

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

EFFECTS OF ENCOURAGEMENT AND LOCUS OF CONTROL
ON WAIS IQ SCORES

A thesis presented in partial fulfilment of the requirements of the degree of Master of Arts in Psychology at
Massey University

WARWICK JOHN BENNETT

1981

02880.18

ACKNOWLEDGEMENTS

Thanks are due to the following people:

Mr Kerry Chamberlain, my supervisor, with whom I have not always agreed, but without whose help, encouragement, and constant requests for revision, this thesis would be much the poorer.

Mrs Shannon Roache, my mentor, who has been a great help to me throughout my course. In particular, her advice was most helpful in bringing me to an acceptance of the necessity to change my writing style.

Dr. Isaac Asimov, the great scholar and science fiction writer, whose statement,

I was in the home stretch and beginning to think forward to writing my Ph.D dissertation. I rather dreaded that, since the obligatory style of dissertations is turgid in the extreme, and I had by now spent nine years trying to write well and was afraid I simply might not be able to write badly enough to qualify for my degree (1974, p.110),

helped me to realise that writers much better than myself had managed to cope with this task.

Mrs Jennie Chapman, whose typing services have been of the highest quality throughout, as readers can see for themselves.

All those who participated in my research including the 3rd year psychology students who were the "guinea pigs" for my practice sessions, and all those who filled in the initial questionnaire, especially the 48 subjects, without whose help, patience, and generosity in freely giving of their time, none of this would have been possible.

Finally, my dear wife, Marian, who has had to put up with all my frustrations, and without whose understanding and support my task would have been so much harder.

All these people I thank with all my heart, and if anyone has been omitted, my apologies, and heartfelt thanks.

Warwick Bennett,
February, 1981.

ABSTRACT

Wechsler (1955, p.27) suggests that for some subjects it may be advisable to make encouraging remarks during testing on the WAIS.

The present study investigated the effects of such encouragement upon WAIS IQs, taking into account a personality variable which has been shown to mediate the effects of reinforcement, Locus of Control.

Forty-eight female introductory psychology students were selected from a class of 128 on the basis of their scores on Rotter's I-E Locus of Control Scale. They were pre-tested on the Naylor-Harwood Adult Intelligence Scale, and assigned to groups for testing on the WAIS.

Subjects who were given encouragement (verbal reinforcement) during WAIS testing did significantly better than those who were not. The observed tendency for subjects external in Locus of Control to be more strongly affected by the encouragement than internals was not significant.

In the light of the inevitable differences between examiners in their interpretations of Wechsler's recommendation, it is concluded that there may be reason to doubt the comparability of scores reported by different examiners. Further research is necessary, however, to determine whether this effect is mediated by Locus of Control.

CONTENTS

	PAGE
Acknowledgements	ii
Abstract	iv
List of Tables	vi
INTRODUCTION	
CHAPTER 1: Intelligence and IQ	1
1.1 Definitions	1
1.2 The Wechsler Adult Intelligence Scale	8
1.3 Reinforcement	14
CHAPTER 2: Locus of Control	32
CHAPTER 3: Hypotheses	54
CHAPTER 4: Method	56
4.1 Subjects	56
4.2 Instruments	60
4.3 Procedure	66
CHAPTER 5: Results	70
CHAPTER 6: Discussion and Conclusions	73
REFERENCES	81
APPENDICES:	
A. Rotter's I-E Locus of Control Scale	91
B. Reinforcement Schedule	96
C. Raw Data	99
D. Communication with Subjects	102
1. Contract	103
2. Letter	104

LIST OF TABLES

TABLE		PAGE
1	Locus of Control Distribution in the Provisional "Experimental" and "Control" Groups (before final recruitment)	60
2	Distribution of Locus of Control Scores in the Final Sample	61
3	Mean Scores and Standard Deviations for Locus of Control and Pretest (NHAIS) IQ	68
4	Mean Scores and Standard Deviations for WAIS Verbal, Performance, and Full Scale IQs.	70
5	Summary Table of Analyses of Variance for WAIS Verbal, Performance, and Full Scale IQs.	71

INTRODUCTION

CHAPTER ONE: INTELLIGENCE AND IQ

1.1 Definitions

Intelligence has been defined in a number of ways, some more useful than others. In attempting to discover whether intelligence is the only thing which an 'intelligence' or IQ test measures, it is important to have a clear idea of what intelligence is.

Although, as Jensen points out, "if the word 'intelligence' were to be included in the Vocabulary test of the Wechsler Adult Intelligence Scale, it would undoubtedly rank as one of the easier items in the order of difficulty" (Jensen, 1980, p. 169), there are almost as many definitions of intelligence in the field of psychology as there are psychologists.

Boring (1923) defined intelligence as "that which the IQ tests measure". This definition automatically validates the IQ tests, in terms of the construct, but is circular, and adds nothing either to our understanding of the concept of "intelligence", or to our conception of what the IQ tests measure. Nevertheless, it is still in use, and must therefore be considered in greater detail.

Eysenck says:

To define intelligence as that which the IQ tests measure is not as nonsensical as it may appear at first sight (1979, p.11),

citing as evidence the mercury thermometer:

"This may seem arbitrary and circular, but it is what is often done in science; the notion of an operational definition was first put forward by a physicist (Bridgman, 1927).... The selection of a mercury thermometer is the more or less accidental choice from thousands of substances which expand with heat, and contract with cold, any of which could have been chosen. If we define temperature as that which is measured by this thermometer...." (Eysenck, 1979, p.11).

Eysenck's argument contains several errors. Firstly, "arbitrary and circular" definitions, far from being "what is often done in science", are the very antithesis of science, in that they remove the criterion of testability. To use such definitions is, therefore, to step outside the boundaries of science, and their use in science is non-existent. That is not to say that operational definitions should not be used, but they should be simply a means to an end, and operational definitions are not the same thing as the "arbitrary and circular" definitions proposed by Eysenck.

Secondly, the selection of mercury as a substance for measuring temperature was far from accidental. There are very few substances known to man which are genuinely suitable for this function, and of these, mercury is, in many situations, the most suitable.

Thirdly, despite the widespread use of the mercury thermometer, scientists do not define temperature as "that which is measured by the mercury thermometer". This idea seems to stem from what Bridgman says about operational definitions:

"we mean by any concept nothing more than a set of operations, the concept is synonymous to the set of operations" (Bridgman, 1927, p.5), but Eysenck's interpretation is dubious. The mercury thermometer is only one of a number of instruments used to measure that property of matter known as temperature; to define temperature operationally, all the other means of measurement must also be taken into account, as pointed out with respect to length by Bridgman (1927, p.10).

Bridgman's approach also assumes that the operations are a full and accurate representation of a conceptual definition. This is simple enough when applied to the concepts, such as length, to which Bridgman refers. When it comes to intelligence, however, the situation becomes more complicated. Without a clear conceptual definition, it is not possible to know that IQ tests fully and accurately measure intelligence (i.e. that the "operations" involved are, in fact, appropriate).

Finally, one wonders why Eysenck should choose a philosophical treatise on physics, written over half a century ago, to represent "what is often done in science", and from his interpretation of that work, draw his own definition of temperature. It seems more reasonable to use a modern definition, such as that given by Lapedes:

a property of an object which determines the direction of heat flow when that object is placed in thermal contact with another object: heat flows from a region of higher temperature to one of lower temperature (1978, p.1604).

Perhaps the best reason for Eysenck to ignore modern definitions of temperature is that such definitions would destroy his case. The fact that temperature is "a property

of an object...", or as Zemansky (1964, p.1) puts it, "a property of matter", rather than as Eysenck suggests, a concept defined "in terms of the methods used to measure it", is relevant to the objections raised here against Eysenck's definition of intelligence: just as temperature is "a property of matter", so intelligence can be seen to be a property of organisms - a real entity - something in existence independently of the methods used to measure it.

Another important consideration when looking at Eysenck's concept of operational definitions is the point raised by Butcher (1968): "If we want to define intelligence as what is measured by an intelligence test or battery of tests, we must first agree on what test or combination of tests to accept" (p.33).

The lack of agreement between people's scores on various "intelligence" tests can only add weight to this view, detracting from Eysenck's position. As an example, Rogers (1956) quotes correlations of .68 between the Thurstone and Stanford-Binet IQs of New Zealand children, and .71 between the Thurstone and Otis Intermediate B. He comments that:

the coefficients cited are of the order usually obtained from test correlations with an outside criterion. Higher relations would be desirable but they are seldom realised (Rogers, 1956, p.34).

Such correlations are hardly sufficiently high to support the idea that these tests are measuring exactly the same thing. Correlations quoted by Wechsler (1958, p.105) between the WAIS and other intelligence scales go as low as .53, while Matarazzo (1972) quotes correlations as low as .37.

Eysenck himself provides a reasonable definition of intelligence when he says: "early psychologists ... saw intelligence as innate, all-round cognitive ability", and "in addition to this general ability ... special verbal, numerical, perceptual, and other abilities differentiated from general mental ability through phylogenetic and ontogenetic development" (1979, p.10).

When references to the origin of intelligence are removed - this is not the place for a consideration of the heritability controversy - what remains of this definition is the concept of general cognitive ability plus various special abilities, as proposed in Spearman's two-factor theory of intelligence (Spearman, 1927).

Burt et.al., (1934) provide a definition very similar to the first part of that given above when they state that intelligence is: "inborn, all-round, intellectual ability" (p.28).

Other definitions include:

The power of combination (Ebbinghaus, 1897).

The power to think abstractly (Terman, 1921).

The power of good responses from the point of view of truth (Thorndike, 1921).

That which can be judged by the incompleteness of the alternatives in the trial and error life of the individual (Thurstone, 1921).

An inherited capacity of the individual which is manifested through his ability to adapt and to reconstruct the factors of his environment in accordance with his group (Boynton, 1933).

The state of equilibrium towards which tend all the successive adaptations of a sensorimotor and cognitive nature, as well as all assimilatory and accommodatory interactions between the organism and the environment (Piaget, 1950).

The ability to undertake activities that are characterised by (1) difficulty, (2) complexity, (3) abstractness, (4) economy, (5) adaptiveness to a goal, (6) social values, and (7) the emergence of originals, and to maintain such activities under conditions that demand a concentration of energy and a resistance to emotional forces (Stoddard, 1943).

The entire repertoire of acquired skills, knowledge, learning sets, and generalization tendencies considered intellectual in nature that are available at any one period of time (Humphreys, 1971).

Comprehension, invention, direction, and censorship: intelligence lies in these four words (Binet, 1910).

Intelligence is: (1) tendency to take and maintain a definite direction, (2) capacity to make adaptations for the purpose of attaining a desired end, and (3) power of autocriticism (Terman, 1916).

Intelligent behaviour is behaviour that is adaptively variable within the life-time of the individual ... Where the capacity for intelligent behaviour is in question I talk of 'intelligence' (Stenhouse, 1974).

Behaviour becomes more 'intelligent' as the pathways between the subject and the objects on which it acts cease to be simple and become progressively more complex (Piaget, 1950).

Chaplin's (1968, p.224) definition of intelligence includes:

1. the ability to meet and adapt to novel situations quickly and effectively;
2. the ability to utilize abstract concepts effectively;
3. the ability to grasp relationships and to learn quickly.

In view of the instrument under scrutiny in the present research, the definitions which may be considered most relevant are those given by Wechsler:

Intelligence, operationally defined, is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (Wechsler, 1958, p.7).

What we measure with tests is not what tests measure - not information, not spatial perception, not reasoning ability. These are only means to an end. What intelligence tests measure, what we hope they measure, is something much more important: the capacity of an individual to understand the world about him and his resourcefulness to cope with its challenges (Wechsler, 1975, p.139).

The major concepts which can be seen to emerge from these definitions include general and specific cognitive abilities, adaptability and the ability to perform complex and abstract tasks. Most of the other concepts mentioned refer either to specific aspects of one or other of the above factors, or to the origin of the skills concerned.

Humphreys' (1971) definition suggests that knowledge is a component of intelligence. While this is a popular notion, supported by Cattell's (1963) theory of fluid and crystallized intelligence, it is somewhat dubious, to say the least. The knowledge that a person gathers over a period of time is certainly an indication of his intelligence, but it is the ability to gain that knowledge, and not the knowledge, per se, that is a component of the individual's intelligence.

Taking Wechsler's (1958) definition, probably the best of those given above, and adding specific mention of the factors identified in the other definitions, the following definition is obtained:

Intelligence is the global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment, including general and specific cognitive abilities, adaptability, and the ability to perform abstract and complex tasks.

It is this definition which will be considered in the present research.

1.2 The Wechsler Adult Intelligence Scale

The Wechsler Adult Intelligence Scale (WAIS) consists of 11 subtests (Information, Comprehension, Arithmetic, Similarities, Digit Span, Vocabulary, Digit Symbol, Picture Completion, Block Design, Picture Arrangement, and Object Assembly), always presented in the same order. The first six of these sub-tests form the Verbal scale, the remaining five the Performance scale.

The WAIS is a well-respected and widely-used test, and appears on the surface to be a good measure of overall intelligence, as defined above. Intelligence may, however, be expressed in an infinite variety of situations in the "real world", and tests such as the WAIS can only possibly measure a very small sample of these.

Considerations of the adequacy or otherwise of such a sample go beyond the scope of the present research, but the question of what the tests, and particularly the WAIS, measure is relevant.

In his 1972 revision of Wechsler's Measurement and Appraisal of Adult Intelligence, Matarazzo looks at the correlations of several indices of validity with Wechsler IQs. These include adaptive behaviour, academic success, occupational achievement, socioeconomic status, and scores on other tests of intelligence.

Studies cited by Matarazzo (1972, p.280) found correlations between IQ and adaptive behaviour in daily living,

as measured by the AAMD Adaptive Behaviour Scales, ranging from .58 to .95, for different samples of mentally retarded individuals.

Academic achievement is considered in terms of school grades, level at which the individual leaves school, and high school rank on graduation. Matarazzo reports "numerous studies ... which show, in toto, a correlation between IQ and grades in school and college of approximately .50" (1972, pp. 281-282).

Several studies cited by Matarazzo show that the higher an individual's IQ, the higher the grade he/she is likely to attain before leaving school. A further "representative" study (Conry and Plant, 1965, cited in Matarazzo, 1972, p.284) showed correlations between WAIS IQ and high school rank of .63 (Verbal), .43 (Performance) and .62 (Full Scale).

Correlations between IQ and occupational achievement are not so high. In the words of Matarazzo (1972, p.291)

studies of the relationship between IQ and occupational success as an index of adaptive behaviour typically reveal validity coefficients of only modest values, averaging about .20.

Matarazzo, however, attributes the low correlations to sampling problems, and suggests that:

on the average (and in stark contrast to the research on success on the job itself) occupational attainment, as defined by ... occupational rankings ..., and IQ correlate at a sufficiently high level as to allow one to conclude that such data constitute another important criterion variable for demonstrating the validity of measures of intelligence such as the IQ (Matarazzo, 1972, p.292).

The correlation between IQ and socioeconomic status is reported by Matarazzo to be "in the neighbourhood of .40" (1972, p.295). Although, as Matarazzo says, "the relationship between IQ and SES is apparently as obvious to the man in the street as is the relationship between IQ and academic or occupational success", it is difficult to say which, if either, is the causal factor.

