioural Science, 11, 257-273.
- Shaver, K. G. (1979). Attributional error and attitudes toward aging: A view of the NCOA national attitude survey. International Journal of Aging and Human Development, 9, 101-113.
- Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The self-efficacy scale: Construction and validation. Psychological Reports, 51, 663-671.
- Smith, E. R., & Miller, F. D. (1978). Limits on perceptual and cognitive processes: A reply to Nisbett and Wilson. Psychological Review, 85, 355-362.
- Snyder, M. (1981). On the self-perpetuating nature of social stereotypes. In D. L. Hamilton (Ed.). Cognitive processes in stereotyping and inter-group behavior (pp. 182-212). Hillsdale: Erlbaum.

- Snyder, M. L., Stephan, W. G., & Rosenfield, D. (1978). Attributional egotism. In J. H. Harvey, W. Ickes, & R. F. Kidd (Eds.). New directions in attributional research, vol. 2 (pp. 91-117). Hillsdale: Erlbaum.
- Snyder, M., & Swann, W. B. (1978). Behavioral confirmation in social interaction: From social perception to social reality. Journal of Experimental Social Psychology, 14, 148-162.
- Snyder, M., Tanke, E. D., & Berscheid, E. (1977). Social perception and interpersonal behaviour: On the self-fulfilling nature of social stereotypes. Journal of Personality and Social Psychology, 35, 656-666.
- Sowa, C. J., & Burks, H. M. (1983). Comparison of cognitive restructuring and contingency-based instructional models for alleviation of learned helplessness. Journal of Instructional Psychology, 10, 186-191.
- Spector, P. E. (1983). Locus of control and social influence susceptibility: Are externals normative or informational conformers? Journal of Psychology, 115, 199-201.
- Suls, J. M. (1977). Social comparison theory and research: An overview from 1954. In J. M. Suls & R. L. Miller (Eds.). Social comparison processes (pp. 1-19). Washington: Hemisphere.
- Suls, J., & Mullen, B. (1982). From the cradle to the grave: Comparison and self-evaluation across the life-span. In J. Suls (Ed.). Psychological perspectives on the self (pp. 97-125). Hillsdale: Erlbaum.
- Swann, W. B., & Ely, R. J. (1984). A battle of wills: Self-verification vs. behavioral confirmation. Journal of Personality and Social Psychology, 46, 1287-1302.
- Tennen, H., Gillen, R., & Drum, P. E. (1982). The debilitating effect of exposure to noncontingent escape: A test of the learned helplessness model. Journal of Personality, 50, 409-425.
- Thelen, M. H., Dollinger, S. J., & Kirkland, K. D. (1979). Imitation and response uncertainty. Journal of Genetic Psychology, 135, 139-152.
- Thelen, M. H., & Kirkland, K. D. (1976). On status and being imitated: Effect on reciprocal imitation and attraction. Journal of Personality and Social Psychology, 33, 691-697.

- Tiffany, P. G., Tiffany, D. W., Camp, C. J. & Dey, K. A. (1984). Relationship between experienced control and domiciles of elderly persons. Psychological Reports, 54, 731-736.
- Tuckman, J., & Lorge, I. (1953). "When aging begins" and stereotypes about aging. Journal of Gerontology, 8, 489-492.
- Turkat, I. D. (1982). Investigation of parental modelling in the etiology of diabetic illness behavior. Behaviour Research and Therapy, 20, 547-552.
- Turkat, I. D., & Guise, B. J. (1983). The effects of vicarious experience and stimulus intensity on pain termination and work avoidance. Behaviour Research and Therapy, 21, 241-245.
- Turkat, I. D., & Noskin, D. E. (1983). Vicarious and operant experiences in the etiology of illness behaviour: A replication with healthy individuals. Behaviour Research and Therapy, 21, 169-172.
- Watson, D. (1982). The actor and the observer: How are their perceptions of causality divergent? Psychological Bulletin, 92, 682-700.
- Watson, D., & Baumal, E. (1967). Effects of locus of control and expectation of future control upon present performance. Journal of Personality and Social Psychology, 6, 212-215.
- Watson, J. M. (1981). A note on the dimensionality of the Rotter LOC scale. Australian Journal of Psychology, 33, 319-330.
- Weary, G., & Arkin, R. M. (1981). Attributional self-presentation. In J. H. Harvey, W. Ickes, & R. F. Kidd (Eds.), New directions in attributional research: Vol. 3. (pp. 225-246). Hillsdale: Erlbaum.
- Weinberg, R. S., Gould, D., & Jackson, A. (1979). Expectations and performance: An empirical test of Bandura's self-efficacy theory. Journal of Sport Psychology, 1, 320-331.
- Weinberg, R. S., Yukelson, D., & Jackson, A. (1980). Effect of public and private efficacy expectations on competitive performance. Journal of Sport Psychology, 2, 340-349.
- Weiner, B. (1974). Achievement motivation and attribution theory. Morristown, N.J.: General Learning Press.
- Weiner, B. (1983). Some methodological pitfalls in attributional research. Journal of Educational Psychology, 75, 530-543.

- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. Psychological Review, 92, 548-573.
- Weiner, B., Frieze, I. H., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R. M. (1971). Perceiving the cause of success and failure. Morristown, N.J.: General Learning Press.
- Weiner, B., & Sierad, J. (1975). Misattribution for failure and enhancement of achievement strivings. Journal of Personality and Social Psychology, 31, 415-421.
- Weisz, J. R. (1983). Can I control it? The pursuit of veridical answers across the life span. In P. B. Baltes & O. G. Brim, Jr. (Eds.). Life-span development and behavior: Vol. 5 (pp. 233-300). New York: Academic Press.
- Willis, S. L., & Schaie, K. W. (1986). Practical intelligence in later adulthood. In R. J. Sternberg & R. K. Wagner (Eds.). Practical intelligence: Nature and origins of competence in the everyday world (pp. 236-268). Cambridge: Cambridge University Press.
- Wilson, T. D., & Linville, P. W. (1985). Improving the performance of college freshmen with attributional techniques. Journal of Personality and Social Psychology, 49, 287-293.
- Wortman, C. B., & Brehm, J. W. (1975). Responses to uncontrollable outcomes: An integration of reactance theory and the learned helplessness model. In L. Berkowitz (Ed.). Advances in experimental social psychology, vol. 8 (pp. 277-336). New York: Academic Press.
- Wortman, C. B., & Dintzer, L. (1978). Is an attributional analysis of the learned helplessness phenomenon viable?: A critique of the Abramson-Seligman-Teasdale reformulation. Journal of Abnormal Psychology, 87, 75-90.
- Wortman, C. B., Panciera, L., Shusterman, L., & Hibscher, J. (1975). Attributions of causality and reactions to uncontrollable outcomes. Journal of Experimental Social Psychology, 12, 301-316.
- Yussen, S. R. (1974). Determinants of visual attention and recall in observational learning by preschoolers and second graders. Developmental Psychology, 10, 93-100.

## Appendix A

Transcripts of Modelling StimuliControl Condition

Well, there are a few different types of problems to work on. On each of the tests, there are some hard ones and some easy ones. When you start on the test, first you read the instructions and then you try a couple of problems just for practice, you know, to get the hang of it. Then, you go ahead with the rest of that test.

On one of the tests, you look at two groups of designs, sort of like doodles -- for instance, one group has designs with straight lines and the other group has designs with wavy lines. Then, you look at some more designs and you decide which group each one belongs in -- does it belong in the straight-line group or the wavy-line group. And there's another test that's sort of like that, but you're looking at rows of alphabet letters. All of the rows have something in common, like maybe one row has A-B-C in it and another has X-Y-Z. But there's one row that doesn't fit in with the others -- doesn't fit the pattern -- you figure out which one it is.

There's another test that's like working with a secret code. You're given some words, and each one is represented by code symbols. For instance, the word "cat" might be shown by a little square, and "black" would be shown by a star-shaped symbol. So, if you see the square and the star together, it means "black cat". And you get some other code symbols, too, so that you can figure out which combination of them means, say, "shaggy black cat" or "sleepy dog".

And there's one test where you read things, like short newspaper articles, and then answer questions about what you've read. For example, you'd read a short paragraph about something, maybe it would be about trout fishing or something like that, and then the questions would be "What's the main theme of the paragraph?"

And one more thing -- before you start each test, you predict how well you think you'll do on it, and then after you've finished, you estimate how you think you really did on it.

Positive Condition

Well, there are a few different types of problems to work on. On each of the tests, there are some hard ones and some easy ones. I think that when I really made an effort, they got easier. When you start on the test, first you read the instructions and then you try a couple of problems just for practice, you know, to get the hang of it. Then, you go ahead with the rest of that test. I figured that I could do it if I really wanted to; I probably have enough ability, and I just have to make good use of it.

