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Henry, Lynne Marie

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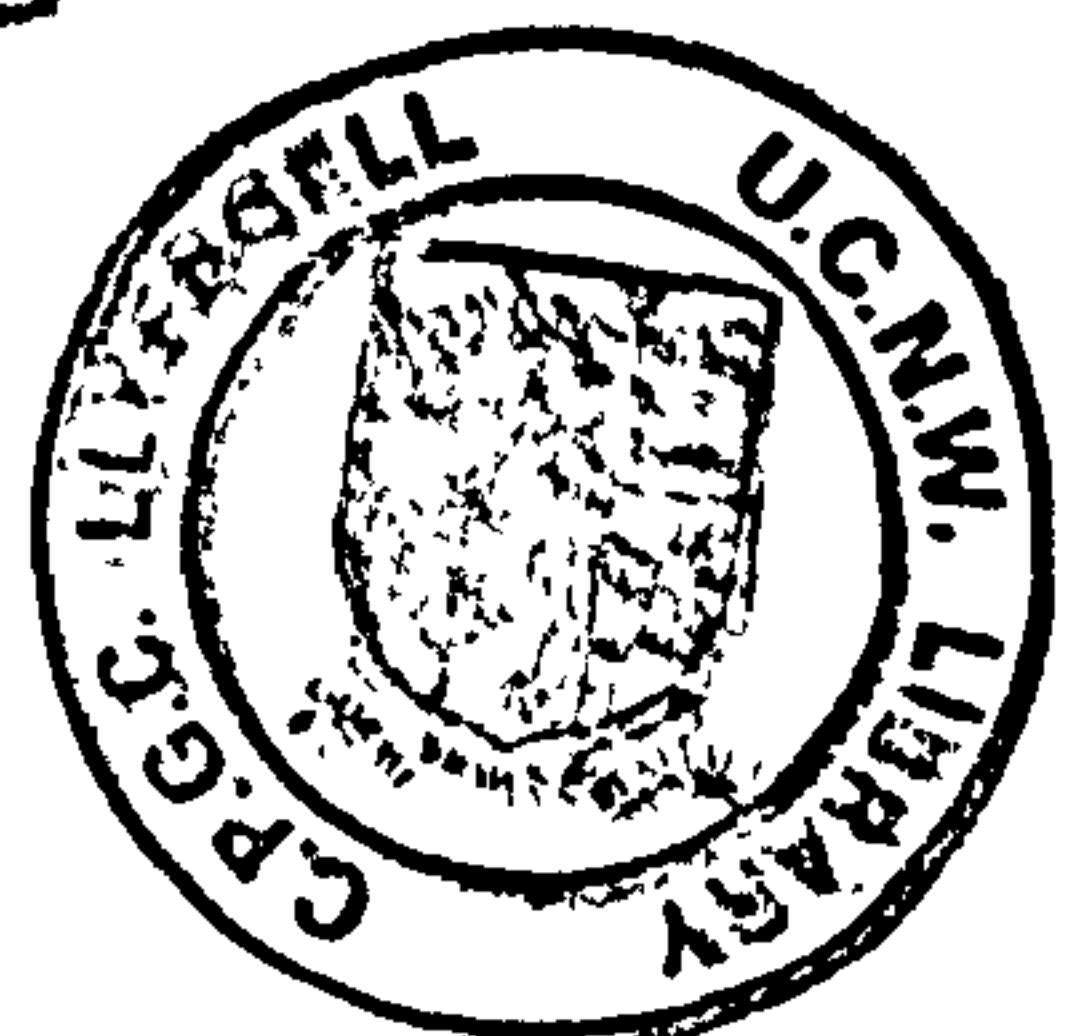
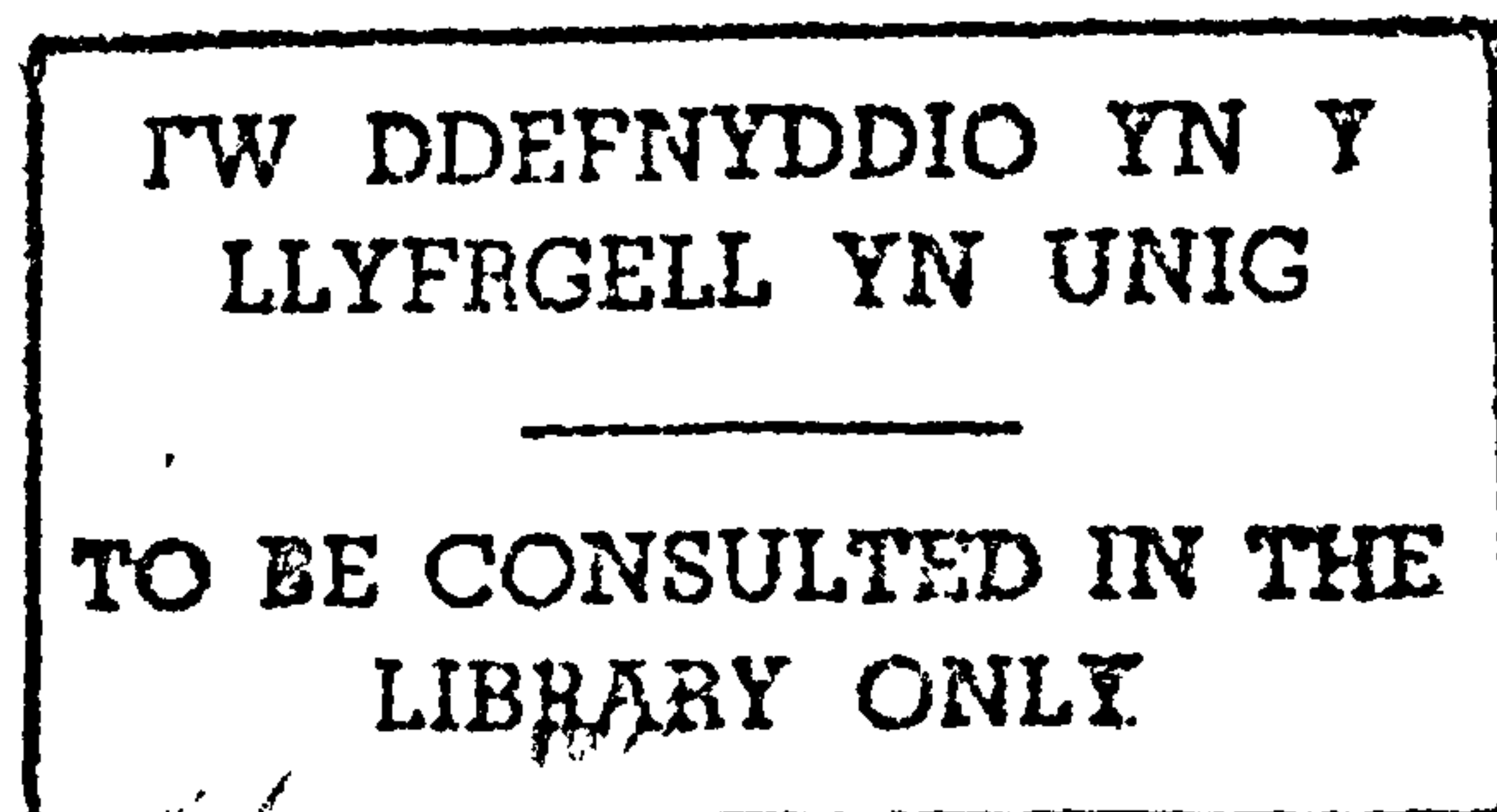
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THE ASSESSMENT AND MODIFICATION OF VERBAL BEHAVIOUR IN  
PEOPLE WITH DEMENTIA

Lynne Marie Henry

PhD

1994



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## SUMMARY

The number of people surviving into old age, is increasing rapidly, bringing attendant social care problems, such as a rise in the number of people suffering from dementia. It is important that research resources be made available to investigate the causes of dementia and the provision of therapeutic measures. The symptomatic role of language disorders in the dementias of old age has already been well established, and is a primary cause of distress to carers and sufferers alike. Strategies for remediation of such language disorders were investigated. Analysis of verbal behaviour, within Skinner's (1957) framework, was selected as a route for further understanding, description, and therapeutic intervention. The deficits in verbal behaviour found, included the echoic, the textual and the tact, mand compliance, and naming, also understanding and production of prepositional relations, and conditional responding or conditional mand compliance. Performance on matching to sample tasks was also found to be poor.

The outcome of reinforcement procedures was moderately successful, but modelling of correct responses was found to reduce frequency of correct non-imitative responses, and was not successful. The application of the textual prompt for naming and mand compliance responding was successful, in that increases in correct textual responses to stimuli were produced. It was not clear, however, whether this success would have resulted in lasting positive behaviour change. Language deficits were discussed in terms of a breakdown in functional relationships between verbal responses and stimuli which under normal circumstances would control them, and in terms of deficits in



conditional responding. A number of suggestions were made for the improvement of therapeutic practice in this area, based on the results obtained.

# CONTENTS

	Page Number
Chapter 1: Introduction	1
Chapter 2: Understanding dementia	5
Chapter 3: Previous findings	41
Chapter 4: Human learning and the role of Verbal Behaviour	66
Chapter 5: General Method and Experiment 1	102
Chapter 6: Experiment 2	145
Chapter 7: Experiment 3 (A) and Experiment 3 (B)	163
Chapter 8: Experiment 4	194
Chapter 9: Experiment 5	216
Chapter 10: Experiment 6	242
Chapter 11: General Discussion and Conclusion	303
References	325
Appendixes	344

## CHAPTER 1

### INTRODUCTION

The investigations of simple classes of verbal behaviour which are reported in this thesis were prompted by and evolved from the author's work in a local unit for elderly mentally infirm (EMI) patients. Specific classes of verbal behaviour were selected as experimentally viable units for empirical assessment. The high prevalence of language disorders in the dementing population ensured that such an investigation would firstly, be feasible, and secondly, have potential therapeutic merit. Despite the provision and encouragement of community care since the Griffiths Report (1987), some dementia patients are so needful of full-time care or so behaviourally disturbed, that they require the daily support of a hospital environment such as the one in which the present research was begun. More detail about this client group is given in Chapter 2.

The following Chapter (Chapter 2), introduces the scope of the problem of dementia in old age to the reader, describes its prevalence and explains some of the diagnostic and evaluative procedures used in the area. The different causes of the more common forms of dementia are also discussed.

The methodologies of behaviour analysis (see Chapter 4) offer a great deal of scope for the development of therapeutic interventions with this difficult and neglected client group. Such analysis also lends itself readily to the documentation of specific deficits of verbal behaviour. Behaviour analysis involves an examination of the contingencies which specific behaviours

operate under, and the factors which encourage (strengthen) or discourage (weaken) their emission. A review of the experimental literature on studies conducted with the dementing elderly revealed that most of the published studies had, however, been conducted outside the tradition of behaviour analysis. Much of this literature is reviewed in Chapter 3.

Chapter 3 gives an overview of some of the research work which has been conducted with dementia subjects, investigating the highly related areas of memory and language. The majority of this has been conducted outside the field of behaviour analysis, for example, the work of Bayles and her colleagues, which has investigated language disturbance in dementia. Some of the procedures commonly used to experimentally assess the (verbal) performance of dementia patients are outlined in Chapter 3.

Chapter 4 suggests ways in which behaviour analysis could be used to understand, evaluate, and modify the behaviour of a wide range of client groups, with particular reference to dementia patients, and evaluates the role of behaviour analysis and its associated processes and procedures, in the investigation of human learning. Working largely within Skinner's theoretical framework of verbal behaviour (Skinner, 1957) (see Chapter 4), some of the discrete language deficits of demented elderly persons were identified and strategies of remediation were investigated. Objects, pictures, and printed words provided the set of stimulus materials, which had carefully been selected to provide the most useful, and ecologically valid, treatment programme.

Chapter 5 introduces the reader to the methodologies used in the present thesis, in the form of a General Method. This



was the standard format (although there were some exceptions) used throughout the following experimental chapters. Chapter 5 also describes Experiment 1, which investigates the effectiveness of reinforcement procedures in re-training simple classes of verbal behaviour. The performance of three subjects, all of whom were at the time of the study, resident in psychogeriatric hospitals, was assessed. Some of the problems of working with this subject population are described in this Chapter. The issue of the circular definition of reinforcement is also examined, and an investigation of the objects and events which might be appropriate as reinforcers for dementia patients is reported.

Chapter 6 examines the role of modelling, and its result, imitation, in the modification of simple classes of verbal behaviour of three dementia patients, and outlines some of the difficulties encountered in such an analysis and intervention. Chapter 7 examines the use of the printed word (the textual) and written (as opposed to spoken) prompts in the modification of two subjects' verbal behaviour, and investigates whether written or printed prompts can be effective in cueing appropriate verbal behaviour. In Chapter 8, following from the work of Morris (1987), the use of the matching to sample paradigm with dementia patients was examined, and the results obtained from three dementia patients and a control group of normal elderly volunteers were critically evaluated.

Chapter 9 examined conditional responding in dementia patients, using a delayed response procedure. Strategies were investigated which might assist patients' performance on such behaviours. The implications of deficits in conditional responding for the language performance of dementia patients are considered.



The final Experiment, reported in Chapter 10, describes a comparison between a group of healthy elderly control subjects and dementia patients, using the measures devised in Experiments 1-3, and 5. Chapter 10 also examined issues such as the validity of the use of assessment procedures routinely administered by clinicians.

Finally, Chapter 11 attempted to formulate some answers to the questions raised in this thesis, in a general discussion and conclusion. Methodological problems which were brought to light during the completion of the thesis were addressed. Some potential directions for future research in this area were also considered.

## CHAPTER 2

### UNDERSTANDING DEMENTIA

#### What is Dementia?

##### Generic description and list of causes

Dementia in old age (senile dementia), is a syndrome of organic origin which renders the elderly person unable to care for him or herself, confused, disorientated, and often with personality disorder; these effects worsen as the disease progresses.

Reber's Dictionary of Psychology (1985), has an entry under "dementia" alone, which appears to be a useful description of the generic form of dementia. Reber defines dementia as "generally, a loss of intellectual capacity to the extent that normal social and occupational functions can no longer be carried out". A number of separate entries under dementia then follow, which explain the common usage of dementia terminology: "dementia, alcoholic" (associated with Korsakoff's Syndrome, or brain damage due to alcohol toxicity); "dementia, multi- infarct"; "dementia naturalis" (an obsolete term); dementia paralytica (dementia associated with advanced syphilis); dementia praecox, an obsolete term for schizophrenia; dementia, pre-senile, which is defined as any dementia with onset before age sixty-five, and is usually associated with Alzheimer's disease; dementia, primary degenerative, a dementia with gradual and progressive deterioration, and widespread cerebral atrophy; dementia pugilistica, a dementia common among boxers which is associated with multiple concussions; dementia, senile, which includes any

dementia affecting the elderly. From the list we may conclude that the symptoms that Reber describes can have many initial causes. Perhaps for this reason, workers in the field of dementia cannot agree on what constitutes dementia; as Reber points out, "some authors use the term only for progressive syndromes with the connotation of irreversibility; others are neutral on prognosis." Furthermore, Jacques, (1988), narrows the criteria even further, in that he claims that to be classed as a dementia the condition must have *gradual* progressive onset. The criteria for severity of dementia are based on the measurable effects on the patient's life. In the case of mild dementia, work and social activities are impaired, but the person can still live independently. When the dementia is moderate, independent living is dangerous and some degree of support is required. When the dementia is severe, the person will need constant support in matters such as personal hygiene, and will be largely incoherent or mute.

Dementia as a generic syndrome is distinct from many or most other mental disorders in that it has established physiological bases. Other kinds of mental disorder may indeed have some physiological involvement. It has been suggested, for example (Creese, Burt, and Snyder, 1978), that schizophrenia may be due to a disturbance of the level of particular neurotransmitters in patients' brains. It is quite clear, however, that the syndrome of dementia is correlated with physical changes on many levels, from physiological to histological, in the patients' brains.

The two most common types of dementia are Alzheimer Type dementia and Multi-Infarct dementia (Mahendra, 1984). These will be discussed in more detail below.



## Predisposing or correlated factors

A number of factors have been shown to predispose an individual to different types of dementia. Knowledge of these factors in a person's history may make diagnosis of type of dementia less problematic. Aronson, et al, (1990), found that in very elderly women a history of myocardial infarction (MI), was related to a diagnosis of dementia. They did a longitudinal study in the Bronx area of New York, of initially non-demented community residing elderly people. Women were three times more likely than men to develop dementia, and women with a history of MI were five times more likely to develop dementia than those without, a correlation not found for men. Head trauma, thyroid disease, age or family history of dementia were *not* found by these authors to be related to incidence of dementia. These authors use the term dementia in its generic form but specify that 47% of cases were of the Alzheimer type.

## Studies of related factors.

Another factor which is commonly related to dementia is depression. Lopez, et al, (1990), longitudinally evaluated the cognitive functions of patients diagnosed as having probable Alzheimer's Disease, and who also met criteria for major depression and found that they did not differ significantly from a sample of Alzheimer type dementia patients who were *not* depressed, on measures of attention, language, memory, learning, and visuo-spatial functions. The authors conclude that depression does not modify the expression or progression of the dementing

disease. It may also be concluded that as there were so few observable differences between the two groups of patients, other than depression, this may make the task of diagnosing dementia even more difficult. If a patient presents as seemingly dementing, and is treated as such, then the possibility of therapeutic treatment may be ignored, when the patient may be in fact primarily be depressed. These factors indicate that more instruments which aid the diagnosis of cause of dementia would be extremely useful. This issue will be discussed below.

### How Prevalent is Dementia?

Dementia in old age affects ten percent of persons over sixty-five and of these about half exhibit symptoms of a severe degree (Wells, 1979). After the age of eighty, the percentage of persons suffering from dementia rises to twenty-two percent (Kay, et al, 1964). Wells' study also notes that demographic trends resulting in an ageing population mean that a higher proportion of our population are likely to be suffering from dementia 5 years on from 1979, (1984), because the number of persons over 80 will increase by 1.76 million in England and Wales. Wells also found that most people suffering from dementia either live alone or are cared for at home, and for every one demented person in an institution of some sort, 5 were cared for at home.

More recently, Hofman, et al, (1991), cited in Melzer, et al, (1992), found that the percentage of persons under eighty suffering from dementia in Europe was 11.8, and the percentage over eighty was 62.45.



### More on prevalence: Issues of diagnosis

A decline in functioning in the elderly population may be seen as a social problem because it creates a need in service provision which must be catered for. Ineichen, (1990), points out that with the growth of the elderly population world-wide has come a demand for residential care of all kinds for elderly people. Ineichen discusses the extent of dementia among elderly people in residential homes. A lot of the studies examining the prevalence of dementia have used formal standardised tests such as the CAPE (Pattie and Gilleard, 1979), but some researchers looking at the prevalence of dementia in residential care have constructed their own scales for assessing dementia. Some of the more commonly used scales are discussed below. The use of a number of different scales on different groups may create problems in terms of interpretation of data, because it has been found that different questionnaires produce different results. For example, Booth, (1985), found a poor correlation in outcome among the results of five different questionnaires. In Britain, studies cited by Ineichen have shown levels of dementia in residential homes (particularly social services 'Part III' homes) to be around 50%. Additionally, there is a problem (for researchers) in that it can be very difficult to accurately diagnose someone as demented at all, because of the issues discussed below.

### Implications for future society

Government policy, as determined by the Griffiths Report (Griffiths, 1987), is to encourage care in the community and phase

out many large psychiatric hospitals, so the proportion of demented elderly persons living 'at home' to those in institutions may now, in 1993, be different to that found by Wells in 1979.

## Diagnosis of Dementia: The Procedures and Techniques

### General considerations

As many researchers are unwilling to categorise their subjects by type of dementia, given the opacity of the issues involved, the reader may assume (unless it is stated otherwise), that in the following studies, the researchers are referring to the generic term dementia. This section attempts to clarify some of the issues related to firstly, diagnosis of dementia, and secondly, diagnosis of sub-type. There are no *absolute* criteria or tests for dementia, and existing criteria are not unanimously agreed upon. Examples of such disagreement are the slight differences between the criteria of the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorder (3rd Edition), (DSM111), and McKhann's (1984), criteria (which are slightly more stringent than DSM111). In consequence, the issue is not without contention.

Two issues are involved in the clinical diagnosis of dementia. The first issue is that of making an accurate diagnosis of dementia; whether a patient is suffering from the generic syndrome of dementia or another condition. The second is establishing what *type* of dementia, or, more accurately (Mahendra, 1984), what is the *cause* of the dementia they are suffering from (see Table 2.1). Certain types of dementia may be treatable, and others have a genetic factor in their aetiology, in which case genetic counselling

of family members may be advisable. Others involve an infective agent. Even if the patient is suffering from a type of dementia which is not treatable, awareness of the type will aid family members and care staff in knowing what to expect from, and how to treat, the patient, as the condition progresses.

Kasper, (1990), points out that the diagnosis of generic dementia in treatment settings is "a complex and technologically intensive process" so therefore it is even more difficult when the person is living in the community. There is dispute over the distinctions which can be made between different rare types of dementia and whether dementia occurring before and after the ages of 65 should be considered separately.

Evidence suggests that mis-diagnosis of dementia is common, and functional psychiatric disorder masquerading as dementia accounts for 8% of cases, amongst which depression is the most common cause of misdiagnosis. However, partly, but not wholly, because of the possibility that the patient's symptoms have a treatable cause, the prospects for remediation are enhanced when the precise diagnosis is pursued energetically (Lishman, 1987).

Persson, et al, (1991), point out that there is general agreement that it is important to diagnose dementia *at an early stage* in order to introduce the most appropriate interventions and at a time when they are likely to be most effective. These authors also suggest that the task of clear diagnosis is made more difficult by the presence of considerable diversity in the relevant functions within the general non-dementing elderly population. Nevertheless, these constraints aside, psychological methods can be very useful in the diagnosis of dementia; although not much is



known about the early stages of dementia, we do know that the following abilities are affected: various memory functions; information processing; language; spatial functions; reasoning ability; and speed of behaviour. These authors have also pointed out that many attempts have been made to distinguish between M.I.D. and Alzheimer type dementia. In some studies differences were obtained between persons with the different types of dementia, and in other studies, not (Persson, et al, 1991). This issue will be considered further below.

### The use of psychometric assessment procedures as an aid to diagnosis

Various assessment measures have been developed with the aim of assisting diagnosis, either of the generic form of dementia or of specific types. These measures will be introduced in this section.

There have been a number of different estimates of the prevalence of cognitive impairment (not necessarily in an individual with a diagnosis of dementia as specified above) in the elderly population. This disagreement, according to Kasper, may be due to the use of different assessment instruments.

### The assessments.

Kasper reports that the tests most commonly used in assessing dementia in community settings, are the Mini-Mental State Exam (Folstein, Folstien, and McHugh, 1975), the Mental Status Questionnaire (Kahn, et al, 1960), the Short Portable Mental

Status Questionnaire (Pfeiffer, 1975), the Information-Orientation-Concentration Test (Blessed, Tomlinson and Roth, 1968) and the Dementia Rating Scale (Mattis, 1976). She suggests that in the case of the functionally impaired elderly, additional attention should be paid to ability to perform Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), rather than merely assessing persons with a view to diagnosing specific conditions. Kasper points out that diagnosis of disease is a poor indicator of functioning, and indeed it may be, but surely the diagnosis of a specific disorder is vital at the onset of a dementing disease, in order to exclude possible treatable causes.

Other currently used tests are the Rivermead Behavioural Memory Test (Wilson, Coburn and Baddeley, 1985), and the Middlesex Elderly Assessment of Mental State (MEAMS), (Golding, 1989). Both of the latter two tests have the disadvantage that they are rather time consuming to administer, and may be rather stressful for the patient, if he or she is more than very mildly impaired. If the tests are completed, however, they may yield large quantities of information about specific cognitive deficits. The Rivermead Behavioural Memory Test does have some particular advantages. It contains conditional tasks (see Chapter 9), which have real-life validity. For example, in one of the conditional tasks, the experimenter asks the subject to lend her a small personal belonging such as a handkerchief, which she then hides while the subject watches. The subject is required to ask the experimenter to return the item, at the end of the session, and to remember where it has been hidden. Also, the subject is instructed to ask the experimenter the date of her next appointment when an alarm sounds, in twenty minutes. These



tasks are useful in that they could explicitly test for impairment of conditional skills, but they do rely on the subject's ability to co-operate with complex instructions. Without such ability on the part of the subject, the task would be impossible to administer.

Possibly due to the greater interest in dementia and related disorders currently, more and more diagnostic instruments are being developed. SIDAM (a Structured Interview for the diagnosis of Dementia of the Alzheimer type, Multi-Infarct dementia, and dementia of other aetiology according to ICD-10 and DSM-111-R), has been developed as another diagnostic tool (Zaudig, et al, 1991), to add to the pool. SIDAM has been developed to include the advantages of longer types of assessments within a shorter form, and the authors claim it has proved to be of value as a brief assessment device, the administration of which takes about 28 minutes. They conclude on the basis of their results that it seems to be a good 'spotter' of dementia.

### Why develop more tests?

The development of more tests is justified by the observation that diagnostic accuracy for dementias is still not very good. This is despite the wide variety of tests currently available. Some of these tests are described below to give an indication of the variety that exists. The CAMDEX (Cambridge Mental Disorders of the Elderly Examination, Roth, et al, 1986), is one of the most widely used assessments for elderly people, and includes all relevant information to make a diagnosis, and which includes established and new scales of cognitive function and behaviour, but has the disadvantage of being rather lengthy. Brayne and

Calloway, (1990), reviewed a number of studies comparing rates of diagnosis of dementia and found that outcomes could be variable. For example, Little, et al, (1987), (cited in Brayne and Calloway), used three different scales on elderly people living at home, and found that different scales identified different individuals, although there was overlap between scales.

Brayne and Calloway, in their own study, compared scales and clinical diagnoses for 365 women aged between 70 and 79. The scales used were CAMDEX, and the information/orientation sub-scale of the Clifton Assessment Procedures for the Elderly (described in more detail below, see Assessments used in this thesis). Also, a random 10% of the subjects were given the Geriatric Mental State Examination, in addition to the CAMDEX. It was found that the rating for dementia given by the subjects' General Practitioners *did not always agree with the CAMDEX*, for instance, the General Practitioners diagnosed 6.7% of the subjects as mildly demented in the 70-74 age range, while the CAMDEX results showed 4.3% to be demented.

Comparable to the CAMDEX is the Geriatric Mental State Examination (GMS), (Copeland, et al, 1976), and the Comprehensive Assessment and Referral Examination (CARE, Gurland, et al, 1977).

### Reliability.

Claus, et al, (1991), investigated the issue of test-retest reliability in their study of clinical trials in dementia. They administered a neuropsychological test battery, comprising a number of sub-tests, for example a paired associate learning test

(Weschler and Stone, 1945), and a matching to sample test (Larrabee and Crook, 1991), to Alzheimer patients and a control group. They found no stable pattern of improvement between test and re-test, in the patient group as a whole, though a small learning effect was shown in the early stages of the disease. As the authors state, these small learning effects may affect the accuracy of measurement in such areas as drug trials, where they are used extensively.

Other factors may affect the accuracy of test results; colour confusion, for example, may affect the accuracy of Stroop test scores. Fisher, et al, (1990), examined experimentally the claims that due to its ability to measure cognitive processes, the Stroop test is a good instrument with which to diagnose dementia. Although the results from a number of studies cited by Fisher indicate that the Stroop test does measure cognitive processes and the interference effect becomes stronger with age, their own study found that, unlike any of the control subjects, eight of twenty two demented patients showed confusion between the colours blue and green. This factor made interpretation of the Stroop test results unreliable, and the authors suggest that the Stroop should be used with caution in dementia patient populations.