The indices of validity so far considered suggest that the WAIS is a moderately good measure of intelligence, but not exceptionally so. It is difficult to say, however, to what extent a measure of intelligence should correlate with a criterion which involves just one component of the construct, or which "should" be related to intelligence. This is a problem which arises in the case of any global construct which cannot be measured directly. It is uncertain, for example, how much any individual's academic achievement is a result of that individual's intelligence, and how much results from other factors, such as the amount of time spent studying.

Another index of the validity of a test is the extent to which it is related to other tests which are thought to measure the same construct. Matarazzo (1972, pp.246-247) gives correlations of the WAIS with other intelligence scales, obtained in a number of studies, from 1954 to 1971. These range from .37 to .86. While this suggests that the tests measure much the same thing, or at least that what each test measures is related to what the others measure, it does not allow any definite conclusions about what is being measured. The evidence from the studies of other indices of validity, however, does suggest that the WAIS measures

something close to what it is intended to measure, and the reasonably good agreement with other tests adds weight to its claim to measure intelligence.

This conclusion cannot hold much weight, however, if the test is not reliable. If the same individual is tested on two separate occasions, his score should be essentially the same, assuming that his intelligence is relatively stable. It is possible, of course, to argue that changes in IQ test scores represent changes in actual intelligence, and this argument is difficult to counter, as intelligence cannot be directly measured. It must be intuitively obvious, however, that changes in an adult subject's intelligence relative to his own age group must be tiny, if they occur at all, in the absence of major accidents. If large numbers of subjects are tested, such tiny changes should be further diminished. The reliability of the test should, therefore, be very close to 1, and anything less than this must be a sign of other factors entering into the testing situation.

There have not been many studies of test-retest reliability of the WAIS and related tests, and most of those which have been done have involved psychiatric patients (the same is true of the inter-test correlations mentioned above). Matarazzo lists a number of studies giving test-retest reliability data for the Wechsler-Bellevue scales (1972, p. 240). Of these, only two used normal subjects, and one of these had a retest interval of "1-26 weeks" (one week is far too short an interval to give accurate results). In the remaining study, with a retest interval of almost

ten years, the reliability coefficients were .83 (Verbal), .45 (Performance), and .82 (Full Scale). While the Verbal and Full Scale reliability coefficients are very good considering the retest interval, the reliability of the Performance score is less impressive. This may be a matter of the stability of the IQ, rather than the reliability of the test, but it would be useful to have a replication of the study.

Among the few studies of WAIS test-retest reliabilities cited by Matarazzo, there are none specifically identified as having used normal subjects. There is, however, one for which subjects are not identified as psychiatric patients, and in this case, test-retest reliabilities of .70 (Verbal), .57 (Performance) and .73 (Full Scale) were obtained.

Most studies of WAIS reliabilities have employed the odd-even split-half technique. This results in an over-estimation of the reliability of the test, as it removes all the factors related to variation between testing sessions, all of which should have no effect were the test measuring pure intelligence. The results of the reliability tests done with the standardisation sample, in which this technique was used, are, thus, deceptively high. Reliability coefficients for Verbal, Performance, and Full Scale IQs respectively, were .96, .93, and .97 for 18-19 and 25-34 year olds, and .96, .94 and .97 for 45-54 year olds (Wechsler, 1955, pp.12-13).

The importance of test-retest reliability can be seen if one considers that a person's IQ is usually determined

from one testing session only. One individual may have entered the testing room tired and hungry, and faced an unsympathetic examiner; another may have entered feeling very good, and been tested by a friendly examiner. If the scores of the two are to be considered comparable, it is essential that either the conditions have no effect whatever on the score of either individual, or the error is measurable.

Some sources of variation can be controlled to a large extent - in most cases, for example, it would be possible to provide a quiet room, comfortable chairs, etc., but other aspects of the "standard" testing situation are more difficult to achieve. Even if the physical testing conditions could be always organised according to a pre-conceived and immutable plan, the introduction of a new element - the examinee - inevitably alters the situation. Even in "standard" conditions the individual examinee's perception of the situation may not follow the standardised rules.

The person administering the test is a further source of variation. No matter how much care is taken to ensure standard conditions, it is highly probable that the examiner will influence the examinee in some way, even if it is only as a result of that examinee's perception of that examiner.

Verbally-administered tests, such as the WAIS, are particularly prone to subtle variations in technique - tone of voice, etc., of which the examiner may be unaware. The consequent interaction between examiner and examinee is unique to each testing session.

Of particular concern to the present researcher is the use of verbal reinforcement, or "encouragement", which may be a source of considerable bias in IQ testing using instruments of this type. This and other types of examiner effect are considered in the following section.

1.3 REINFORCEMENT

Wechsler (1955, p.27) suggests that:

The examiner should make an effort to obtain the subject's cooperation and maintain his motivation. With many subjects the examiner may find it advisable to make encouraging remarks during the testing.

This is in agreement with Terman and Merrill (1937, 1960), who felt that encouragement - remarks such as "good", "fine", "that was very good" - should be given during testing to reward the examinee's efforts. It contrasts, however, with Wechsler's own statement that:

In no case should the examiner indicate dissatisfaction with a response as given nor build up an expectation of approval in the subject so that no comment would be interpreted by him as disapproval (1949, p.19).

The problem with the encouragement approach as recommended by Wechsler (1955) is in deciding (a) which subjects are among the "many" to whom encouragement should be given, and (b) how much encouragement should be given. In the absence of specific guidelines, this is bound to be interpreted differently by different examiners, and if the encouragement is effective, this casts doubt on the comparability of scores reported by different examiners.

Such differences could be as much a function of the differences between examiners as of those between examinees, or at least sufficiently so as to make comparison impossible. If, on the other hand, the encouragement has no effect, there would seem to be little point in using it.

Galdieri, Barcikowski and Witmer (1972) point out, in quoting Witmer, Borstein and Dunham (1971), that: "the examiner's neutrality may 'appear as a negative stimulus to some individuals'." In their study, 36 middle- and 36 lower-class children were randomly selected from a group of 47 middle- and 65 lower-class third grade pupils. These subjects were then tested on the WISC either with or without "verbal approval". No significant differences were found.

Four design problems are immediately apparent in the study by Galdieri, Barcikowski, and Witmer (1972).

Firstly, verbal approval was given for the first response in each sub-test, whether correct or incorrect. Thus a subject who did not know the answer to a question, but gave an answer which he knew to be incorrect, assuming that this was better than nothing, would be told that his answer was "good". Such a subject would rapidly become disillusioned about the validity of the feedback being given.

Secondly,

The examiner limited his approval to verbal comments and refrained from non-verbal approval such as smiling or nodding (p. 406).

Such incongruous behaviour on the part of the examiner is unlikely to engender in the subject a feeling of confidence

in the sincerity of the comments.

Thirdly,

The S's first incorrect response, after the initial question in each subtest, elicited the examiner's comment, 'That was hard, wasn't it? But you are doing good' (p. 405).

The subject may pick up from such a comment the idea that his answer was wrong, and that the examiner was patronising him. It seems highly unlikely, too, that any reasonably articulate third-grade pupil would fail to note the poor grammar involved, and to subsequently lower his opinion of the examiner's competence. Thus, the scores of the more intelligent subjects in the "verbal approval" group might be expected to be depressed, resulting in a lessening of the measured effect of the verbal approval.

Finally, there was no pre-test. Subjects in the "verbal approval" group may have been less intelligent, on average, than those in the control group. In such a case, any effect of the verbal approval might be "used up" in raising the experimental group to the level of the control subjects.

Several other studies have found that reinforcement has no significant effect on achievement and intelligence test scores. In most cases, however, this can be explained in terms of design problems.

Hauck (1978) tested 60 children of average IQ and 60 retarded individuals on two rote, paper-and-pencil pre-tests and two post-tests. Three types of treatment were used: mastery, mastery and praise, and control.

The effect of the mastery treatment approached significance for only one of the tests, and praise had no significant effect beyond that provided by mastery on either of the two tests. Insufficient information is given concerning the nature of the tests and the treatment conditions to allow for evaluation of the design.

Wilén (1976) tested "low-income black fourth graders" on the Arithmetic subtest of the Wide Range Achievement Test, and on the Slosson Intelligence Test. No information is provided regarding the number of subjects, or the composition of the reinforcement groups: candy, money, stars, praise, and control. The lack of information in the report makes consideration of the adequacy or otherwise of the research design difficult, as was the case with Hauck (1978).

One problem does emerge clearly. As was the case with most of the other studies reviewed in this section, no pre-test was carried out. Wilén's failure to obtain a significant effect may, therefore, have been the result of uncontrolled initial differences.

Tiber and Kennedy (1964) tested 480 second and third grade subjects (160 middle class white, 160 lower-class white, and 160 lower-class negro) on the Stanford-Binet Form L-M. Four incentive groups were used: verbal praise, verbal reproof, candy reward, and control. No significant differences were found among the incentive groups.

Although the large sample size, and random assignment, should produce a relatively good distribution of

subjects of high and low intelligence among the treatment groups, this is not guaranteed, and the lack of pretest is again a serious problem.

Quay (1971, 1975) also used the Stanford-Binet Form L-M. Subjects in the 1971 study were 100 negro children aged 3 years, 8 months to 5 years, 3 months. The 55 boys and 45 girls were randomly assigned to four groups of 25 subjects each. The four treatment conditions were (a) standard English with praise, (b) standard English, with candy, (c) Negro dialect with praise, and (d) Negro dialect with candy. In the 1975 study, 92 low SES black children, 46 of each sex, ranging in age from 8 years, 11 months to 10 years, 2 months, were assigned to two treatment groups, money reward and praise. In neither case was there a control group, and the statement that there was "no IQ difference due to reward" (Quay 1975, p.132) simply means that there was no significant difference between the effects of one type of reward and those of another. No conclusion can be drawn concerning the existence or magnitude of any actual reinforcement effect.

The absence of any pre-test is a particularly important problem in the absence of a control group, although to be adequate, the study would need to have both.

Goh and Lund (1977) pre-tested their 90 preschool subjects with Form A of the Peabody Picture Vocabulary Test. Apparently they did not, however, take the results of this testing into account in assigning subjects to treatment groups for the post-test, the verbal portion of the Wechsler

Preschool and Primary Scale of Intelligence (WPPSI). It is stated that: "each subject was then randomly assigned to one of the three treatment conditions and administered the verbal subscales of the Wechsler" (Goh and Lund, 1977, p.1012).

In one treatment condition, the subject's responses were followed by comments such as "good", "very good", or "you're pretty smart"; in another, responses were reinforced with comments such as "right", "correct", or "that's a good answer"; the third condition was a control group. The major problem in the design of this study was that, although responses such as "don't know", and those of an "obviously irrelevant" nature, were not reinforced, all other responses, whether right or wrong, were reinforced. As in the case of Galdieri et al., (1972), this may well be the reason for the lack of significant results.

Sheckart and Bass (1976) pretested their 18 male and 18 female black adult subjects on the Quick Test, a short form of the WAIS. Although it is stated that: "the QT was employed to insure the equivalence of the groups prior to the administration of the treatment conditions" (p.827), the QT was not used to balance the groups. Subjects were randomly assigned to treatment conditions, and the WAIS presented under the selected condition immediately following administration of the QT for each subject. Nor is it reported whether the groups were found to be equivalent.

The treatment conditions were verbal reinforcement ("good" or "fine"), nonverbal reinforcement (nod of the head or "mmhmm") and no reinforcement. Subjects in the

reinforcement conditions were reinforced for every correct response. This approach is better than reinforcing even incorrect responses, but may still create problems. The subject is likely to recognise his incorrect responses by the lack of reinforcement. If reinforcement were given intermittently this problem would not arise.

Dana and Dana (1969) had their graduate student examiners administer the Rosenthal photo-rating task to six subjects each, immediately before administering the WAIS. From the results of the photo-rating task, examiners were categorised as consistently obtaining high or low bias scores. No significant differences were found between high and low bias groups for WAIS Verbal, Performance and Full Scale scores, and numbers of scoring errors. The authors concluded that: "the experimenter-bias effect is weak and may not generalise across tasks Es and Ss" (p. 694).

Other studies, however, have shown positive results for various kinds of reinforcement.

Willcutt and Kennedy (1963) tested 90 fourth-grade students on a discrimination task. On a series of stimulus cards, the children were required to select, as quickly as possible, which of four patterns was different from the rest. After the first trial of 16 cards, subjects in the "reproof" condition were given negative feedback regarding their performance. Those in the "praise" group were given positive feedback, and the rest (control group) were asked questions of a biographical nature. This was followed by a second trial of the same length. Group means on the first

trial were not significantly different, but significant differences were found on the second trial, with subjects who had received praise decreasing their variability and reaction time, and those receiving reproof increasing in both of these variables.

Brown (1973) observed time taken and attempted responses on a word completion exercise, by 53 eight and nine year old girls. The first six minutes of a treatment session constituted the baseline period. During the next fourteen minutes, the subject was reinforced every two minutes. There were no significant differences between a group receiving "person reinforcement" ("good" and "fine"), and another receiving "performance reinforcement" ("right" and "correct"). A significant difference was found, however, between these two groups and the control group, which received no feedback.

Feather (1966, 1968) studied performance on an anagrams task, manipulating the success or failure of subjects by giving easy anagrams to one group, and unsolvable ones to the other group. This constitutes a form of intrinsic reinforcement. Subjects for the 1966 study were 96 female undergraduate psychology students; for the 1968 study, 134 undergraduate students (46 male, 88 female) were used.

On a subsequent anagrams task, comprising ten anagrams selected to be of 50 percent difficulty, those who had experienced initial success performed significantly better than those who had experienced initial failure.

Johnson (1974) randomly assigned 145 third, fourth and fifth grade children to three groups for testing on Figural Form A of the Torrance Tests of Creative Thinking. "Immediate-reward" subjects were told that if they worked hard on the game they would each receive six prizes at the end of the game. "Delayed-reward" subjects were told they would have to wait one week to receive the prizes. The control group was given the test with no mention of reward.

Children receiving immediate or delayed-reward instructions scored significantly better than those receiving no information concerning rewards, but there was no difference between the two reward groups.

Chambers et al., (1977) offered more than 200 building blocks of varying size and shape to each of their 20 six- to eight-year-old subjects. The children were told to build as many things as they wished. When each child announced that he was finished he was dismissed and his creations evaluated by three experimenters. The ten children in the experimental group were given a "positive, non-directive, verbal response" each time they produced a new form. No comment was made for the control group. Children in the experimental group produced significantly more diverse responses than those in the control group.

Rasmussen (1974) tested 18 "Normal" (IQ = 95-105) and 18 "Borderline" (IQ = 70-79) children on the WISC with "person" or "performance" verbal reinforcement or no reinforcement. No information is given concerning what constituted the "person" versus "performance" reinforcement,

but it seems safe to assume that Rasmussen's use of these terms corresponds with that of Brown (1973). Reinforcement was given after each correct response, as in the case of Sheckart and Bass (1976). This time, however, the subjects receiving reinforcement scored significantly higher in WISC Performance and Full Scale IQs than those receiving no reinforcement. There was no significant difference between the effects of person and performance reinforcement, and no significant difference between subjects of the different intelligence levels in the effects of the reinforcement.