On one of the tests, you look at two groups of designs, sort of like doodles -- for instance, one group has designs with straight lines and the other group has designs with wavy lines. Then, you look at some more designs and you decide which group each one belongs in -- does it belong in the straight-line group or the wavy-line group. And there's another test that's sort of like that, but you're looking at rows of alphabet letters. All of the rows have something in common, like maybe one row has A-B-C in it and another has X-Y-Z. But there's one row that doesn't fit in with the others -- doesn't fit the pattern -- you figure out which one it is. These two tests were kind of new for me, but I can learn just about anything if I try hard enough.

There's another test that's like working with a secret code. You're given some words, and each one is represented by code symbols. For instance, the word "cat" might be shown by a little square, and "black" would be shown by a star-shaped symbol. So, if you see the square and the star together, it means "black cat". And you get some other code symbols, too, so that you can figure out which combination of them means, say, "shaggy black cat" or "sleepy dog". I don't think luck has anything to do with how a person does on this kind of test -- we all make our own luck just by approaching things the right way.

And there's one test where you read things, like short newspaper articles, and then answer questions about what you've read. For example, you'd read a short paragraph about something, maybe it would be about trout fishing or something like that, and then the questions would be "What's the main theme of the paragraph?"

And one more thing -- before you start each test, you predict how well you think you'll do on it, and then after you've finished, you estimate how you think you really did on it. I got some of them wrong -- maybe I didn't try hard enough, or didn't read the instructions carefully. But I know I got some of them right, too; I just kept at them and gave them my best effort.

### Negative Condition

Well, there are a few different types of problems to work on. On each of the tests, there are some hard ones and some easy ones. I couldn't find any tricks to make the hard ones easier. When you start on the test, first you read the instructions and then you try a couple of problems just for practice, you know, to get the hang of it. Then, you go ahead with the rest of that test. I don't know if it mattered how hard I tried; at my age, maybe I don't have the right kind of ability.

On one of the tests, you look at two groups of designs, sort of like doodles -- for instance, one group has designs with straight lines and the other groups has designs with wavy lines. Then, you look at some more designs and you decide which group each one belongs in -- is it the straight-line group or the wavy-line group. And there's another test that's sort of like that, but you're looking at rows of alphabet letters. All of the rows have something in common, like maybe one row has A-B-C in it and another has X-Y-Z. But there's one row that doesn't fit in with the others -- doesn't fit the pattern -- you figure out which one it is. These two tests were kind of new for me, and you can't teach an old dog new tricks.

There's another test that's like working with a secret code. You're given some words, and each one is represented by code symbols. For instance, the word "cat" might be shown by a little square, and "black" would be shown by a star-shaped symbol. So, if you see the square and the star together, it means "black cat". And you get some other code symbols, too, so that you can figure out which combination of them means, say, "shaggy black cat" or "sleepy dog". I suppose luck has something to do with how a person does on this kind of test -- you might get easy or hard questions, or maybe you just stumble on the answer.

And there's one test where you read things, like short newspaper articles, and then answer questions about what you've read. For example, you'd read a short paragraph about something, maybe it would be about trout fishing or something like that, and then the questions would be "What's the main theme of the paragraph?"

And one more thing -- before you start each test, you predict how well you think you'll do on it, and then after you've finished, you estimate how you think you really did on it. I got some of them wrong -- maybe it was bad luck, or maybe the questions are too hard for someone my age. But I know I got some of them right, too; I suppose it's the law of averages -- you win some and you lose some, or maybe those questions were easy.

## Appendix B

Response Options for Measuring Efficacy

Compared to most people, how do you think you will do (you did) on this task?

very poorly  
worse than most  
bit below average  
bit above average  
better than most  
very well

## Appendix C

Questions and Response Options for Attributional Ratings

Is this cause due to myself, or due to something outside of me?

totally due to myself  
mostly due to myself  
somewhat due to myself  
don't know  
somewhat due to something outside of me  
mostly due to something outside of me  
totally due to something outside of me

Will this cause happen again in my life?

no, never  
almost never  
seldom  
don't know  
often  
almost always  
yes, always

Does this cause influence other things I do?

only these tasks  
hardly anything else  
some other things  
don't know  
many other things  
almost everything I do  
everything I do

Can I control this cause?

not at all  
only a bit  
somewhat  
don't know  
a fair amount  
almost completely  
completely

## Appendix D

Questions and Response Options for Manipulation Checks

How easy or how difficult was the problem-solving task which you just finished?

far too hard  
quite hard  
somewhat hard  
neither hard nor easy  
somewhat easy  
quite easy  
far too easy