### Different patterns of impairment

A study conducted in Rome (Gainotti, et al, 1980), investigated different patterns of neuropsychological impairment in various types of dementia. The authors of this study hoped to differentiate depressive pseudo-dementia from proper dementia,



and to distinguish the different diagnostic groups of dementia, using a specially designed instrument, the Mental Deterioration Battery. The study intended to assess whether the battery would identify different patterns of impairment based on different aetiologies. The Mental Deterioration Battery is composed of three verbal and three visuo-spatial tasks, which give six scores of different cognitive functions. The battery has been effective in distinguishing normal from demented persons, but in this study they wanted to discover whether it was effective in differentiating different types of dementia, for example Alzheimer type. Independent diagnosis of different type of dementia was made by looking at medical and neurologic data, EEG results, neuro-radiologic and CT scans, and radioactive isotope scans (see below for details of the latter three procedures). The results did show that the battery *was* able to distinguish between different types of dementia, correlating well with the independent measures described above.

### Quick and simple or long and comprehensive?

The trouble with lengthy assessments is that often elderly persons, particularly if they are dementing, have a very short concentration span and cannot or will not co-operate with lengthy assessment procedures. Indeed, the present author was repeatedly reminded of this throughout the experimental assessments reported in this thesis. There are also a number of shorter assessments such as the Mini Mental State Exam (Folstein, et al, 1975), but despite their usefulness as assessment devices, of

level of functioning, they are not very good on their own as diagnostic tools for dementia.

### Assessments used in this thesis.

The three clinical assessment procedures used in the present study will now be described. All three were included in the study on the recommendation of clinical staff liaising with the study and involved in the patients' care. The tests used were: the Cognitive Assessment Scale (CAS), of the Clifton Assessment Procedures for the Elderly (CAPE, Pattie and Gilleard, 1979); the Mini Mental State Exam (see above); and the Graded Naming Test (GNT, McKenna and Warrington, 1983). A brief description and critical evaluation of these tests follows.

### The CAS scale of the CAPE.

The advantages of the CAS scale of the CAPE are that it gives a lot of information about the patient's cognitive abilities and mental state, it is easy and relatively quick to administer, can be administered by unqualified personnel, and, if administered properly, is not stressful to the patient. It consists of three sections, testing current information or knowledge, (for example the patient's name, and the name of the current Prime Minister), and orientation, mental ability, and psycho-motor ability. One of the most common features of mental impairment in the elderly is the inability to understand information about the current environment (Pattie and Gilleard, 1979), and this leads to disorientation in place and/or time. Often the patient will not be



aware what day or month it is, and will state that their current place of residence is somewhere they lived in their earlier life. Sometimes married women will refer to themselves by their maiden name and apparently forget that they have taken their husband's name for at least the past 20 years.

Performance on the mental ability sub-test of the CAS reflects skills which should have been well established before any deterioration in mental abilities occurred. The skills involved are reading, counting, saying the alphabet, and writing. Lastly, the Gibson Spiral Maze provides a measure of psycho-motor ability. The CAPE has also been validated by its authors who administered it to a sample of 38 patients over 65 years of age admitted to an acute psychiatric ward, and 38 patients admitted to a Social Services Home for the Elderly.

### The MMSE.

The MMSE has the advantages of the CAS and has some elements in common with it. The reliability and validity of the MMSE has been established by giving it to 206 patients with dementia syndromes, affective disorders, mania, schizophrenia, personality disorders, and to 63 normal subjects, and it is widely used. The MMSE is, like the CAS (above), divided into a number of sub-sections. The first tests whether the patient is oriented in space and time by asking for full details of the current date and place of residence. Next the examiner asks the patient whether he or she may test his or her memory. The names of three unrelated items are then presented to the patient, clearly and slowly, and then the patient is asked to repeat them. This first repetition

determines a short term recall score and then the patient has to repeat them again at least three times, until the patient reports that he or she has learnt them. A test of attention and calculation is then administered. The patient is asked to begin with the number 100, and count backwards in sevens. If the patient cannot or will not co-operate with this test, the alternative test of spelling the word "world", backwards, is administered. Next, the patient is asked to recall the three words previously learnt. Then a wrist watch and then a pencil are shown to the patient and the patient is asked to name them. Following that, the sentence "no ifs, ands, or buts", is uttered slowly and clearly by the tester, and the patient is asked to repeat it. Then the patient is given a blank piece of paper and the following instruction: "Take the piece of paper in your right hand, fold it in half, and put it on the floor." In the next part of the test the patient is given a piece of paper upon which the examiner has written in letters large enough for the patient to read, the instruction "close your eyes", and only if the instruction is followed is the patient awarded a point. Then the patient is given yet another piece of paper and asked to compose a sentence. In the present study the experimenter made this request in the following way: "Now I want you to write me a sentence. It can be about anything you like!" Next, the patient is given a sheet of paper on which are shown two intersecting pentagons, and asked to copy them. All angles must be represented in the copy, although slight errors are not taken into account. Lastly, the patient's level of consciousness is estimated, for example, whether he or she is alert or drowsy.



### The GNT.

The third clinical assessment used in this study was the Graded Naming Test (GNT). This test consists of 30 black and white line drawings, graded in order of difficulty. For example, the first line drawing represents a kangaroo, the second a scarecrow, the third a buoy, and so on until the last line drawing, of a retort, is a rather uncommon item. The test was developed in response to the frequent observation that a dementing individual who has an extensive vocabulary before the development of any mental impairment, will not be 'spotted' if tests which rely on very common objects (to ensure a familiar vocabulary for all subjects), are used. McKenna and Warrington claim that it is well established that patients experiencing naming difficulties find that less frequent items are more likely to elicit these difficulties. However, a patient's pre-morbid naming vocabulary is not usually available to the clinician assessing the patient. Inability to name the more difficult items in the test will therefore not be a good indicator of dementia. Observation of scores from two normal samples may illustrate this issue. In McKenna and Warrington's normal group, 8% of normals made only three errors. However it is likely that this group was of a relatively high standard, as another sample of normals tested by Baxter (cited in McKenna and Warrington, 1983), showed lower scores. In contrast to McKenna and Warrington's group, 20% of whom were able to correctly identify the most difficult item (a retort), only 4% of Baxter's group were able to.

As with all these tests, the tester should firstly make the patient comfortable and establish rapport with him or her, should

avoid persisting with the presentation of items that the patient finds difficult. When tests are administered this way, most patients should co-operate and do not become distressed.

Tests such as these may have an added disadvantage that repeated administration may encourage practice or learning effects, and thus give a distorted picture, though this is possibly true of all tests of this nature. Practice effects are so common in experimental research that most designs include measures to guard against them (Plutchick, 1983).

### Non-psychological techniques.

Diagnosis of dementia is made using a number of different techniques, psychometric assessment playing, of course, a part. This review is intended mainly to cover the psychological aspect of dementia, but in diagnosis of different kinds of dementia, a number of procedures are of interest as well as the psychological. Medical and radiological procedures are routinely used, and can aid in the diagnosis.

These other techniques include electro-encephalograph (E.E.G.), a technique which gives a record of the brain's electrical potential, and computerised axial tomography (C.T.) scan, which is a non-invasive technique for examining soft tissue, based on a kind of X ray. A little more detail of the use of these two procedures may be helpful. Evans, (1985), assessed the value of the resting E.E.G. in the diagnosis of Alzheimer type dementia and M.I.D. She tested a group of elderly demented patients who had scored at opposite ends of the Hachinski Scale (see Table 2.2). Both groups provided abnormal readings, and the two groups differed



from each other in their E.E.G. patterns. Lishman, (1987), also cites the use of the E.E.G. in aiding the diagnosis of dementia. Use of the C.T. scan may also be helpful. C.T. can show whether cortical atrophy or enlarged ventricles are present. Both features are common in old age and also in dementia, so their presence should not be taken as indicative of dementia, but can lend *support* to such a diagnosis. Other abnormalities such as the presence of lesions, however, may indicate M.I.D. The site of cortical atrophy may indicate whether the dementia is due to Alzheimer type dementia, or another type of dementia such as Pick's disease, where there is particular atrophy of the frontal lobes of the brain.

Of additional interest is a new scanner at the brain metabolism unit in Edinburgh. Professor G. Fink, who is responsible for research with the scanner, claims that it can determine which parts of the brain are operating incorrectly in conditions such as Alzheimer's Disease. The single photon emission tomography (SPET) scanner works by identifying areas of low blood uptake in the brain after the patient has been injected in the arm with radioactive iodine. A picture can be built up of the areas of the brain that are functioning, and those that are not, and this can help in diagnosis (McKie, 1990).

A full description of assessment procedures for the patient with dementia can be found in Mahendra, (1984), and Fraser, (1987).

### Recognised Causes of Dementia: The Sub-types

In order to clarify the issues of diagnosis further, Table 2.1 (Gilhooly, et al, 1986), shows the disorders of the elderly which

may cause dementia-like symptoms, and their causes, where known.

Table 2.1

<u>Subtype.....</u>	<u>Cause</u>
Alzheimer's Disease.....	unknown
Pick's Disease.....	genetic
Huntingdon's Chorea.....	genetic
Creutzfeld-Jacob-Disease.....	viral
Neurosypilis.....	infection
Normal Pressure Hydrocephalus.....	intra-cranial mass
Multi-Infarct Dementia.....	vascular
Depression.....	functional
Subdural Hematoma.....	intra-cranial mass
Vitamin B12 Deficiency.....	dietary
Hyper/hypothyroidism.....	metabolic/endocrine
Alcoholic Dementia/Korsakoff's Syndrome.....	toxicity
Parkinson's Disease.....	not known

Added to this list should be A.I.D.S.-related dementia (Gelder, Gath and Mayou, 1989), and other dementias which can occur as a result of systemic disorders.

The present study includes patients suffering from some of the above conditions, and in the cases in which their diagnosis has been made, by a clinician liasing with the study, this will be pointed out.

## Alzheimer Type Dementia

Alzheimer's Disease (generally referred to as Alzheimer Type Dementia) is also known as pre-senile dementia and it can occur at a much earlier age, than 65, from the age of 40, and (rarely), in even younger persons (Lishman, 1987).

The most widely accepted definition of dementia of the Alzheimer's Type is that provided by the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorder (3rd Edition) (DSM 111). The definition is as follows (cited in Melzer et al, 1992). The condition has insidious onset with a generally deteriorating course, there is demonstrable evidence of impairment in long and short term memory, and at least one of the following: impairment in abstract thinking, impairment in judgement, other disturbances of higher cortical function, for example aphasia (that is, loss of language abilities) or agnosia (that is, loss of recognition abilities), and personality change. Also, these symptoms must be serious enough to interfere with the patient's usual activities or relationships. The symptoms do not occur exclusively in the course of delirium. Also, there must be evidence from the patient's history, physical examination, or laboratory results (such as computerised tomography (CT) scan), of specific organic factors judged to be related to the disturbance. *Alternatively*, the absence of any non- organic mental disorder is a relevant criterion in the diagnosis of AD.

There is also some disagreement as to whether the disease described by Alzheimer was intended to describe a distinct and already existing disease, or a new one. Berrios, (1990), suggests that Alzheimer did not intend to describe a new disease, and that



it was publicised as such by Kraepelin, in 1907, for other reasons. Alzheimer may well have intended to describe an unusual, early-onset case of what at the time was thought of as senile dementia. It seems likely (in the present author's opinion) that he did intend to describe a new category, because he described his patient's condition as "This distinctive process [which] separate[s] it from the known neurologic disorders.....this represents a unique entity." (Alzheimer, 1907).

### Possible causes of Alzheimer Type Dementia.

#### The role of amyloid proteins.

A number of researchers (Beyreuther, et al, 1988), have emphasised the role that the formation and deposition of abnormal proteins, namely, A4 amyloid, plays in the development of dementia of the Alzheimer Type. Amyloid protein is thought to disrupt the function of affected synapses and brain cells. The amyloid protein has been found to be involved in the formation of the plaques and tangles, which are characteristic of Alzheimer's Disease. Amyloid is formed by the accumulation of "B" protein, from the breakdown of larger molecules. It is an unusual protein, and seems to be linked to the degeneration which occurs in AD. The areas where amyloid accumulates in the cerebral cortex, are the areas associated with changes in nerve endings which also get the neurofibrillary tangle protein. This may indicate that in Alzheimer's Disease alone, and only in the cerebral cortex, is amyloid associated with damage to nerve endings. In certain other illnesses, and in other parts of the brain, amyloid is deposited, but

isn't associated with damage to nerve endings of this type (Mann, 1991). It is possible, however, that amyloid deposits are an age-related phenomenon, occurring in normal elderly brains as well as demented ones, (in the same way that aluminium does (see below)).

Bowen, et al, (1988), have pointed out that amyloid deposits do occur in the brains of non-demented elderly subjects, but they do not involve neurites. But in AD the amyloid is disruptive. Beyreuther believes that the protein is similar in action to a cancer, and can be expected to spread. At present it is not known why the amyloid protein occurs, but some evidence suggests that there is a genetic factor involved.

The gene which controls the synthesis of the amyloid protein is found on chromosome 21, which when present in triplicate causes Down's Syndrome. Persons with Down's Syndrome develop AD pathology almost as a matter of course, and this seems to be related to the over-expression of the amyloid precursor gene. Bowen, et al, conclude that over-expression of the amyloid gene may be the key event leading to AD pathology. This may be due to a variety of causes; in Down's syndrome it is due to triplication of the gene, but in AD, it could be the presence of stressors. In familial AD (a type of AD which is characterised by early onset, and which generally occurs in persons with a relative who had AD), it may be due to "a defect in regulatory mechanisms" (Bowen, et al, 1988).

Further findings discussed by Rossor, (1993), suggest that the genetic mistake which leads to over-expression of the amyloid gene is extremely rare. However, another area of genes has been identified, on chromosome 14, which appears to explain a large

number of familial cases. This area is also involved in the production of amyloid, or a factor very like it.

Additional research on the role of amyloid in the development of AD has been conducted by Roberts, et al, (1993). They suggested that the amyloid production may be linked to, and possibly prompted by, compensatory re-sprouting and synaptogenesis of the neurones of the failing Alzheimer's Disease brain.

### The role of Aluminium.

There is scepticism about the much publicised role aluminium may have in causing Alzheimer Type dementia, because it can be seen at high levels in the *normal* elderly brain. The interested reader who wishes to know more about the possible role of aluminium in Alzheimer's Disease is referred to Edwardson, (1989).

### Diagnostic measures in Alzheimer Type Dementia

Diagnosis of Alzheimer's Disease as distinct from other forms of dementia can be extremely inaccurate before post-mortem, according to Lishman (1987), who states that often "the precise (diagnosis) is revealed only by careful post-mortem examination of the brain and even then a measure of uncertainty can remain in some cases. Accordingly, Kasper notes that there is little agreement among workers in the field regarding the prevalence of Alzheimer's Disease; Folstein, et al, (1985), claim that AD accounts for only one third of cases of dementia, while Katzman, (1986),



argues that it accounts for two thirds of dementia cases. According to McKhann, et al, (1984), twenty per cent or more of cases with the clinical diagnosis of Alzheimer's Disease are found at autopsy to have other conditions which preclude the diagnosis of Alzheimer's Disease. The criteria for Alzheimer's Disease are exclusive: there must be an insidious onset and progression; and there must be no other brain or systemic diseases present, including multi-infarct dementia. Although DSM 111 and the Hachinski Scale are the most commonly used criteria for the differential diagnosis of dementia, Burns, (1991), claims that their sole use leads to poorer accuracy rates than the use of the criteria set out by McKhann and colleagues. These criteria divide diagnosis into probable, possible and definite cases of Alzheimer's Disease (see Burns, for further details). A comprehensive review of the different criteria for diagnosis of Alzheimer's Disease can be found in Boller and Saxton, (1990).

#### Drug treatments for Alzheimer Type Dementia.

A number of researchers have attempted to provide help for dementia sufferers through the use of drug treatments. Drugs which attempt to treat the condition itself do this by stimulating the acetylcholine pathways in the brain (Leonard, 1990). It is likely that a 'cure' will not be found for some time yet, although trials of the drug Anticholinesterase Tetrahydroamineacradine (THA), by Summers, et al, (1987), have shown some beneficial effects. However, not all patients have shown any improvement on the THA trials, and development of the drug is still at an extremely early stage. Perhaps the most interesting approach in

the treatment of dementia is one which combines pharmaceutical and behaviourally-based therapies. Cherkin and Flood, (1983), develop this idea further. They comment that attempts to treat senile dementia in the past have focused on the Parkinson's Disease model, where treatment with L-Dopa has led to some successes. This treatment is based on the assumption that Parkinson's Disease has a unitary cause, and therefore a unitary treatment will be effective. However, with senile dementia, it is likely, or at least possible, that any one case has a number of contributory factors or causes, and thus a multi-modal approach may be most beneficial. The authors suggest combining drug treatments "with psychological and other non-drug treatments", for example cognitive skill training, exercise, sensory stimulation, and socialisation.

Cherkin and Flood gave memory-enhancing cholinergic drugs to mice and found that their memory for a maze-running task was improved. However, the evidence that this effect can also be observed in humans is weak (see Summers, above, and Davies, below). Davies, et al, (1990), also investigated the effects of the cholinergic drug Tetrahydroaminoacridine (THA), on demented patients. The drug was administered in a two-month, double-blind, placebo-controlled crossover trial, and then eight of the ten patients continued to take the THA for a further three months. The drug initially did have limited success, the patients as a group during the trial period showed improvement on one of the tests of memory, one patient showed improvement throughout the period of study, and six showed *some* improvement. Such improvement was illustrated, for example, by the comments of the husband of one patient that she was " 'much improved', able to take telephone



messages and to have recovered some memory functions." However, the eight patients who received a further three months of THA showed a significant deterioration on two test scores, and during the two month trial period, six of the ten patients developed abnormal liver function tests, and nausea was a frequent side-effect. Therefore, it can be concluded that at the moment, THA treatment does not have any long-term benefits and certainly should not be regarded as a 'cure' for dementia. It may be that more work needs to be done on finding an effective dose of a cholinergic drug, as Davies, et al, found that very small doses were effective, as they pointed out that in the case of memory-enhancing drugs "low doses enhance, high doses impair".

Drugs are more generally prescribed to ameliorate dementia *symptoms* such as anxiety, restlessness and behavioural disturbance. Because of the lack of real success in this area, a psychological approach, whilst not providing a 'cure' as such, may ameliorate some of the difficulties faced by the demented elderly and their carers.

### Multi-Infarct Dementia

Assessment of the probable presence of multi-infarct dementia (M.I.D.) can be made with the Hachinski Scale (Hachinski, 1974), which indicates the likelihood that a person has cerebro-vascular disease. The items in the Hachinski scale are described below, and the presence of any item carries a score of either 1 or 2. If the patient scores higher than 7, the likelihood that they are suffering from M.I.D. is high.



The Hachinski scale provides a good summary of the distinguishing features of M.I.D.

Table 2.2. Hachinski score for the diagnosis of M.I.D. (cited in Jacques, 1988)

<u>Factor</u>	<u>Score</u>
Abrupt onset	2
Step-wise deterioration	1
Fluctuating course	2
Nocturnal confusion	1
Relative preservation of personality	1
Depression	1
Somatic complaints	1
Emotional lability	1
History of hypertension	1
History of stroke	2
Evidence of arteriosclerosis elsewhere	1
Focal neurological signs	2
Focal neurological symptoms	2
<u>Total score possible</u>	<u>18</u>

Factors related to dementia: Differentiating between AD and MID

A number of researchers have investigated various factors which have been linked to different types of dementia, in particular those factors which enable clinicians to distinguish between Alzheimer's Disease (AD) and M.I.D. Fischer, et al, (1990), point out that there is no standard assessment which reliably distinguishes between these, the most common two types of dementia. They conducted a study which was intended to

evaluate the importance of patient characteristics which are seen through the progression of the two dementias, in the differential diagnosis of AD and MID. Their findings were that a step-wise progression helped to exclude AD, but MID could not be excluded through a history of gradual onset and decline. As they were only able to confirm 21 of their 57 cases through post-mortem examination, these results do not seem widely conclusive of the importance of such course characteristics in differential diagnosis.

One study conducted by Kontiola, et al, (1990), found differences in the pattern of language impairment in AD and MID, and this is discussed in more detail in Chapter 3, Previous Findings.

### Less common types of dementia

These have been introduced above in Table 2.1.

Pick's Disease is similar to Alzheimer's Disease, although its prevalence is only about one hundredth of that of AD, and can occur in middle age, affecting the personality early in the disease.

Jacob-Creutzfeldt Disease is related to scrapie in sheep and is transmissible. The viral agent may be located in the brain, at biopsy or post-mortem. It has been transmitted through surgical procedures, for example corneal transplants.

Huntingdon's Chorea is also known as Huntingdon's Disease and is inherited, via a dominant gene. Onset is usually around the age of 30 to 40, although cases have been recorded in childhood.

Syphilis used to be responsible for a very large proportion of dementia cases, with its effects on the nervous system, although with health education and treatment with penicillin, it is now a

much more rare cause of dementia. The present author only encountered a single Neurosyphilis patient during the conduct of this thesis.

Dementia due to AIDS is likely to become more common in the future, unless a cure for the disease is found. At the moment, however, there is little published research on the dementia aspect of AIDS.

The interested reader who wishes to learn more about the different types of dementia is referred to Fraser, (1987), Lishman, (1987), and Mahendra, (1984), which are more comprehensive works on the matter.

### What Differences in Elderly People's Behaviour Could Affect Test Outcomes?

#### General Considerations

Senile dementia, by definition occurs within a specified age group, those over sixty-five years of age. The same symptoms occurring in younger people are given the diagnosis pre-senile dementia. Therefore any statements made about the population of people suffering from senile dementia will also be statements about elderly people, so the population in question will differ from "normal healthy adults" on two variables. Elderly people exhibit a number of differences to younger people. They are wary of participation in experimental research and so samples are often taken from 'captive' institutionalised groups who may not be representative of the elderly population as a whole.

Experimental findings quoting differences between elderly



and younger people when the only experimental variable is age, must be looked at with suspicion, as elderly people differ from younger people on a number of other variables, such as educational level, cultural bias, and linguistic sophistication. Level of physical health may also affect experimental outcome (Hussain, 1981).

### What behavioural differences exist?

Hussain cites some differences between elderly people and younger people, which have been reliably found in experimental studies: decreased sensitivity to speech discrimination (Corso, 1977); a number of studies found decreased sensory capacity; and difficulties were found in ignoring irrelevant information in visual search tasks (Rabbitt, 1968). However, whenever time is taken to increase the elderly person's familiarity with the equipment or the task requirements, and whenever 'motivation' to respond accurately is increased, elderly subjects perform more like younger subjects (Hussain, 1981).

Age related changes and differences are also found in studies of rote learning, memory for newly learned verbal material, and memory for incidental material, and whenever the task involves a split of attention, elderly subjects generally perform worse than do younger subjects. Contrary to popular belief that the old person remembers his or her young days with clarity, Bahrick, et al, (1975), found that older people showed a deficit in recall for temporally remote events. Elderly people also tend to have lower scores on I.Q. tests, but Spencer and Dorr, (1975), showed that while verbal abilities are approximately the

same in different age groups, on sub-tests designed to measure psycho-motor speed, spatial integration, and perceptual-manipulative skills, elderly people do perform worse. This is likely to be due to deficits in fine motor control, reaction time skills and time perception, rather than deficits in overall intellectual functioning. Typically used I.Q. tests are not therefore very good measures of intellectual ability in elderly persons.

Botwinik, (1967), has suggested that the caution which has been generally observed when elderly people complete cognitive tests is a reasonable adaptive strategy, based on the individual's awareness that his or her senses, perceptions, memory, and manual dexterity are not as accurate as they once were.

Gilbert and Levee, (1971), point out that most researchers have assumed that intellectual ability declines with age. They comment that most tests have used verbal memory or vocabulary scores as their measure, but that these may be inadequate because, as the authors point out, "memory is not a unitary function". Gilbert and Levee administered tests which were intended to investigate the following 'cognitive skills': immediate recall of meaningful verbal material; delayed recall or retention of meaningful verbal material; immediate recall of newly formed associations; and delayed recall or retention of newly formed associations. The age range of the subjects was between thirty-five and seventy-five years, and young scores were obtained from a group of subjects whose ages ranged from twenty to thirty-four years. They found that immediate recall of meaningful material as assessed by recall of a passage of prose, declined from the age group thirty-five onwards, but there was little difference between the scores of those in the fifty to sixty years age groups, indicating



that the decline in memory capacity had slowed down. Also impaired was performance on recall of paired associates, and memory for designs. Recall of digits did not show an age related decline except in the oldest age groups, from the fifties onward. There was an age related decline in the delayed recall of paired associates. The authors comment that their results show that the general assumption to which they refer earlier in their study, that with increasing age there is a decline in cognitive functioning, is meaningless unless it is specified exactly which cognitive skills are being referred to.

Poon and Fozard, (1980), gave a recognition memory test to fifty-seven males of three different age groups, the mean ages of these groups were 20, 52, and 63 years. The task was to judge from a long list of words, whether the word was presented for the first or second time in the sequence. There was no difference between the scores when the number of words between different presentations did not exceed the immediate or short term memory span.

Rybash, Hoyer and Roodin, (1986), have suggested, however, that in specific domains which are relevant to the individual there may *not* be any age related decline.

### What psychophysiological differences exist?

Physical changes also affect the elderly person's capacities. Various illnesses become more common, as do changes in the sympathetic and parasympathetic nervous systems (parts of the autonomic nervous system (ANS) which plays a part in neurotransmission and response to release of some hormonal



transmitters). These changes, plus decrements in the quality of function in the hypothalamus, may adversely affect performance. Other changes also occur in the normal elderly person's central nervous system (CNS). The changes typical of senile dementia of the Alzheimer's type also occur in the 'normal' brain: senile plaques form in the hippocampus (which plays a large part in memory), and in the frontal cortex. Neurofibrillary tangles occur, and neurones degenerate. The 'age pigment' *lipofuscin* begins to appear in the brain. All these changes (for more detail see Miller, 1977, for example), plus a number of additional CNS changes (which cause the brain to weigh 8% less at age 75 than at age 30), can result in changes in the nature of emotional and behavioural response and the ability to respond adequately to change (Hussain, 1981).

There is some debate in the psychological literature as to whether the changes seen in dementia are an exaggeration of normal ageing, or a distinct disease process. Cherkin and Flood, (1983), point out that the correlation of age-related changes in the brain with senile dementia is well established (for example by Ammaducci, et al, 1980), but Cherkin and Flood do not accept that a causal connection has yet been established. They list the major neuropathological changes which occur in Alzheimer's Disease as follows: the increased presence of neurofibrillary tangles; senile plaques; and granulovacuolar bodies. A number of changes occur in the 'normal' ageing brain as well, however, and these changes include enlarged ventricles, regional loss of neurons, dendrites and dendritic spines, increased lipofuscin, loss of cerebral extracellular space, and altered ratios of grey to white matter. Other changes occur in the normal elderly brain at the level of

neurotransmitters and so on. There is a decreased amount of acetyltransferase, acetylcholinesterase, and other disturbances or changes in neurotransmitters. So far no one has isolated one of these changes which is specifically related in a causal fashion to the memory and behavioural disorders seen in dementia.