Kennedy and Willcutt (1964), did a review of the literature about the effects of praise and blame as incentives for school-age children, in various intellectual tasks, from 1897 to 1964. They report that: "praise generally acts as a facilitator to performance, though often it is indistinguishable from practice effect" (p.323).

A further literature review by Galdieri (1971) led to the conclusion that "children generally perform better when exposed to verbal approval by an adult" (Galdieri, Barcikowski, and Witmer, 1972, p.404).

Although the results of Brown (1973), Johnson (1974), and Rasmussen (1974) suggest that the type of reinforcement used is unimportant, this may not be so.

Deci (1971) conducted two laboratory experiments, each using 24 introductory psychology students as subjects, and a field replication using eight students who comprised two four-man staffs of headline writers. In the laboratory

experiments, subjects were required to connect pieces of plastic to make various configurations. Each subject participated in three one-hour sessions. In the first session, they used the pieces to reproduce configurations which had been drawn on a piece of paper. During the second session, experimental subjects were given the reward for all configurations completed within a thirteen minute time limit, while the control group received no reward. In the first experiment, the reward was monetary - one dollar for each correctly solved puzzle; in the second, verbal reinforcement was given. In the third session of each experiment, no reward was given. The measure of intrinsic motivation was the amount of time spent on puzzle solving during an eight minute free choice period in the middle of each session, in the absence of the experimenter.

The field study differed from the first laboratory experiment mainly in that it was conducted in an ongoing real-life situation, involving the actual work of the subjects, who were not aware that they were participating in research. Results of the three studies indicated that where money is used as an external reward, intrinsic motivation decreases, whereas where verbal reinforcement is used, intrinsic motivation increases.

In several studies, including those of Feather (1966, 1968), negative administrations or prior failure have resulted in lower scores or lower expectancies in achievement and intelligence tests.

Montanelli and Hill divided their 108 ten-year-old

subjects into 18 groups, with three boys and three girls per group. There were six adult experimenters, three of each sex, and three reinforcement conditions (praise, non-reaction, and criticism) in a two-part marble-dropping task. Criticism had a strong negative effect on achievement expectancies across Part I, while praise had a positive effect. The effects of Part I were reversed in Part II if the experimenter changed from praise to criticism or vice-versa, but not if the change was simply to non-reaction.

Davis (1969) and Davis et al., (1969) administered the WAIS Arithmetic subtest in three conditions, one involving a failure experience prior to administration of the subtest. Subjects in the former study were 60 males and 60 females, and in the latter, 90 males. In both studies, the prior failure group scored significantly lower, and in the latter study, there was an interaction between experimenters and treatment conditions, which was felt to be a result of undefined personality characteristics of the experimenters.

Murdy (1962) using two short forms of the WAIS with his 48 male undergraduate student subjects, found a significant decrease in Vocabulary subtest scores as a result of the negative treatment condition. Examiners were eight male graduate psychology students who: "received specific instructions concerning their behaviour during the administration of the treatment conditions" (p.1076).

Some studies have yielded results suggesting that performance may be negatively related to reinforcement and associated factors, such as success-failure and examiner congruence.

Rosen (1975) gave undergraduate psychology students a 1,000 word reading passage to study for testing during the same class period. Reinforcement for correct responses took the form of monetary reward and early class dismissal. Reinforcement increased the use of instructional objectives when practice test items were absent, but decreased their use when such items were present. The amount learned was positively related to the use of instructional objectives. It was concluded that "reinforcement has complex effects ... (and) in some cases it may actually decrease learning" (p. 7134).

Sherman and Blatt (1968) examined the effects of prior success or failure on WAIS Digit Span, Digit Symbol and Vocabulary scores. The WAIS Information subtest was administered to all subjects (43 female psychology students), followed by an anagrams task on which success-failure was manipulated. The Digit Span, Digit Symbol, and Vocabulary subtests were administered after the anagrams task.

Although subjects were randomly assigned to treatment groups, there were significant differences between the group means on the Information subtest, with the "failure" group performing less well than the "success" and "neutral" groups.

Scores on the Digit Span, Digit Symbol, and Vocabulary subtests were adjusted to account for the differences in Information scores. This requires the assumption that the Information subtest is equivalent to the other three subtests. The intercorrelations quoted by Wechsler (1955, p.15) show that this is not so. The Information subtest correlates

.54 with Digit Span, .65 with Digit Symbol, and .81 with Vocabulary. The performance of the "failure" subjects, after adjustment, was significantly superior to that of the "success" subjects on both Digit Span and Digit Symbol. No differences were found for Vocabulary. While the superior performance of the "failure" group on two subtests may be genuine, it appears at least equally likely that it was an artifact of the authors' decision to "adjust" the scores. It is especially interesting that the effect was not found on the Vocabulary subtest, which correlates best with Information.

In the opinion of the present researcher, Sherman and Blatt (1968) should have used a pre-test more closely related to the post-test, or reassigned subjects to groups on the basis of their scores on the pre-test, or (preferably) both.

Pelosi (1969) investigated the effects of examiner race, style, and sex on the test performance of male negro subjects. Tests used were six subtests of the WAIS (Information, Comprehension, Vocabulary, Digit Symbol, Block Design and Picture Arrangement), the Purdue Pegboard, and the IPAT Culture Fair Intelligence Test.

Although the differences were not significant, it was noted that subjects treated coldly tended to score slightly higher than those treated warmly.

Libowitz (1967) looked at the effects of the "perceived examiner congruence" on WAIS IQs, congruence being defined as "an accurate matching of a person's experience, awareness,

and communication which is manifested in genuine, non-defensive, integrated behaviour" (p.1167). Forty-eight white males entering college were tested twice on the WAIS, by different examiners, and asked to rate the examiners on the Adapted Congruence Scale. Although Performance IQ was positively related to congruence, there was a significant negative correlation between gains in Verbal IQ and congruence difference. It may be that perceived congruence is not important in terms of Full Scale IQ, as what is gained in Performance may be lost in the Verbal section, but any conclusion must, at this stage, be drawn with caution.

There have been other studies which, like Rosen (1975), have found that reinforcement has complex effects.

Weisz (1976) investigated relationships among hypothesis behaviour on a blank trials discrimination learning task, helplessness, mental age (MA), and IQ. Subjects were children of low, average, and superior IQ, and three MA levels ($5\frac{1}{2}$, $5\frac{1}{2}$, and $9\frac{1}{2}$ years). He discovered that "with increasing MA there was an increasingly positive relationship between IQ and responsiveness to 'right'" (p.6406).

Verma and Nijhawan (1976) looked at the effects of anxiety, reinforcement, and intelligence on the learning of a difficult paired-associates task. Their 252 student subjects, with a mean age of 14.7 years, were divided into two anxiety groups (high and low), three reinforcement conditions (praise, reproof, and praise plus reproof), and three levels of intelligence (high, middle, and low). Praise improved task learning at lower and middle levels of

intelligence, but had no effect at upper levels. Most affected was the middle intelligence/high anxiety group, which performed better under praise than under praise plus reproof, and reproof alone.

Two studies (Campo, 1964, and Elwood, 1969) have investigated differences in WAIS scores between automated and face-to-face testing. Elwood (1969) tested 35 subjects in a counterbalanced order on the WAIS Block Design, Picture Arrangement and Object Assembly subtests, under face-to-face and automated testing conditions. Face-to-face testing resulted in a higher mean pro-rated Performance IQ. This is the result that would be expected if reinforcement were effective, but as Elwood says, his results must be interpreted with caution, since his sample "included a larger than normal proportion of mentally retarded subjects" (p.288).

Campo (1964) used two randomly selected groups of 45 high school students aged 16 to 18 years. One group received the machine-administered short form of the WAIS (Information, Comprehension, Similarities, and Vocabulary) first, followed at least two months later by the conventional administration of the full WAIS. The order was reversed for the other group, with a similar inter-test interval. There were no significant differences between scores for the two methods of testing, but a questionnaire revealed a clear preference among subjects for the machine administration. This preference may, however, have resulted from the fact that the machine administration involved only four subtests,

and was therefore, considerably shorter than the clinical administration of the full scale.

The possible effects of examiner expectancies on the WAIS and the WISC are highlighted by Wessler (1970). Sixteen graduate counselling students estimated the Verbal, Performance, and Full Scale IQs they would obtain from their subjects, prior to testing them on the WAIS (N=12) or the WISC (N=4). The correlations between expected and obtained IQs were higher than most correlations of the Wechsler scales with other intelligence scales, as reported by Wechsler (1958, p.105) and Matarazzo (1972, pp.246-247). This may be explained either by expertise, in which case it casts doubt on the necessity for testing, or by expectancy effects, suggesting that rigid control of testing conditions, including the amount of encouragement, is necessary. It is important, however, to remember that, as Wessler admits, "the sample is too small to permit generalisation" (p.268).

In summary, then, Wechsler recommends "encouragement", or verbal reinforcement, for some subjects, but is not specific either about which subjects should receive the encouragement, or about the amount of encouragement which should be given. In view of the recommendation, it is considered important to gauge the effects of encouragement on WAIS scores. The previous literature examining the effects of reinforcement on academic and test performance is somewhat mixed in terms of the conclusions drawn.

There are some studies in which reinforcement shows no effects, but most have design problems which could account for this.

A majority of the research suggests that reinforcement is effective and in most studies employing different kinds of reinforcement, the type of reinforcement has been found to be relatively unimportant.

Negative administrations have generally resulted in lower performance or expectancy. There have been some studies suggesting a negative relationship between reinforcement and performance, but overall the evidence suggests that reinforcement may play a very important part in increasing measured IQ.

CHAPTER 2

LOCUS OF CONTROL (LC)

A possible reason for the results of previous research in the area of reinforcement and intellectual performance being somewhat mixed is the failure of the researchers to account for personality differences which affect the individual's perception of the situation. For some subjects the "reinforcement" being given may not really be reinforcement at all.

An important personality factor related to the way in which individuals perceive "reinforcement" is Locus of Control, defined thus by Rotter (1966):

When a reinforcement is perceived by the subject as following some action of his own, but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of forces surrounding him.... We have labelled this a belief in external control. If the person perceives that the event is contingent upon his own behaviour or his own relatively permanent characteristics, we have termed this a belief in internal control (p.1).

As Korman (1974) points out, an individual high in external control

is predicted to learn less from reinforcement.... Studies of people defined as holding internal, rather than external, beliefs have generally supported this hypothesis (p.120).

It seems reasonable to hypothesise that an individual's

responsiveness to reinforcement on an IQ test may be related to his Locus of Control. A number of studies have investigated the relationship between Locus of Control and the effects of reinforcement on various tasks.

Fine (1973) studied the effects of Locus of Control and positive verbal reinforcement on expectancy and performance in 109 third-grade black children of lower socioeconomic status. The measure of Locus of Control was the Intellectual Achievement Responsibility Questionnaire (IAR) (Crandall et al., 1965), which consists of three subscales: "I plus" (I+) which measures attribution for success; "I minus" (I-) which measures attribution for failure; and "I total", the overall measure. Girls with highly internal beliefs, as measured by the I- subscale, performed significantly better on a Picture Memory Task and an Angle Matching Task than "external" girls under 75 percent reinforcement. Differences under 25 percent reinforcement were not significant, and the effect was not evident in the boys.

An exploratory study by Cornell (1968) investigated the effects of internality and test anxiety on performance, and the effect of teacher behaviour on these two variables. Average performance gain of highly internal children in language and arithmetic was not affected by their teachers' verbal reinforcement. There was, however, a positive relationship between internality and performance gain, irrespective of reinforcement. Highly internal children also showed greater variance in performance.

So far, the evidence does not seem to convincingly favour an interaction between Locus of Control and effective-

ness of reinforcement. Perhaps this depends upon the type of reinforcement used.

Baron et al., (1974) tested 170 ten and eleven year old boys on a simple form discrimination task. Subjects were randomly selected from a pool of lower socioeconomic level fourth and fifth grade students. They had been pretested on the IAR and classified internal or external. Two reinforcement conditions were used: extrinsic, in which the experimenter said "very good" if a correct response was given, or "sorry, try again" if the response was incorrect; and intrinsic, in which the experimenter allowed the subject to see for himself whether he was correct or incorrect. External subjects performed better than internals under extrinsic reinforcement, and did better under extrinsic than intrinsic reinforcement. Conversely, internals did better than externals under intrinsic reinforcement, and did better under intrinsic than extrinsic reinforcement.

Baron et al., (1974) also conducted a similar study with 72 male undergraduate psychology students as subjects. The experimental task was a concept attainment task, and subjects were rated "high", "medium", or "low" in externality, according to their scores on Rotter's Locus of Control Scale. The results were the same as those of the previous study.

Quinn (1975) looked at the relationship between Locus of Control and reinforcement effectiveness for 35 fourth to sixth grade boys with conduct disorders or personality problems. He found that, in general, internals tended to do better with intrinsic than with extrinsic reinforcement.

No information is given regarding the effectiveness of reinforcement for externals.

Kumchy and Rankin (1975) had their 24 male internal and 24 male external subjects perform a pursuit-rotor task under two reinforcement conditions. One condition comprised task reinforcement, which corresponds to the "intrinsic" reinforcement given by Baron et al., (1974) and Quinn (1975). In the other condition, combined task and verbal reinforcement was given. External subjects performed better under combined (task + verbal) reinforcement than task reinforcement alone, while there was no difference in the effectiveness of the two modes of reinforcement for internals.

The finding is consistent with previous research for externals, who performed better in a situation where some extrinsic reinforcement was present than under purely intrinsic reinforcement. The fact that internals did not do significantly better in the intrinsic (task) reinforcement condition does not weaken the case put by Baron et al., (1974) and Quinn (1975), since intrinsic reinforcement was present in both conditions.

Petzel and Gynther (1970) examined the effects of skill or chance instructions on an anagrams task. Their subjects, 44 externals and 44 internals, were drawn from a pool of 98 male sophomores on the basis of Rotter's Locus of Control Scale. The results, surprisingly, showed skill instructions to be more effective than chance instructions for externals, and chance instructions to be more effective for internals.

The reason for this result remains unexplained.

Petzel and Gynther suggest that possible reasons for the discrepancy between their results and those of previous research include differences in the composition of the Locus of Control groups, and the fact that in this case reinforcement was intrinsic, whereas previous studies had used extrinsic reinforcement.

McConnell (1966) selected 32 subjects scoring high (internal) on the Bialer-Cromwell LC scale, and 32 subjects scoring low (external) on the same scale. Subjects undertook form discrimination tasks in four treatment conditions: ER-S, in which the experimenter rewarded successful or correct responses with the comment "good"; ER-F, where the experimenter punished failure or incorrect responses by saying "wrong"; MR-S, where reinforcement was provided mechanically, with a pleasant bell to indicate success; and MR-F, where a raucous buzzer indicated failure. Internal subjects made fewer correct responses under "success emphasis" than under "failure emphasis" in the experimenter-controlled reinforcement conditions, and fewer correct responses under experimenter than mechanically controlled success reinforcement. No other results were significant.