Was this task familiar to you, or was it strange?

very familiar  
quite familiar  
somewhat familiar  
neither familiar nor strange  
somewhat strange  
quite strange  
very strange

Do you feel that you are similar to, or different from, the woman whose comments you heard on the tape recording?

very similar  
quite similar  
a bit similar  
a bit different  
quite different  
very different

Did her comments influence the way you approached the problem-solving task?

yes, very much  
a fair amount  
somewhat  
not much  
no, not at all

## Appendix E

Personal Data

In order to better understand the results of this study, we need to know a few things about you and your background. We will use this information for research purposes only, and it will be kept strictly confidential. You will notice that we do not ask for your name on the form.

What year were you born? \_\_\_\_\_

How many years of education have you had? Please circle the number of years of full-time attendance you have completed at each level.

Grade school                    1 2 3 4 5 6 7 8

High school                    1 2 3 4 5 6

Technical, nursing, or  
business school                1 2 3 4 5 6

University                    1 2 3 4 5 6 7 8

(Do not include part-time or extension courses taken for interest).

If you are not currently in school, what year did you leave? \_\_\_\_\_

Currently, are you (please circle one):

married      single      widowed      divorced      separated

How many children do you have? \_\_\_\_\_

Currently, are you:

\_\_\_\_\_ employed full-time  
 \_\_\_\_\_ employed part-time  
 \_\_\_\_\_ retired  
 \_\_\_\_\_ full-time homemaker  
 \_\_\_\_\_ part-time homemaker  
 \_\_\_\_\_ full-time student  
 \_\_\_\_\_ part-time student  
 \_\_\_\_\_ doing volunteer work  
 \_\_\_\_\_ other \_\_\_\_\_

If you are currently employed, what is your present job?

\_\_\_\_\_

How long have you held this job? \_\_\_\_\_

If you are retired, when did you retire? \_\_\_\_\_

What was your job prior to retirement? \_\_\_\_\_

\_\_\_\_\_

If you are a full-time homemaker, how long have you been a home-maker? \_\_\_\_\_

If you were employed in the past, what job did you have?

\_\_\_\_\_

If you are a student, what program and degree are you pursuing?

\_\_\_\_\_

Compared to a perfect state of health, how has your general health been during the past couple of months?

very good      good      fair      poor      very poor

Compared to other people your age, how has your general health been during the past couple of months?

very good      good      fair      poor      very poor

What age do you feel, most of the time? \_\_\_\_\_

If you could be any age you want, what age would you like to be?

\_\_\_\_\_

VITA

Surname: McEwan Given Names: Jane Hnatiuk

Place of Birth: Canada

Educational Institutions Attended, with Dates of Entering and Leaving:

Thiel College, Pennsylvania	1965 to 1967
McMaster University, Ontario	1967 to 1969
University of British Columbia, B.C.	1972 to 1974
B.C. Institute of Technology, B.C.	1979 to 1981
University of Victoria, B.C.	1985 to 1989

Degrees, Diplomas, Etc., Awarded:

B.A.	1969	McMaster University, Ontario
M.A.	1974	University of British Columbia, B.C.
Certificate	1981	B.C. Institute of Technology, B.C.

Honours and Awards:

Dean's Scholarship, University of Victoria, 1988/89

Publications:

Ambeau, J., Macurdy, E., & Hollander, M. (1979). An analysis of side-effects reported by clients on a methadone maintenance program. Vancouver: Alcohol and Drug Commission of B.C.

Hultsch, D.F., & McEwan, J. (1988). Cognitive intervention in later life: Philosophical issues. In J.E. Thornton & E.R. Winkler (Eds.). Ethics and aging: The right to life, the right to die. Vancouver: University of British Columbia Press.

PARTIAL COPYRIGHT LICENSE

I hereby grant the right to lend my dissertation (the title of which is shown below) to users of the University of Victoria Library, and to make single copies only for such users or in response to a request from the Library of any other university, or similar institution, on its behalf or for one of its users. I further agree that permission for extensive copying of this dissertation for scholarly purposes may be granted by me or a member of the University designated by me. It is understood that copying or publication of this dissertation for financial gain shall not be allowed without my written permission.

Title of Dissertation:

Age Differences in the Effect of Socially Modelled Efficacy and Attributions on Self-Efficacy and Performance

Author:



(Signature)

Jane Hnatiuk McEwan

\_\_\_\_\_  
(Name)

20 December 1989

\_\_\_\_\_  
(Date)