### Can such changes cause dementia by themselves?

The debate as to whether documented brain changes can be causally linked to dementia has been mentioned by Shepherd, et al, (1990), in their study of measures of ageing in demented and non-demented elderly people. These authors hypothesise that if dementia is a distinct disease, patients who have it will show changes related to the disease which are *not in proportion* to other measures of ageing related to their age.

These other measures of physiological ageing (developed by Comfort, 1969), were skin thickness, blood pressure, and hair greying, and were administered to a group 14 elderly patients suffering from dementia, 24 functionally ill non-demented elderly patients, and 15 functionally ill younger patients. The study found no significant differences in measures of ageing between the two elderly groups. This suggests that *if* dementia is a phenomenon of normal ageing, then it can occur without evidence of exaggerated ageing in other tissues.

### To summarise:

In conclusion, then, it seems that the subject matter of research into dementia is wide, from the development of paper

and pencil psychometric tests to studies of genetics. Causes of dementia are for the most part not well established, nor are effective treatments or therapies. Although clinicians are agreed on what factors must be present for the diagnosis of a particular type of dementia, in practice terms, these diagnoses are often not made, because often individual patients do not receive appropriate assessments and investigations. The issues raised in this chapter may begin to explain some of the reasons why such diagnoses are not always made.

Obviously it is important that research into dementia is given a high priority. An understanding of the different factors present in dementia as a generic syndrome, and in different subtypes, may help us come to a better treatment of the issue, and of patients themselves. Language disturbances have been reliably shown to be among these factors. The following Chapter (Chapter 3), reviews the research which has been conducted into the language deficits of the demented elderly.



## CHAPTER 3

### LANGUAGE AND MEMORY IN DEMENTIA PATIENTS

#### General Considerations

The areas of language and memory are so related that it is difficult to assess one without involving the other. It is difficult to conceive of a human behaviour which involves memory but is independent of language or thought (see Vygotsky, 1978). Many tasks involve a combination of memory and language as traditionally conceived, because both are necessary for the subject to respond appropriately to task instructions, and subsequently complete the task. For clarity of presentation, this review of the area divides the research into two sections, 'language,' and 'memory.' It must be noted, however, that many tasks which set out to investigate language in dementia, also test subjects' memory, and vice versa.

#### Language and Dementia

##### Early research: Alzheimer

The first researcher to document the deficits of the demented elderly was Alzheimer in 1907. He described the language disorders of his original subject thus: "When shown objects she could name them relatively correctly. However, her perceptions were extremely disturbed. Immediately after naming the objects she would forget them. She made paraphrasic errors

[for example] (milk pourer instead of cup). She did not understand some questions put to her" (Alzheimer, 1907).

### The need for a unifying theory, and later research

Later workers have elaborated on Alzheimer's description. In a recent review of the literature on language and dementia, Miller, (1989), comments that language impairments have long been regarded as a factor in dementia, although some workers have regarded them as a manifestation of aphasia. In terms of a linguistic analysis, the semantic and lexical aspects of language appear to be more vulnerable than the phonological and syntactic. Miller's review covers a number of different aspects of language: naming; speech comprehension; word association; perseveration; and spontaneous speech. He points out that the study of language in dementia until recently has been rather a-theoretical, with a concentration on simple experimental paradigms, and if work is to become more complex, a theoretical background will become necessary. In this Chapter, a review of a representative sample of research that has been conducted in the area of language and memory, with dementia patients, will be conducted.

It seems quite clear that language impairment is indeed a primary feature of dementia. Overman, (1979), Bayles and Boone, (1982), Bayles and Tomoeda, (1983), and Horner and Heyman, (1982), also presented results supporting the finding that language deterioration progresses with the course of dementia, although Bayles and Boone, (1982), only found this with more severely demented subjects. Appell, et al, (1982), found that out of a hospital sample of twenty five patients with a diagnosis of

senile dementia, patients "differed from normals on all language variables and all were aphasic to some degree." The relationship between dementia and aphasia will be considered below.

Emery, (1986), found that linguistic errors are among the first to appear in the progressive deterioration of higher order cortical processes, and that a deterioration in language is an integral part of the dementing syndrome. She also put forward the hypothesis that in the diffuse degeneration of Alzheimer's Disease, language skills deteriorate in the reverse order to their acquisition during normal language development. This hypothesis is considered further in the General Discussion.

### What language functions are affected? The evidence

#### A Naming Deficit.

Kirshner, et al, (1984), found that naming impairment was present in all twelve of their subjects, suggesting that this was "an early manifestation of dementia that progresses with overall language deterioration". Subjects were better at naming objects than photographs, and performed worst on naming line drawings and partially obscured line drawings.

More investigations into the naming difficulty of dementia patients were conducted by Skelton-Robinson and Jones, (1984), who presented stimuli to be named, "some as objects, some as pictures, some as actions" (p. 169). They found a direct relationship between the degree of senile dementia and the *severity* of naming difficulties. Another investigation of the naming disorder of dementia was carried out by Flicker, et al,



(1987). In this study the authors examined the remote memory and language function of young and elderly normals, and of mild to moderate and severe dementia patients. They found that on all the language tests examined, the elderly normals exhibited a slight, non-significant deficit relative to the young control group, and the group with advanced dementia were very impaired on all the tests. The mildly demented group were impaired on tests of object naming.

Many workers have suggested that the naming deficit seen in dementia may be due to a disorder of '*visual recognition*'. Rochford, (1971), found that subjects could name parts of the body better than they could name line drawings. Additional support for the hypothesis that the major deficit could be one of '*visual recognition*' was provided by Barker and Lawson, (1968). They found that if the experimenter demonstrated the use of an object, it was more easily named. Unfortunately the authors of these two studies do not explain what they mean by '*recognition*', and unless they do so the argument becomes circular.

More research on naming in dementia was conducted by Overman, (1979), who found that his subjects were better at naming printed letters and numbers than pictures. Experiments 3 and 6 in this thesis, examine the issue of naming of printed words further.

### Compensatory strategies in naming.

Evidence of the use of compensatory strategies in naming behaviour comes from a case study by Schwartz, et al, (1979), whose patient was unable to name any of the presented objects,

except one, "cup", but was able to mime the use of others so accurately that "a naive observer was able to differentiate her "use" of the spoon as distinct from the fork" (Schwartz, et al, p.283).

### Responses to the experimenter's naming.

Knotek, et al, (1990), administered the Peabody Picture Vocabulary Test (Dunn, 1965), which is a test of vocabulary, and is often used with pre-literate children, to ten mildly and thirteen moderately demented patients, twice, with a seven day inter-test interval. The test involved the utterance by the experimenter of a stimulus word, the placement of 4 pictures in front of the subject, and the instruction "Point to the picture that best shows me the meaning of the word". This procedure may be compared to the mand compliance procedure used in the present thesis (see Chapter 5, for example). They found that moderately demented subjects responded inconsistently, significantly more often than normal controls, and mildly demented subjects showed a trend to giving more inconsistent responses than normal controls. Also, Tomoeda, et al, (1990), found that elderly controls and subjects with Alzheimer's Disease demonstrated that the greater the syntactic complexity of experimenter's instructions, the poorer was subjects' comprehension of task requirements, for example, they had more difficulty complying with the statement "touch the big green circle" than with the statement "touch the blue square".

Flicker, et al, (1987), found that dementia patients showed deficits on selecting [by pointing] the name of an object presented on screen, from a list of four words presented under the picture of the object, and they also had difficulty in recalling the object's function. A little more detail about the selection task is appropriate to this account. A computer screen presented the subject with a representation of a 25 room house, and in each of the rooms there were images of household items. On each trial, the name of one of the items was presented in text above the house, and the subject was instructed to point to that item. The deficit shown by this group was least on tests of selecting the picture of named object from among a selection of distractor pictures (a task similar to the mand compliance task used in the present study, see Chapter 5), recalling the function of an object, and on the vocabulary sub-test of the WAIS.

These results provide additional evidence that the language impairment in dementia is a major one.

The ability to make appropriate spoken responses to questions.

Lebrun, et al, (1987), found that two of a small sample of four persons with dementia were able to answer simple questions appropriately, but more complex questions either did not elicit a response, or elicited unintelligible responses and echolalia. One of the other subjects did not understand any of the simple verbal questions and instructions. The speech they did produce was composed largely of repetitions of mono- and bi-syllabic words. The last subject had no spontaneous speech at all. Lebrun



concludes, that these patient's speech features are characteristic of the verbal behaviour of patients with degenerative dementia, since they were not comparable to aphasic patients' speech, such as that of patients with Broca's, Conduction, or Transcortical motor aphasia, or amnesic aphasia.

### Production and comprehension.

Bayles, et al, (1987), found that in her subjects, speech *production* was generally not affected, the meaning of speech (comprehension) was lost, but syntax and phonology were preserved. These results are supported by findings of Whitaker, (1976), who reported a subject who, though in an advanced state of pre-senile dementia, was able to correct sentences containing errors of syntax and phonology presented by the examiner, but not errors of meaning.

### Performance on word association tasks.

Eustache, and colleagues, (1990), gave a free word association task to two groups of subjects, one English and one French speaking. They assessed level of dementia with the Mini-Mental State Exam, and found that level of dementia correlated with increased production of uncommon responses on the word association task. In other words, the responses were only slightly, or not at all, related to the stimulus words. The authors conclude that their results support their hypothesis that a breakdown in semantic memory is involved in Alzheimer's Disease. Their data may equally be taken as supporting the view

that semantic relations between words break down in Alzheimer's Disease. There is a possibility that breakdown in a hypothetical entity such as semantic memory may underlie, or "cause" the language breakdown, but suggesting that this is so does not actually bring us any nearer to understanding why the breakdown happens or what can be done about it in real practical terms. More studies which have investigated the possible role of "semantic memory" in the language disorders of dementia will be considered later in this Chapter.

#### Attending to the task.

Attentional factors have also been thought to be important in word learning tasks. Partridge, et al, (1990), used an orienting procedure to ensure that subjects "with a presumptive diagnosis of [dementia of the Alzheimer Type]" attended to the task. Subjects studied lists of words which were presented in the form of a series of cards. The orienting procedure involved subjects being required to provide a meaning for words which they were asked to remember (subjects unable to do this were excluded from the experiment). Partridge, et al, found that subjects were impaired on tests of free and cued recall, but performed normally on a word completion task, which involved the subject giving a complete word response to a 'word' which had the last letters missing, for example, giving the response "glass," to the stimulus "gla..".

### Speech fluency.

Speech fluency is the ability to "thread words smoothly and meaningfully into sentences...with appropriate melodic and rhythmic line, and with an unbroken flow of vocalization" (Loebel, et al, 1990, p. 42). This aspect of language was investigated by Loebel, et al, who found that speech fluency and self-awareness of memory problems did not decline simultaneously. Loebel, et al, made the clinical observation that some dementia patients are able to maintain language skills for much of the course of their illness, while others have language deterioration quite early on. Judgement of fluency was based on "overall impression of the patient's speech."

Fluency was also investigated by Hart, and her colleagues (1988), in a study in which they assessed the relative fluency with which patients with early dementia of the Alzheimer Type produced words belonging to specified semantic categories as opposed to categories specified by the first letter of a word. They found that the demented subjects were less fluent than the controls. There was however, a point of similarity in that both groups were better at producing words from defined semantic categories than words beginning with a defined first letter. The deficit which they had in producing words of the same first letter was not related to their intellectual ability. Hart, et al, also found no difference in fluency as assessed on the tasks between senile and pre-senile patients and concluded that assessing word fluency may be helpful in detecting early dementia.

Also, Flicker, et al, (1987), found major deficits on category instance fluency (production of the names of a number of items



which belong in the same category, such as fruit). Additional evidence for a deficit of fluency is provided by Bayles, et al, (1989). They asked demented subjects to generate as many exemplars as possible from three semantic categories (animals, fruits, vegetables), and three letter categories (words beginning with F, A, and S) and found that subjects found the two tasks equally difficult.

### Categorisation.

Demented subjects have been found to have difficulty putting objects into correct categories. Tissot, et al, (1967), found that a *specific* term such as "trumpet" might be substituted for a *general* category of musical instruments, and Schwartz, et al, (1979), found that a subject matched comparison stimuli of photographs of both dogs and cats to the printed word "cat", and both squirrels and rabbits were put in the same category as dogs. Further evidence for a disorder of categorisation comes from Bayles and Tomoeda, (1983), who found that with a twenty item naming test, more semantically related than visually similar errors occurred in demented patients.

### Use of Language Markers as an Aid to Diagnosis of Subtype of Dementia.

Hart, (1988), commented that the study of the involvement of language in the dementias of old age was once a victim of comparative neglect, but is now flourishing as an area of study, and the identification of language disorders in a person with

possible dementia may mean that clinicians can classify their disorder as cortical or sub-cortical, or early or late onset dementia, as well as being an aid to diagnosis of dementia in itself.

Hart also points out that because language is necessary for the comprehension of most other psychological tests, the involvement of language in the dementing disorder will mean that a person with dementia will show impairment on many tasks which do not overtly test language. For example, she also points out that dementia involves overall cognitive deterioration, and so any language task which requires that the subject *recognise* a stimulus, will be a test of possible perceptual or other cognitive ability, as well as any language skill explicitly tested.

In support of Hart's assertion, that language changes may aid in differential diagnosis, Schwartz and colleagues, (1979), have suggested that patients with dementia may differ in the distribution of degenerative changes which they exhibit, these changes, producing different behavioural effects, "may mimic the aphasic manifestations of focal pathology", and indicate that the degenerative changes are primarily in the speech and language area of the brain.

#### Differences in language impairment between Alzheimer Type Dementia and Multi- Infarct Dementia.

Few studies have examined the linguistic, cognitive and neuropsychological differences which may exist between different types of dementia, for example those differences which might exist between Alzheimer's Disease and Multi-Infarct Dementia. A recent study by Kontiola, et al (1990), however, did just that. They

assessed thirty-three patients with Alzheimer's Disease and fifty-two patients with Multi-Infarct Dementia, and eighty-six elderly community residents. Their assessment included the application of a number of neuropsychological tests, many of which were based on Luria's Neuropsychological Investigation, (Luria, 1973), including, for example, orientation, visuo-spatial functions, reading, and repetition, and they found a clear difference in the language abilities of their control group compared to the group who had mild dementia. As we might expect, they also found that the *degree* of dementia was related to the degree of impairment shown by the tests. Interestingly, they also found that the type of dementia also was related to performance on the tests. They found that Alzheimer's Disease was associated with a defect of understanding of grammatical structures, while Multi-Infarct Dementia was associated particularly with a deficit in word recognition (the authors do not define their use of this term, but usually it would involve presenting the subject with a list of words, and some time later, presenting a sample word and asking the subject whether he or she recognises it), naming, and repetition. The authors suggest that these results indicate that degenerative changes in the CNS (of patients with Alzheimer Type dementia), seem to particularly affect the complex forms of language without disturbance in the symbolic aspects of language, and that the disorders are mainly of receptive speech. They also claim that "the language disorders in MID appear at more elementary, symbolic structures of language". More studies need to be conducted to establish the reliability of these findings particularly where clear diagnoses of Alzheimer Type and Multi Infarct type Dementia are made at post-mortem.



Relationship of the Language Disorders of Dementia to Those of Aphasia.

In contrast to the findings of Lebrun, et al, (1987), cited above, Appell, et al, (1982), relate the presence of language disorders in twenty five patients with senile dementia of the Alzheimer Type (no patients with MID were reported) to the presence of Wernicke's, and Transcortical sensory aphasia. In Appell, et al's, sample, Broca's Conduction and Transcortical motor aphasia were uncommon. Their sample differed though from "simple" aphasia by the presence of a range of other deficits, for example, demented subjects performed worse than aphasia on tests of drawing, block design, and on constructional tasks such as bisecting a line. They found that naming ability was similar in aphasia and Alzheimer Type dementia. These authors also point out that patho-anatomical studies of Alzheimer's Disease have shown a characteristic loss of cellular connectivity in the tertiary association areas and in parts of the brain associated with memory (the hippocampus), and this may result in loss of semantic competence and a deterioration in other cognitive skills, but may leave language initiation, articulation, and phonemic competence relatively intact.

A number of workers have compared the different language skills of demented patients and stroke patients in order to make inferences about possible underlying cognitive deficits. Margolin, et al, (1990), contrasted the performance of 11 Alzheimer Type dementia patients and 8 anomic aphasic stroke patients with 32 normal elderly subjects on the Boston Naming Test and the Controlled Oral Word Association Test. These tests tax

different skills because the Boston Naming Test requires subjects to name line drawings of objects, and the Controlled Oral Word Association Test requires subjects to generate lists of words that begin with a specific letter of the alphabet. The authors found that the demented subjects and the stroke patients were significantly impaired on the Boston Naming Test, but the performance of the demented patients was significantly further from the performance of the normals than was the performance of the stroke patients. The reverse pattern was seen, however, when performance on the Controlled Oral Word Association Test was examined. The demented subjects performed significantly better than the stroke patients on this task. This seems to accord with previous findings that a number of linguistic 'sub-skills' are preserved until quite late in the dementing process, for example, those described above.

#### Dementia patients' performance on tests designed for non-humans

Various workers have used tests designed for animals lower down the phylogenetic scale, finding the simplicity of these tasks ideal for dementing humans who find many complicated test procedures difficult to grasp. Sidman, and his co-workers, have conducted a lot of research with brain-damaged and amnesic subjects to investigate certain issues pertaining to brain function.

Matching to sample procedures.

In one of Sidman's studies, (Mohr, Leicester, Stoddard, and Sidman, 1971), a matching to sample task was used to assess the learning capacities of a stroke patient. They found that he was able to learn on tasks which involved written words, but not on those which involved colour. The matching to sample procedure involved the use of a display panel containing 9 translucent windows, arranged in a 3 x 3 matrix. A sample stimulus was presented in the centre window of the matrix, and when the subject pressed this, 8 choice stimuli were presented in the outer windows of the matrix. On some occasions, the sample remained (simultaneous matching) and on others it was removed (delayed matching).

Squire, and colleagues, (1988), tested amnesic patients on delayed matching to sample, and object-reward association (in this procedure the subject was required to learn which of 2 items would have a penny hidden under it). Another test examined 8-pair concurrent discrimination learning task (in which there were 8 pairs of items, and in each pair one item consistently had a penny hidden under it). Patients were also tested on an object discrimination task, similar in procedure to previous tests used by these authors. Squire, and colleagues, found that performance of the amnesic patients correlated with the ability to verbalize the principle underlying the task, and was similar to that of monkeys with amnesic lesions.

Also, Kessler, et al, (1986), used a concurrent object discrimination task with Korsakoff's amnesics, alcoholics, abstinent alcoholics, and a control group. They found that the alcoholics and



the Korsakoff subjects were impaired but the control group and the abstinent alcoholics weren't. The authors comment that the task may be particularly sensitive to human amnesia because it does not rely on abstract, verbal or integrative functions, but may rely solely on the subject's ability to associate visual stimuli. This point is contentious, however, because other researchers (such as Dugdale and Lowe, 1990), have suggested that verbal skills (within the equivalence paradigm at least (see Chapter 4) such as labelling may be at work in the completion of such tasks by human subjects.

Irle, et al, (1987), also found that learning tasks designed for the monkey were sensitive to amnesic disorders in humans. They tested eight subjects with the likely diagnosis of senile or pre-senile dementia of the Alzheimer Type on a concurrent object discrimination task and a delayed non-match to sample task and found that they were severely impaired. They were also impaired on cognitive, mnemonic, perceptual and language tasks.

### In conclusion:

From the above summary of language impairment in dementia, we may conclude that a number of different aspects of language are affected in dementia, such as naming, categorisation, speech fluency, and the ability to respond appropriately to questions. There is some evidence that these aspects could be differentially affected in different types of dementia, and so tests of language function may help in diagnosis. Some of the suggestions as to why these language disturbances arise are that a

disturbance in recognition memory may be present, or a disorder of attention, or a disturbance in semantic memory.

### Memory in Dementia

A number of experimental studies have been carried out with dementing individuals which have not just examined language skills. Many of these have taken as their theoretical framework a cognitive, or a neuropsychological approach. Overall there has been a recent increase in the amount of researchers looking at Alzheimer's disease and other dementias from a 'cognitive' viewpoint. It is not necessarily the case that such studies do not also examine language, however. A selection of these studies will be critically examined here.

#### "Working Memory".

Baddeley, and his team, (1986), have approached the learning disorder of dementia from the point of view of a deficit in functioning of the 'Central Executive' component of 'working memory'. They administered a tracking task (which involved following a moving target on screen with a light-sensitive pen), with three concurrent tasks. These were: articulatory suppression, in which the subjects were required to count from 1-5 repeatedly; simple reaction time to a tone; and auditory digit span, in which subjects were required repeat increasingly long lists of spoken numbers). There were three groups of subjects, people with dementia of the Alzheimer Type, age matched controls, and young controls. They found that when digit span or concurrent reaction

time were combined with tracking, the demented group were markedly impaired. As the working memory hypothesis is that the Central Executive system is important for the performance of two cognitive tasks, this result supports the hypothesis that the Central Executive is impaired in dementia. It seems clear however, that the deficit shown by the demented group could be due to a number of other factors, and as they point out "A sceptic might, for example, suggest that anything that makes a task more difficult will differentially penalise DAT patients." Indeed, the three concurrent tasks may well have inhibited any covert or overt verbal strategies the subjects may have otherwise used in order to help them complete the task. Baddeley, et al, also comment that the working memory model is a useful way of conceptualising their results, but at the present time it doesn't give a better account of the learning disorder of dementia than other models. Baddeley and his colleagues conclude that the tasks used in their study may be helpful in the diagnosis of dementia, and hopefully, the assessments developed in this thesis may also be added to the growing body of experimentally developed tests which have been used to investigate dementia, which might also be useful in the clinical situation. It would be preferable that a conceptual unity could be achieved by researchers hoping to develop more tests, in order that more progress may be made in finding the underlying difficulties and behavioural deficits of dementia patients.



### Encoding Strategies.

Taylor and Gilleard, (1990), examined different memory strategies in Depression, Dementia of the Alzheimer Type, and Multi-Infarct Dementia, looking specifically at encoding strategies, and suggested that there may be a change in *level of processing* in dementia. They asked their subjects to complete a task in which they had to look at word lists, then do a multiple choice recognition test where the target word was mixed up with distractor words, these being related by meaning, sound, or not related at all. They found that the more demented AD subjects were more likely to respond with words which were not related than the less demented AD subjects, but there was no *significant* difference between the groups in terms of types of errors made. They also found that all subjects tended to make more semantic than acoustic errors, and pointed out that this accords with Corkin's (1982) suggestion that demented people may fail to use encoding strategies normally.

Another study which looked at different 'encoding strategies' was carried out by Herlitz, and colleagues, (1991). They examined "the ability of patients.....to utilise semantic category cues in order to improve memory performance.....under five different encoding conditions: (a) nouns; (b) objects; (c) objects with a semantic orienting question [such as, what do you usually do with a pistol?]; (d) objects with self-generated motoric acts [show me what one usually does with a pistol!]; (e) objects with experimenter-instructed motoric acts." Subjects were asked to remember the items for a later test. Herlitz, et al, found that the severely demented subjects were only able to use the helpful cues

for recall provided in the latter condition (e). This result was interpreted as supporting the hypothesis that the ability to use category cues following a motoric encoding is preserved later in AD than other forms of encoding. This kind of encoding, as in the previous study described, is a kind which is significantly less verbal, and therefore does not tax the subjects failing language skills so much. This point will be dealt with further below.

### Episodic and recognition memory.

Also looking at memory, Abbenhuis, et al, (1990), examined the performance of demented subjects on tasks designed to assess episodic and recognition memory. Subjects were presented with written words via a computer screen, and asked to read them aloud, and it was found that they were quicker at responding the second time around, a result which was also found for the elderly control group. This outcome was taken by the authors to indicate that a facilitation effect due to previous exposure was present. This task tested memory, but the subject was supposedly not 'aware' that memory was being tested. The subjects then were given an explicit memory task, in which they had to recognise the words by saying whether they had seen them before. In this task, there was a difference between the normal and demented group in recognition memory, but the subjects were once more, supposedly not 'aware' that memory was being tested. Like many of the other studies reported here, this seems open to interpretation along the lines of the 'aware-not aware' distinction. Of course, there may be another confounding variable in this study, that the demented subjects, aware that their memory was



being tested, performed badly due to anxiety effects. It is likely that subjects come to the experimental situation with a variety of hypotheses about what the experiment will involve. According to Wearden, (1988), "he or she faces a game-like social situation", and the experimenter and the procedure may confirm or disconfirm these hypotheses, but they are likely to exert an influence on performance.

### Alzheimer's Disease and Huntingdon's Disease: Differences on memory tasks

Could tasks aimed at examining memory abilities be useful in diagnosing different types of dementia? Butters, Heindel, and Salmon, (1990), have reported more research in this area. They reviewed a number of studies conducted by their team in which a variety of tasks had been administered to Alzheimer and Huntingdon's Disease subjects and controls. They found that the AD and the HD group differed from each other in their ability to do their tasks. The Alzheimer subjects were similar to the control group on a weight biasing task (which involved the subjects making judgements about the relative heaviness of weights), and a pursuit rotor task (which involved the subject tracking a disc on a turntable with a hand-held stylus). They differed markedly from the other two groups in their capacity to benefit from lexical and pictorial priming when given paired associate learning and stem completion tasks, and a task involving the identification of fragmented drawings of common objects. The Huntingdon's subjects, however, did benefit from the priming, but could not do



the pursuit rotor task and demonstrated little weight biasing. The authors suggest that the [well-documented] different kinds of effect of the two different diseases on the brain may account for the different deficits of their two groups of subjects.

### The contribution of work with amnesics

More work on priming has been reported by Davis, (1990), who examined preference based pseudo-word priming in dementia and amnesia, in an attempt to show that amnesics and patients with dementia of the Alzheimer type can learn given the right carefully selected conditions, or more specifically, they can show repetition priming effects for pseudo-words if they are given an appropriately sensitive task.

Shaw, et al, (1990), working with two groups of amnesic subjects and an alcoholic control group, on a cross-modal identification task, found that the two groups performed differently. The group whose amnesia was due to Korsakoff's syndrome did not differ from alcoholic controls in their ability to match the feel of an arc shape to the sight of the circle from which it was taken. The group whose amnesia was due to encephalitis were impaired on this task though. The latter group were similar to the Korsakoff's group in their inability to identify common objects by feel. All groups performed normally on a task in which they had to match the feel of the arc to the feel of the circle, or the sight of an arc to the sight of a circle. As the tasks use almost identical shapes, the authors thought that no verbal cues would be involved. This makes the task interesting, because learning tasks which minimally involve language in an

experimental setting are quite rare. Of course real-world tasks in which language may be minimally involved are quite common, riding a bicycle is a good example. If, as I suggest, the language impairment in dementia is to a large extent responsible for our subjects' difficulty in completing tasks which involve language, then giving them a task such as this, which does not overtly utilise verbal cues, may provide evidence in support of the hypothesis that language impairment is the primary deficit in dementia. However, the idea of tasks which do not involve language is contentious in itself, because even the skill of riding a bicycle may have been learned through the use of instructions to some extent, and performance may have been monitored verbally from time to time. This issue is considered in more depth in Chapter 4.

### Task instructions

Many of the tasks or tests described above would be complicated by the possibility that demented subjects might not understand the instructions, and that is why very simple experimental tasks are likely to give us clearer results, because they will provide results which are less contaminated by instructional effects.