Most of the above studies appear to conform to the prediction of Feinberg et al., (1979),

that in strictly non-social conditioning, internal subjects would be more conditionable than externals. In situations involving direct social reinforcement, externals would be more conditionable (p.678).

The same principle applies to the differential effects of attempts to influence the attitudes of internals and externals, as shown by several studies. Although this lit-

erature is not as directly relevant to the topic as the studies of reinforcement per se, it is relevant, as any reinforcement may be seen by the subject as an attempt to influence him. Therefore, a brief summary follows.

Strickland (1970) conditioned subjects to give verb responses in choosing which of a group of four words "goes best" with a given noun. Internal subjects were more likely than externals to deny being influenced, and to follow their own inclinations. They were also more likely to increase their rate of verb responses on the extinction trials, when non-verb responses were reinforced.

Getter (1966) had his subjects select from word pairs the one word which related "most abstractly" to a given construct. One word of each pair ended in "-ion", and this was the one for which reinforcement ("mmhmm" and a nod of the head, as in the case of Strickland (1970), above) was given. Again, externals were more easily conditioned, and internals gave the conditioned response once reinforcement was removed.

Crowne and Liverant (1963) found that in a perceptual discrimination task where they were allowed to place small bets on the accuracy of their choices, externals conformed more than internals to the expressed views of confederates. Externals were less confident overall than internals, and while internals bet approximately the same on all trials, externals bet significantly less on trials where they did not yield to the views of the confederates.

Ritchie and Phares (1969), looking at responses to influence attempts on a minor political issue found that

internals were affected more by the content of the communication than the prestige of the communicator, the reverse being true for externals.

Gore (1962) used overt and covert influence to increase the length of her subjects' TAT stories. Externals produced longer stories in both influence conditions, than in a no-influence condition. Internals, on the other hand produced shorter stories in response to the covert influence but did not react to the overt influence.

Biondo and MacDonald (1971) attempted to influence students' attitudes to a proposed new grading procedure for their course. Externals conformed to the influence attempt in both a high and a low influence condition. Internals were not affected by the low influence, but reacted against the high influence. It is suggested that internals may not have been aware of the influence attempt in the low influence condition.

James et al., (1965) investigated the effect of a rational appeal for a change in smoking behaviour. Those who were not convinced by the Surgeon-General's report were more external than those who were convinced, but the effect was not significant for males. Those males who actually stopped smoking were significantly more internal than those who did not stop, but this was not so for females. Thus, it appears that internals may be more affected than externals by a rational appeal for behaviour change.

It appears then, that Locus of Control may have a major influence on the effectiveness of different forms of

reinforcement and conditioning. Internals are more likely to be affected by intrinsic, non-social reinforcement, which they can see as being under their own control. They react against attempts to influence them, and pay more attention to the content of a communication than the prestige of the communicator. Externals, on the other hand, respond better to extrinsic, social reinforcement, given by someone else. They allow themselves to be influenced, and react to the prestige of the communicator, rather than what he is saying.

In addition to the influence of Locus of Control upon reinforcement, it may be that reinforcement, in turn, influences Locus of Control.

Brecher and Denmark (1972) used as their subjects three college classes, comprising 88 female undergraduate students. Two classes, totalling 66 subjects, comprised the control group. Immediately prior to the experimental session, the instructor of the class of 22 which formed the experimental group gave these students negative feedback regarding their performance in a course exam administered a week before. In the experimental session, subjects filled out Rotter's Locus of Control questionnaire. The mean LC score for the experimental group was significantly higher (more external) than that of the control group.

Davis and Davis (1972) gave their 80 male introductory psychology student subjects a test consisting of 15 anagrams. For 40 of the subjects, the "success" condition, the anagrams were all easy; for the other 40, the "failure" condition, five were selected from the "success" list, the

other ten being unsolvable. The success condition produced more ability attribution than the failure condition. That is to say, "success" subjects were more likely to exhibit internal Locus of Control with respect to their performance than "failure" subjects.

Feather (1969) also used an anagrams task with his subjects, 89 male and 78 female introductory psychology students. Success-failure was not manipulated, but subjects were asked to indicate after the test to what extent they felt their performance was due to their ability, as against luck. Subjects who had either just passed or just failed showed a greater tendency to external Locus of Control in relation to their performance than those at the extremes.

Thus, it appears that positive feedback may cause a shift towards internal, and negative feedback a shift towards external, Locus of Control, and the more clear-cut an individual's success or failure, the more likely he is to attribute this to his own ability, rather than luck.

The shift towards internality caused by positive feedback may not be a serious problem in research into the interaction of Locus of Control and reinforcement, since it is likely to be small and relatively uniform. That is to say, there may be a shift in the Locus of Control of the group receiving reinforcement, but the individuals within the group should remain in a similar position on the scale relative to the others in the group. Nevertheless, it is as well to be aware of this as a possible confounding factor.

Discussion of Locus of Control and performance in learning and achievement tasks so far in the present report

has centred on the interaction with reinforcement. Some of the research in this area suggests that Locus of Control may itself be related to academic achievement. Results, however, are somewhat mixed.

Eisenmann and Platt (1968) tested 85 male and 56 female psychology students on Rotter's Locus of Control Scale, and asked for background information, including present grade point average. No relationship was found between Locus of Control and reported grades.

Most of the studies in this area do, however, show a relationship of some kind between Locus of Control and achievement. Of these, a majority suggest that it is internals who perform better.

McGhee and Crandall (1968) tested 932 elementary, junior high, and high school students on the IAR, and found that subjects classed "internal" had higher report card grade averages than externals.

Messer (1972) tested 78 fourth grade children on the Matching Familiar Figures Test (MFF) and the IAR. Internals had higher grades and achievement test scores than externals, even when IQ and cognitive impulsivity were statistically controlled.

These last two studies differ from that of Eisenmann and Platt in several ways, any of which might explain the differing results. The difference in age levels is one possibility, since McGhee and Crandall (1968) and Messer (1972) had children as subjects. Another is the difference in the measures of Locus of Control, the IAR being a more specific measure, related to academic achievement. A

third difference is that Eisenmann and Platt relied on subjects' self-reports of their grades.

The first two of the above differences need not be considered too serious, since further research showing superior performance by internals has been done both with adults and using other measures of Locus of Control.

Peters (1969) working with prison inmates, found that internal subjects retained more information than externals, and a greater proportion of internal than external subjects participated in occupational education programmes.

Powell and Vega (1969) correlated scores on the Adult Locus of Control Scale (ALOC) with those on a number of other instruments, for 21 female teachers and 23 female teacher-aides. ALOC scores were found to be strongly related to intelligence, as measured by the College Qualification Test.

Some studies, however, have linked more external Locus of Control with higher academic achievement.

Butterfield (1964) studied Locus of Control, test anxiety, frustration reaction, achievement attitudes, and grades for 47 introductory psychology students (22 female, 25 male). The measure of Locus of Control was the inventory developed by Liverant and Scodel (1960). As Locus of Control became more external, subjects' range of expected grades increased, and their actual grades increased. The partial correlation between Locus of Control and actual grade, with WAIS scores held constant, was .348. There was, however, no

significant difference between internals' and externals' WAIS scores.

Thurber (1972), looking at externality and academic achievement in women, found that those characterized as external on Rotter's Locus of Control Scale performed better than internal women.

Rotter and Mulry (1965) tested 61 female and 59 male elementary psychology students on a difficult discrimination problem. Rotter's Locus of Control Scale was administered to 60 of the subjects prior to the discrimination task, and to the other 60 afterwards. Half of the subjects were informed that the discrimination was so difficult as to be a matter of luck, while the others were told that although the task was difficult, some people are more skilled than others in making such discriminations.

On six of the first eight trials, subjects were told they were right; on the second and fourth trials, they were told they were wrong. They were then given up to fifty extinction trials, on which they were told they were wrong on every trial. The experiment was terminated in fewer than fifty trials if the subject stated an expectancy of success less than or equal to 1 in 10 on two successive trials. Internals took significantly longer than externals to make decisions where the task was considered skill-related.

Comparison of the 60 subjects who were given the Locus of Control scale before the discrimination task with the 60 given it afterwards revealed only one significant difference. The pre-tested group had significantly longer

decision times on the first eight trials. The lack of a significant interaction with the chance-skill or internal-external control variables is evidence that the experimental task, and the reinforcement given, did not appreciably affect the subjects' Locus of Control.

Several studies suggest that the relationship between Locus of Control and performance in intellectual tasks may be a complex one.

Brecher and Denmark (1969) gave their 84 female undergraduate subjects Rotter's Locus of Control Scale and a modified form of Thurstone's word fluency test in counter-balanced order. Internals scored significantly better than externals and had higher mean scores for each minute of work, as well as for the total four-minute period. When order of presentation was taken into account, however, the highest mean score for either group in any one minute interval was gained by the externals to whom the word fluency test was given before the Locus of Control scale.

Bellack and Tillman (1974) selected 24 internal and 24 external students from an introductory psychology class on the basis of Rotter's Locus of Control Scale. The experimental task involved recognition memory for two easy and two difficult sets of letter trigrams. Internals made fewer correct responses than externals on easy tasks, but more correct response than externals on difficult tasks.

Lefcourt and Telegdi (1971) tested 90 male students on Rotter's Locus of Control Scale, and a measure of field dependence using a portable rod and frame device. Four groups were formed: internal field-independent (N=21);

internal field-dependent (N=24); external field-independent (N=25), and external field-dependent (N=20). In three one hour sessions, subjects completed the Remote Associates Test, Baron's Human Movement Threshold Inkblot Test, and an incomplete sentences blank. On all three measures, the verbal productivity of internal field-independent subjects was highest, followed closely by that of external field-dependent subjects, with the two "theoretically incongruent" groups (internal field-dependent and external field-independent) scoring lowest on all measures.

Although the testing instruments used in the above three studies do not constitute a full coverage of tests of intellectual ability, the evidence they provide is sufficient basis to conclude that if a relationship exists between Locus of Control and intellectual ability is is unlikely to be a simple one.

Another factor which may be involved in such a relationship is persistence. Even here, the evidence is not clear-cut.

Becker (1975) used as his subjects 300 introductory psychology students. In the first of two sessions, the subjects filled out the Edwards Personal Preference Schedule, the Janis-Hovland self-esteem scale, and Rotter's Locus of Control Scale. This was regarded as a laborious task. Of the original 300 subjects, only 89 attended the second session. These were labelled the "persist" group, and a "representative", presumably random, sample of 89 subjects was selected from the remaining 211, to form the "non-persist" group. No relationship was found between Locus

of Control and persistence.

Thurber, Heacock, and Peterson (1974) administered Rotter's Locus of Control Scale to 24 white male introductory psychology students, after which they were required to assemble a wooden cube puzzle of 12 parts. The task was unsolvable, as one part had been removed and another of a different shape substituted. In this case, there was a significant relationship between Locus of Control and persistence, with internals spending more time on the puzzle than externals.

While these two studies appear to conflict, this may not be so. The measures of persistence used are so different that they may well be measuring entirely different traits. The biggest difference is that in Becker's study, subjects were given a "laborious task", then required to return a week later for a further session, whereas in the case of Thurber, Heacock and Peterson, only one session was involved. Had Becker's persistence measure involved a more arduous task, and a record of the amount of time each subject remained at work, the results would be more easily comparable.

Another possible reason for the discrepancy is the difference between the experimental tasks. On one hand, the task in Becker's study could be completed, while the Thurber, Heacock and Peterson task could not. On the other hand, puzzles are generally regarded as fun, and as leisure time pursuits, whereas form-filling is regarded as work. There may be some difference in the attitudes of internals and/or externals to the different tasks.

Any study which observes a small, relatively homogeneous sample of a large, more heterogeneous population must consider the possible effects of any demographic variables in that population with respect to which the sample is relatively homogeneous. Three such variables for the present study are race, social class, and sex.

Race and social class have been postulated to have some relationship with Locus of Control. Research results have, however, given little support to any relationship between Locus of Control and race, and while there seems to be a trend for people of higher socioeconomic status to be more internal, not all studies have confirmed this.

Solomon et al., (1969), looking at 137 white and 125 negro children, found no relationship between Locus of Control, measured with the IAR, and either socioeconomic status or race.

Katz (1967), also using the IAR, found no relationship between Locus of Control and race.

A further study showing no relationship between Locus of Control and SES was that of Crandall et al., (1965). The measure of Locus of Control was again the IAR, and subjects were 923 elementary and high school students.

Battle and Rotter (1963) tested 80 sixth and eighth grade children on a projective measure of Locus of Control, the Children's Picture Test of Internal-External Control, developed by Battle. The Bialer Locus of Control Scale was also used, and found to be significantly related to the projective measure. Middle-class children were found to be more internal than lower-class children, with lower-

class negro children significantly more external than either middle-class negro or white children.

Gruen and Ottinger (1969) tested 20 working class and 20 upper middle-class children on a modification of the Bialer Locus of Control Scale. Although ten subjects in each socioeconomic group were identified as "chance-oriented" (external) and ten in each group as "skill-oriented" (internal), a significantly greater proportion of working-class than upper-middle class subjects behaved in a "chance-oriented" manner on a three-choice discrimination task.

Bartel (1969) used the Bialer Children's Locus of Control Scale and six items relating to control and self-concept with her 431 subjects. Lower and middle-class children of the first and second grades did not differ significantly in the Locus of Control, but by the sixth grade, middle-class children were significantly more internal. The lack of a difference in the younger children of Bartel's study points to one possible reason for the discrepancy' between the results of the studies of Solomon et al., (1969), Katz (1967), and Crandall et al., (1965), and those of the later-mentioned studies. The differences may be age-related.

Another possible reason is the difference in measures of Locus of Control. All three of the "no difference" studies used the IAR, not such a general measure of Locus of Control as the scales used in the other studies.

The "age-related" explanation is not in itself sufficient, as Crandall et al., used subjects ranging up to twelfth grade, but it must be considered as a possible factor. It is important, therefore, to look at any evidence

relating to adults.

Powell and Vega (1972), using the Adult Locus of Control Scale with teachers and teacher-aides, found that their subjects showed higher internality with higher socioeconomic status.

While clear sex differences have usually been found, the results of studies looking at Locus of Control and sex have been somewhat mixed, in terms of the direction of differences.

Battle and Rotter (1963) found no relationship between sex and scores on either the Children's Picture Test of Internal-External Control, or the Bialer Locus of Control Questionnaire.

Solomon et al., (1969) and Crandall et al., (1965) however, found that girls were significantly more internal than boys on the IAR.

This tendency does not appear to apply to university students, however. Means reported by Rotter (1966) for several samples of university students shows a consistent difference between the sexes, with males being the more internal in each case.

Likewise, in international studies of university students' Locus of Control, Parsons and Schneider (1974) and McGinnies et al., (1974) found women to be significantly more external than men. The direction of the difference was consistent for all national groups, although in the case of India (Parsons and Schneider, 1974) the difference was very small.

In university students then, the tendency appears to be for women to be more external than men. It is difficult to say whether the difference between children and university students in this regard is simply a matter of age, or whether something else is involved. If more studies of non-student adults were available, it might be possible to establish whether, for example, the difference was a result of the "defensive externality" of women in academic achievement suggested by Thurber (1972).

As well as the absolute sex difference, it is important to consider interactions between sex and Locus of Control, in relation to academic achievement. The results here, as in many areas, are mixed.

Crandall et al., (1962) studied 40 first to third grade children, 20 of each sex. The children were tested for Locus of Control with the IAR, intelligence with the Stanford-Binet, and academic achievement skills with the California Achievement Tests. They were also questioned and observed over a one-week period. While there were few absolute sex differences, several measures varied in their predictive utility for the boys and the girls. The most relevant finding to the present research was that internality was frequently a good predictor of academic achievement behaviours for the boys, but essentially unrelated to those of the girls.

Messer (1972) found that while internal subjects consistently achieved higher grades the I- subscale of the IAR was a better predictor of grades for girls, with I+ being a better predictor for boys.

McGhee and Crandall (1968), studying Crandall et al.'s (1965) sample of 932 children, found that for third to fifth grade girls both the I+ and I- subscales were significantly related to academic achievement, with internals scoring better. For boys, however, only the I- subscale was significantly related to higher grades. This is in direct contrast to the results of Messer (1972), who disputes the accuracy of McGhee and Crandall's conclusions.

A further study by McGhee and Crandall (1968) found no significant relationships between internality and grades.

Fine's (1973) study, reviewed early in this chapter, introduced reinforcement as a further complicating variable in the interaction of Locus of Control and sex. Under 75 percent reinforcement girls, but not boys, showed greater performance with greater externality. No differences were found under 25 percent reinforcement.

Locus of Control, then, is a factor which may well influence an individual's responsiveness to encouragement on the WAIS.

No clear-cut difference has been established between internals and externals in the effects of reinforcement per se, but when type of reinforcement is considered, differences do emerge.

Externals have been shown to respond better to verbal reinforcement of a social, extrinsic kind. Internals, on the other hand are more affected by intrinsic, non-social reinforcement.

As the kind of reinforcement recommended by Wechsler

is social, extrinsic verbal reinforcement, this may well bias the scale in favour of externals. The intrinsic, non-social type of reinforcement, which would seem to be best for internals, is not only not recommended, but amounts to a direct violation of Wechsler's instructions:

It is not appropriate to make a remark such as, 'That is right', following a response, since a subject may then expect to be informed about the accuracy of his other responses (1955, p.27).

Locus of Control may itself be influenced by reinforcement, but the evidence of this is not conclusive in view of the small number of studies in this area, and the fact that the results of Rotter and Mulry (1965) suggest that there is no effect.

Locus of Control may also be related to academic achievement, but here, too, results are mixed. Although a majority of studies which have found an effect suggest that internals are higher achievers, there are some studies which show externals to be superior. A number of studies have shown that other factors such as field-dependence, difficulty of task, sex, etc., may influence the relationship, and it is unlikely to be a simple one.

Relationships may also exist between Locus of Control and demographic variables, such as race, social class, and sex. Studies of race and social class have shown little relationship between Locus of Control and race, but higher social class is often associated with higher internality.

Research into the relationship between Locus of Control and sex with children as subjects have generally

found girls to be more internal than boys. The lack of studies of non-student adults makes it difficult to draw any conclusions about the Locus of Control sex relationship for adults generally, but in studies of university students males have been found to be more internal than females.

Several studies have identified interactions between sex and Locus of Control in academic achievement, but there has been little agreement on the nature of the interaction.

CHAPTER 3

HYPOTHESES

3.1 Previous research, as reviewed in section 1.3 of this report, has shown that, in general, reinforcement tends to raise performance in academic achievement situations, including intelligence tests. There have been some studies in which reinforcement has shown no effects, but in most cases these studies have been found to have major design problems. A few studies have found a negative relationship between reinforcement and performance, but the majority suggest that reinforcement has a positive effect upon achievement and intelligence test scores.

It is postulated, therefore, that if one of two groups, equivalent in intelligence, is given verbal reinforcement, or "encouragement", during a WAIS testing session, while the other receives none, the reinforced group will achieve higher WAIS IQ scores than the non-reinforced group.

3.2 Research into the effects of Locus of Control on effectiveness of reinforcement, as reviewed in Chapter 2, has generally found that where the reinforcement is of an intrinsic, non-social type, internals perform better than externals. If, on the other hand, the reinforcement is extrinsic, and social in nature, it is externals who receive higher scores.

Wechsler (1955) recommends the use of "encouragement", consisting of comments such as "good", which are clearly of

a social, extrinsic type, and specifically advises against the use of the intrinsic reinforcement suited to internals.

Using the type of reinforcement advised by Wechsler, therefore, it is postulated that external subjects will receive higher WAIS IQ scores than internal subjects, all other factors being equal. For those subjects not receiving reinforcement, no difference is expected to be found between internals and externals. Thus, the second hypothesis predicts an interaction between Locus of Control and reinforcement.

CHAPTER 4

METHOD

4.1 SUBJECTS

Subjects for the present study were 48 female students enrolled in a Stage I psychology class at Massey University. They were selected on the basis of their scores on Rotter's I-E Locus of Control Scale, administered to the entire class of 128, including 86 females, 39 males, and 3 students whose sex was not determined.

The use of university students as subjects must be made with caution, as the generalizability of any results is limited. Nevertheless, most previous studies have used either children or introductory psychology students, and if any significant results are obtained, it would seem reasonable to postulate the existence of a trend in the society as a whole. As the student population is expected to display a higher IQ level than the average for the general population, any increases brought about by encouragement might be considered all the more psychologically significant.

As a result of matching problems, which came about through the small number of males available, and the range of their LC scores, it was considered advisable to limit the sample to female students. Although this limits even further the generalizability of the results, it is considered warranted in view of the complex relationships among Locus of Control, sex, and intellectual perfor-

mance, as found in the literature reviewed above.

A number of previous studies have used subjects of only one sex, e.g., Phares (1968), Ritchie and Phares (1969), Strickland (1970), Lefcourt and Telegdi (1971), Thurber (1972), and Thurber, Heacock, and Peterson (1974).

The need to use only one sex, to avoid bias, has been explained by some of the above researchers, e.g. Strickland (1970): "To control for the sex factor only female subjects were used, and the experimenter was a female graduate student" (p.367), and Ritchie and Phares (1969): "Since sex sometimes interacts with opinion change , it was decided to use only female Ss" (p.434).

One problem which may be expected in a student population is a restricted range of Locus of Control scores, with a bias towards the "internal" end, as a result of a gradual "weeding-out" of externals as they progress up the academic ladder. It is interesting, therefore, to look at the results of comparative studies of LC scores of students from various countries.

Parsons and Schneider (1974) looked at university students from eight countries (United States, Canada, West Germany, Italy, France, Japan, India and Israel) and McGinnies et al., studied students from five countries (Australia, New Zealand, Japan, Sweden, and the United States). All subjects were lower level university psychology students, except the Swedish group in McGinnies et al's study, who were senior secondary school students.

The mean scores on Rotter's Locus of Control Scale, in the case of Parsons and Schneider (1974), varied from

9.60 for the Indian students, to 13.97 for the Japanese. McGinnies et al., (1974) found national means ranging from 10.14 to 14.57, the highest (most external) of these scores being that of the Swedish secondary school students. The range for university students was 10.14 to 11.70.

The mean Locus of Control scores for the university students in both studies were, thus, close to the middle of the 23-point scale, being if anything slightly external. Compared with the scores quoted by Rotter (1966) for samples of several student populations, the students of the two studies cited above appear somewhat more external, though the difference is not dramatic except in comparison with the Peace Corps trainees, whose mean of 5.94 is very much more internal.

The scores of most relevance to the present research are those of New Zealand students, since this is the population from which the sample for the present study is drawn. McGinnies et al., found that their New Zealand subjects (introductory psychology students from the University of Auckland) were, on average, the most internal of those from all the countries they studied, with means of 9.75 for males, 10.66 for females, and 10.14 overall.

The New Zealand students also had the highest standard deviations (5.35 male, 5.74 female), and hence the widest variation in scores. These standard deviations were higher than any of those quoted by Parsons and Schneider (1974) or by Rotter (1966).

Thus, selecting from a similar population, there is a reasonable basis for expecting a wide range of scores,

with a median quite close to the middle of the scale. The range of scores can also be seen to be wider, and the mean score closer to the mid-point of the scale, when females only are used.

Twenty-four subjects were chosen from each end of the LC distribution, resulting in a group of "external" subjects with scores of 15 to 18, and a group of "internal" subjects with scores ranging from 5 to 10. The subjects were divided into two groups, matched on Locus of Control scores. These groups were provisionally labelled "experimental" (encouragement) and "control" (no encouragement), although the final composition of the experimental and control groups would depend upon the availability of the chosen subjects for participation in the remainder of the research, and the comparability of their pretest (NHAIS) IQs.

The distribution of Locus of Control scores in the two groups thus chosen was identical, as shown in Table 1. Ten of the originally selected subjects had to be replaced. Four were unwilling to participate, three had had course work experience with the testing instruments, one could not be contacted, one was willing but had to decline for health reasons, and one had erred in filling out the Locus of Control questionnaire.

Of those selected to replace the above, two had to be replaced in turn. One was insufficiently identified on the questionnaire answer form, and turned out to be a male, and the other was familiar with the instruments. After all replacements had been made, the separation between the

TABLE 1: Locus of Control Distribution in the Provisional "Experimental" and "Control" Groups before Final Recruitment

LOCUS OF CONTROL SCORE	"EXPERIMENTAL" GROUP FREQUENCY	"CONTROL" GROUP FREQUENCY	TOTAL FREQUENCY
5	1	1	2
6	2	2	4
7	2	2	4
8	3	3	6
9	3	3	6
10	1	1	2
15	2	2	4
16	3	3	6
17	3	3	6
18	4	4	8
TOTAL	24	24	48

two Locus of Control groups was not as large as originally expected. Ten of the twelve replaced were in the "internal" group, which now included subjects scoring from 5 to 12 on the Locus of Control scale. Table 2 shows the final distribution of Locus of Control scores.

4.2 INSTRUMENTS

The instruments used were the I-E Locus of Control Scale (Rotter, 1966), the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955), and the Naylor-Harwood Adult Intelligence Scale (NHAIS) (Naylor and Harwood, 1972).

TABLE 2: Distribution of Locus of Control Scores in Final Sample

LOCUS OF CONTROL SCORE	EXPERIMENTAL GROUP FREQUENCY	CONTROL GROUP FREQUENCY	TOTAL FREQUENCY
5	-	1	1
6	1	2	3
7	2	2	4
8	3	1	4
9	1	2	3
10	1	1	2
11	4	2	6
12	-	1	1
<hr/>			
TOTAL "INTERNAL"	12	12	24
<hr/>			
15	2	2	4
16	3	3	6
17	3	4	7
18	4	3	7
-			
<hr/>			
TOTAL "EXTERNAL"	12	12	24
<hr/>			
TOTAL	24	24	48
<hr/>			

A. Rotter's I-E Locus of Control Scale is a 29-item forced choice scale consisting of pairs such as:

- (a) What happens to me is my own doing.
- (b) Sometimes I feel that I don't have enough control over the direction my life is taking.

Six of the items are "filler items" not related to

Locus of Control, leaving a maximum score of 23. The scale is scored in the external direction, so the higher the score, the more external is that individual's Locus of Control.

Rotter (1966) cites several studies looking at the internal consistency (split-half, Spearman-Brown, Kuder-Richardson) of the scale. The correlation coefficients obtained range from .65 to .79, most being approximately .70. Test-retest reliabilities have been found in the range .49 to .83, averaging about .7. The coefficient of .49 appears very low, possibly due to the procedure used. The first session involved group administration, but in the second session, two months later, the scale was administered individually. It also seems likely that some of the variability may be a result of changes in the testees' life situations during the interval.

While the "face validity" of the scale is high - a look at the items (see Appendix A) will reveal that they appear to be testing the construct as defined by Rotter (1966, p.1) - the actual validity of the scale is difficult to quantify. Some evidence is available, however, from factor analysis, and correlations with other scales.

Rotter (1966) cites an unpublished doctoral dissertation by Franklin (1963) in which a factor analysis of scores from 1,000 high school students is reported. He states that "All of the items loaded significantly on the general factor which accounted for 53% of the total scale variance" (Rotter, 1966, p.16). This suggests that the scale is indeed measuring one trait, and while this in

itself does not show that the trait concerned is Locus of Control, it does add weight to the claim for validity. This is especially so in view of the strong "face validity".

Comparisons of the Rotter scale with the James-Phares Likert-type scale (cited by Rotter, 1966, p.17) have generally produced correlations of between .55 and .60. A study comparing the scale with a semistructured interview measure yielded a biserial correlation of .61 (see Rotter, 1977, pp.17-18). Thus, there is evidence that the I-E Scale is a reasonably reliable and valid measure of Locus of Control.

B. The Wechsler Adult Intelligence Scale is a well-known and widely-used IQ test, consisting of eleven subtests. These are:

1. Information, in which the subject's general knowledge is tested with 29 questions.
2. Comprehension, consisting of 14 questions, some requiring application to everyday life, and others requiring the subject to explain well-known sayings.
3. Arithmetic, comprising 14 computational problems.
4. Similarities, requiring the comparison of 13 pairs of objects or concepts.
5. Digit Span, consisting of two sections:
 - (a) Digits Forward, in which the subject repeats series of digits (from three to nine digits long) read to him by the examiner, and
 - (b) Digits Backward, where the subject must repeat the series of digits (two to eight digits long) in the opposite order to that in which they are read.
6. Vocabulary, in which the subject is asked to define 40 words.
7. Digit Symbol, consisting of 10 practice items, and 90 test items. The subject is required to

fill in the square beneath each digit with the appropriate mark as shown in a key. There is a 90-second time limit.

8. Picture Completion, consisting of 21 picture cards, each with a part missing. The subject is required to identify what is missing in each picture.
9. Block Design, where the subject reproduces 10 designs from cards, using a set of patterned blocks.
10. Picture Arrangement, in which the subject is presented with 8 series of cards in the wrong order, and asked to put them in the correct order, so that they tell a story.
11. Object Assembly, where 4 sets of jumbled pieces are presented to the subject, who must put them together to form a picture of something.

All subtests begin with easy items, and become progressively more difficult. In some of the Verbal subtests the examiner omits the first few items, returning only if the subject fails consistently.

For comments on the reliability and validity of the WAIS, refer to section 1.2 of this report.

C. The Naylor-Harwood Adult Intelligence Scale is "an Australian adaptation of the WAIS" (Naylor and Harwood 1972, p.1). It is very similar in form, but has no content overlap. Several of the subtests are lengthened, all items of every subtest are presented to every subject, and the "Digit Symbol" subtest is changed to "Letter Symbol".

The rationale behind the changes is explained by Naylor and Harwood, thus:

It was not the basic intention to improve upon the WAIS, although attempts were made in several places to avoid situations which occur here and there in the WAIS itself and which appeared somewhat undesirable. Variations in scoring have enabled a fuller range

of scaled scores to be achieved ... and the occasional lengthening of the individual subtests has been directed successfully towards increasing their reliability (1972, p.1).