Other researchers have commented on the difficulty of devising tests which are not confounded by dementing subjects' inability to understand the instructions about the task. Lafleche, et al, (1990), administered an item recognition task involving the recognition of letters, and found that non-demented Parkinson's Disease patients, mildly demented Alzheimer's Disease patients and normal controls did not differ significantly on the task. They

did find however (this finding was not statistically significant), that some of the Parkinson's Disease patients had slower scanning patterns. The Alzheimer's group didn't have such patterns, but they needed highly structured instructions to be able to complete the task, and some could not do it even with more structured instructions. The difficulty seemed to be that the AD subjects *could not understand what to do*.

### To conclude

To return to Miller's plea for a unifying theory to encompass research in this area, it is not clear whether the radical behaviourist analysis advocated primarily by Skinner will prove adequate as such a theory. It is clear from the above review that most of the work in this area has not been conducted in the behaviour analysis tradition.

Chapter 3 has made it clear that a progressive deterioration in the skills of expressive and receptive language (for example, in naming and making appropriate responses to the experimenter's naming), occurs to a large extent in the dementias of old age, no matter with which conceptual framework these skills are interpreted. It is clear that these skills are vital if participants are to be able to request assistance or objects, comprehend names, comply with instructions and communicate with others around them. However, it seems (as described above) that different aspects of language are affected to different degrees during the course of dementia. It has also been recognised that the involvement of language disorders in dementia is one of the most difficult to cope with aspects of the disease for a person caring for



their dementing relative at home. Development of therapeutic strategies, which utilise and maximise remaining skills, in this area, would consequently, be most beneficial.

The following Chapter (Chapter 4), examines the study of human learning and verbal behaviour, and suggests how this research may be applied in the analysis and remediation of language skills in dementia as outlined here.

## Chapter 4

### Human Learning and the Role of Verbal Behaviour

The progressive deterioration in functional ability of the dementing person which has been described in Chapter 2, means that they will ultimately need 24 hour skilled care. The Griffiths Report, (1987), encourages care in the community, but if the dementing person is being cared for at home, a large strain will be put on family members, and if they are in a hospital or nursing home, staff resources will be severely burdened. To make the provision of care easier, and also to maintain the personal autonomy and quality of life of the dementing person, it is essential that their self-care, communication, and if possible, daily living skills be maintained for as long as possible, and where necessary and possible, re-trained. Despite the needs of the client group, and the issues outlined above, it is possible that the low status of the mentally infirm elderly as a social group has slowed down the advance of research in this area. There is no logical inconsistency in the feasibility of remediating skills deficits of the demented elderly. The experiments reported in this thesis are concerned with the adequacy of techniques of behaviour analysis as strategies for such assessment and remediation of deficits in language skills with this group. Miller, (1977), has made a theoretical division between verbal learning experiments with the dementing elderly and other kinds. This distinction is unfortunate, as it is in direct opposition to Skinner's assertion that verbal behaviour can be acquired or lost under the same kinds of contingencies as other behaviour. However, because of the nature of verbal behaviour, normal subjects are *usually* 'aware' that they

are acquiring or losing it, and this awareness may in turn have some effect on the way in which it is acquired or lost. One of the principal assertions of this thesis is that the language deficit is partially responsible for the learning difficulties shown by the dementing elderly.

This chapter will attempt to explain the background to the decision to use the techniques of behaviour analysis, and the background of human learning and applied behaviour analysis, in so far as it is relevant to this work, and to the experiments which were conducted.

The interventions commonly employed in behaviour analysis are reinforcement, modelling, labelling, instruction, and response cueing. The history of these techniques can be outlined as follows.

## REINFORCEMENT

The use of reinforcement procedures in the applied setting has been developed and modified since Thorndike first outlined the Law of Effect, (1898). This stated that responses with satisfying effects were "stamped in", whereas those with annoying effects were "stamped out", Thorndike, (1898), cited by Catania, (1992). Reinforcement as a technique has been extremely widely used in many fields, notably education, and the treatment of abnormal behaviour. Reinforcement as a procedure, may be defined as a process in which desirable responses are made more likely to occur, by the application of reinforcing consequences contingent upon those responses. It is the very fact that the consequence increases the frequency of the response that defines



it as a reinforcer. Certain stimuli act commonly as reinforcers: these may be food; drink; money; social attention of various kinds; or the opportunity to engage in a particular activity, such as listening to music. Many therapeutic interventions "fall down" however, because of the assumption that these consequences will *universally* act as reinforcers for the behaviour of subjects, when in fact they may not.

It is possible that much of human behaviour occurs under the control of reinforcement in a very direct way. Catania points out the comparison between a pigeon completing a stimulus-related chain of pecking responses, which is reinforced by the delivery of food pellets, and a person completing a complex activity such as preparing a meal. Monetary reinforcement is likely to keep people working at boring jobs in the same way that 'job satisfaction' is also likely to keep people at more interesting work. The application of the "piecework" rate, in which workers earn money for each "piece" they complete, rather than by the amount of hours they work, in general increases production. This suggests that monetary payment does indeed act as a reinforcer for work. The term reinforcement is generally associated with the procedure of operant conditioning, in which an operant response is brought under stimulus control by the contingent presentation of reinforcement upon the occasion of the organism emitting the response. Operant conditioning may also take the form of the application of a punishment contingent upon the emission of a response, which will decrease the likelihood that the response is emitted in future.

Research into the effects of positive reinforcement and within the tradition of behaviour analysis is somewhat lacking in

the field of the modification of the behaviour of the dementing elderly. The work which has, however, been done, is reviewed below.

### Reinforcement with dementia subjects.

Miller, (1977), has suggested the use of operant conditioning techniques in the remediation of skills deficits in dementia. This possibility was also favourably discussed in a review paper by Hoyer, (1973).

Previously, Makay, (1965), investigated the susceptibility of dementing and non dementing elderly subjects to operant conditioning, using a lever pulling task, but the demented group gave erratic and low responses rates, and their behaviour was not subject to changes in reinforcement contingencies. Makay also found that elderly control subjects on different schedules of reinforcement performed much the same as has been observed in other human and animal studies. Ankus and Quarrington, (1972), point out that in the above study the designated 'reinforcer' may have been ineffective, since "subjects received chocolate, cigarettes, and pennies, regardless of whether they liked chocolate, smoked, or had any use for money." These authors took the importance of reinforcement into account in their own study, in which they note that the demented elderly often need 'reinforcement' specifically adapted to their needs. For example, food (a commonly used 'reinforcer'), may not be an effective 'reinforcer' for the behaviour of elderly persons who may have to be persuaded to eat even small amounts of food by their carers. They found that drinks and money (which patients had the

opportunity to spend in the hospital shop) were effective reinforcers for lever-pulling behaviour in male and female 'memory-disordered' subjects. They concluded that "when reinforcement is appropriate to the individual subject, it is possible to obtain relatively normal fixed ratio behaviour in memory-disordered patients with either primary or secondary reinforcement."

Two studies were reported by Burgess, et al, (1992), also using operant conditioning procedures with demented persons who were in a long stay psychogeriatric ward. In their initial experiment, three severely demented female subjects pressed a lever to obtain a compound reinforcer of music and lights, with praise, on a fixed interval (FI) schedule (in which the last response made after a given interval of time is reinforced). Two of these subjects needed extensive acquisition trials before any learning took place, but the other subject learnt the response straight after the preliminary training session and responding was maintained over three FI schedules of different durations. In the second experiment, two male subjects (who were mildly to moderately demented) were placed on three varying FI schedules of reinforcement, and responding was maintained on all three. Interestingly, none of the subjects correctly perceived the relationship between their own lever pressing behaviour and the contingency, although all subjects interpreted the FI schedule incorrectly as a FR schedule (in which reinforcement is given contingent upon the number or ratio of responses made, rather than the interval). This was inferred on the basis of their behaviour and verbalisations (one subject commented after a lever press that was not followed by a reinforcer, "should be it,



I've pressed it enough". Burgess concludes that this study shows that a "robust learning effect" can be seen with demented persons on an FI schedule. Overall, the study describes additional strong evidence in support of the contention that demented persons do have large residual learning capacities. Although Burgess stated that the subjects were mildly, moderately and severely demented, the severely demented subjects were not so demented as to have lost the capacity to emit task-relevant verbal behaviour, as shown by the appropriate verbal behaviour reported above, and this may have been relevant to their performance. The role of verbal behaviour will be discussed in more depth below.

Within the operant paradigm, there are differences between age groups. Response acquisition takes longer, for elderly age groups, and there is greater resistance to extinction (Goodrick, 1968), although Jarvick and Cohen, (1973), found that by giving clear instructions and utilising reinforcement procedures, the previously observed age differences in learning and in other tasks were minimised.

### Is there a role for attention and motivation?

Wood, (1988), has discussed the possibility that persons with disorders which affect motivation and/or attention may be less susceptible to the conditioning process. He cites Belmont, (1969), who stated that brain injured patients are particularly vulnerable to motivational deficits, in ways which impede the process of rehabilitation. Also persons with organic disorders such as frontal lobe damage may have disorders of insight and of emotional control, and these disorders may affect the conditioning

process. The neuropsychological systems which mediate associative learning may be damaged in such cases, the environmental cues involved may not be perceived, and the reward incentive may be damaged. Therefore, operant conditioning procedures may not have the usual effect, or at the least, certain modifications may have to be made to the procedure, such as coupling conditioning with a drug treatment.

### Classical conditioning: Age differences

Classical conditioning is inextricably linked with operant conditioning, because the reinforcing consequences, which in the experimental setting are often secondary reinforcers such as praise or money, have acquired their hedonistic properties through classically conditioned associations with primary reinforcers such as food.

Minor age differences have been found in the area of classical conditioning. Shmavonian, Miller and Cohen, (1968), have shown that classical conditioning with elderly persons is more difficult than with younger persons, but that age differences become insignificant when the intensity of the conditioned stimulus (C.S.) is increased. The conditioned response (C.R.) extinguishes more rapidly in older subjects, though (Botwinik, 1967). Also, Botwinik and Kornetsky, (1960), and Braun and Geiselhart, (1959), using the Galvanomic Skin Response, and the eye-blink, respectively, found that susceptibility to classical conditioning declines in late life. Solyom and Barik, (1965), were concerned to discover whether there were any differences in classical conditioning between demented elderly subjects and age-

matched controls, and investigated "certain parameters of the conditioning paradigm which may differentiate between senescence and senile brain disease." They used a conditioned eye-blink response procedure to differentiate between normal elderly subjects and a group of subjects with dementing disorders. Solyom and Barik found that the only significant difference in classical conditioning in the two groups was in the rate of acquisition of the conditioned response. The dementing group *acquired the response more slowly* than the young group or the normal old group, but once the C.R. had been established, response rate varied little between the two elderly groups. The authors also report that the demented subjects were only dimly aware of the connection between the C.S. and the C.R., that is, they had difficulty in verbalising the connection. It is likely that the success of classical conditioning procedures with the dementing elderly, in contrast to the limited success of operant conditioning procedures relates in large part to the lack of the involvement of language in classical conditioning. One does not need to make verbal stimulus-response associations, generate hypotheses, or rules, in order to acquire a classically conditioned response. These differences would necessitate a different approach to work with the elderly in an applied setting.

#### The token economy.

The token economy programme is another technique much used by therapists working in the behaviour analysis tradition, since Ayllon and Azrin, (cited in Kazdin, 1983), first developed it in 1965. The usual format of the token economy involves giving



the patient a token at times when his or her behaviour is appropriate, and withholding them when it is inappropriate, and can be used with individuals or larger populations such as entire groups in hospital wards. Tokens may be exchanged by the patient for goods or privileges. It has been used successfully with a wide variety of populations, including patients with organic brain syndromes (Murphy, 1976, also cited in Kazdin). Kazdin points out that there are a number of disadvantages to the token economy, for example, a lack of success when staff instituting the programme are not highly trained and supervised. The token economy was used by Heinrichs, (1990), to investigate the learning abilities of a patient who had suffered brain damage resulting in dementia as a result of a failed suicide attempt using carbon monoxide poisoning. He found that the patient's maladaptive behaviours (such as screaming and hitting others) declined when the programme was instituted. The patient had demonstrated that she was not able to learn "explicit" verbal information, for example word pair associates, but was able to demonstrate some degree of "implicit" learning, in that she replied to a word association test with some items from a study list she had been previously given. The token economy programme followed the usual format of giving the patient a token at times when her behaviour was appropriate, and withholding them when it was inappropriate, and she was told the nature of the contingencies in operation. However, Heinrichs does not state whether the patient was questioned about the nature of the contingencies, and does not report whether she produced any relevant verbalisations.

The issue of reinforcement will be dealt with further in Experiment 1, Chapter 5.

## SHAPING

The term *shaping* describes how responses not in the repertoire may be acquired. In the process of shaping, successive approximations to a target behaviour may be reinforced, until the individual completes the correct response. Skinner, (1957), describes how the young child learns to speak her first words with the aid of the shaping process. Many human behaviours are learned through a combination of shaping, modelling and reinforcement. In writing an essay for example, modelling and imitation have occurred in the school-room, where the student first learned to form the letters and organise them together into words and sentences, and then she or he learned various meaningful sentence structures which formed the content of his or her essays. But positive reinforcement would be a factor in the student continuing to write essays, and the gradual process of shaping would enable the child to progress from the poor and childish standard of his or her infant school essays to the more literate standard required in later school and college years.

## MODELLING AND IMITATION.

The first instances of imitation occur as the young child acquires her speech vocabulary. The initial babbling of the young child contains a wide range of human speech sounds. The infant learns to discriminate between sound aspects of the speech of

others, and native language speech sounds will be reinforced by the verbal community. Echolalic sounds (self-echoing, for example "ma-ma-ma"), and echoic behaviour will be reinforced, and once the child has acquired an echoic repertoire, she will have the capacity to imitate others. If imitation is reinforced, learning via imitation can begin. The subject in a modelling situation may or may not be overtly encouraged to imitate a response. Successful imitation of a response, should, in the learning situation, be reinforcing. Thus, the modelled response can be learnt. Catania, (1992), describes imitation as that which occurs "when one organism duplicates the behaviour modelled by another organism." He distinguishes imitation from observational learning in the following way: "The most important difference between observational learning and imitation is that in imitation the observer's behaviour corresponds to that of the organism that has been observed. Imitation does not imply that the imitating organism has learned something about contingencies." (Catania, 1992, p.216). Cooper, et al, (1987), define imitation as a parcel of three environmental arrangements. Firstly, a model is presented that sets the occasion for a response from a learner. Then, following the presentation of a model, the imitative behaviour is emitted and then is reinforced. These authors suggest some guidelines for the use of imitation training with what they call "non-imitative learners," who in their case are children with learning difficulties, but could also be demented elderly patients. They point out that imitation cannot take place until the subject attends to the model, so attending should first be ensured. They cite Striefel, (1974), who has developed specific procedures for teaching any simple behaviour to subjects without imitative skills.



Assessment of attending should first take place. Attending is defined as staying seated during instruction, looking at the trainer whenever one's name is called, keeping hands in lap, and looking at objects identified by the trainer. Once imitation training has begun, sessions should be kept short but active, allowing the student no more than a few seconds between model and imitation. About 10 to 15 minutes would be a good length of time for a training session. Reinforcement should initially be given immediately and contingently on every correct imitative response, and if reinforcement other than social reinforcement (such as patting the subject's arm and giving descriptive verbal praise) is given, it should be paired with the presentation of the social reinforcement. These guide-lines, where appropriate, have been observed in the present study.

### SOCIAL LEARNING THEORY.

It may be appropriate to consider the relevance of social learning theory to this account of human learning. Social learning theorists, for example Bandura, claim that the environment is only one of the factors governing the acquisition of behaviour. Other vital factors are characteristics of the person, and the person's own behaviour. According to Bandura, (1977), the essence of reinforcement is that it provides evidence about the effect that one's behaviour has on the environment. Social learning theorists consider that reinforcement, whether it is direct or vicarious, is not even considered necessary for learning in many cases (Miller, 1989). Bandura states, "After the capacity for observational learning has fully developed, one cannot keep people from

learning what they have seen". He also claims that models mainly influence us by *providing information* rather than by evoking matching behaviour, and although overt behaviour is important, it is only one aspect of the process and may not be a necessary aspect. Catania describes the situation in the typical verbal learning experiment, in which, for example, the subject has to learn a list of words, and when the subject responds correctly, he is told "that's right". This can be viewed as feedback, or as implicit instructions or information about how to respond next time.

### REALITY ORIENTATION.

Hanley, (1981), used signposts and active training to modify ward disorientation among long-stay psychogeriatric patients. Verbal cues and rehearsal was used to describe the ward environment, and large three-dimensional pictorial signs were introduced. A combination of these strategies was found to be most effective at reducing disorientation. Such a technique uses the methods of Reality Orientation, (Holden and Woods, 1988), which seems to be the main psychological therapy in use with dementia patients. Woods states that "it seems likely that re-learning is one component of the (limited) success of Reality Orientation programmes." McEnvoy and Patterson, (1986), assessed whether the demented elderly could re-learn lost skills, and if so, which skills could be re-learned. Modelling and prompting techniques were used to train subjects in items of personal information, spatial orientation, communication, and two levels of activities of daily living. They found improvements in their demented group approaching the level of the non-demented

control group in activities of daily living, and in communication. The only skill which did not improve was the second level of activities of daily living, which included quite complex skills such as doing one's laundry. In the measure of personal information, the demented group showed a small but significant improvement, as they did on the measure of spatial orientation

### Prompting and reinforcement.

A similar study to that cited above was conducted by Gotestam and Melin, (1990), who investigated the effects of prompting and reinforcement on activity levels of residents in a psychogeriatric hospital. The activities selected for training were communication, writing and drawing, reading papers and books, and playing card games. The authors found that the prompting condition was effective, but the addition of reinforcement did not add to the effect. However, it is not clear how the authors ensured that no reinforcement (social or intrinsic) occurred during the prompting only sessions, or whether the putative 'reinforcers' performed as such. They conclude that "prompting is an effective means to improve the demented patient's normally occurring activity on the ward."

### What factors assist learning in dementia?

McEnvoy and Patterson comment of their study that the results show that certain kind of skills are easier for demented people to re-learn. These skills are those in which "physical practice [is] a large part of the training, when feedback [is]



received from many sensory systems, and when less cognitive involvement [is] required." We might re-phrase this statement to indicate that demented subjects find tasks which are not overtly verbal, which do not place a large demand on the subject's inadequate language capacities, and which utilise a system of learning which is largely contingency-governed, which they might not be 'aware' of, much easier.

### CONTINGENCY GOVERNED AND RULE GOVERNED BEHAVIOUR.

Humans can learn new behaviour through the direct operation of contingencies upon behaviour, and also formulate rules through the observation of such contingencies. Skinner, (1984), gives the example of the blacksmith operating a pair of bellows. His behaviour is firstly learned through the direct influence of contingencies, or by observing the effect of the action of the bellows on the bed of coal, and it is then wholly contingency-governed. Then he makes up a verse (formulates a rule), to help him remember how to operate the bellows. At that point his behaviour is rule-governed, but the rule has been derived from observation of the contingencies. When his apprentice learns how to operate the bellows by reciting the verse, his behaviour is wholly rule-governed. The search for empirical evidence in support of purely contingency-governed behaviour, or 'conditioning without awareness', in adult humans has generated a great deal of controversy, and seems like the searches of alchemists in medieval times or of the search for a metaphorical Holy Grail! As Skinner suggests, it is possible to think of many examples in which human behaviour is learned

through direct contact with contingencies. Another example, (Catania, 1992), is of the child who learns that when he cries, his mother quiets his shouting father, so he learns that in his mother's presence he can escape the shouting by crying. The child is unlikely, however, to be 'aware' of these contingencies.

There is a small possibility that demented persons *may* show contingency governed behaviour, or 'conditioning without awareness,' as the subjects in experiments by Solyom and Barick, and Burgess, et al, were not aware, or were only dimly aware, of the connection between their response and its consequences. Their behaviour may have been learned through the direct operation of contingencies on behaviour, without any mediating verbal process of covert verbal behaviour of the sort: "if I do X, then Y will occur."

Brewer, (1974), has claimed that "there is no convincing evidence for classical or operant conditioning in adult humans", and has suggested that only those subjects showing awareness of contingencies will exhibit the learned response. This suggestion is important, because it is likely that dementia patients would *not* be aware of contingencies. Various experiments, however, have suggested that Brewer's view may not be correct. Some examples are cited below.

#### Evidence in support of contingency governed behaviour

Rosenfeld and Baer, (1969), used a complex 'double agent' masking procedure to ensure that neither experimenter nor subject knew the real contingencies in operation in an experiment on verbal behaviour. An interview-type situation was set up, and



the so-called experimenter (in reality the subject), was told to reinforce a motor response (chin rubs), in the subject, with the response "yeah". The authors found that production of "yeah" increased in frequency in the so-called experimenter, without his being aware of what was happening, when "yeah" was reinforced by chin-rubs. Other evidence to suggest that conditioning without awareness occurs in adult humans comes from Greenspoon, (1955), who conducted an experiment on conditioning of verbal behaviour. The response class to be reinforced (by the experimenter saying the word "aha!" in appropriate tones), was plural nouns, and subjects' production of plural nouns did indeed increase. Questions were asked of the subjects (for example, "what was the purpose of the aha?"), after the experiment. Their answers to these questions indicated that they had no awareness of the contingencies in operation during the experiment. Another early experiment into the effect of reinforcement on verbal behaviour was carried out by Taffel, (1956). He used a flash of light and the words "good!" to encourage the production of the words "I," or "we," in sentence construction tasks in which the subject had to choose cards with words printed on them and form them into phrases. The subjects claimed not to be aware of the contingencies in operation during the experiment. They were psychiatric patients, and the experiment was interesting in that it showed that responses such as "I feel better", might be learned in this way. It is debatable, however, whether one can be truly unaware of a verbal response made by one's own vocal apparatus. This anticipates the question of what exactly the subject must be unaware of in order for the behaviour to be classed as contingency-governed. It would be simplest to assume that one



must be unaware of the contingencies in operation, rather than be unaware of the behaviour itself.

### Work with amnesic patients: Contingency governed behaviour?

Working with amnesic subjects, Warrington and colleagues have investigated a number of learning situations including conditioning. Weiskrantz and Warrington, (1979), found clear evidence for classical conditioning in two amnesic subjects, using the conditioned eye-blink response, and found that the subjects were not aware of the nature of what they had learnt. Warrington and Weiskrantz, (1982), suggested that amnesic subjects could show learning by repetition, or of simple stimulus-response relationships not requiring cognitive mediation, "[which is] cognitive elaboration, use of imagery, embellishment, manipulation or organization." (Warrington and Weiskrantz, 1982), or they show conditioning without awareness, at least after they had learnt the task. According to the authors, the subjects did not "acknowledge instances of learning and retention which have occurred." The tasks presented were a test of responses to verbal stimuli, a test of phonological, linguistic, and semantic paired associate learning, and a test of paired associate learning in which the "distance" (for example, a word *commonly* given as an associate to "walk", such as "run", would be a *close* associate) of the associates was a factor. We might tentatively suggest that a distinction could be made in this study, between contingency-governed behaviour, which the amnesic subjects were able to acquire, and rule-governed behaviour, which they were not. This is to say that they did not acquire any explicit verbal hypotheses

about what they were learning, and a clearer distinction might be made about learning with different levels of awareness. Warrington and Weiskrantz discuss this in terms of a "disconnection syndrome" and suggest that "a cognitive mediational memory system" and "a semantic memory system" are disconnected in the amnesic patient". It seems likely that demented subjects are also susceptible to "conditioning without awareness", and their behaviour may possibly be interpreted in a similar way. In a later discussion of possible differences in memory for events and memory for facts, Warrington, (1986), points out that behavioural responses to certain kinds of stimuli, for example, abstract as opposed to concrete words, may be broken down differently, as in the case of a patient she was working with who could define 85 percent of abstract words presented, but only 24 percent of concrete words presented (Warrington, 1975, cited in Warrington 1986). This accords with the present hypothesis that different language functions will be affected in different ways, in dementia, and independently of each other, and it may be assumed that this is due to particular and focal brain damage. It may also be useful to assume that abstract and concrete words might functionally be defined as different classes of stimuli. In Experiment 3 (B) reported in this thesis, the possibility of differential responses to abstract and concrete words is investigated. It would be interesting, however, to determine whether these skills can be re-acquired by dementing individuals.

Work on conditioning in amnesia has also been conducted by Sidman and colleagues. In an early study of the well-documented patient "H.M.," Sidman, Stoddard and Mohr, (1968), found that H.M. was able to learn a visual discrimination task, but was unable to



say what he had been doing. On a delayed matching to sample task with verbal stimuli, he was able to do the task with up to 40 second intervals, but with non-verbal materials that required him to devise his own coding system, his performance was not so good. The authors suggest that H.M.'s failure to use verbal coding was a factor in his inability to improve his memory span.

### Aphasics' performance.

Skinner pointed out (1957), that there was support for the notion of functional independence of discrete classes of verbal behaviour in some types of aphasia where there is a loss of one class of behaviour but not another. According to Skinner, this loss occurs when "a response of a given form may no longer be under the control of one functional relation, although it is still under the control of another." (Skinner, 1957, p. 190). Also, Sidman, (1971), and Sidman, Stoddard, Mohr, and Leicester, (1971), showed from work with aphasic patients that a brain injury does not necessarily break down all verbal stimulus-response relations. More work in the area of aphasia was conducted by Rosenberger, et al, (1968), who trained an aphasic youth on a matching to sample task with presentation of stimuli through different sensory modalities, for example, he had to match a tactile stimulus to a choice of visual stimuli. The authors suggested that the subject's lack of language skill may have limited his ability to perform the task efficiently. The lack of ability to verbalise stimulus-response relationships on the part of such subjects raises interesting questions about the nature of potential response



## CONDITIONAL RESPONDING.

A conditional response is any response which is made conditionally upon the occurrence of another variable, such as the presentation of a stimulus. An example of such a response is the conditional mand compliance response used in the present study, which is described in detail below, and in Chapter 5.

Pribram, (1987), discusses the work in this area using such conditional tasks (with which patients with damage to the frontal lobe commonly show deficits), and describes them as tasks "characterised by a delay between stimulus presentation and opportunity for the response to occur". Also working with patients with brain damage (frontal lobe excisions to remediate epilepsy and tumours), Petrides, (1985), used a conditional task and found that the patients with frontal lobe lesions were impaired. The task used was similar to the conditional mand compliance task used in the present study (see Chapter 9), in that on presentation of a conditional cue the subject had to perform a particular response. A typical delayed response procedure is one in which the experimenter hides, within sight of the subject, a reward in one of two identical boxes. A screen is then brought down for at least 5 seconds, then the screen is raised and the subject is given the opportunity to find the reward. A similar procedure is used in the Rivermead Behavioural Memory Test, (Wilson, et al, 1985), in which, as part of a larger assessment, the experimenter borrows an item belonging to the subject, and the subject is requested to ask for it to be returned at the end of the interview (see Chapter 2).

More evidence indicating that the frontal lobes of the brain are involved in (at least temporal) conditional tasks comes from Fuster, (1987), who found that brain waves showed a particular effect when a stimulus was presented which was associated with the need to perform a given behavioural response in the very near future. Fuster describes the delayed task as a universal intellectual skill: " All....include the.....need to bridge the time between interdependent events. In all of them, an action,.....is contingent upon two items of information that are temporally separate. The trivialising of such tasks as contrived or unnatural reflects an ignorance of the universality of the essential principle they test [which is] the temporal integration of behaviour."