The NHAIS was chosen as the pretest for the present study because it is very close to the WAIS in its form and content, without having any actual content overlap, and a reasonable matching of scores on the two tests has been obtained. No other intelligence scale known to the present writer has as great a similarity to the WAIS without content overlap. Unfortunately, very little information is available regarding the reliability and validity of the NHAIS.

Naylor and Harwood (1972) found correlations between the corresponding subtests of the WAIS and NHAIS ranging from .54 to .90. While the correlation coefficient of .54 for the two Picture Completion subtests looks rather low, it is higher than the split-half reliability of .47 obtained on the sample for the WAIS Picture Completion subtest.

Naylor and Harwood point out that:

when correlation coefficients appeared lower than expected, split-half analyses of both WAIS and NHAIS subtests were made to ensure that the latter were not inferior to the original WAIS in this regard. The results show that generally the value of split-half r is greater for the NHAIS than for the WAIS.... Hence it was concluded that inconsistencies in the subtests of WAIS precluded the possibility of a greater degree of comparability (1971, p.2).

Although there is little information available, that which is provided by Naylor and Harwood, along with the close similarity of the two scales, is sufficient evidence to suggest that the NHAIS is a reasonable approximation of the WAIS for the purposes of the present study.

4.3 PROCEDURE

Rotter's I-E Locus of Control Scale was administered to a Stage I psychology class at Massey University. Subjects were selected as described in section 4.1. Those selected were contacted individually, and asked to sign a contract (see Appendix D1) agreeing:

(1) to make themselves available for two experimental sessions, neither to exceed two hours in duration, and

(2) that they would not divulge any details of the research to any other person until informed that the research was completed.

At the first session, the NHAIS was administered without reinforcement by the present writer, a white male graduate student, aged 24 years. The same examiner was used for all subjects to ensure that conditions were as nearly identical as possible. The experimenter was not aware of subjects' Locus of Control scores.

Following testing on the NHAIS, the experimenter arranged with the subject a date and time for the WAIS session. Test-retest intervals varied from 14 to 73 days, with a mean of 40 days (median and mode = 42 days). The 14 day interval was considered somewhat short, but was made necessary by late replacements in the case of two subjects. It was not possible to have a uniform test-retest interval because of the necessity to fit sessions in when both experimenter and subject were available.

Subjects were divided into four groups: Internal-experimental, Internal-control, External-experimental, and

External-control. Control subjects were to receive no reinforcement. The reinforcement for experimental subjects took the form of positive extrinsic verbal reinforcement, or "encouragement", as recommended by Wechsler (1955, p.27), according to a predetermined schedule (see Appendix B). As shown in the schedule, subjects were given a certain number of reinforcers of a certain type for each subtest, e.g. in the Vocabulary subtest, the experimenter said "Very good" twice, "Fine" twice, and "That's good" once. The reinforcers were not tied to particular items, in case the subject gave an incorrect or "don't know" response to a reinforced item. For reasons explained in the Introduction, it was considered wise to make reinforcement both intermittent and contingent upon the item being answered correctly.

To ensure standard presentation of reinforcement, the experimenter undertook a number of practice sessions using the reinforcement schedule, with several third-year psychology students as subjects. These sessions were videotaped to allow the experimenter to study his style and overcome any problems prior to the experimental sessions.

Once all pretest (NHAIS) IQ scores had been obtained, an assistant of the experimenter assigned subjects to the final groups, matched on Locus of Control and pretest IQ. In this way, the experimenter was kept unaware of the Locus of Control scores of all subjects until the testing was complete.

In most cases, matched subjects were within one point of each other in Locus of Control score (mean difference = 0.75) and within 5 IQ points (mean difference = 3.17).

In one case it was necessary to have a Locus of Control difference of 3 points, and in another, an IQ difference of 9 points.

The mean scores and standard deviations for the groups can be found in Table 3. There is no appreciable difference between the Locus of Control scores of the experimental and control groups, nor among the pretest IQs of the four groups.

TABLE 3: Mean Scores and Standard Deviations (in parentheses) for Locus of Control and Pretest (NHAIS) IQ.

TREATMENT GROUP		LOCUS OF CONTROL GROUP	
		INTERNAL	EXTERNAL
EXPERIMENTAL (encouragement)	Locus of Control	8.92 (1.83)	16.75 (1.14)
	NHAIS IQ	116.42 (10.45)	117.25 (6.98)
CONTROL (no encouragement)	Locus of Control	8.42 (2.42)	16.67 (1.07)
	NHAIS IQ	116.42 (8.53)	117.08 (7.95)

In the second testing session, the WAIS was administered, either with or without reinforcement, depending upon the group to which the subject had been assigned. The present writer was again the examiner for all subjects, to ensure the equivalence of testing conditions.

Following the WAIS administration, the experimenter

explained to the subject the nature and purpose of the research, and answered any queries. The subject was then thanked for participating, and reminded not to tell anyone what had happened or what the experiment was about until she was informed that the research had been completed.

After the last subject had been tested, a letter was sent to all subjects, thanking them again for giving up their time, and informing them that the research was now completed (see Appendix D2).

CHAPTER 5

RESULTS

The data in Table 3 suggest that there were no appreciable pretest IQ differences among groups. A one-way analysis of variance performed on the Full Scale NHAIS IQs confirmed this. There were no significant inter-group differences ($F(3,44) = 0.031, p > .05$). Similar analyses were conducted for NHAIS Verbal and Performance IQs separately, with similar results ($F = 0.143, 0.080$ respectively; $p > .05$).

Clear differences did, however, emerge in the WAIS testing session. Mean scores and standard deviations for Verbal, Performance, and Full Scale IQs of all groups are shown in Table 4.

TABLE 4: Mean Scores and Standard Deviations (in parentheses) for WAIS Verbal, Performance, and Full Scale IQs

TREATMENT CONDITION	SCALE	LOCUS OF CONTROL	
		INTERNAL	EXTERNAL
Experimental (encouragement)	Verbal	119.83 (10.15)	123.67 (9.51)
	Performance	122.42 (8.67)	125.58 (7.40)
	Full Scale	122.25 (8.85)	125.92 (7.08)
Control (no encouragement)	Verbal	115.83 (6.71)	117.33 (9.31)
	Performance	121.25 (6.92)	115.17 (10.39)
	Full Scale	119.25 (6.60)	117.25 (8.80)

To determine whether the hypothesised effects of the encouragement and the interaction between this and Locus of Control were statistically significant, two-way analyses of variance were conducted for the three WAIS IQs, using the Statistical Package for the Social Sciences (Nie et al., 1975).

A summary of these analyses is contained in Table 5.

TABLE 5: Summary Table of Analyses of Variance for WAIS Verbal, Performance and Full Scale IQs

SCALE	SOURCE OF VARIATION	MEAN SQUARE	df	F
VERBAL	Locus of Control	85.333	(1,44)	1.050
	Encouragement	320.333	(1,44)	3.941
	Interaction	16.333	(1,44)	0.201
PERFORMANCE	Locus of Control	25.521	(1,44)	0.357
	Encouragement	402.521	(1,44)	5.637*
	Interaction	256.688	(1,44)	3.595
FULL SCALE	Locus of Control	8.333	(1,44)	0.134
	Encouragement	408.333	(1,44)	6.548*
	Interaction	96.333	(1,44)	1.545

* significant, $p \leq .05$

As expected, there was no significant main effect for Locus of Control. This means that neither internals nor externals scored significantly better overall on any of the scales.

The main effect for encouragement (reinforcement) was significant. As predicted in the first hypothesis,

experimental subjects - those who received the encouragement - scored significantly higher than the control group in both Performance and Full Scale WAIS IQs. For Verbal IQ, the effect just failed to reach the required level of significance.

The hypothesised interaction between Locus of Control and encouragement did not attain significance. This was in spite of the fact that 1) the difference between experimental and control group means was considerably larger for externals than internals on all three scales, and 2) for Performance and Full Scale IQs, internals scored higher than externals in the control group, but lower in the experimental group.

CHAPTER 6

DISCUSSION AND CONCLUSIONS

In the present research, an attempt has been made to investigate the relationships among Locus of Control, positive extrinsic verbal reinforcement, referred to by Wechsler and others as "encouragement", and IQ scores obtained with the Wechsler Adult Intelligence Scale.

It was postulated that the encouragement recommended by Wechsler would cause an increase in measured IQ, and that this increase would be greater for externals than for internals, since previous research has shown that this type of reinforcement is more effective for externals.

The first hypothesis was confirmed. For Full Scale IQ, a significant effect was found, with those who received the encouragement scoring higher than those who did not. This was supported by the result for Performance IQ, although for Verbal IQ the effect was not significant.

This result is in agreement with much of the previous research, as cited in the Introduction, in which reinforcement of various kinds has been found to have a significant effect on academic performance and test scores.

Studies such as those of Galdieri et al., (1972), Wilen (1976), Tiber and Kennedy (1964), Quay (1971, 1975), Goh and Lund (1977), and Sheckart and Bass (1976) found no significant effects, but all had design problems which were

eliminated in the present study. The fact that the effect was significant here is further evidence that these design problems may have been the reason for the non-significant results.

Sherman and Blatt (1968) found that subjects receiving negative feedback ("failure" condition) performed better than those receiving positive feedback, but design problems were again evident. The present study did not contain a negative feedback condition, but the superiority of experimental subjects' scores over those of the control group is evidence that positive feedback gives better results than a neutral approach. From this it can be assumed, admittedly without empirical backing, that a positive feedback condition should give results superior to those of negative feedback.

It seems highly likely that Sherman and Blatt's results, too, are a product of the flaws in their design.

The effect was not significant for Verbal IQ. In this respect, the results of the present study are similar to those of Rasmussen (1974), who found that reinforcement significantly increased Performance and Full Scale scores on the WISC, but the effect was not significant for the Verbal scale.

It remains unclear whether the failure of the encouragement effect to attain significance for Verbal IQ in the present study and that of Rasmussen (1974) is the result of a genuine difference in the susceptibility of the Verbal and Performance scales to reinforcement, or of some other factor. One possible explanation is the order

of administration, as the Verbal scale is always presented first. Taking into account the fact that, in the present study at least, a low frequency of reinforcement was used, and none was given during the Information subtest, it seems likely that the reinforcement would take some time to begin having a significant effect.

If, however, something in the nature of the Verbal scale itself is responsible for the non-significant result, this would add some support to the conclusions of researchers such as Verma and Nijhawan (1976) and Rosen (1975), who found a complex relationship between reinforcement and performance on learning tasks.

It is clear, in any case, that encouragement did have some effect, if only on Performance and Full Scale IQ scores. The first hypothesis is, thus, supported.

The results, shown in Table 4, are in the direction postulated by the second hypothesis, but do not, in this case, reach significance.

Previous research, including studies by Baron et al., (1974), Quinn (1975), Kumchy and Rankin (1975), and Feinberg et al., (1979), suggests that externals perform better than internals under social, extrinsic reinforcement. There is also a considerable body of literature concerning social influence which supports such a conclusion. This includes studies by Strickland (1970), Getter (1966), Crowne and Liverant (1963), Ritchie and Phares (1969), Gore (1962), Biondo and MacDonald (1971), and James et al., (1965).

The weight of the evidence from previous studies

appears, thus, to be solidly against the non-significant finding obtained here.

It is possible that the encouragement effect on the WAIS is peculiar in some regard, and does not follow the same rules as that shown in other tests and academic and social situations. Since none of the previous studies looking at the interaction of Locus of Control and reinforcement have used the WAIS, it is impossible to discount the possibility of this being the correct interpretation.

A more likely explanation, however, is that the present research has failed to detect an interaction which does exist. There are several ways in which this may have occurred. One possible factor is the composition of the Locus of Control Groups. The sampling population was small, and a disproportionately large number of replacements had to be made in the internal group. Consequently the "internals" were not quite so internal, and the gap between the groups not so large, as originally expected. As the most external members of the "internal" group scored above the mid-point of the scale, and thus closer to the external than the internal end, it is doubtful that the group was truly representative of internals.

The spread of scores in the internal group was also considerably larger than that of the externals, with a range of 7 (standard deviation = 2.04), in comparison with the externals' range of 3 (standard deviation = 1.08).

The possible effect of the reinforcement itself upon Locus of Control should not be forgotten, either. A shift towards internality with positive feedback, and externality

with negative feedback, has been demonstrated by Brecher and Denmark (1972), Davis and Davis (1972), and Feather (1969). With an "internal" group which was less internal than expected, and the reinforcement possibly producing a tendency towards internality even in the externals, it may be that the groups were too similar in Locus of Control at the time of testing for the interaction to appear.

The marginally non-significant effect of encouragement upon Verbal IQ, combined with the fact that the interaction approached significance only in the case of the Performance IQ, suggests another possible explanation: the low magnitude of the encouragement effect.

The difference between experimental and control group means, as can be seen from Table 5, is only 3.00 for internals, and 8.67 for externals. Thus, although the effect is statistically significant, it is rather small, amounting to only .20 of the WAIS standard deviation for internals, and .58 of that standard deviation for externals. Overall, the difference between means for the experimental and control groups is only 5.84 IQ points, or .39 of the standard deviation.

When considering this point, however, it is important to take into account the intelligence level of the subjects. With a mean pretest (NHAI) IQ of 116.79 (range = 100-139), the subjects for the present research were already scoring more than one standard deviation above the mean. At this level, it is considerably more difficult to raise the scores, and the increase obtained must be considered all the more psychologically significant. The relative homogeneity of the sample is also important - as can be seen from

the figures in Table 3, the standard deviations here were much lower than those in the WAIS standardisation sample.

As expected, Locus of Control did not have any effect on WAIS IQ. Any such effect would have been surprising, for three main reasons. Firstly, there is no consistent trend in the previous research for either internals or externals to have higher grades, IQ, etc. Of the two studies which considered IQ in this regard, one (Powell and Vega, 1969) found that internals scored higher, while the other (Butterfield, 1964) - the only one to use the WAIS - found no significant difference. Of the studies considering grades, and other measures, one, Eisenmann and Platt (1968), found no significant differences, three (McGhee and Crandall, 1968, Messer, 1972, and Peters, 1969) favoured internals, with the other three (Butterfield, Thurber, 1972, and Rotter and Mulry, 1965) favoured externals.

Secondly, no relationship between Locus of Control and IQ appeared in the NHAIS results for these subjects, and thirdly, the groups were matched on pretest (NHAIS) IQ before testing on the WAIS.

Wechsler (1955), in making the recommendation, "With some subjects, the examiner may find it advisable to make encouraging remarks during the testing" (p.27), poses problems for anyone administering the WAIS.

As the amount of encouragement, and to whom it should be given, is not specified, it is inevitable that some differences will arise among examiners. These differences do not matter if the encouragement has no effect, but if that is the case, there is little point in using it.

The present study, in line with much of the previous research, has found that the encouragement does indeed have an effect. That this occurred in a sample of such high pretest IQ suggests that standardisation of the amount of reinforcement to be given during testing is overdue.