#### THE ROLE OF LANGUAGE IN HUMAN LEARNING.

The unique aspect of human behaviour, according to Lowe, (1979), is that humans are able to formulate rules such as that described above by Skinner, quite easily, through the use of their language skills. When language skills are absent, and rules are not formulated, human behaviour may show similarities to that produced by other animals. Lowe, and colleagues, (Bentall and Lowe, 1982, and Lowe, Beasty, and Bentall, 1983), demonstrated this effect on schedule performance in young children whose language skills had not developed sufficiently to allow them to formulate hypotheses about the contingencies in operation during the experiment. Older children whose language skills were more highly developed, did not show the similarities to animal response patterns, and instead produced response patterning that was like that of adult humans.

### Behaviour analysis: Further considerations.

The techniques of behaviour analysis involve examining the contingencies the behaviour operates under. These may be reinforcing or punishing a behaviour, thus making it more, or less, likely to occur. A verbal behaviour will be as affected by these contingencies as any other behaviour, as Greenspoon showed in his classic study (Greenspoon, 1955). More recently, these techniques have been successfully used by Lowe, Horne and Higson, (1988), and Woods and Lowe, (1986), to remediate deficient verbal self-control, problem solving and planning skills, and have been used to modify the delusional thought patterns of persons suffering from schizophrenia (Chadwick, 1989).

Also working with elderly people, Green, et al, (1986), have used these techniques to modify the inappropriate speech of two elderly stroke patients. It is clear that the use of psychological techniques with elderly persons will need some degree of modification if it is to be effective. Suitably modified, Self Instructional Training (Meichenbaum, 1977), Problem Solving Training (Goldfried and Zurilla, 1969), and Relaxation Training (Wolpe, 1969), as well as a number of other behaviourally based therapies (Hussain, 1981) have successfully been used with the elderly client. Techniques used with elderly persons suffering from senile dementia will have to take age related differences into account, and *also* the differences referred to in Chapters 2 and 3, which come about through the dementing process.

In the study cited above by Burgess, et al, the subjects were not aware of the relationship between their response and the



contingency in operation, or at least could not explicitly verbalise it. However, their initial responses were based on instruction and modelling by the experimenter, and although they were not given instructions about *when* to respond, this factor surely eliminates the possibility that responding was wholly contingency-governed. Burgess, et al, note that the subject who experienced the most difficulty was the subject who produced the least on-task verbalisations, and as such verbalisations have been suggested to influence motor behaviour, as described above, this would suggest that learning of a rule, at whatever level of awareness, influenced the behaviour to some extent. However, the situation described by Burgess could be procedurally comparable to that of a pigeon whose 'random' pecking behaviour to the key has already (previously) been shaped, who then learns to respond on a fixed interval schedule. We would not suggest that the pigeon had to spontaneously learn the pecking response *contiguously with* the schedule in order to obtain reinforcement.

#### Understanding verbal behaviour.

The teaching or re-training of language skills in the present context requires some understanding of the processes of language learning as it occurs in early development. A number of researchers have tackled this question in some depth, notably Skinner. Skinner discusses language acquisition and the analysis of language, in *Verbal Behavior* (Skinner, 1957).

The unique and revolutionary aspect of Skinner's treatment of speech was that he treated speech as another aspect of behaviour, susceptible to the same laws as other, more observable

behaviour such as pressing a lever, or cooking a meal. By specifying the antecedent verbal or non-verbal stimuli and the consequences, the response form can be classified as a verbal operant (Carroll and Hesse, 1987). Skinner identified the simplest functional relations making up verbal behaviour as the echoic, the mand, the tact, the intraverbal, the textual, copying a text and taking dictation. A brief explanation of these terms is perhaps in order in so far as they have been used as defining terms in the experiments which follow.

### The mand.

The class of verbal behaviour which Skinner deals with first is the mand. Skinner, (1957), describes the reasons for naming the term as such, as follows: "The term "mand" has a certain mnemonic value derived from "command, " "demand," "countermand," [and] may be defined as a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation". (Skinner, 1957, page 36). This definition may be clarified by the use of an everyday example, cited by Skinner. At the dinner table one person may use the mand "Pass the salt!". It specifies an action (pass), and a reinforcer (salt). The mand (as a behaviour emitted by the subject) was not investigated fully in the present study, as its occurrence as a spontaneous behaviour on the part of the subject depends on pre-existing conditions of deprivation. It was thought difficult and unethical to induce such conditions. In pilot studies, the potential for assessing the subject's use of the mand in a



"game" situation was investigated, but, it was found practically impossible to assess.

#### Mand compliance.

Although Skinner does not use the same terminology, the passing of the salt by the listener in this example (complying with the mand), is of the same form as the mand compliance response used in the present study. The verbal behaviour of the mand on the part of the speaker, has an effect on the listener, of mand compliance. Many more examples of the mand compliance response can be easily generated, and quite clearly, as a common example of listener behaviour, it is an extremely important function in all kinds of human interaction.

#### Conditional mand compliance.

The "conditional mand" has also been described by Skinner. He gives the example of the instruction "When the fire burns out, close the damper", in which the action manded is brought under the control of a future stimulus. The conditional mand (or, on the part of the listener, conditional mand compliance) has been investigated in depth in the present study, in Experiments 5 and 6, Chapters 9 and 10.

More details of the procedures used in assessing these classes of verbal behaviour will be given in the first experimental chapter.

#### The echoic.

Skinner describes the first verbal behaviour which the present study is concerned with as follows: "In the simplest case in which verbal behaviour is under the control of verbal stimuli, the response generates a sound-pattern similar to that of the stimulus." (Skinner, 1957, page 55). This is the echoic. A



repertoire of echoic behaviour is established in the child by the verbal community, through the practice of reinforcement. The child must learn that the originally meaningless sound "cat" can be reproduced by her own voice as the sound "cat," and the process of shaping may be involved as the child first makes a sound which is not quite correct, and successive approximations towards the correct sound will be reinforced.

### The tact.

The next class of verbal behaviour which the present study is concerned with is the tact. The tact is involved in the speaker's verbal response to events and stimuli in the environment around her. Skinner defines the tact as an "invented term .....[which] carries a mnemonic suggestion of behaviour which "makes contact with" the physical world.....a verbal operant in which a response of given form is evoked (or at least strengthened) by a particular object or event or property of an object or event." (Skinner, 1957, pp 81-82). Again, a description and an everyday example will clarify the use of this term. Skinner cites the example of the child who achieves some sort of generalised reinforcement, for example, by saying "doll" in the presence of a doll. The tact can be seen to be of the same form as the response commonly termed "naming." Indeed, the procedures used in the present work come under the heading "naming", for the sake of clarity, but the response class in question may be identical to the tact. Skinner justifies his use of the term as follows: "It may be tempting to say that in a tact the response "refers to,"....."names," or "describes" its stimulus. But the essential relation between response and controlling stimulus is precisely the same as in echoic, textual and intraverbal behaviour.....the only useful functional relation is expressed in the

statement that the presence of a given stimulus raises the probability of occurrence of a given form of response." (Skinner, 1957, page 82).

#### Generic extension of the tact.

Most tacts occur as responses to stimuli belonging to categories of stimuli. Thus, a subject will respond "chair," to a new kind of chair not encountered before (Skinner's example). The response "chair," does not need to be learned anew each time a chair which has not been responded to previously is encountered. Skinner terms this kind of categorical responding generic extension of the tact. Generic extension may also cover the occasions in which the subject will respond "chair", to a three-dimensional chair, a pictorial representation of a chair, and a written word "chair". Later work (for example, see Lowe and Beasty, 1987), in the area of verbal behaviour has investigated this issue further and suggested that such groups as the above can be termed "equivalent stimuli" when each member of the class (three-dimensional object, pictorial stimulus, spoken word, and written word), evokes the same response, or are responded to as equivalent stimuli. Catania (1992), describes the equivalence class as follows: "Such classes may be a special property of human behavior; whether they can be demonstrated with primates or other non-human organisms is a source of controversy". A typical example of the equivalence paradigm can be described as follows (see Catania, 1992). Children who had first demonstrated one aspect of equivalence, *reflexivity*, that is matching a stimulus to an identical copy of that stimulus, were then presented with spoken words, and were able to learn to choose the picture

corresponding to the relevant spoken word from an array. Then they learned to choose the corresponding printed word from another array, this time of printed words. Through learning these relations, the children were able to demonstrate that they had learned *other* relations, which had not been explicitly taught, through *symmetry*. They could produce the name of the picture when shown it, and they could produce the name of the printed word when shown it. Yet more were learned without being explicitly taught through *transitivity*, so when shown a picture they could select the appropriate printed word, and when shown a printed word they could select the appropriate picture. Catania points out that new relations could have been added to the equivalence class, such as the object corresponding to the spoken word, the script word, and so on.

#### The textual.

This leads us on to Skinner's description of the textual; a related behaviour which is a kind of tact but which merits a separate explanation by Skinner. This is the response of, for example, saying "cat," in the presence of the written word "CAT". This would usually be termed "reading," but the textual has a more restricted meaning within the Skinnerian account, as it does not specify any underlying 'understanding', or mental events, on the part of the reader, in the way that the word "reading," may do. In textual behaviour, the child learns that the meaningless marks on paper correspond to the sound "cat," which she then speaks. The stimulus of the written word is the controlling factor which determines the subject's behaviour. Skinner calls this stimulus "the textual". Like the tact and the echoic, the



textual is a functionally equivalent verbal response to a discriminative stimulus. On seeing the cat, the child's tactual response is to say "cat". On hearing the spoken word /cat/ the child's response is also to say "cat". On seeing the *written word* "CAT" her response is again to say "cat". These three classes of response, "cat" are all responses to functionally equivalent stimuli. The stimuli are functionally equivalent because they all occasion the same response. In this way we may say that the written or spoken word, the object, and the heard spoken word are functionally equivalent members of an equivalence class. The emission of the textual response may be induced by labelling of a three-dimensional stimulus. The technique of labelling used in the present study depends upon the correspondence between the written word and the sound of the word as a means of attempting to re-train appropriate labelling behaviour. The removal of any other distracting written stimuli from items, and their replacement with the clearly printed name of the item, should evoke the correct spoken name or textual response from the subject. The rationale behind the use of this technique was that the association of the object with the textual stimulus (written word) would lead to the object re-acquiring control of the verbal response as a tact, in the same way the child learns to say "cat," *in the presence of a cat*, after he or she has heard adults do so enough times.

We respond to written words in many different ways and the 'textual environment' is a controlling factor which is part of the 'verbal community'. Traffic signals and shop signs are two everyday examples of aspects of the textual environment that

control human behaviour. Such stimuli may be described as textual stimuli, or as implicit or explicit instructions. Using the above examples, the traffic signal "Give Way", gives a set of instructions to the driver which carry the implication that disregarding the instruction will lead to aversive consequences. A shop sign "Bakery", carries the implicit instruction about what is sold in the shop and the nature of the consequences which will arise for the person entering the bakery. Written prompts operate in the theatre when an actor is not considered capable of remembering lines, and reads prompts from a scrap of paper concealed in his hand or written on his cuff. Originally, in the early days of the theatre, such prompts were written on pieces of scenery and were called "idiot boards". Verbal prompts will also be in operation and a prompter will be employed to sit and follow the text and cue the actor who forgets lines. Different coloured lights act as cues in the theatre to signal actors' entrances, scene changes, cues to start speaking, and these are known as "cue lights." A news-reader will read most of the text from a hand held script or an overhead known as an "autocue." Cues such as this may be seen as complex discriminative stimuli. Skinner, (1933), described the use of a light as a discriminative stimulus in an early experiment cited by Catania, (1992), in which a rat learned to respond by pressing a lever in the presence of a light, and not respond when no light was shown. "The response to the lever plus light is always followed by the discharge of a pellet of food into the tray, while the response to the lever alone is never so reinforced. The animal eventually learns to respond to the lever when the light is on but not to respond when the light is off." Skinner, 1933, p. 304-305, cited in Catania, 1992, p 23). Catania

comments that "The light signals the consequence of pressing the lever, and the rat comes to press the lever more often when the light is on than when it is off; we may say that the lever press is reinforced in the presence but not the absence of the light, and that the light is a discriminative stimulus." (Catania, 1992, p. 23). In the same way the prompts and cues described above can be understood as discriminative stimuli specifying particular consequences.

### Conditional discrimination.

Assessment of conditional responding of the conditional discrimination form is comparable to the conditional mand compliance behaviour described above. The subject is required to make a response contingent upon the presentation of a particular stimulus, and to discriminate that stimulus appropriately.

The use of conditional discrimination procedures is standard practice in research into matching to sample performance. Many researchers, for example Catania, et al, (1989 ), have used them to investigate the development of equivalence relations. Morris, (1987), investigated matching to sample task performance with dementia patients, (see Experiment 4, Chapter 8), and justified their use of tests designed for use by comparative psychologists thus, "they place minimal demands on the patient's understanding of the test and allow for the optimal performance of the patients to develop, and so provide a measure that more truly reflects their residual abilities." They investigated conditional discrimination learning in patients with moderate to severe Alzheimer Type dementia, and compared their performance to age



matched controls. The finding was that the AD subjects were able to learn the matching and oddity discrimination tasks, although they were slower than the control group. The control group were able to verbalise the principle underlying the task, and this probably facilitated their performance. The AD group however, did not transfer the matching discrimination rapidly to a new set of stimuli. Morris interprets this as indicating that they did not acquire the verbal matching rule, and that learning was mediated by stimulus response associations [or was contingency-governed]. It is hypothesised that the lack of verbal skill in the dementing individuals led them to solve the task through stimulus-response associations. This may provide additional evidence that language is an important factor in human learning, and without it complex tasks may present difficulty.

#### Language acquisition: Receptive and productive verbal behaviour.

Possibly the most complex learning experience is the experience a child has of learning language and the social rules of her culture. According to Shaffer, (1989), and other developmental psychologists, children learn language in a particular sequence. Before they can speak, infants understand what certain words mean and can discriminate between them. In this way, we can say that receptive speech comes before productive speech.

Shaffer cites a study by Thomas, Campos, Shucard, Ramsay and Shucard, (1981), which showed that young children who did not have productive language skills *were* able to respond

appropriately to spoken words. The children were placed on high chairs which were facing four objects, one of which the infant's mother was sure the infant was familiar with the name of. The infant was able to look at the named item when asked to do so. These results suggest that receptive verbal behaviour is acquired before productive verbal behaviour, or that listener behaviour is acquired before speaker behaviour.

### Receptive and expressive prepositional relations.

Skinner does not discuss the use of the relational terms assessed in the present study. However, it is clear that (depending on whether they take a descriptive or an instructional form), they can be either tacts, or mand compliance. Subject's responses to the experimenter's question "Is the cup on the bowl or in the bowl?" are tacts of expressive prepositional relations. Subjects' responses to mands on the part of the experimenter, such as "put the cup into the bowl", are mand compliance with receptive prepositional relations. Appropriate responding to these terms constitutes the behaviour of receptive prepositional relations, and production of them is termed expressive prepositional relations. According to de Villiers and de Villiers, (1978), these prepositional relations are acquired early in the sequence of language acquisition. In his study of language acquisition in chimpanzees, Premack, (1976), used mand compliance and naming extensively to establish verbal repertoires. The subjects learned to respond correctly to the instruction "Give X", and learned the names of a large variety of stimuli. They were able to correctly perform mand compliance to a stimulus, and to name that stimulus. They were also able match

stimuli to other instances of the same stimulus, and to respond to instructions of the form "put X under Y" (receptive prepositional relations), and to tell the experimenter "X is under Y" (expressive prepositional relations). Premack comments, in describing the chimps' attempts to learn a conditional discrimination task, that the ability to understand conditional relations is necessary for the acquisition of language, because the use of words is inherently conditional. We only call a table a table because it is culturally conventional to do so. Had we not learned language, we would not call it anything, and if we were speaking German we would not call it a table. Our use of words is not only dependent on the native language of the speaker but also on various conditionally dependent situational constraints, such as time, place, and circumstance.

### Concluding remarks

Much of the research on verbal behaviour has been done with children, for example Carroll and Hesse's (1987), work on the effects of alternating mand and tact training on the acquisition of tacts, and Hall and Sundberg's work (1987), investigating whether teaching topographies as tacts would lead to their emission as mands. Many studies have indicated that Skinner was correct in asserting that verbal operants are acquired in a functionally independent way, for example, Lamarre and Holland, (1985), in a study with retarded language impaired subjects, found that the acquisition of mands and tacts was functionally independent. A number of studies have applied behavioural techniques to the language behaviour of elderly persons (see



above), and Emery, (1986) (see Chapter 3), pointed out that language breakdown may follow an inverse path to that of language acquisition. No work as yet, however, has used Skinner's analysis of verbal behaviour to investigate the verbal behaviour of dementing elderly persons. This may merely be due to the small amount of research work which *Verbal Behavior* has generated in the years since its publication, as noted by Oah and Dickinson, (1989), in their review of empirical studies of verbal behavior.

The next Chapter, Chapter 5, investigates one aspect of human learning, reinforcement, and its effect on the verbal behaviour of 3 dementia patients.

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## CHAPTER 5

# DO INTERVENTIONS BASED ON THE TECHNIQUES OF BEHAVIOUR ANALYSIS HAVE AN EFFECT ON THE LEVEL OF PRODUCTION OF DISCRETE CLASSES OF VERBAL BEHAVIOURS?

### General Method

The general subject, apparatus, and procedure specifications apply to all experiments unless exceptions are noted.

### Subjects

All experimental subjects were patients with a diagnosis of dementia. Dementia is difficult to diagnose by type before post-mortem examination (see Chapter 2, Understanding Dementia). The pre-experimental assessments conducted by the experimenter also indicated the presence of dementia. The diagnoses therefore, were as accurate as medical and psychological assessment currently allows.

The subjects had no overt sensory or motor deficits which could affect their ability to participate in the assessments, and no non-organic psychiatric disorders. The assessment of their levels of dementia was conducted by the experimenter using clinical assessment procedures, before the start of the language assessments, and is described in more detail below.

Thirty eight patients suffering from dementia participated in the experiments. They were from various occupational backgrounds and had no prior experience of psychology experiments. All were recruited through the referral of local



Health Authority and Social Services personnel. Next-of-kin of each subject were approached and asked to provide their written consent to the participation of their relative in the study. A copy of the standard letter sent and consent form can be seen in Appendix 1.

### Setting and Materials

All experimental sessions took place in the subject's own home, or the psychogeriatric hospital in which they lived, or the day centre which they attended regularly. The setting was consistent for each subject, except where otherwise stated. As pilot studies had shown that performance could be affected by time of day, all experiments were conducted at the same time of day for each subject, and in the same location. As far as was practically possible, background noise and distractors were kept at minimum levels. Test and training materials were presented on a tray placed on the table at which subject and experimenter were seated across from each other.

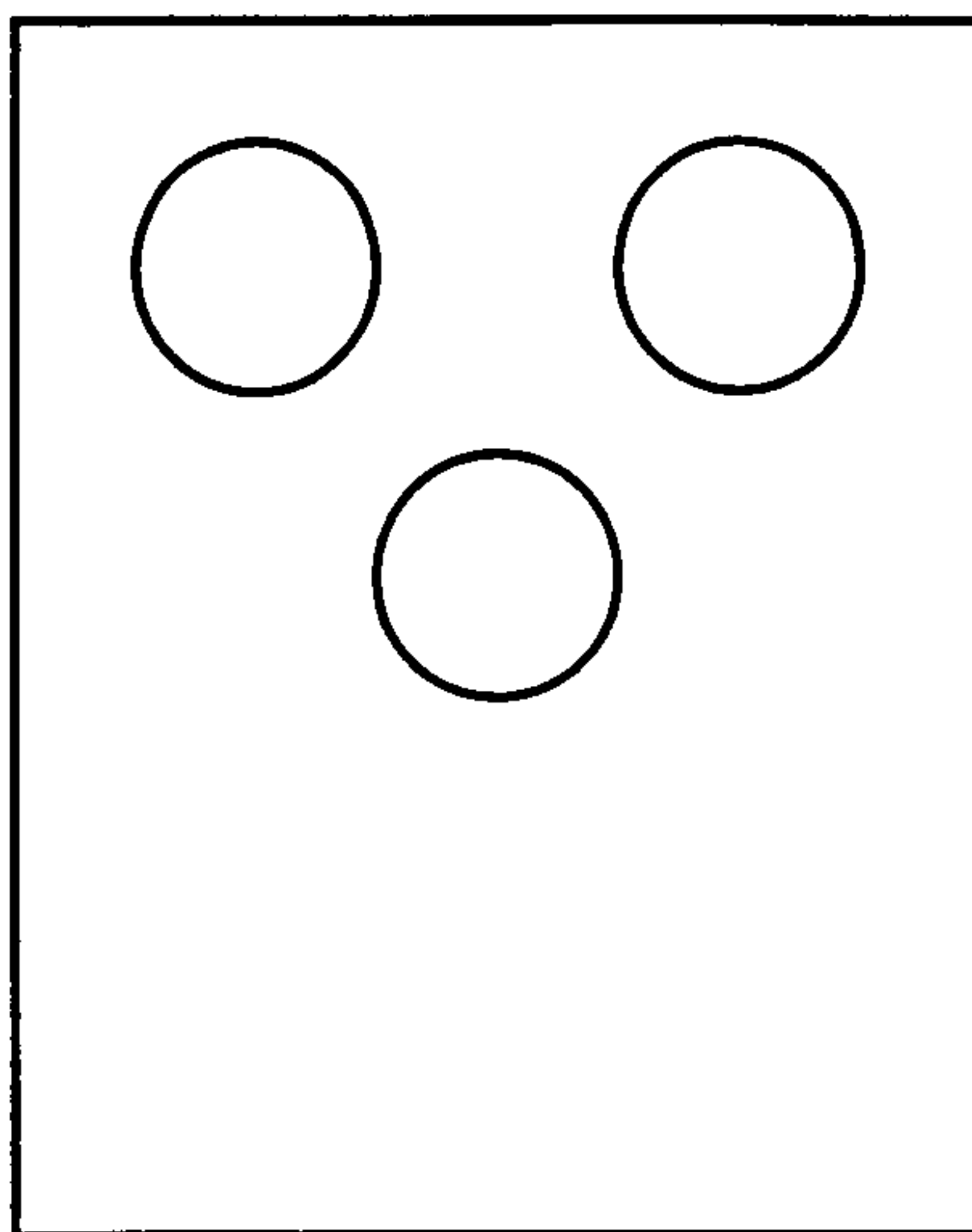
To assess the mental state of the patient, three standard assessments were used. These were the Mini-Mental State Exam (MMSE), (Folstien, et al, 1976), and the Cognitive Assessment Scale of the Clifton Assessment Procedures for the Elderly (CAPE), (Pattie and Gilleard, 1981). The use of these tests is well established with this population, and has been described in Chapter 2, Understanding Dementia. Their use had been recommended by the Consultant Psychogeriatrician who was liaising with the project. In addition to the Mini- Mental State Exam and the Cognitive Assessment Scale of the Clifton

Assessment Procedures for the Elderly, the Graded Naming Test, (GNT), (McKenna and Warrington, 1983), was used. The use of the latter test was recommended by the Clinical Psychologist responsible for Elderly Mentally Infirm (EMI) at the time. Scores of less than 20 on the MMSE are taken as indicating the presence of dementia, whilst scores below 15 are taken as indicating the presence of a severe degree of dementia (Karlsson, Backman, and Herlitz, et al, 1989, cited in Burgess, Wearden, Cox, and Rae, 1992). The scores for the CAPE are not as strictly interpreted, but the maximum score is 35, and scores of 29 or less can indicate mild impairment (Pattie and Gilleard, 1981). The normal range of scores for the GNT is 21-30.

Also used were ten common household items (which had been selected after consultation and use of a questionnaire (see Appendix 3) with care staff), and a tray on which the items were placed. Also used were ten colour photographs of these items, and ten written words corresponding to the conventional names of those items. The photographs were not to scale, and were mounted on card discs, filling the discs, which were eight centimetres in diameter. The cards were then covered with clear transparent plastic film. The written words were printed in uppercase letters in 14 point bold font in black on a white background, using an Apple Macintosh Word 4 programme, and a Laser printer. They were then mounted in the centre of circular cards, as with the photographs. These cards were also covered with clear transparent plastic film.

During conditional discrimination tasks a modified version of the Wisconsin Testing Apparatus (see Morris, 1987), for further details), was also used. Below is a two-dimensional representation

of the tray in which stimuli in the conditional discrimination task were presented.



The apparatus consisted of a screen 20 cm high, and a sliding tray. There was gap of 30 cm wide and 8 cm high in the centre of the screen through which the tray containing the stimulus items could be presented. The screen was high enough for the experimenter to set out the stimulus items without the subject viewing them prior to presentation, by sitting in the position described above in which she could see both sides of the screen. The tray contained three circular wells, as shown above, which were necessary when objects to be presented had response contingent stimuli hidden underneath them, and had a removable template surrounding the wells, which was of red or blue, depending on the task condition.

During the conditional discrimination assessment, pennies were used as response contingent stimuli. Sweets, pennies, and small novelties, specific to individual subjects, were used in conjunction with praise, as contingent events for target behaviours in all other tasks.



An audio tape recorder, or a video recorder, was used to record subjects' verbalisations and other behaviour.

In addition, from trial to trial, data were recorded on pre-prepared computer generated score sheets. These indicated random presentation of trials and served to record accuracy or inaccuracy of responses, and additional contextual details when appropriate. Randomisation of stimuli was conducted using a Macintosh "Wingz" programme (Informix Software, 1989).

### Design

A single subject multiple baseline design across behaviours was used for each subject. Multiple baseline designs usually involve taking assessments over time of at least two precisely defined behaviours. A baseline period of assessment is taken, and then the intervention is introduced to one behaviour, after a period of stability, or the absence of any systematic trend, is observed in the data. In an ideal case, this trend should include at least three data points of the same level. When all the baseline behaviours are stable, an intervention can be applied to one of them (Kazdin, 1982). The first behaviour to receive the intervention should be that behaviour which stabilises first. If a change immediately occurs in the behaviour to which the intervention has been applied, it can be assumed that the change is due to the intervention. Then the intervention can be applied to the second behaviour. At this stage in the experiment, the intervention has been applied to the first behaviour for a number of sessions, whilst baselines have continued to be taken of the others. When the intervention has been applied to the second

behaviour, it continues to be applied to the first, and baselines continue to be taken of the remaining behaviours. The effect of the treatment on one behaviour should not generalise to other behaviours, and this can be ascertained by observation of the data. Though generalisation of the effect of interventions may be clinically desirable, it is not conducive to the aim of demonstrating the causal impact of interventions as independent variables. Ideally, if generalisation does occur, it consists of a change in other baseline dependent variables occurring some time after the impact of the intervention on the target behaviour.

The multiple baseline design across behaviours has a number of advantages but some weaknesses. One of the main advantages is that the behaviour of a single subject can be examined, thus there is the possibility of targeting specific behaviours on which the subject requires assessment or treatment. Clear effects of an intervention can be shown with a single subject, since there are several opportunities to demonstrate the effect of each intervention. In the multiple baseline across behaviours design, each behaviour or dependent variable targeted with an intervention or independent variable, constitutes such an opportunity. In addition, the generality of the effect of the intervention or independent variable can be assessed, since each behaviour or dependent variable has a distinct form, and/or function.