If this were done, however, examiners would still be faced with the problem of individual personality differences mediating the effects of the reinforcement, thus disadvantaging certain types of people. One possible mediating factor in the relationship between "encouragement" and WAIS scores was considered in the present study. Locus of Control did not, in this case, significantly influence the effects of the reinforcement given. Certain factors mentioned above may have affected this result, however, and in view of the evidence from past research on Locus of Control and reinforcement, further research is necessary before definite conclusions are drawn concerning the effects of this and other personality variables.

Such research should take a larger sample from a considerably wider population, approximating as closely as possible the society at large, especially in the distribution of IQ. The sampling population should be sufficiently large to allow the selection of well-differentiated Locus of Control groups. It might be wise to give considerably more reinforcement than was used in the present study, and to exercise greater control over test-retest intervals.

Whatever the results of the recommended research, caution should be applied in comparing the IQ scores of different individuals if they were obtained by different examiners, until there is standardisation of "encouragement".

Although the differences obtained in the present research were within the standard error of measurement of the WAIS, it must be remembered that as a result of factors mentioned above, and the fact that examiner differences were kept to a minimum, the effect found in the present study was probably a minimal one.

Considering all the above points, it seems reasonable to say that until there is standardisation of reinforcement on the WAIS, this scale should not be regarded as a truly accurate measure of intelligence as defined in Chapter one.

REFERENCES

- Asimov, I. The Early Asimov, Vol.3. Frogmore, St. Albans, Herts.: Granada, 1974.
- Baron, R.A. Motivation and performance in skill and chance defined situations. Psychonomic Science, 1967, 9, 631-632.
- Baron, R.M., Cowan, G., Ganz, R.L., and McDonald, M. Interaction of locus of control and type of performance feedback: Considerations of external validity. Journal of Personality and Social Psychology, 1974, 30, 285-292.
- Bartel, N.R. Locus of control and achievement in middle class and lower class children. Dissertation Abstracts, 1969, 29(9-A), 2991.
- Battle, E.S., and Rotter, J.B. Children's feelings of personal control as related to social class and ethnic group. Journal of Personality, 1963, 31, 482-490.
- Becker, W.M. I-E locus of control, selected Edwards Personal Preference Scales, and task persistence. Psychological Reports, 1975, 36, 97-98.
- Bellack, A.S., and Tillman, W. Effects of task and experimenter feedback on the self-reinforcement behaviour of internals and externals. Journal of Consulting and Clinical Psychology, 1974, 42, 330-336.
- Binet, A. Les Idees Modernes sur Les Enfants. Paris: E. Flammarion, 1910.
- Biondo, J., and MacDonald, A.P. Jr. Internal-external locus of control and response to influence attempts. Journal of Personality, 1971, 39, 407-419.
- Boring, E.G. Intelligence as the tests test it. The New Republic, 1912, 34, 35-36.
- Boynton, P. Intelligence: Its manifestations and measurement. New York: Appleton-Century-Crofts, 1933.
- Brecher, M., and Denmark, F.L. Internal-external locus of control and verbal fluency. Psychological Reports, 1969, 25, 707-710.
- Brecher, M., and Denmark, F.L. Locus of control: Effects of a serendipitous manipulation. Psychological Reports, 1972, 30, 461-462.
- Bridgman, P.W. The logic of modern physics. New York: MacMillan, 1927.
- Brown, J.H. The differential effects of social reinforcement on achievement behaviour across two levels of social desirability. Dissertation Abstracts International, 1973, 34(3-A), 1122.

- Burt, C., Jones, E., Miller, E., and Moodie, W. How the mind works. New York: Appleton-Century-Crofts, 1934.
- Butterfield, E.C. Locus of control, test anxiety, reactions to frustration, and achievement attitudes. Journal of Personality, 1964, 32, 355-370.
- Butcher, H.J. Human intelligence: Its nature and assessment. London: Methuen, 1968.
- Campo, R.E. Clinical vs automated administration of a mental test: A study of examiner influence. Dissertation Abstracts, 1964, 25, 285.
- Cattell, R.B. Theory of fluid and crystallized intelligence: a critical experiment. Journal of Educational Psychology, 1963, 54, 1-22.
- Chambers, K., Goldman, L., and Kovesdy, P. Effects of positive reinforcement on creativity. Perceptual and Motor Skills, 1977, 44, 322.
- Chaplin, J.P. Dictionary of Psychology. New York: Dell, 1968.
- Cornell, T.D. The effects of teacher reinforcement on the performance of children with varying degrees of internality and test anxiety. Dissertation Abstracts, 1968, 28 (7-A), 2550.
- Crandall, V.C., Katkovsky, W., and Crandall, V.J. Children's beliefs in their own control of reinforcements in intellectual-academic achievement situations. Child Development, 1965, 36, 91-109.
- Crandall, V.J., Katkovsky, W., and Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviours. Child Development, 1962, 33, 643-661.
- Crowne, D.P., and Liverant, S. Conformity under varying conditions of personal commitment. Journal of Abnormal and Social Psychology, 1963, 66, 547-555.
- Dana, J.M., and Dana, R.H. Experimenter bias and the WAIS. Perceptual and Motor Skills, 1969, 28, 694.
- Davis, W.E. Effect of prior failure on subjects' WAIS arithmetic subtest scores. Journal of Clinical Psychology, 1969, 25, 72-73.
- Davis, W.E., Peacock, W., Fitzpatrick, P., and Mulhern, M. Examiner differences, prior failure, and subjects' WAIS arithmetic scores. Journal of Clinical Psychology, 1969, 25, 178-180.
- Davis, W.L., and Davis, D.E. Internal-external control and attributions for success and failure. Journal of Personality, 1972, 40, 123-136.

- Deci, E.L. Effects of externally-mediated rewards on intrinsic motivation. Journal of Personality and Social Psychology, 1971, 18, 105-115.
- Ebbinghaus, H. Uber eine neue Methode zur Prufung geistiger Fahigkeiten und ihre Anwendung bei Schulkindern. Zeitschrift fur Psychologische und Physiologische Sinnesorgane, 1897, 13, 401-459.
- Eisenmann, R., and Platt, J.J. Birth-order and sex differences in academic achievement and internal-external control. Journal of General Psychology, 1968, 78, 279-285.
- Elwood, D.L. Automation of psychological testing. American Psychologist, 1969, 24, 287-289.
- Eysenck, H.J. The structure and measurement of intelligence. Berlin: Springer-Verlag, 1979.
- Feather, N.T. Effects of prior success and failure on expectations of success and subsequent performance. Journal of Personality and Social Psychology, 1966, 3, 287-298.
- Feather, N.T., Change in confidence following success or failure as a predictor of subsequent performance. Journal of Personality and Social Psychology, 1968, 9, 38-46.
- Feather, N.T. Attribution of responsibility and valence of success and failure in relation to initial confidence and task performance. Journal of Personality and Social Psychology, 1969, 13, 129-144.
- Feinberg, R.A., Lombardo, J.P., Miller, F.G., and Steigleder, M.K. Instrumental conditioning using attitudinal reinforcement as a function of locus of control. Psychological Reports, 1979, 44, 675-678.
- Fine, J.R. The influence of belief in locus of control and rate of reinforcement on expectancy change, task performance, and self-evaluation of performance among lower socioeconomic status black children. Dissertation Abstracts International, 1973, 34, (2-A), 615.
- Galdieri, A.A. The effect of verbal approval upon the performance of middle and lower-class third grade children on the Wechsler Intelligence Scale for Children. Unpublished doctoral dissertation, Ohio University, 1971, cited in:
- Galdieri, A.A., Barcikowski, R.S., and Witmer, J.M. The effect of verbal approval upon the performance of middle and lower-class third grade children on the WISC. Psychology in the Schools, 1972, 9, 404-408.
- Getter, H. A personality determinant of verbal conditioning. Journal of Personality, 1966, 34, 397-405.

- Goh, D.S., and Lund, J.M. Verbal reinforcement, socio-economic status, and intelligence test performance of pre-school children. Perceptual and Motor Skills, 1977, 44, 1011-1014.
- Gore, P.M. Individual differences in the prediction of subject compliance to experimental bias. Doctoral dissertation, Ohio State University, 1962, cited in Ritchie and Phares (1969) (q.v.)
- Gruen, G.E., and Ottinger, D.R. Skill and chance orientations as determiners of problem-solving behaviour in lower- and middle-class children. Psychological Reports, 1969, 24, 207-214.
- Hauck, E.P. The relationship of mental age and IQ to the effectiveness of two kinds of reinforcement. Dissertation Abstracts International, 1978, 39, (5-B), 2501.
- Humphreys, L.G. Theory of intelligence. In R. Cancro, (Ed.), Intelligence: Genetic and environmental influences. New York: Grune & Stratton, 1971, 31-55.
- James, W.H., Woodruff, A.B., and Werner, W. Effect of internal and external control upon changes in smoking behaviour. Journal of Consulting Psychology, 1965, 29, 184-186.
- Jensen, A.R. Bias in mental testing. London: Methuen, 1980.
- Joe, V.C. A review of the internal-external control construct as a personality variable. Psychological Reports, 1972, 30, 44.
- Johnson, R.A. Differential effects of reward versus no-reward instructions on the creative thinking of two economic levels of elementary school children. Journal of Educational Psychology, 1974, 66, 530-533.
- Katz, I. The socialization of academic motivation in minority group children. In D. Levine (Ed.), Nebraska Symposium on Motivation, 1967, Lincoln: University of Nebraska Press, 1967.
- Kennedy, W.A. and Willcutt, H.C. Praise and blame as incentives. Psychological Bulletin, 1964, 62, 323-332.
- Kinnie, E.J., and Sternlof, R.E. The influence of non-intellective factors on the IQ scores of middle- and lower-class children. Child Development, 1971, 42, 1989-1995.
- Korman, A.K. The psychology of motivation. Englewood Cliffs, N.J.: Prentice-Hall, 1974.
- Kumchy, C.G., and Rankin, R.E. Locus of control and mode of reinforcement. Perceptual and Motor Skills, 1975, 40, 375-378.

- Lapedes, D.N. (Ed.), McGraw-Hill Dictionary of Scientific and Technical Terms (2nd Edition), New York: McGraw-Hill, 1968.
- Lefcourt, H.M. Locus of control: Current trends in theory and research. Hillsdale, N.J.; Lawrence Erlbaum Associates, 1976.
- Lefcourt, H.M., and Telegdi, M.S. Perceived locus of control and field dependence as predictors of cognitive activity. Journal of Consulting and Clinical Psychology, 1971, 37, 53-56.
- Libowitz, J.M. The effect of the perceived degree of examiner congruence on WAIS IQs. Dissertation Abstracts, 1967, 28(3-B), 1167.
- Liverant, S., and Scodel, A. Internal and external control as determinants of decision-making under conditions of risk. Psychological Reports, 1960, 7, 59-67.
- McConnell, T.R. Locus of control, examiner presence, and source and type of reinforcement as factors in visual discrimination learning with mental retardates. Dissertation Abstracts, 1966, 27 (4-B), 1292.
- McGhee, P.E., and Crandall, V.C. Beliefs in internal-external control of reinforcements and academic performance. Child Development, 1968, 39, 91-102.
- McGinnies, E., Nordholm, L.A., Ward, C.D., and Bhanthumnavin, D.L. Sex and cultural differences in perceived locus of control among students in five countries. Journal of Consulting and Clinical Psychology, 1974, 42, 451-455.
- Matarazzo, J.D. Wechsler's measurement and appraisal of adult intelligence (5th and enlarged edition). Baltimore: Williams and Wilkins, 1972. (N.B. This is the 5th edition of Wechsler, 1958.)
- Messer, S.B. The relation of internal-external control to academic performance. Child Development, 1972, 43, 1456-1462.
- Montanelli, D.S., and Hill, K.T. Children's academic expectations and performance as a function of two consecutive reinforcement experiences, sex of subject, and sex of experimenter. Journal of Personality and Social Psychology, 1969, 13, 115-128.
- Murdy, W.G. Jr. The effect of positive and negative administrations on intelligence test performance. Dissertation Abstracts, 1962, 23, 1076.
- Naylor, G.F.K., and Harwood, E. Interim manual for the Naylor-Harwood Adult Intelligence Scale. Hawthorn, Victoria, Australia: Australian Council for Educational Research, 1972.

- Nie, N.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K., and Bent, D.H. Statistical package for the social sciences. (2nd edition). New York: McGraw-Hill, 1975.
- Norris, T.A. An investigation of verbal scale IQ and performance scale IQ differentiation on the Wechsler Intelligence Scale for Children and response to verbal reinforcement and extinction. Dissertation Abstracts International, 1975, 35(9-A), 5932.
- Parsons, O.A., and Schneider, J.M. Locus of control in university students from Eastern and Western societies. Journal of Consulting and Clinical Psychology, 1974, 42, 456-461.
- Pelosi, J.W. A study of the effects of examiner race, sex and style on test responses of negro examinees. Dissertation Abstracts International, 1969, 29(11-A), 4105.
- Peters, J.M. Effect of internal-external locus of control on learning and participation in occupational education. Dissertation Abstracts, 1969, 29(10-A), 3469.
- Petzel, T.P., and Gynther, M.D. Effects of internal-external locus of control and skill or chance instructional sets on task performance. Journal of General Psychology, 1970, 82, 87-93.
- Phares, E.J. Differential utilization of information as a function of internal-external control. Journal of Personality, 1968, 36, 649-662.
- Piaget, J. The psychology of intelligence. London: Routledge and Kegan Paul, 1950. (Translated by M. Piercy and D.E. Berlyne).
- Powell, A., and Vega, M. Correlates of adult locus of control. Psychological Reports, 1972, 30, 455-460.
- Quay, L.C. Language dialect, reinforcement and the intelligence test performance of negro children. Child Development, 1971, 42, 5-15.
- Quay, L.C. Reinforcement and Binet performance in disadvantaged children. Journal of Educational Psychology, 1975, 67, 132-135.
- Quinn, A.R. The effects of intrinsic and extrinsic reinforcement on the learning of paired associates as it relates to middle-class boys with behaviour problems who vary in their locus of control. Dissertation Abstracts International, 1975, 35 (11-A), 7132.
- Rasmussen, N.H. The effects of violating WISC standard administrative procedures on the performance of third, fourth and fifth-grade children of normal and borderline intelligence. Dissertation Abstracts International, 1974, 34(8-A, pt.1), 4886.