As a description of each patient's symptoms, it is a great improvement on the one-off assessments often given to patients in that it provides a continual record of all dependent variables over a considerable time span. Variability in scores can therefore be assessed as well as possible inter-relations in dependent

variable score fluctuations, providing a greater insight into the behavioural status of each. The multiple baseline design also has the advantage that an effect of treatment can be shown without having to remove the treatment within the experiment, as is necessary in an ABA type design (see Kazdin 1982, for a full discussion of the ABA design).

Notable disadvantages of the multiple baseline design are that (except when assessing naturally occurring behaviours in a naturalistic setting) order effects can occur. Thus, a subject could perform worse on the last behaviour assessed, in each experimental period, because of fatigue or other subject variables. From session to session, therefore, the behaviours should be assessed in a random order.

Another limitation of the multiple baseline design is that it may be necessary to observe a baseline for a large number of sessions. This may mean that it changes over time, before the intervention is applied. It could improve, due to practice effects, or deteriorate, due to other subject variables, for example, boredom or worsening health.

### Procedure

Before commencing the work, the approval of the local Health Authority Ethical Committee was successfully obtained. This was necessary as the patients, who were to participate in the Experiments, were in the care of the Health Authority. Through involvement with the Ethical Committee application, the consent of the Consultant Psychogeriatrician and a the relevant nursing officers was obtained. This enabled the research to be conducted



with the full support of all relevant personnel. A provision of the Committee giving its approval, was that written consent to the participation of each subject be given by the subject's next of kin.

### Assessment of Verbal Behaviour

The simple verbal behaviours chosen as the targets for change, were selected through observation of what demented patients in a psychogeriatric hospital were able to do, what they had difficulty doing, and what it would be useful for them to be able to do, as assessed in preliminary pilot work and observation, and discussions with care staff. Another reason the behaviours were chosen was that they were amenable to accurate experimental assessment.

The experimenter initially introduced herself to the subject, and proceeded to initiate a conversation about a general matter. From assessment of such conversations, it gradually became clear what type of language difficulties the subjects were experiencing. A number of "games," using the formats set out below, and some additional formats (which were later rejected as unsuitable), were then developed, and the subjects' performance on such "games," was observed. Analysis of the relevant literature also revealed clues as to the type of classes of verbal behaviour that the subjects would perform badly on (for example, confrontation naming). Assessment of the subject's mental state with a clinical assessment scale also indicated the subject's level of ability (see below for details). The particular set of objects to be targeted for comprehension and production verbal behaviours were chosen by observation of the items in the patients' environment which it

would be useful for them to know the names of, in order to communicate their needs and intentions, and to interact effectively with their environment. A list of word frequency norms was then consulted to ensure that the names of all stimuli had approximately equal frequency in the English language (Francis and Kucera, 1982).

The behaviours chosen for study *with each subject* were selected from the results of informal assessments. In each case at least two sessions were spent selecting the appropriate classes of verbal behaviour, and this selection also reflected the subject's level of language competence and level of dementia. In each case, behaviours which were neither at floor or ceiling level were selected for further assessment and training. A behaviour on which the subject was scoring at ceiling level would have no scope for improvement, and a behaviour on which the subject was scoring at floor level, would offer no correct responses to be reinforced. In certain cases it was impossible to follow these guide-lines 'to the letter', for example in the case of Subject 1, when the subject was so incapable of performing the behaviours that performance at almost floor level had to be taken as the baseline.

This pre-experimental informal assessment period also allowed subject and experimenter to develop a positive and relaxed relationship. Thus, potential confounding effects of subject anxiety were minimised. The pre-experimental period was also important in allowing the experiment to be conducted as smoothly as possible. Dementia patients are a particularly difficult subject group to work with for a number of reasons. Their functional impairments dictate that only the simplest experimental

procedures can be carried out with them, and these simple procedures have to be carefully designed so that the subjects can follow instructions and complete tasks. They have to be told exactly what to do, and where to sit, and so forth, at the start of each session, because they often don't remember what happened in previous sessions. They can be extremely sensitive to small failures and react in a hostile way. Often they are disinhibited in their behaviour, saying and doing things that range from the socially unacceptable to the extremely offensive.

### Pre-test Assessment of Dementia

Where possible, the MMSE, GNT, and the CAPE were used to assess the patient's mental state and level of dementia, prior to other experimental investigations. Only one such test was administered to the subject per session, to prevent fatigue effects, and was introduced to the subject in an informal manner, as "some questions I'd like to ask you", or "a quiz". Every attempt possible was made to avoid provoking anxiety about these tests on the part of the subject.

For each subject, each session consisted of randomly scheduled ten-trial assessments of each class of verbal behaviour selected for inclusion in the multiple baseline design. Each assessment period consisted of all the classes of verbal behaviours selected, so could contain up to forty trials (four verbal classes with ten trials per class).

At the start of each session, the experimenter greeted the subject and explained that they were going to play some games to help him or her with his or her memory. The experimenter then



sat opposite the subject and commenced the session. There was a pause of a few minutes in between each ten trial block, in order that the subject's concentration span be maximised. As far as was possible, general conversation between subject and experimenter filled this pause. The specific procedure followed for each assessment will be described separately, below.

A broader definition of verbal behaviour than that given by Skinner is employed in this study. We include listener behaviour (responding appropriately to verbal instructions), as well as speaker behaviour. It is clear that both are involved in any verbal behaviour such as that described below.

#### Behaviour 1. The echoic.

This task assessed the most basic unit of verbal behaviour (Skinner, 1957). The echoic is a necessary skill which the speaker must use in performing imitative responses (see Chapter 4, Human Learning and the Role of Verbal Behaviour, for more detail). The echoic paradigm can also be useful at the start of an assessment as a check on the subject's hearing ability.

At the start of the session, the experimenter told the subject "I'm going to ask you to repeat some words after me."

Then at the start of each trial she asked the subject "can you say 'cup?'" (or another stimulus word). If there was no appropriate response, this was repeated a second time.

On the third occasion the word alone was verbalised by the experimenter. If the subject did not echo the word after three attempts, the next word was attempted. This procedure was attempted for each of the ten test stimuli.

### Behaviour 2. Mand compliance.

This class of verbal behaviour was not named as such and was not given the status of verbal behaviour by Skinner (1957). In his description of the mand, he describes mand compliance (without naming it as such), as the compliant response to the mand or request. Skinner does regard mand compliance as necessary support for verbal behaviour since it is actually "listener" behaviour. Other members of the verbal community must "listen" appropriately, or verbal behaviour will be extinguished (see Chapter 4 for more detail on mand compliance). It is a skill essential for competent social interaction.

At the start of each session, the subject was presented with a tray of ten objects. The subject was then told, "I'm going to ask you to give me one of these things." Then at the start of each trial the subject was asked, "can you get me the (cup)?" She was given approximately fifteen seconds to comply with the request. If she selected the correct item from the array on the tray, the trial was scored as correct. The item selected was then replaced on the tray by the experimenter and the items were spatially rearranged. The next trial was then begun with another object and so on until all ten stimuli had been presented.

### Behaviour 3. Naming.

As with the behaviours described above, the behaviour commonly known as naming has been described (as the "tact", see

Chapter 4), by Skinner as a simple verbal behaviour. Many studies (see Chapter 3), have used naming as an experimental measure, and in particular to assess the 'memory' problems of dementia patients.

At the start of each session, the subject was presented with the tray of ten objects. Then, the subject was told "I'm going to ask you what some of these things are called." The experimenter selected one of the ten items as indicated by the randomised score sheet, from the tray, held it in front of the subject, who was then asked "What's this?" The subject was allowed to handle the object if he or she wished (that is, if he or she reached for it or asked to hold it). She was given approximately fifteen seconds to name the object which the experimenter showed her. If she correctly named the object the trial was scored as correct. As in mand compliance, each item selected was then replaced on the tray by the experimenter and the next trial was then begun.

#### Behaviour 4. Receptive prepositional relations.

This measure assessed the subject's ability to respond appropriately to an instruction containing relational terms. The terms "in" and "on" were selected. These were chosen as typical of prepositional terms which connect units of verbal behaviour in relation to one another (see Chapter 4 for further details).

At the start of each session the experimenter told the subject "I'm going to ask you to put one of these things *in* or *on* a thing." The experimenter indicated the tray of stimulus items. Then the experimenter said to the subject "Put the (spoon) *in* the (cup)." The presentation of the "on" and "in" commands was



randomised, also the presentation of the names of the stimulus items was randomised. However, each stimulus name occurred twice in the session, as there were ten stimuli, and two stimuli acting in the in-on relationship in each trial. When the relationship was impossible, it was modified by the experimenter. Thus, a randomly generated "cup in the fork" would become "fork in the cup". Procedural difficulties such as this led to the modification of this assessment in Experiment 6. The subject was given approximately fifteen seconds to comply with the request. If she selected the correct items and placed them in the correct relation to each other, the trial was scored as correct. As in mand compliance, the items selected were then replaced on the tray by the experimenter and the next trial was then begun.

#### Behaviour 5. Expressive prepositional relations.

This measure assessed the subject's ability to appropriately *produce* the terms "in" and "on". The experimenter placed two objects in relation to each other, as determined by the randomised score sheet (as in comprehension of prepositional relations, above). The experimenter indicated the tray of stimulus items. The subject was then asked "What is *in* what"?

The trial was scored as correct if the subject correctly named the two items and their relation to each other, for example by saying "the fork is in the cup." Procedural difficulties such as those in Behaviour 4 also led to the modification of this assessment in Experiment 6.

#### Behaviour 6 (i). Conditional mand compliance (counting cue).

This assessment involved using the basic procedure of the mand compliance assessment, as above. Additionally, it required the subject to wait for the occurrence of a cue, before he or she performed the mand compliance response. In this respect the assessment was similar to the delayed response and conditional discrimination tasks discussed in Chapter 4 .

In the present assessment the experimenter requested one of the ten stimulus items, and the subject had to count up to ten before complying with the request. The purpose of the conditional cue was to investigate :

1. the subject's ability to respond appropriately to the "count" instruction;
2. the subject's ability to then select the appropriate stimulus.

The assessment was explained to the subject as follows. At the start of each session, the experimenter said to the subject "I'm going to ask you to give me one of these things (indicating the array of stimulus items), but before you give me it, I want you to count out loud up to ten." At the start of each trial the subject was told " count out loud, up to ten, and *then* give me the (cup)."

The trial was scored as correct if the subject counted audibly up to ten and gave the experimenter the correct object. As in previous tasks, at the end of each trial the stimulus item was replaced on the tray and the next trial commenced.

#### Behaviour 6(ii). Conditional mand compliance (card cue).

In this version of the conditional mand compliance assessment, the subject was required to follow a "when.....then," instruction, with no requested sequence of mediating behaviour. This procedure was similar to that above, except that the instruction to the subject was "I'm going to ask you to give me one of these things (the experimenter indicated the ten household items), but before you give me it, I want you to wait for me to hold up this card." At the start of each trial, the subject was told "*When* you see me hold up the card, give me the (cup)." The trial was scored as correct if the subject waited until the card was held up, and then gave the experimenter the correct item.

As in previous tasks, at the end of each trial the stimulus item was replaced on the tray and the next trial commenced, with the next stimulus item.

#### Behaviour 6(iii). Conditional mand compliance (bell cue).

In a simple version of the assessment which utilised an external cue or conditional prompt, the experimenter set a clock alarm to sound in a few seconds. The subject was told at the start of each session, "In this game, I'm going to ask you to point to some of these items (the experimenter indicated the ten household items), but before you point to the item, I want you to wait until you hear the bell sound." At the start of each trial the subject was instructed to "wait until you hear the bell sound, and then point to the --. "

In each version of the assessment, each trial was scored as correct or not, depending on (1), whether the subject waited for



the conditional cue before pointing to an item, and (2), whether the correct item was pointed to.

Behaviour 6(iv). Conditional mand compliance (blocks cue).

To perform this task, the subject was given a number of large wooden blocks. She was then told to "Pile the blocks up on top of each other." This was to ensure that this necessary skill was present in her behavioural repertoire. The subject was then told "In this game, I'm going to ask you to point to some of these items (the experimenter indicated the ten household items), but before you point to the item, I want you to pile up the blocks." At the start of each trial, the subject was given the instruction "Pile up the blocks, and then point to the--."

In *all four conditional tasks*, two criteria had to be satisfied before the experimenter could score the response as correct on the pre-prepared score sheet. In the first instance, the subject had to allow for the occurrence of the conditional cue. Any impulsive responses which occurred before the conditional cue, were scored as incorrect. The second criterion was of course that the correct stimulus had to be selected.

Behaviour 7. Matching to sample tasks.

These tasks used the modified version of the Wisconsin Testing Apparatus as described above.

Matching to sample (7i). Simultaneous identity matching.

In this procedure, the subject was presented with one sample stimulus in the centre well of the tray, and two comparison stimuli were presented in the two outer wells of the tray. A penny was hidden under the outer stimulus which was identical to the centre stimulus. The template surrounding the wells was blue, as an arbitrary cue for the subject that the task involved identity matching. The subject was instructed "Look at this one" (the experimenter pointed to the centre stimulus), and then "look at these ones" (the experimenter pointed to the outer two stimuli). The subject was then told "Now lift up the one you think the penny is hidden under." The subject then had to lift up one of the outer stimuli. If the subject attempted to lift the centre sample, she was reminded that "the penny will always be under one of these (the experimenter pointed to the outer two stimuli). If the subject was successful, she was able to retrieve the penny.

Matching to sample (7ii). Simultaneous oddity matching.

The procedure for this was the same as for identity matching, except that the coloured template was red, and the penny was hidden under the non-matching comparison stimulus.

Matching to sample (7iii). Delayed identity matching.

This procedure differed from that of simultaneous identity matching, in that the subject was presented first with a single

sample stimulus in the centre well, and the other wells were empty. The subject was instructed to "look at this." The experimenter then withdrew the tray, the sample was then removed, and then two comparison stimuli were presented in the outer two wells. The subject was then instructed to "now look at these." Again, a penny was presented under the comparison stimulus which was identical to the one which had been presented earlier as the sample. Again, the template surrounding the wells was blue.

#### Matching to sample (7iv).Delayed oddity matching.

This procedure was similar to that of delayed identity matching except that the template surrounding the wells was red, and the penny was hidden under the non-matching comparison stimulus.

The length of each session varied, depending on how many verbal behaviours were assessed, and the subject's level of co-operation. Typically, each session lasted for about thirty to forty minutes.



## EXPERIMENT 1

### ASSESSMENT OF THE EFFECT OF A CONTINGENT DELIVERY OF A PUTATIVE REINFORCER

#### Introduction

It has been made clear in previous chapters that the demented elderly have a number of psychological problems, as a result of the dementing process, of which deteriorating language and memory skills are not the least. Various strategies, such as Reality Orientation techniques, have been used to attempt to remediate these problems, with little real success.

The techniques of behaviour analysis were thought by the present author to have possible therapeutic value, as they have been used successfully in many situations in which the subjects' memory and language skills are not extensive, for example, with animals, young children, and mentally handicapped persons (see Chapter 4, Human Learning and the Role of Verbal Behaviour). In particular, positive reinforcement is widely believed (Davey, 1988), to be an important variable affecting the behaviour of a wide range of species, including adult humans. It was chosen as the most appropriate procedure for use in the first experiment, because of the large amount of evidence in support of its general effectiveness, and its simplicity as a procedure.

Miller, (1977), has suggested that positive reinforcement may also be a useful tool in the modification of the behaviour of the dementing elderly. However, the identification of positive reinforcers for the behaviour of the latter client group is a less

straightforward issue than is the case in animal studies and procedures employed with non-dementing human subjects, because the dementing elderly are particularly likely to have C.N.S. damage which may limit the potency of primary positive reinforcers, or secondary positive reinforcers such as tokens or money. It is important, therefore, to identify reinforcing events for each subject, and to carefully tailor the positive reinforcer to the individual's needs, as suggested by Ankus and Quarrington, in their study (see Chapter 4). Selection of appropriate response contingent events chosen as potential reinforcers for individual subjects was carried out firstly by observing the subject's usual interests and activities on the hospital ward. In this way, a variety of items were identified as salient, and further exposed to the subject, using an informal choice procedure. Secondly, if the subject showed interest in the items, for example by reaching for them, by smiling or laughing, on exposure to the items, or by asking for them, they were given the items. They were then asked if they liked the items, and their response was noted. Also, relative preference for a number of items such as a sweet, a coloured pen, a flower, a spinning-top, was noted in a more formal choice procedure, by placing them on a tray and allowing the subject to choose which item she would keep. The behaviour of the subject with the item was then further observed, and the experimenter noted whether the subject used the items, whether she hoarded the items, and so on. Through these observations and choice procedures, potential positive reinforcers were identified. The issue of reinforcement is considered further in the Discussion.

In Experiment 1, the intervention assessed was the delivery of a putative reinforcer contingent upon the subject making a correct response.

## Method

### Subjects

Three elderly female subjects participated. The three subjects were all patients in long-stay psychogeriatric wards. All subjects spoke English as their first language.

*Specific subject details* are set out below.

#### Subject 1. (date of birth 1917)

This subject was so severely demented, that administration of the CAPE and MMSE was impossible. She had first been referred to the psychiatric services three years previously, and had a diagnosis of senile dementia, (probably of the multi-infarct type). She spent most of her time, unoccupied, in a reclining chair. However, it was possible to establish good eye contact with her. She had an extremely limited speech repertoire, consisting of a few words such as "Hello," and various swear words. The verbal behaviours chosen for study were the echoic, mand compliance, object naming, and comprehension of prepositional relations. The echoic was chosen as the class of behaviour to be targeted with the intervention. The other three classes of behaviour were assessed as continuously measured baselines. The potential reinforcer chosen for use with Subject 1, was a combination of



praise and smiles from the experimenter and a chocolate button which was placed in her mouth. This was chosen because it elicited smiling and laughing from the subject, and it seemed that her dementia was too far advanced for her to appreciate anything other than primary reinforcement.

Subject 2. (date of birth 1899)

This subject was a "rota patient", who resided in the hospital for two week periods, to give her carer a break (under a system known as 'respite care'). Her performance on pre-experimental measures indicated moderate dementia (see Table 5.1).

She had been referred to the psychiatric services about one year before participating in the study, and had a diagnosis of dementia of the Alzheimer's type. She was quite active and had moderately well preserved social skills.

The classes of verbal behaviours assessed were two conditional mand compliance behaviours, and expressive and receptive prepositional relations. The class of behaviour chosen to be targetted with the intervention was a conditional mand compliance behaviour (Behaviour 6 (i)), whilst the other three classes of verbal behaviour were assessed as continuously measured baselines.

The potential reinforcer chosen for this subject was praise and conversation from the experimenter, and coloured stickers. She had commented that the coloured stickers were pretty, and appeared pleased (smiling and laughing increased in frequency), at the extra attention she was getting from the experimenter.

### Subject 3. (date of birth 1914)

This subject was severely demented as indicated by her scores on the CAPE (see Table 5.1). She had a diagnosis of senile dementia (probably of the Alzheimer type). She was dependent on nursing staff for all activities. Her speech repertoire was wide, and her eye contact was good, but it was impossible to engage in meaningful dialogue with her, as the majority of her speech was irrelevant and bizarre. The verbal behaviours chosen for assessment were mand compliance, object naming, and receptive prepositional relations. The classes of verbal behaviour chosen for intervention were mand compliance and naming. The potential reinforcer chosen for Subject 3 was the same as for Subject 2, and for the same reasons.

### Setting and Materials

*Specific setting details* are described below. The materials used were described in the General Method.

### Subject 1

To move the subject, two or sometimes three members of staff were needed to assist her into a wheelchair, take her to the side room selected as the experimental room, and then lift her out of the wheelchair and into a standard straight-backed chair. During and for some ten minutes after this, the subject seemed to be quite considerably distressed. Consequently, it was considered more appropriate for the subject to remain where she was

originally sitting, although this meant that the environmental distraction level was quite high.

### Subject 2

The subject was assessed in a quiet side room.

### Subject 3

The subject was assessed at her usual location in the day room, as she was not mobile enough to walk with ease, and she expressed a preference for this location.

### Design

The design was as described in the General Method.

### Procedure

The procedure was as described in the General Method, except that in the case of Subject 2, the conditional mand compliance "Card cue", assessment was replaced by "Pen cue", and the instruction "When you see me hold up this pen", replaced "When you see me hold up this card".



## Results

All results were stored in Cricket Graph data storage files (Cricket Software, 1988), and transferred to a MacDraw graphics programme (Claris Corporation, 1988), when detailed visual analysis of the data was required. This made it possible for accurate treatment of the data and both simple descriptive statistics such as means and curve fits, and clear graphical presentation, to be completed.

Tables 5.1 and 5.2 show subjects' scores on the standard assessments, and the choice of verbal behaviours selected for assessment and training. Where a score is missing, this indicates that the subject was unable to attempt the assessment.

Table 5.1: Subjects' scores on two clinical tests for dementia: the Mini Mental State Exam (MMSE); and Cognitive Assesment Scale of the Clifton Assessment Procedures for the Elderly (CAPE).

SUBJECT	ASSESSMENT and SCORE	
	CAPE	MMSE
1	did not participate	did not participate
2	7	6
3	4.5*	did not participate

\*= mean score of two assessments

Table 5.2: Classes of verbal behaviour selected for assessment and training for each subject.

ASSESSMENT	SUBJECT		
	1	2	3
ECHOIC	✓		
MAND COMPLIANCE	✓		✓
NAMING	✓		✓
RECEPTIVE PREPOSITIONAL RELATIONS		✓	✓
EXPRESSIVE PREPOSITIONAL RELATIONS		✓	
CONDITIONAL MAND COMPLIANCE (i)		✓	
CONDITIONAL MAND COMPLIANCE (ii)		✓	

Key:

✓ =behaviour selected for assessment and training

In studies using multiple baseline designs it is conventional to analyse data by visual inspection of the graphs (Kazdin, 1984).

Means and standard deviations, and median scores, have also been calculated in each phase for purposes of comparison. The standard deviation of the mean indicates the amount of variability in the scores from which the mean has been calculated, and thus is a good indicator of its validity as a statistic. The median, however, may be the most useful statistic for consideration in the analysis of this set of results. This is because a) the median is a real score corresponding to the middle point of the data in a given phase (or the mid-point of two middle data points in a phase with an uneven number of scores), and b) because it is not distorted by extreme scores. Extreme scores do tend to occur in experimental research (Howell, 1985), and if they occur only occasionally, they are not judged to be important for the data as a whole. A subject could give an unusually low score because he or she was feeling unwell, or give a high score because he or she had been given a different medication that day. In longitudinal research with dementia patients, this issue is particularly pertinent, because dementia patients have occasional periods of lucidity and also days when their mood is low. This variability within subjects means that longitudinal assessment of the type reported here may give a most accurate picture of an individual's abilities.

Additionally, computer generated simple curve fits have been plotted on continuously assessed baselines in the cases where there is visible variation in the baseline. Observation of upward or downward trends in such baselines, whether or not such trends were clear from visual analysis of the data, must lend



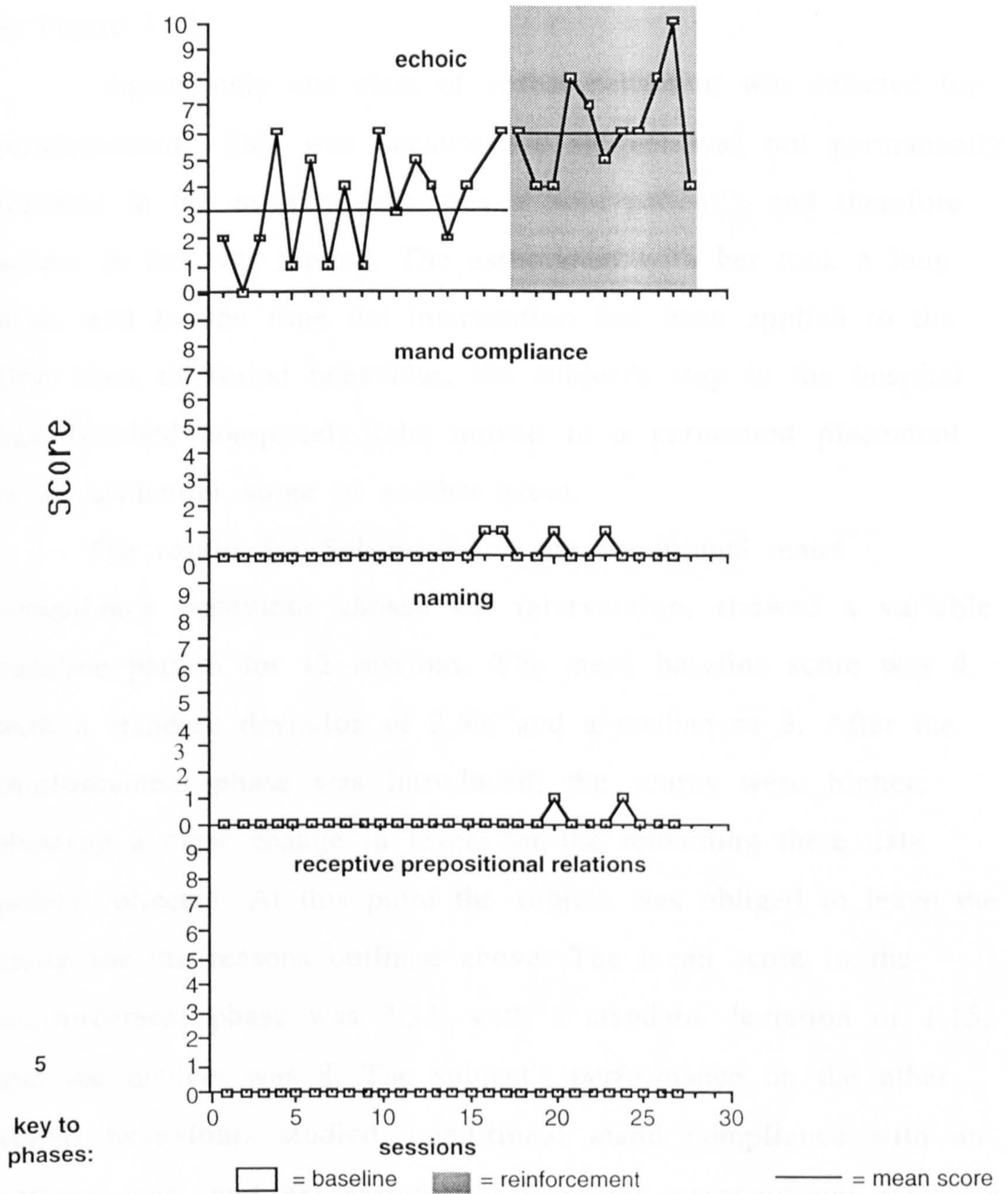
support to the possibility that behaviours were changing over time regardless of the interventions applied. It must be noted that the simple curve fit used in this sense is merely a descriptive statistic showing the trend in a particular set of data, and, as it is not calculated in the same way as the mean, cannot be compared or contrasted directly with the statistics used to describe the behaviours which received the interventions.

The behaviours chosen to be assessed for Subject 1 were the echoic, mand compliance, naming, and receptive prepositional relations (see Figure 5. 1). The results for Subject 1 on the echoic, showed a variable pattern in the baseline phase, with a mean score of 3.25 ( standard deviation 2.02), and the median score was 3. After a baseline period of sixteen assessments, the 'reinforcement' phase was begun.