- Ritchie, E., and Phares, E.J. Attitude change as a function of internal-external control and communicator status. Journal of Personality, 1969, 37, 429-443.
- Rogers, C.A. Measuring intelligence in New Zealand. Auckland: Auckland University College, 1956.
- Romanuk, F.W. Performance, persistence and satisfaction as a function of reinforcement and the trait of intrinsic motivation. Dissertation Abstracts International, 1977, 37(9-B), 4702.
- Rosen, T.A. The effect of instructional objectives, reinforcement, and test items on learning from text. Dissertation Abstracts International, 1975, 35(11-A), 7133-7134.
- Rotter, J.B. Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 1966, 80(1), Whole no 609 (1-28).
- Rotter, J.B., and Hochreich, D.J. Personality. Glenview, Illinois: Scott, Foresman & Co., 1975.
- Rotter, J.B., and Mulry, R.C. Internal versus external control of reinforcement and decision time. Journal of Personality and Social Psychology, 1965, 2, 598-604.
- Rotter, J.B., Seeman, B., and Liverant, S. Internal versus external control of reinforcement: A major variable in behaviour theory. In N.F. Washington (Ed.), Decisions, Values and Groups, Vol 2. London: Pergamon Press, 1962 (473-516).
- Sheckart, G.R., and Bass, B.A. The effects of verbal and nonverbal contingent reinforcement upon the intelligence test performance of black adults. Journal of Clinical Psychology, 1976, 32, 826-828.
- Sherman, A.R., and Blatt, S.J. WAIS digit span, digit symbol, and vocabulary performance as a function of prior experiences of success and failure. Journal of Consulting and Clinical Psychology, 1968, 32, 407-412.
- Solomon, D., Houlihan, K.A., and Parelus, R.J. Intellectual achievement responsibility in negro and white children. Psychological Reports, 1969, 24, 479-483.
- Spearman, C. The abilities of man. New York: Macmillan, 1927.
- Stenhouse, D. The evolution of intelligence. London: George Allen and Unwin, 1974.
- Stoddard, G.D. The meaning of intelligence. New York: Macmillan, 1943.
- Strickland, B. Individual differences in verbal conditioning, extinction, and awareness. Journal of Personality, 1970, 38, 364-378.

- Terman, L.M. The measurement of intelligence. Boston: Houghton-Mifflin, 1916.
- Terman, L.M. Intelligence and its measurement, Part II. Journal of Educational Psychology, 1921, 12, 127-133.
- Terman, L.M., and Merrill, M.A. Measuring intelligence. New York: Houghton-Mifflin, 1937.
- Terman, L.M., and Merrill, M.A. Stanford-Binet Intelligence Scale. Boston: Houghton-Mifflin, 1960.
- Thorndike, E.L. Intelligence and its measurement, Part I. Journal of Educational Psychology, 1921, 12, 124-127.
- Thornhill, M.A., Thornhill, G.J., and Youngman, M.B. A computerized and categorized bibliography on locus of control. Psychological Reports, 1975, 36, 505-506.
- Throop, W.F., and MacDonald, A.P., Jr. Internal-external locus of control: A bibliography. Psychological Reports, 1971, 28, 175-190.
- Thurber, S. Academic achievement as a function of task structure and locus of control. Unpublished doctoral dissertation, University of Texas, Austin, 1970.
- Thurber, S. Defensive externality and academic achievement by women. Psychological Reports, 1972, 30, 454.
- Thurber, S., Heacock, D., and Peterson, R. Locus of control and response persistence. Psychological Reports, 1974, 35, 810.
- Thurstone, L.L. Intelligence and its measurement. Journal of Educational Psychology, 1921, 12, 201-207.
- Tiber, N., and Kennedy, W.A. The effects of incentives on the intelligence test performance of different social groups. Journal of Consulting Psychology, 1964, 28, 187.
- Verma, P., and Nijhawan, H.K. The effect of anxiety, reinforcement, and intelligence on the learning of a difficult task. Journal of Experimental Child Psychology, 1976, 22, 302-308.
- Wechsler, D. Wechsler Intelligence Scale for Children, Manual. New York: The Psychological Corporation, 1949.
- Wechsler, D. Manual for the Wechsler Adult Intelligence Scale. New York: The Psychological Corporation, 1955.
- Wechsler, D. The Measurement and Appraisal of Adult Intelligence (4th edition). Baltimore: Williams and Wilkins, 1958.

- Wechsler, D. Intelligence defined and undefined: A relativistic appraisal. American Psychologist, 1975, 30, 135-139.
- Weisz, J.R. A developmental analysis of relations among hypothesis behaviour, helplessness, and IQ. Dissertation Abstracts International, 1976, 36(12-B,pt.1), 6406.
- Wessler, R.L. Estimating IQ: Expertise or examiner effect? Perceptual and Motor Skills, 1970, 30, 268.
- Wilens, D.K. The effects of selected reinforcement conditions by sex of subject on the standardized performance of low-income black students. Dissertation Abstracts International, 1976, 36(9-A), 5962-5963.
- Willcutt, H.C., and Kennedy, W.A. Relation of intelligence to effectiveness of praise and reproof as reinforcers for fourth graders. Perceptual and Motor Skills, 1963, 17, 695-697.
- Witmer, J.M., Borstein, A., and Dunham, R. The effects of verbal approval and disapproval upon the performance of third and fourth grade children on four subtests of the Wechsler Intelligence Scale for Children. Journal of School Psychology, 1971, 9, 404-408.
- Zemansky, M.W. Temperatures very low and very high. Princeton, N.J.: Van Nostrand, 1964.

APPENDICES

APPENDIX A

ROTTER'S I-E LOCUS OF CONTROL SCALE

(Rotter, 1966)

N.B. The responses marked (✓) are scored one point each (external). These marks did not, of course, appear on the questionnaires supplied to subjects.

Items 1, 8, 14, 19, 24, and 27 are "filler items".

MASSEY UNIVERSITY

DEPARTMENT OF PSYCHOLOGYINSTRUCTIONS

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered A or B. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

Your answers to the items on this inventory are to be recorded on the separate answer sheet provided. Print your name and any other information requested by the examiner on the answer sheet, then finish reading these directions. Do not turn the page until you are told to do so.

Please answer these items carefully but do not spend too much time on any one item. Be sure to find an answer for every choice. Find the number of the item on the answer sheet and black-in the letter A or B which you choose as the statement more true.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. (A) Children get into trouble because their parents punish them too much.
(B) The trouble with most children nowadays is that their parents are too easy with them.
2. ✓(A) Many of the unhappy things in people's lives are partly due to bad luck.
(B) People's misfortunes result from the mistakes they make.
3. (A) One of the major reasons why we have wars is because people don't take enough interest in politics.
✓(B) There will always be wars, no matter how hard people try to prevent them.
4. (A) In the long run people get the respect they deserve in this world.
✓(B) Unfortunately an individual's worth often passes unrecognized no matter how hard he tries.
5. (A) The idea that teachers are unfair to students is nonsense.
✓(B) Most students don't realise the extent to which their grades are influenced by accidental happenings.
6. ✓(A) Without the right breaks one cannot be an effective leader.
(B) Capable people who fail to become leaders have not taken advantage of their opportunities.
7. ✓(A) No matter how hard you try some people just don't like you.
(B) People who can't get others to like them don't understand how to get along with others.
8. (A) Heredity plays the major role in determining one's personality.
(B) It is one's experiences in life which determine what they're like.
9. ✓(A) I have often found that what is going to happen will happen.
(B) Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
10. (A) In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
✓(B) Many times exam questions tend to be so unrelated to course work that studying is really useless.
11. (A) Becoming a success is a matter of hard work, luck has little or nothing to do with it.
✓(B) Getting a good job depends mainly on being in the right place at the right time.
12. (A) The average citizen can have an influence in government decisions.
✓(B) This world is run by the few people in power and there is not much the little guy can do about it.
13. (A) When I make plans I am almost certain that I can make them work.
✓(B) It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. (A) There are certain people who are just no good.
(B) There is some good in everybody.
15. (A) In my case getting what I want has little or nothing to do with luck.
✓(B) Many times we might just as well decide what to do by flipping a coin.
16. ✓(A) Who gets to be the boss often depends on who was lucky enough to be in the right place first.
(B) Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
17. ✓(A) As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
(B) By taking an active part in political and social affairs the people can control world events.
18. ✓(A) Most people don't realize the extent to which their lives are controlled by accidental happenings.
(B) There really is no such thing as "luck".
19. (A) One should always be willing to admit mistakes.
(B) It is usually best to cover up one's mistakes.
20. ✓(A) It is hard to know whether or not a person really likes you.
(B) How many friends you have depends upon how nice a person you are.
21. ✓(A) In the long run the bad things that happen to us are balanced by the good ones.
(B) Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. (A) With enough effort we can wipe out political corruption.
✓(B) It is difficult for people to have much control over the things politicians do in office.
23. ✓(A) Sometimes I can't understand how teachers arrive at the grades they give.
(B) There is a direct connection between how hard I study and the grades I get.
24. (A) A good leader expects people to decide for themselves what they should do.
(B) A good leader makes it clear to everybody what their jobs are.
25. ✓(A) Many times I feel that I have little influence over the things that happen to me.
(B) It is impossible for me to believe that chance or luck plays an important role in my life.
26. (A) People are lonely because they don't try to be friendly.
✓(B) There's not much use in trying too hard to please people, if they like you, they like you.

27. (A) There is too much emphasis on athletics in high school
Team sports are an excellent way to build character.
28. (A) What happens to me is my own doing.
✓(B) Sometimes I feel that I don't have enough control over the
direction my life is taking.
29. ✓(A) Most of the time I can't understand why politicians behave the
way they do.
(B) In the long run the people are responsible for bad government on
a national as well as on a local level

A N S W E R S H E E T

1.	(A)	(B)	16.	(A)	(B)
2.	(A)	(B)	17.	(A)	(B)
3.	(A)	(B)	18.	(A)	(B)
4.	(A)	(B)	19.	(A)	(B)
5.	(A)	(B)	20.	(A)	(B)
6.	(A)	(B)	21.	(A)	(B)
7.	(A)	(B)	22.	(A)	(B)
8.	(A)	(B)	23.	(A)	(B)
9.	(A)	(B)	24.	(A)	(B)
10.	(A)	(B)	25.	(A)	(B)
11.	(A)	(B)	26.	(A)	(B)
12.	(A)	(B)	27.	(A)	(B)
13.	(A)	(B)	28.	(A)	(B)
14.	(A)	(B)	29.	(A)	(B)
15.	(A)	(B)			

APPENDIX B

REINFORCEMENT SCHEDULE

(A certain number of each specified encouragement was given for each subtest, as shown. These were not tied to particular items, to avoid reinforcing false or non-responses).

1. Information subtest: no encouragement given during subtest. At end of subtest, examiner says "Very good, now....", followed immediately by the starting item (no.3) of the Comprehension subtest.
2. Comprehension: "Very Good" (once); "Fine" (once); "Good" (once). At end of subtest, "OK, you're doing well, now let us try these". (Note that the underlined words are those used in all WAIS administrations to introduce the Arithmetic subtest).
3. Arithmetic: "Very Good" (once); "Mmhhh, that's good" (twice). At the end of subtest "Right, you're coming along nicely, now" followed immediately by the first item of the Similarities subtest.
4. Similarities: "Good" (once), "Fine" (once). At end of subtest: "OK, that's good, now..." followed immediately by administration of the Digit Span subtest.
5. Digit Span:
 - a. Digits Forward: "Well done" (once), "Fine" (once).
 - b. Digits Backward: "That's good" (once), "Well done" (once).
 At end of subtest "That's good, now...." followed immediately by presentation of the Vocabulary subtest.
6. Vocabulary: "Very Good" (twice); "Fine" (twice); "That's good" (once).
7. Digit Symbol: At the end of subtest; "mmhhh, well done, now ...", followed immediately by administration of the Picture Completion subtest.

8. Picture Completion: "Good" (once); "Fine" (once).
At end of subtest, "Right-oh, you've done well so far, now let's try something else", followed by administration of the Block Design subtest.
9. Block Design: "Well done" (once); "That's good" (once).
10. Picture Arrangement: "Good" (once); "Very Good" (once).
At end of subtest: "That's good, now ..." followed immediately by presentation of the Object Assembly subtest.
11. Object Assembly: "Well done" (once). This was to be given near the beginning of the subtest - in practice, it was always given for the manikin, the first item.

APPENDIX C

RAW DATA

N.B. The subjects are divided into groups, as in the experiment, but apart from this, they are not presented in any particular order.

Abbreviations Used

LC	=	Locus of Control score
VIQ	=	Verbal IQ
PIQ	=	Performance IQ
FSIQ	=	Full Scale IQ
NHAIS	=	Naylor-Harwood Adult Intelligence Scale
WAIS	=	Wechsler Adult Intelligence Scale

Sub- ject No.	Group	NHAIS				WAIS		
		LC	VIQ	PIQ	FSIQ	VIQ	PIQ	FSIQ
1	Internal, Control	11	108	118	113	112	118	115
2		12	118	131	125	123	124	125
3		7	123	114	120	113	122	118
4		11	117	127	123	115	131	123
5		8	103	116	109	109	111	111
6		6	109	117	114	115	127	121
7		10	101	108	104	106	110	108
8		5	116	109	114	120	120	121
9		7	102	105	103	111	114	113
10		9	124	133	130	126	130	129
11		6	123	125	125	127	125	128
12		9	117	115	117	113	123	119
13	External, Control	18	113	110	112	112	108	111
14		16	119	127	124	121	130	126
15		18	108	118	113	112	118	115
16		17	124	132	129	132	123	130
17		17	110	115	113	111	113	112
18		16	128	111	122	129	111	123
19		15	111	102	107	105	110	107
20		17	122	118	122	127	103	118
21		18	113	124	119	116	127	122
22		16	105	115	110	111	110	111
23		15	124	128	128	126	130	129
24		17	110	099	106	106	099	103
25	Internal, Experimental	11	114	118	116	113	124	119
26		11	107	102	105	105	112	109
27		6	113	097	107	127	113	122
28		8	110	106	108	124	119	123
29		8	124	119	123	123	124	125
30		7	114	119	117	118	129	124
31		8	133	142	139	140	144	145
32		11	115	130	123	118	127	123
33		9	121	120	122	125	114	122
34		11	115	124	120	112	123	117
35		10	095	107	100	105	120	112
36		7	118	113	117	128	120	126

Sub- ject No.	Group	NHAIS				WAIS		
		LC	VIQ	PIQ	FSIQ	VIQ	PIQ	FSIQ
37	External, Experimental	16	113	107	111	120	110	117
38		15	127	116	124	137	122	132
39		18	109	107	108	119	119	119
40		18	113	115	115	116	120	119
41		17	120	125	124	124	128	127
42		16	131	127	131	142	133	141
43		16	118	110	116	127	127	129
44		17	100	128	113	111	135	122
45		18	117	118	119	129	135	133
46		18	107	115	111	117	126	122
47		15	103	123	112	113	130	122
48		17	125	118	123	129	122	128

APPENDIX D

COMMUNICATIONS WITH SUBJECTS

1. Contract signed at recruitment
2. Letter sent out on completion of research

I,of

 (contact address)

hereby agree to make myself available for research being carried out by Warwick Bennett, at the time and place nominated below, and for a further period not exceeding two hours, to be arranged later.

I further undertake not to divulge any details of the research to any other person until I am informed by the researcher that the research has been completed.

Appointment Time: Date:1980.

Place: Room .P334., in the Psychology Building, Massey University.

Alternative venue in case of unavailability due to emergency, at the time stated:

Time: Date: 1980.

Place: Room .P334., in the Psychology Building, Massey University.

Signed: Date:1980.



Massey University

Department of Psychology

Dear

Thank you very much for participating in my thesis research. The experimental work is completed, so you are now free to discuss it with anyone if you so desire.

The results are not as conclusive as I would have liked. There was a significant effect for reinforcement, but the interaction between this and locus of control, though apparent, was not significant.

Thanking you once again,

Yours sincerely,

WARWICK BENNETT