When reinforcement was introduced, an increase in the scores on the echoic was visible. Scores ranged from 10, to 4, with a mean score of 6.2 (with a standard deviation of 1.94), and a median score of 6. On the other classes of verbal behaviour studied as baselines, the scores were consistently low and are in accordance with this subject's severe level of dementia. The intervention was only applied to the echoic, in the case of Subject 1. There were two reasons for this. The first reason was that the baseline of the class of echoic behaviour was extended for 16 sessions, because the baseline behaviour was variable, and it was assumed that it might in time become more stable. The second reason that only one behaviour was targetted for intervention was because the baselines of the other behaviours were at such a low level that they were not considered appropriate for intervention, and production of verbal behaviour in the continuously assessed

baselines was so low that no trends could be plotted. Additionally, Subject 1 was so severely demented that few data of any nature could be obtained from her, and these with great difficulty and extensive expense of time.

Figure 5.1. Subject 1's scores on four classes of verbal behaviour, illustrating the effect of delivery of response contingent praise and chocolate buttons on the echoic, with baselines of mand compliance, naming, and receptive prepositional relations



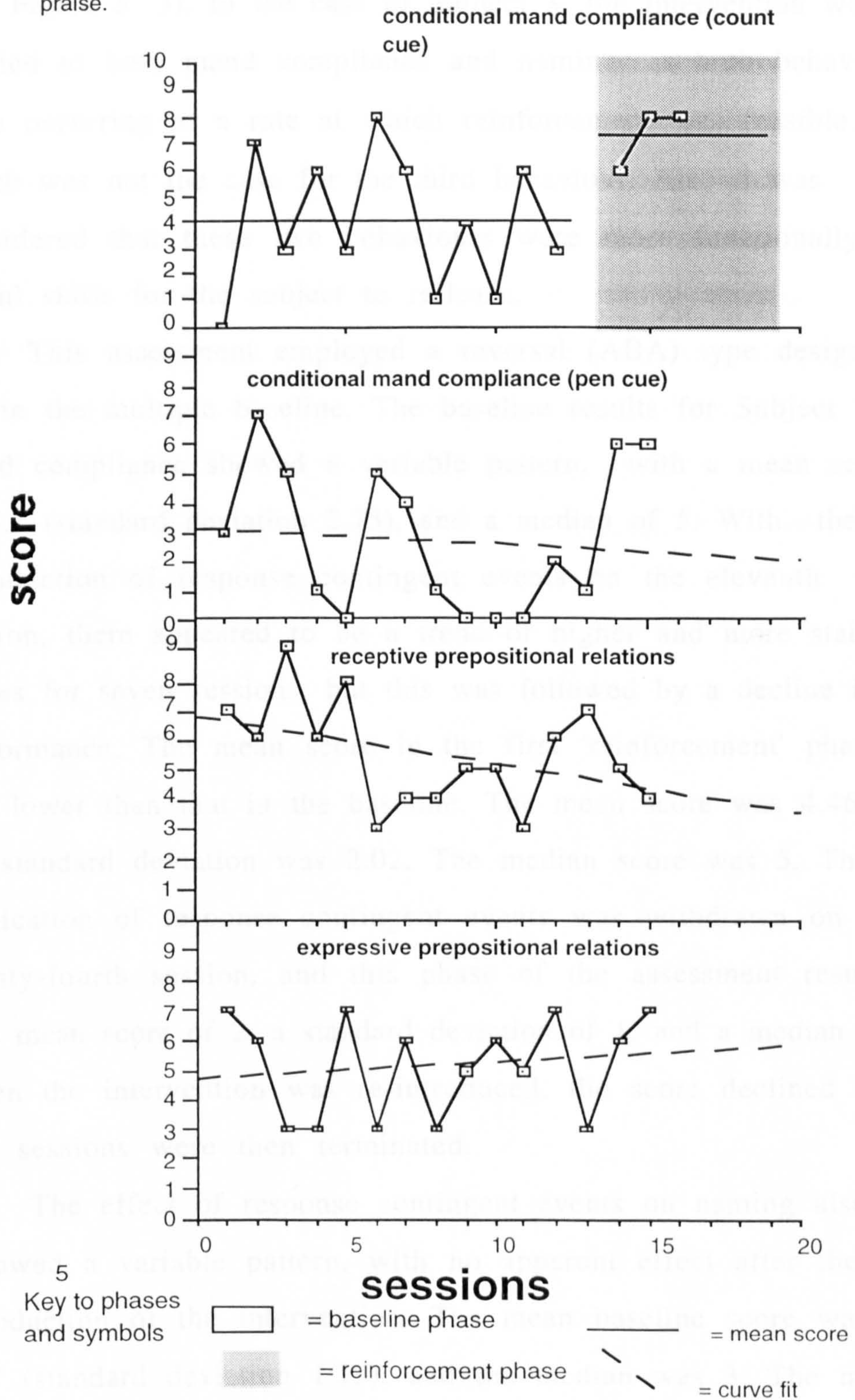


The behaviours chosen to be assessed for Subject 2, were receptive prepositional relations, expressive prepositional relations, conditional mand compliance (counting cue), and conditional mand compliance (pen cue). These data are presented in Figure 5. 2.

Again, only one class of verbal behaviour was selected for reinforcement. This was because the subject was not permanently resident in the hospital (she was a 'rota patient'), and therefore access to her was limited. The assessment with her took a long time, and by the time the intervention had been applied to the first class of verbal behaviour, the subject's stay in the hospital had finished completely (she moved to a permanent placement in a residential home in another area).

The results for Subject 2, on the conditional mand compliance behaviour chosen for intervention, showed a variable baseline pattern for 12 sessions. The mean baseline score was 4, with a standard deviation of 2.59, and a median of 3. After the reinforcement phase was introduced, the scores were higher, showing a clear change in level, for the remaining three data points collected. At this point the subject was obliged to leave the study for the reasons outlined above. The mean score in the reinforcement phase was 7.33, with a standard deviation of 1.15, and the median was 8. The subject's performance on the other verbal behaviours studied, conditional mand compliance with an external cue, and expressive and receptive prepositional relations, showed a variable pattern with no *clear* upward or downward trend, although the simple curve fit plotted showed a downward trend in the former two cases, and a very slight upward trend in the case of expressive prepositional relations.

Fig. 5. 2. Subject 2's performance on four classes of verbal behaviour: conditional mand compliance (count cue); conditional mand compliance (pen cue); expressive prepositional relations; and receptive prepositional relations, showing the effect of the delivery of response contingent small novelties and praise.





The behaviours chosen for assessment for Subject 3, were mand compliance, naming, and receptive prepositional relations (see Figure 5. 3). In the case of Subject 3, the intervention was applied to both mand compliance and naming, as both behaviours were occurring at a rate at which reinforcement was feasible, which was not the case for the third behaviour. Also it was considered that these two behaviours were more functionally useful skills for the subject to re-learn.

This assessment employed a reversal (ABA) type design, within the multiple baseline. The baseline results for Subject 3 on mand compliance showed a variable pattern, with a mean score of 5.1 (standard deviation 2.73), and a median of 5. With the introduction of response contingent events on the eleventh session, there appeared to be a trend of higher and more stable scores for seven sessions, but this was followed by a decline in performance. The mean score in the first 'reinforcement' phase was lower than that in the baseline. The mean score was 4.46, and the standard deviation was 2.02. The median score was 5. The application of response contingent events was withdrawn on the twenty-fourth session, and this phase of the assessment resulted in a mean score of 2, a standard deviation of 1, and a median of 2. When the intervention was re-introduced, the score declined to 1. The sessions were then terminated.

The effect of response contingent events on naming also followed a variable pattern, with no apparent effect after the introduction of the intervention. The mean baseline score was 3.27 (standard deviation 1.39), and the median was 3. The mean score then declined a little to 2.33 (standard deviation 1.66), in the intervention phase, with a median of 2. The mean score fell



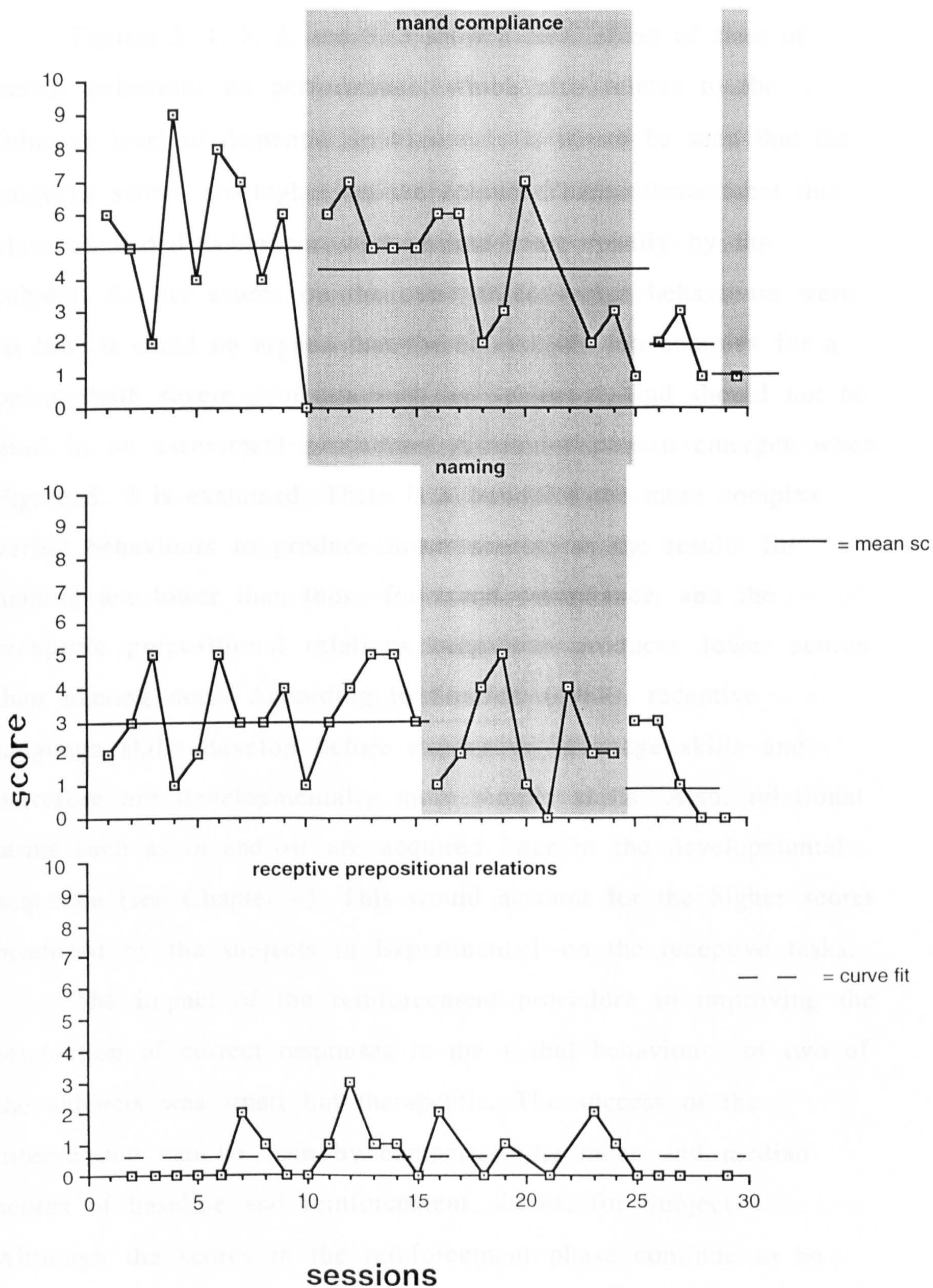
again to 1.75 (standard deviation 1.52), in the second baseline phase, with a median of 1.

The third verbal behaviour assessed was receptive prepositional relations, and this showed a consistent pattern of low scores throughout the assessment, and the simple curve fit showed no trend.

The assessment was terminated because of a number of factors. The subject's dementia was progressing throughout the period of assessment, and consequently she was becoming more difficult to work with. Consequently an ethical dilemma was raised as to whether the experimenter was justified in asking the subject to complete procedures which did not appear to be of immediate benefit to her.



Fig. 5. 3. Subject 3's performance on three classes of verbal behaviour: mand compliance ; naming; and receptive prepositional relations, showing the effect of the response contingent delivery of small novelties and praise.





## Discussion

Figures 5. 1, 5. 2, and 5. 3 show a clear effect of class of verbal behaviour on performance, which also relates to the subject's level of dementia. In Figure 5. 1, it can be seen that the subject's scores are higher on the echoic. This indicates that this class of verbal behaviour was emitted more readily by the subject. As her scores on the other three verbal behaviours were so low, it could be argued that these tasks are too complex for a person with severe dementia such as Subject 1, and should not be used in an assessment procedure. A similar pattern emerges when Figure 5. 3 is examined. There is a trend for the more complex verbal behaviours to produce lower scores, as the results for naming are lower than those for mand compliance, and the receptive prepositional relations behaviour produces lower scores than naming does. According to Shaffer, (1989), receptive language skills develop before expressive language skills and therefore are developmentally more simple skills. Also, relational terms such as *in* and *on* are acquired later in the developmental sequence (see Chapter 4). This would account for the higher scores produced by the subjects in Experiment 1 on the receptive tasks.

The impact of the reinforcement procedure in improving the production of correct responses in the verbal behaviour of two of the subjects was small but therapeutic. The success of the intervention can be seen by comparing the mean and median scores of baseline and reinforcement phases, for Subject 1. Although the scores in the reinforcement phase continue to be extremely variable, the mean and median were approximately doubled in the reinforcement phase. A similar improvement can



be seen in the results of Subject 2, with reinforcement phase scores again approximately double those in baseline. Additionally, performance in the reinforcement phase for Subject 2 was more stable, as can be seen by the smaller standard deviation of the latter mean score. Data derived from this experiment do show that performance on the echoic (Subject 1), and conditional mand compliance (Subject 2), can be improved by the delivery of reinforcers contingent upon correct responding. Further studies with other subjects would establish the generality of this finding for these verbal classes. The impact of response-contingent reinforcers on the performance of other verbal classes needs to be assessed to determine whether the intervention is generally effective in improving verbal performances.

The intervention, however, was not successful in the case of Subject 3 (see Figure 5. 3).

Why, then, was the technique of contingent delivery of a putative reinforcer not universally effective in this experiment?

Analysis of the literature revealed few clues as to which objects or events are potential reinforcers for the behaviour of the dementing elderly. It was difficult to select items which would be appropriate for this client group because many items commonly used as reinforcers were seen as childish by the elderly subjects.

Ankus and Quarrington found that beer was an appropriate reinforcer for the behaviour of their male subjects, but since all the subjects in Experiment 1 were female, beer was not used. Ankus and Quarrington also found that pennies were an effective reinforcer for the behaviour of their female subjects, but in this experiment it was found that the subjects attempted to return the pennies to the experimenter with the statement "I don't need

these," or "you'll need these for next time." This may have been related to the fact that subjects had few opportunities for spending money (the present hospital did not have a shop, unlike the one Ankus and Quarrington worked in). Therefore pennies were not considered an appropriate 'reinforcer'.

It is possible that the designated 'reinforcer' may have been inappropriate, for the behaviour of Subject 3. A more appropriate 'reinforcer' may have also maximised the small improvements in the behaviour of Subjects 1 and 2. It was stated in Chapter 4 that the demented elderly may not respond to reinforcement procedures, and reinforcement may have to be adapted specifically to their requirements. Although, as described above, great care was taken to ensure that this was, as far as possible, the case, possibly a wider range of potential reinforcers should have been made available to the subject in the informal and formal choice procedures. Practical constraints limited the range available in this study. Even if reinforcers were effective at the start of an intervention phase, their effectiveness could decline as the subjects became satiated with the designated 'reinforcers.' Physiological constraints (such as brain lesions causing ahedonia, Wood, 1988), other than declining sensory capacities may have limited the effectiveness of the 'reinforcer.' This difficulty may have been overcome had assessment of the continued effectiveness of the 'reinforcer' taken place outside the experimental sessions. In longitudinal studies of this kind it may be necessary to monitor (on other tasks) the reinforcing status of the contingent stimuli employed. Difficulties of this nature commonly arise when working with human subjects. Inter-subject differences make selection of reinforcers difficult, and satiation

can easily occur, as it would be unethical to keep the subjects in a state of deprivation, although it is accepted practice to do so in animal studies.

All subjects who participated in the study were deteriorating, and any gains made during the study may have been offset by their physical and mental deterioration. Observation of continually assessed baselines did not confirm this possibility. In the case of Subjects 1 and 3, the baselines did not show trends (see Figures 5. 1 and 5. 3), and in the case of Subject 2 (see Figure 5. 2), one baseline showed an upward trend, whilst two showed a downward trend. Practice effects, occurring without experimenter-generated reinforcement, could have accounted for maintenance of any appropriate production of responses. Practice effects, mentioned in Chapter 3, within the non-demented population are so well documented that most experimental designs include strategies to safeguard against them (Plutchik, 1983). Evidence cited by Wearden (1988) suggests that the performance of adult humans on operant tasks may be governed by informational contingencies. The practice effect observed in a in a assessment with no overt reinforcement could be accounted for by the informational contingencies inherent in task performance.

The likelihood that the experimenter would witness a decline in the subject's health, mental state, and level of functional ability during the course of an experiment was high. This decline might not have been noticed by care staff who were working with the patient all the time on a daily basis, but it is likely that when performance is subject to the rigorous scrutiny of experimental conditions, any decline will be more visible. A patient who still



has insight into his or her condition will often become distressed when this decline is exposed. Patients who have insight into their condition can find the revelation of their deficits embarrassing and distressing, and care was taken by the experimenter throughout this study to be sensitive to this possibility.

## CHAPTER 6

### EXPERIMENT 2

#### DOES REINFORCEMENT FOLLOWED BY MODELLING HAVE AN EFFECT ON LEVEL OF PRODUCTION OF CLASSES OF VERBAL BEHAVIOURS CHOSEN FOR ASSESSMENT?

##### Introduction

The rationale for the use of reinforcement has been discussed above. As the therapeutic effects produced by reinforcement in Experiment 1 left additional scope for improvement, modelling was added to the treatment strategy. Modelling has been shown to be an important influence on human learning, by Bandura, et al, (1969), for example. It is likely that much of children's language acquisition is facilitated by imitation of adults (see Catania (1992), for a discussion of this issue, and Chapter 4, this volume). Therefore it was considered a potential therapeutic factor for further investigation.

##### Method

##### Subjects

Three elderly subjects participated. All were resident in long-term care facilities. All general subject details are as

described in the General Method; *specific subject details* are set out below.

Subject 4 (date of birth 1914)

This male subject was an ex-soldier and had a history of alcohol abuse which culminated in a crisis involving his selling off the family home to pay gambling debts, his admission to the North Wales Hospital and diagnosis of Korsakoff's Syndrome. He was transferred to a local hospital where the study was conducted. He was disoriented in time and place, and on questioning by the experimenter he claimed he was in an army camp in Italy. His first language was Welsh, but he spontaneously spoke in English to English staff members.

The three classes of verbal behaviour studied were mand compliance, naming, and receptive prepositional relations, all with objects. The potential reinforcers chosen for this subject were coloured pens, opportunities to use a spinning top or a miniature pin-ball machine, and praise. He could be observed occupying himself with the 'prizes' when the experimental sessions were not in progress. At the end of each session he was given a specific time to play with the 'prizes.' The experimenter observed that he stored the 'prizes' carefully in his room after obtaining them.

Subject 5 (date of birth 1907)

This female subject had a mixed diagnosis of senile dementia/Korsakoff's Syndrome. The latter had onset some ten years before the study began. She was admitted to the North



Wales Hospital about two years before commencement of the study, and after assessment there, had been placed in a long-stay hospital locally. She had worked on her husband's farm and as a housewife, before her difficulties began. She was pleasant and had well-preserved social skills, but otherwise was severely demented. The classes of verbal behaviour chosen for study with Subject 5 were mand compliance, naming, and receptive prepositional relations.

#### Subject 6 (date of birth 1899)

This female subject was a resident in a Social Services residential home for the elderly. She had a diagnosis of dementia, and her scores on the two cognitive assessments indicated severe dementia. The onset was some three and a half years previously. She was dependent on the staff for her care and could not walk independently. She had a history of aggressive outbursts, but during assessment was pleasant with well-preserved social skills. The classes of verbal behaviour chosen for study with Subject 6 were mand compliance, naming, and receptive and expressive prepositional relations.

#### Setting and Materials

Setting and material details were as described in the General Method.

## Design

The design was as described in the General Method.

## Procedure

The general procedure was as described in the General Method. Reinforcement and modelling were used as interventions, in an attempt to assess the effectiveness of reinforcement without and with modelling. The application of reinforcement to target verbal behaviours was as in Experiment 1, and the application of modelling to these behaviours will be described below.

In the case of mand compliance (Subjects 4 and 6): after the subject had responded incorrectly to a request for an item, the experimenter modelled the correct response by selecting the correct item, and giving it to the subject, with the words "give me this one." The trial was then repeated. Because of the nature of the mand compliance assessment, modelling of the full response was impossible, as it required the subject to select an item, and give it to the experimenter.

In the case of naming (Subjects 4, 5, and 6): after the subject had responded incorrectly to a request for a name of an item, the experimenter provided the name for him or her (for example, by saying "cup,") and then the trial was repeated.

Responses during modelling interventions were recorded separately: responses that followed a request from the experimenter are referred to and were recorded as non-imitative modelled responses, and responses the subject made after the

model had been produced by the experimenter are referred to and were recorded as imitative responses. This enabled the experimenter to determine whether imitative learning resulted in an improvement in non-imitative performance on the verbal classes which received the interventions.

## Results

Tables 6.1 and 6.2 show Subjects 4, 5, and 6's scores on the standard assessments, and the classes of verbal behaviour selected for assessment and training.



Table 6.1. Subjects' scores on two clinical tests for dementia: the MMSE and the CAPE.

SUBJECT	ASSESSMENT and SCORE	
	CAPE	MMSE
4	2	did not participate
5	1	did not participate
6	3	2

Table 6.2: classes of verbal behaviour selected for assessment and training for each subject.

ASSESSMENT	SUBJECT		
	4	5	6
MAND COMPLIANCE	✓	✓	✓
NAMING	✓	✓	✓
RECEPTIVE PREPOSITIONAL RELATIONS	✓	✓	✓

Key:  
✓ =behaviour selected for  
assessment and/ or training

The effects of the interventions on the classes of verbal behaviour selected for assessment and training are described below, and separately for each subject.

Figure 6. 1 shows that Subject 4 had a mand compliance score of 6 on the first session. The assessments needed to be carried on, therefore, for enough sessions for the data to show that the score was not going to spontaneously recover to this level. The mean score in the baseline phase of the mand compliance assessment was 0.84 (the standard deviation of the mean was 1.34), and the median was zero. The scores then showed an increase after the introduction of reinforcement at session 27, with a mean of 3, (standard deviation 2.59) and a median of 2. Modelling was introduced when it was clear that the scores were not about to improve any further in the reinforcement phase, with mand compliance. The improvement in production of correct responses was sustained through the modelling phase only in the imitative responses. The mean here was 4.09 (standard deviation 1.24), and the median was 4. However, the mean of the non-imitative correct responses decreased to 1.1 for the mean (standard deviation 2.41), and the median was 1. Subject 4 imitated 45.52% of the experimenter modelled responses (showing that even the immediate impact of this intervention was limited in this case). The implications of this result will be discussed further in the Discussion.

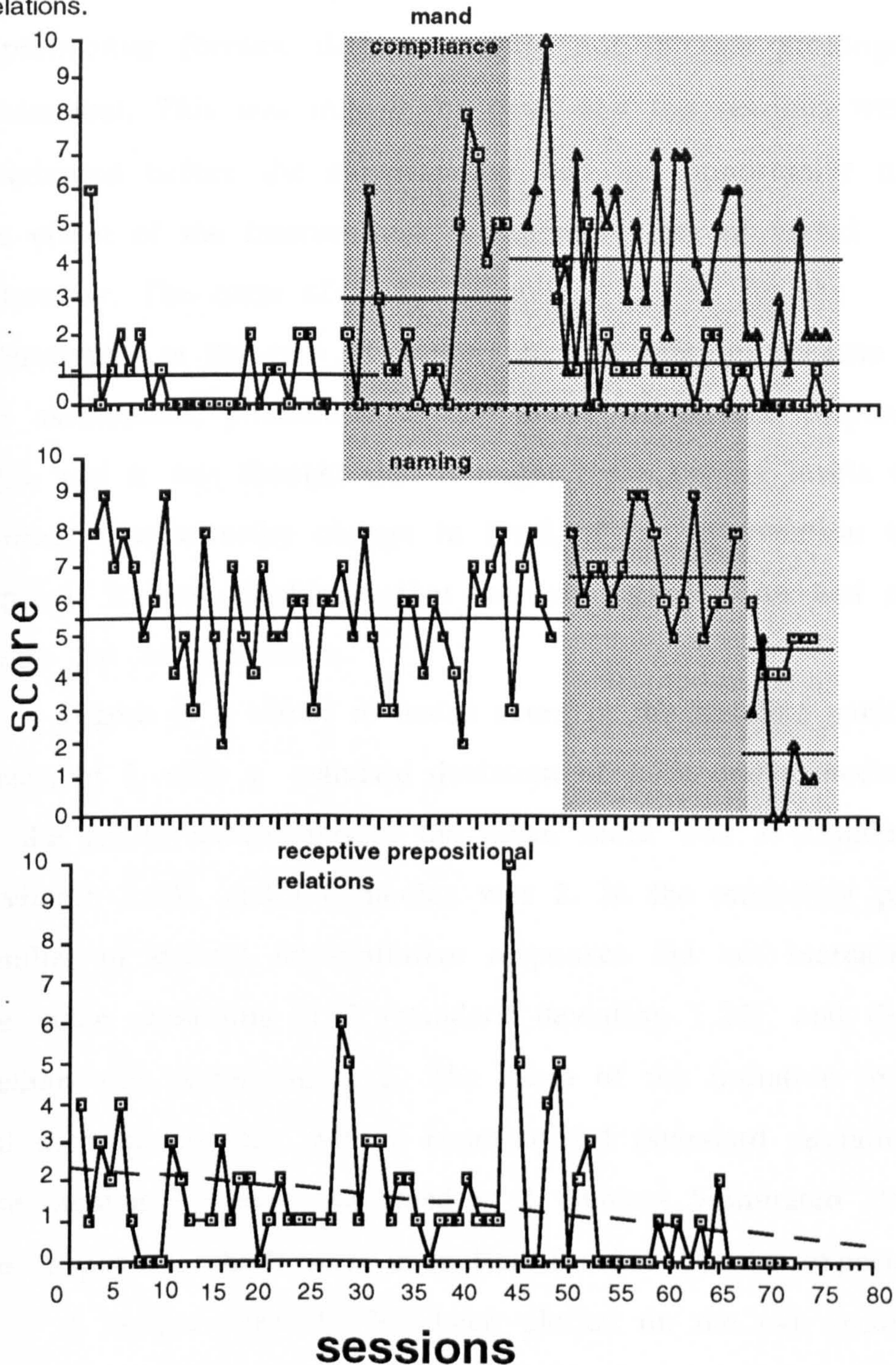
On the assessment of the naming response, reinforcement was not introduced until it had been withdrawn on the mand compliance response, thus ensuring that the effect of reinforcement across the two different behaviours was not confounded.

A rather different pattern to the trend seen in the mand compliance behaviours can be seen in the graphs illustrating Subject 4's correct naming responses (see Figure 4). The results showed a mean score of 5.68 (standard deviation 1.79), in the baseline phase, and a median of 6. There were also a number of high scores in the baseline phase, for example, with two scores of 9. There was a visible increase in correct responses after the introduction of the reinforcement phase, and this gave a mean score of 6.94 (standard deviation 1.34), and a median of 6.5. As with mand compliance, naming scores dropped in the modelling phase, with a mean score for the non-imitative responses of 4.71 (standard deviation 0.76), and a median of 4; the mean score of the imitative responses was 1.71 (standard deviation 1.78), with a median of 1. Subject 4 imitated 32.43% of the modelled naming responses demonstrated by the experimenter.

A simple curve fit was plotted to illustrate the trend in the receptive prepositional relations response, and the curve fit shows a downward trend.



Fig. 6. 1. Subject 4.'s scores on mand compliance and naming before and after (i) delivery of response contingent coloured pens and praise, and (ii) modelling and delivery of response-contingent coloured pens and praise, with a free-running baseline of receptive prepositional relations.



key to phases and symbols:

□ represents the baseline phase

■ represents the reinforcement phase

■ represents the modelling phase

□ squares represent non-imitative scores

▲ triangles represent imitative scores

— = curve fit — = mean score



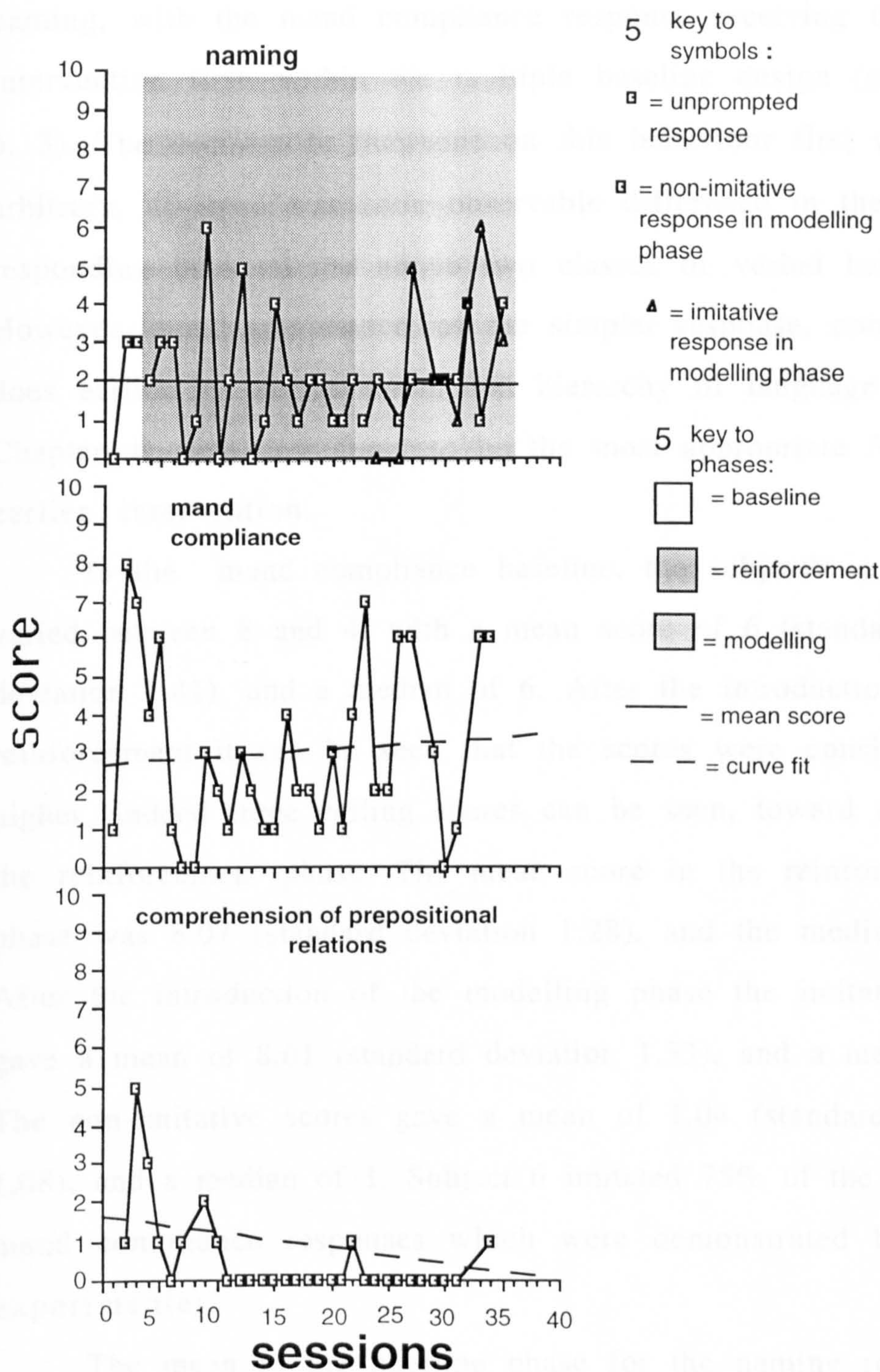
Figure 6. 2 shows that, in the case of Subject 5, modelling and reinforcement were only applied to one behaviour, because Subject 5 was extremely difficult to work with and the experimenter foresaw that she would not tolerate prolonged assessment. This was indeed the case, and the sessions were terminated before the experimenter had the opportunity to assess the effect of the interventions on another class of verbal behaviour. The class of verbal behaviour chosen for the intervention in the case of Subject 5, was naming, because early in the assessment, production of the mand compliance response was high, and it was thought that it might reach ceiling levels quickly, without a noteworthy change in level, if the intervention was applied. It was considered that the naming response had more scope for improvement.

Figure 6. 2 shows a mean score in the baseline naming phase, of 2, with a standard deviation of 1.73, and a median of 3. In the reinforcement phase, the mean score was 2 (standard deviation 1.63), and the median was 2. In the modelling phase the number of correct non-imitative responses did not increase, with the mean remaining at 2 (standard deviation 1.25), and the median also remaining at 2. The mean of the imitative responses did increase slightly, with a mean of 2.4 (standard deviation 2.06). The median, however, remained at 2. Subject 5 imitated 30% of the responses which were modelled for her by the experimenter.

A simple curve fit has been plotted on the two continuously assessed baselines. The trend shown in the mand compliance response can be seen to be very slightly upwards, whilst the trend shown by the curve fit for receptive prepositional relations is downwards.



Fig. 6. 2. Subject 5.'s scores on three classes of verbal behaviour, naming, mand compliance, and comprehension of prepositional relations, showing the effect of response contingent delivery of small novelties and praise, and of the addition of modelling.





For Subject 6, the classes of verbal behaviour chosen to be targetted with the intervention were mand compliance and naming, with the mand compliance response receiving the intervention first, within the multiple baseline design (see Figure 6. 3). The decision to intervene on this behaviour first was rather arbitrary, as there was little observable difference in the level of responding between the above two classes of verbal behaviour. However, mand compliance, as the simpler response, coming as it does earlier in the developmental hierarchy of language (see Chapter 4), was considered to be the most appropriate for the earlier intervention.

In the mand compliance baseline, the subject's scores varied between 8 and 4, with a mean score of 6 (standard deviation 1.41), and a median of 6. After the introduction of reinforcement it can be seen that the scores were consistently higher. Indeed three ceiling scores can be seen, toward the end of the reinforcement phase. The mean score in the reinforcement phase was 8.07 (standard deviation 1.28), and the median was 8. After the introduction of the modelling phase the imitative scores gave a mean of 8.61 (standard deviation 1.33), and a median of 9. The non-imitative scores gave a mean of 1.04 (standard deviation 1.08), and a median of 1. Subject 6 imitated 75% of the modelled mand compliance responses which were demonstrated by the experimenter.

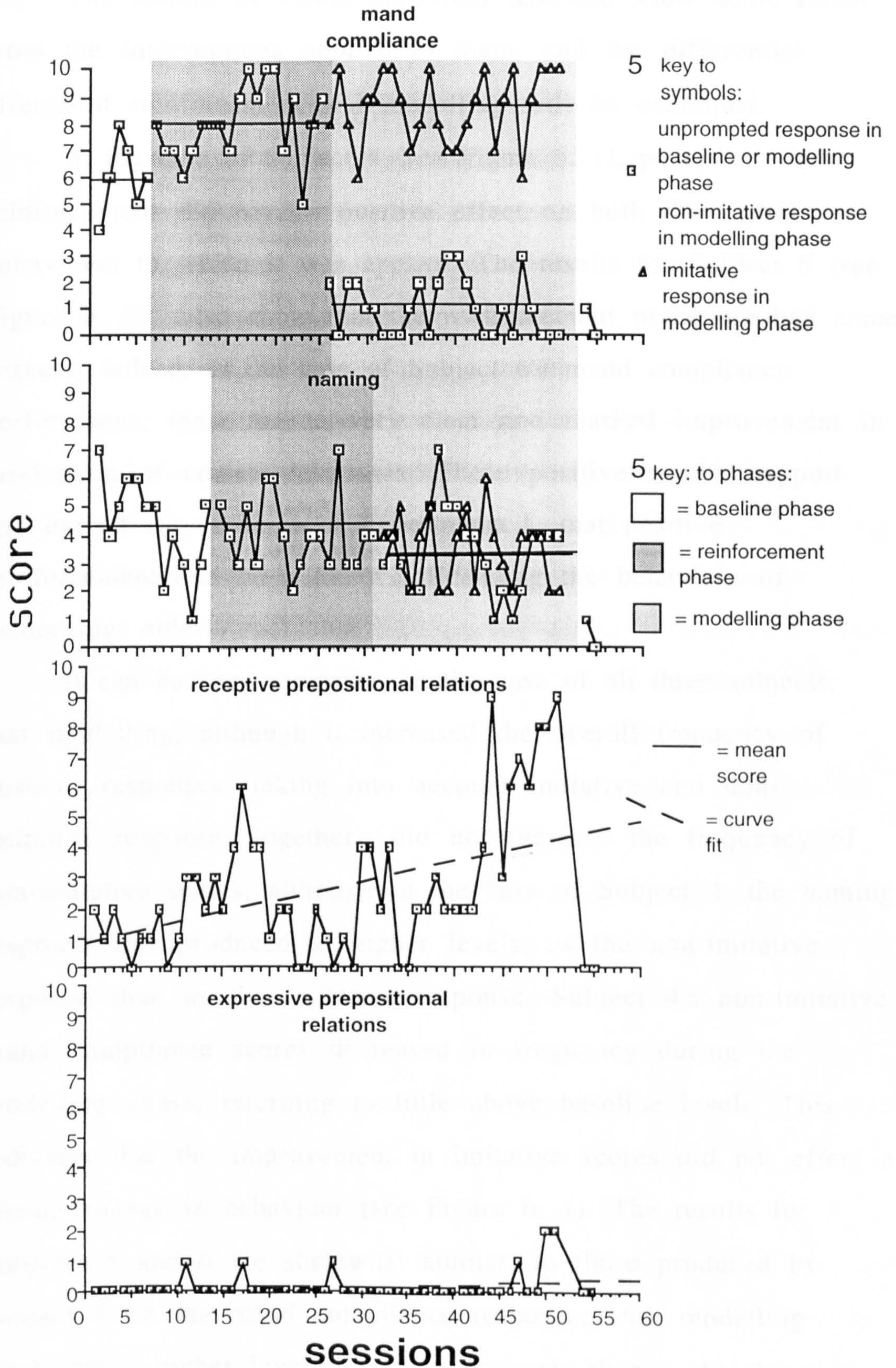
The mean in the baseline phase for the naming response was 4.31 (standard deviation 1.7), and the median was 4.5. There was a very slight mean increase in correct responding visible in the reinforcement phase, and this increase produced a mean score of 4.36 (standard deviation 1.3). The median, however, was 4.

In the modelling phase, the mean of non-imitative correct naming responses was 3.45 (standard deviation 1.5), and the median was 4. The mean of the correct imitative naming responses was 3.5 (standard deviation 1.28), and the median was 4. Subject 6 imitated 53.43% of the modelled naming responses which were demonstrated by the experimenter.

A slight upward trend could be detected from observation of the simple curve fit plotted on the two free-running baselines.



Fig. 6. 3. Subject 6's responses on four verbal behaviours, mand compliance, naming, receptive and expressive prepositional relations, showing the effect of response contingent small novelties and praise, and with the addition of modelling.





## Discussion

The classes of verbal behaviour assessed show some effect from the interventions applied to them, and the differential effects of reinforcement and modelling will be examined.

In the case of Subject 4 (see Figure 6. 1), positive reinforcement did have a positive effect on both the verbal behaviours to which it was applied. The results for Subject 6 (see Figure 6. 3) also show that the reinforcement procedure had some success, indeed, in the case of Subject 6's mand compliance performance, there was a very clear and marked improvement in production of correct responses. These positive results support and extend the findings of Experiment 1, that positive reinforcement can be a factor influencing the behaviour of dementing elderly persons.

It can be seen, however, in the case of all three subjects, that modelling, although it increased the overall frequency of positive responses (taking into account imitative and non-imitative responses together), did not increase the frequency of non-imitative scores, although in the case of Subject 4, the naming response was produced at higher levels, as the non-imitative response than as the imitative response. Subject 4's non-imitative mand compliance scores decreased in frequency during the modelling phase, returning to little above baseline levels. This indicates that the improvement in imitative scores did not effect a lasting change in behaviour (see Figure 6. 1). The results for Subjects 5 and 6 are somewhat similar, to those produced by Subject 4 on the mand compliance response, with modelling producing a higher level of imitative scores than in baseline or

reinforcement phases, but not an increase in production of non-imitative responses. No subject in Experiment 2 imitated all the experimenter-modelled responses. Imitation rates on the mand compliance assessment ranged from 75% (Subject 6), to 45.4.2% (Subject 4). On naming, rates ranged from 53.43% (Subject 6), to 30% (Subject 5). It would seem likely that were subjects unable, as has been shown to be the case in a large percentage of instances, to produce immediate imitative responses, modelling as a therapeutic technique is unlikely to have significant beneficial effect.

Nevertheless, the results do show that the interventions had some effect on the behaviours to which they were applied, and this indicates (contrary to the prevalent view), that the behaviour of the demented elderly is amenable to analysis and change.

The behaviours of which a free-running baseline was taken did show slight changes when the curve fits were applied. The absence, however, of any noticeable change, before statistical treatment, suggests that these small changes were not connected with the interventions applied, over the period of assessment. This indicates that any changes which occurred, in frequency of the target correct response, were due to the interventions applied and not other factors. This issue will be discussed in more depth in the General Discussion (Chapter 11).

Some factors which may have affected the modelling process will be briefly discussed. Firstly, the subject's level of residual ability may have affected his or her ability to acquire the modelled response. Subjects were selected from a larger population of dementia patients partially (but not wholly) on the basis of their inability to perform certain tasks, and the severity

of their dementia may have affected their ability to acquire new responses.

Secondly, the modelling given to the subjects in this experiment could be viewed in yet another way. It is possible that the process of the experimenter modelling the response for the subject, served as a social reinforcer. The behaviour of the subject perhaps was influenced in a more direct way than by modelling. Of course, if the model had occurred, this meant that the desired response had not been emitted by the subject. If this was the case, then incorrect responses or non-responses, were being inadvertently reinforced by the experimenter (when she produced the model/social reinforcement). Successful imitation did *not* always result in lasting behaviour change, as the response which had been imitated did *not* always occur in the next session. The imitative response could, therefore, be seen as evidence of only short term learning, with a high probability of extinction occurring.

The results of Experiment 2 suggest that modelling might have an adverse effect on the subjects' behaviour in their daily life on the ward. If a patient is repeatedly shown how to complete a particular task rather than being encouraged to perform the task by him or herself, the patient may become increasingly dependent on care staff completing (modelling) a procedure for him or her. In this way, the patient, whose skills are declining anyway, may lose these skills faster. The comparison with daily activities was noted in the case of Subject 4. He seemed to rely on the experimenter modelling the response for him. In the same way, he was quite able to dress himself in the mornings, but required quite a lot of time, maybe half an hour or so. If staff



were in a hurry and did not have the time to allow him half an hour to put his clothes on (Subject 4 required close supervision), they would do it for him. This invariably resulted in Subject 4 being totally passive and unhelpful, in the dressing session, not even moving his limbs into appropriate positions, so absolutely everything had to be done for him. He would claim that he was unable to put the items of clothing on without assistance, although this was patently untrue.

## Chapter 7

## EXPERIMENT 3(A)

DOES THE PRESENTATION OF THE PRINTED NAME OF A STIMULUS  
HAVE AN EFFECT ON THE LEVEL OF PRODUCTION OF DISCRETE  
CLASSES OF VERBAL BEHAVIOURS?

## Introduction

As the modelling procedure assessed in Experiment 2 generated results which were not clearly successful, an additional repetition of modelling procedure was assessed in the present Experiment, and also a printed prompt procedure. The theory behind the former intervention was similar to that in the *overlearning* procedure used by Rachman, et al, (1988), in modelling of snake and spider fear reduction, and a fuller discussion of similar procedures can be found in Heron (in Cooper, et al) 1987. Heron describes a similar procedure known as *positive practice overcorrection*, in which, for example, the subject is told to perform the behaviour, then he or she is guided to ensure that he or she performs the behaviour correctly, and then the subject is required to perform multiple repetitions of the behaviour for a specific period of time. This procedure was only used with one class of verbal behaviour, in Experiment 3(A), mand compliance.

There is no precedent for the use of labelling or written prompts as prompts or cues to elicit appropriate verbal behaviour in the literature (but see Chapter 4 for some applications of this procedure in the entertainments business). It was thought a

strategy worth trying, however, for two reasons. Firstly, it is common practice in psychogeriatric hospitals to clearly label certain salient features of the environment. This is a feature of reality orientation programmes, and is generally restricted to doors for rooms such as toilets, bathrooms and kitchens. The intended purpose of this practice may be merely to indicate to residents who can still read, what is in the room! However, it is not clear whether residents who can still make appropriate textual responses to these labels would respond appropriately to the labels in other ways, for example, if a patient were to be asked by a nurse to go to the kitchen and bring a cup, would the sign *KITCHEN* on the door prompt the patient to enter that room and select the appropriate item?

There doesn't seem to be any experimental evidence supporting the use of such labels, and in its absence, staff support for the practice is mixed. The second reason to suppose this strategy may be effective is from the work done on equivalence training with children and animals. There is much evidence to suggest that pairings of a picture or an object, a written word, and the sound of a word, lead to the formation of a functional equivalence class in which all three stimuli evoke the same response. Therefore, pairing a written word with a picture or an object, could result in the subject to some extent, re-learning the name of a stimulus he or she had forgotten. The criteria for re-learning the name of a stimulus would be firstly, that the subject would be able to respond appropriately to the spoken name of the stimulus. Secondly, that he or she would, when presented with the stimulus, be able to produce the spoken name. Thirdly, he or she would be able to respond appropriately to the written name of the



stimulus by selecting its referent. Pairing of the written name of the stimulus with the stimulus itself, could possibly be more effective in aiding the subject to re-learn the name of the stimulus, than pairing the stimulus with the spoken word, and prompting the subject to produce a delayed echoic, or spoken word, which is the technique employed in modelling. This would be due to the possibility, gleaned from observation of Subject 7's ability to respond appropriately to textual cues on the ward, that his textual repertoire was intact, and the experimenter intended to capitalise on this advantage to rebuild the mand compliance repertoire and possibly the naming repertoire. This possibility was investigated in Experiment 3(A).

## Method

### Subject

One male subject, Subject 7 (date of birth 1906), took part in this experiment. Subject selection, pre-experimental assessment and other general details were as described in the General Method. Subject 7 was a patient in a long stay psychogeriatric hospital. He did not complete any of the standard assessments, because of the severity of his dementia. Upon informal questioning by the experimenter, he was extremely disorientated in time and place, and was dependent upon staff for some assistance with all activities of daily living, suggesting that he was at least moderately demented. His psychiatric diagnosis was of senile dementia.

### Setting

The setting details were described in the General Method.

### Materials

The ten household items described in the General Method were used, and also the cards on which the written words corresponding to the names of the items were printed.

### Design

The design was as described in the General Method.

### Procedure

Subject 7 was assessed on mand compliance, naming, comprehension of prepositional relations, and conditional mand compliance (card cue), all with objects. For details of the procedures please refer to the General Method.

There were five phases in the assessment of the mand compliance response. These phases were: baseline, reinforcement, reinforcement and modelling, reinforcement and repetition of model, and, printed prompt and reinforcement. The procedure followed in the reinforcement and modelling phases was as described in Experiments 1 and 2.

In the repetition of modelling phase, in each trial, the response was modelled by the experimenter a second time if the subject failed to complete the desired response after the first model. If, after the second model, the subject completed the

response, the trial was repeated to give the subject the opportunity to make a second response.

In the printed prompt and reinforcement phase of the mand compliance assessment, after the experimenter had made a request for the item, a card on which the name of the requested item was printed was displayed in front of the subject by the experimenter. This occurred on each trial in this phase, regardless of whether the subject was able to complete the desired response.

There were four phases in the assessment of the naming response. These were the same as the assessment of mand compliance, except that the repetition of modelling phase was not included, and the treatment continued from modelling to written prompt. In the case of this treatment strategy with naming, the experimenter asked the subject "what's this?", and placed an item on the table in front of the subject. At the same time, a card bearing the printed name of the item was introduced into the subject's visual field. The assessment of comprehension of prepositional relations was a free-running baseline, as was assessment of conditional mand compliance.

## Results

Figure 7. 1 shows results for Subject 7, on naming, mand compliance, comprehension of prepositional relations, and conditional mand compliance.

The mand compliance response was variable in the baseline, with a mean of 7.50 (the standard deviation was 1.77), and a median of 8. After the introduction of the reinforcement phase,



the mean score became 7.78 (the standard deviation was 1.06), and the median became 7.

With the introduction of the modelling and reinforcement phase, the mean of the non-imitative correct responses became 6.93 (standard deviation 1.44), and the median became 7. The mean of the imitative mand compliance responses was 3 (standard deviation 1.36), and the median was 3. Comparison of the imitative and non-imitative scores shows that the vast majority of modelled responses produced by the experimenter were imitated by Subject 7.

In the modelling and reinforcement with repetition of the model phase, the mean score for the non-imitative responses was 6.22 (standard deviation 1). The median was 6. The mean score for the imitative responses was 3.72 (standard deviation 1.07), and the median was 4. The mean score of the repeated responses in this phase was 3.44 (standard deviation 1.15), and the median was 3. Again, comparison of these averages shows that with assistance the subject was able to complete the assessment.

The mean score of the correct mand compliance responses on the introduction of the printed prompt, with reinforcement for correct responses, was 7.2 (standard deviation 1.52), and the median was 7.

The mean score in the baseline phase on the naming response was 2.82, with a standard deviation of 1.47, and the median was 2. In the 'reinforcement' phase the mean score was 2.5 (standard deviation 1.7), and the median was 2. In the modelling plus reinforcement phase that followed, the mean score for the spontaneous responses was 1.57 (standard deviation 1.27), and the median was 1. The mean score for the imitative responses

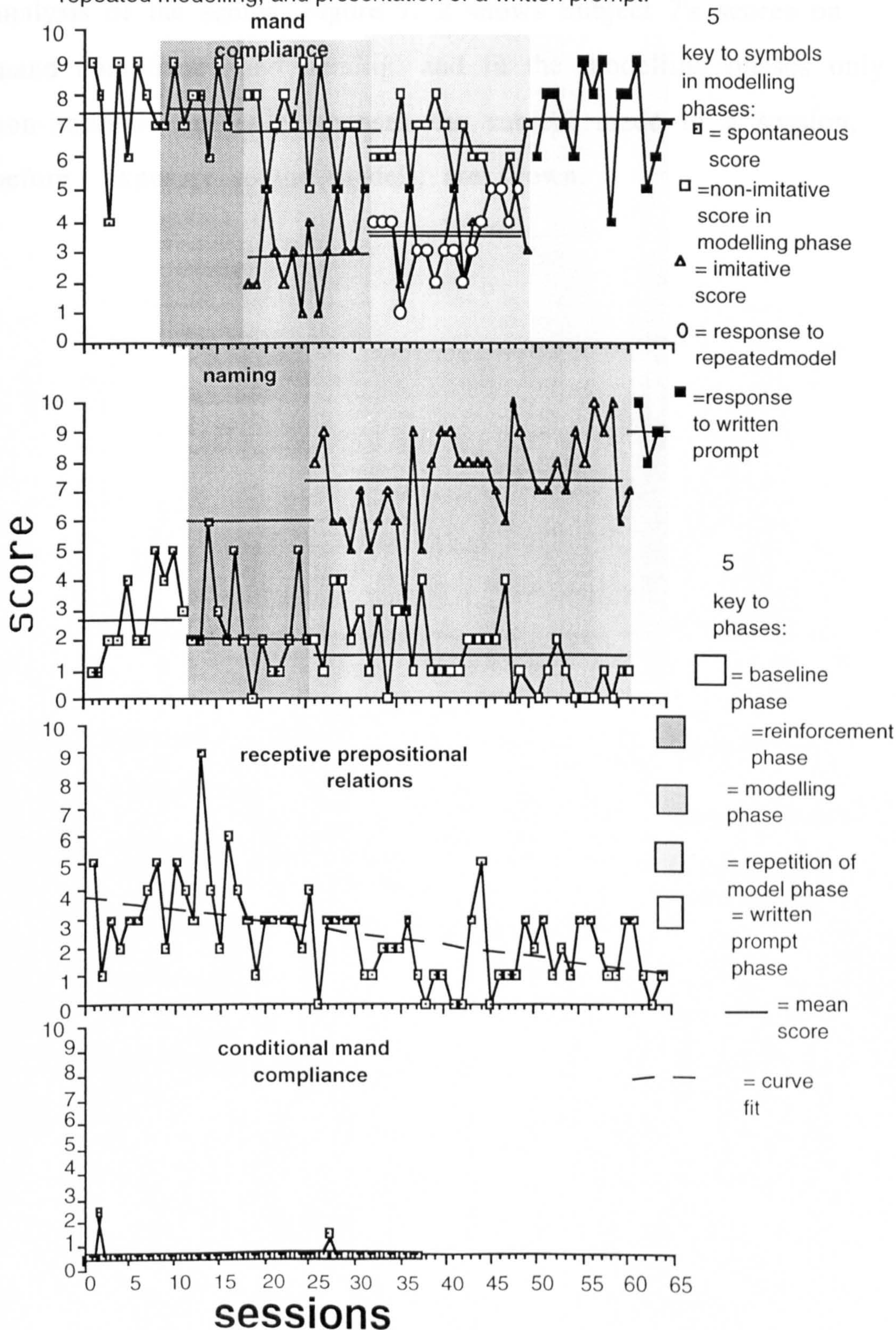
was 7.43 (standard deviation 1.63), and the median was 8. In the printed prompt and reinforcement phase the mean score was 9 (standard deviation 1), and the median was also 9.

Regarding the free-running baselines, the mean score for receptive prepositional relations was 2.41, the standard deviation of the mean was 1.65 and the median was 2. Also, the simple curve fit plotted on receptive prepositional relations showed a downward trend.

The mean score for the conditional mand compliance assessment was 0.05 (standard deviation 0.28), and the median was 0.



Fig. 7. 1. Subject 7's scores on four classes of verbal behaviour: mand compliance; naming; receptive prepositional relations; and conditional mand compliance, showing the effect of four interventions (which all included the delivery of contingent stimulus reinforcement): delivery of response contingent events (small novelties and praise); modelling; repeated modelling; and presentation of a written prompt.

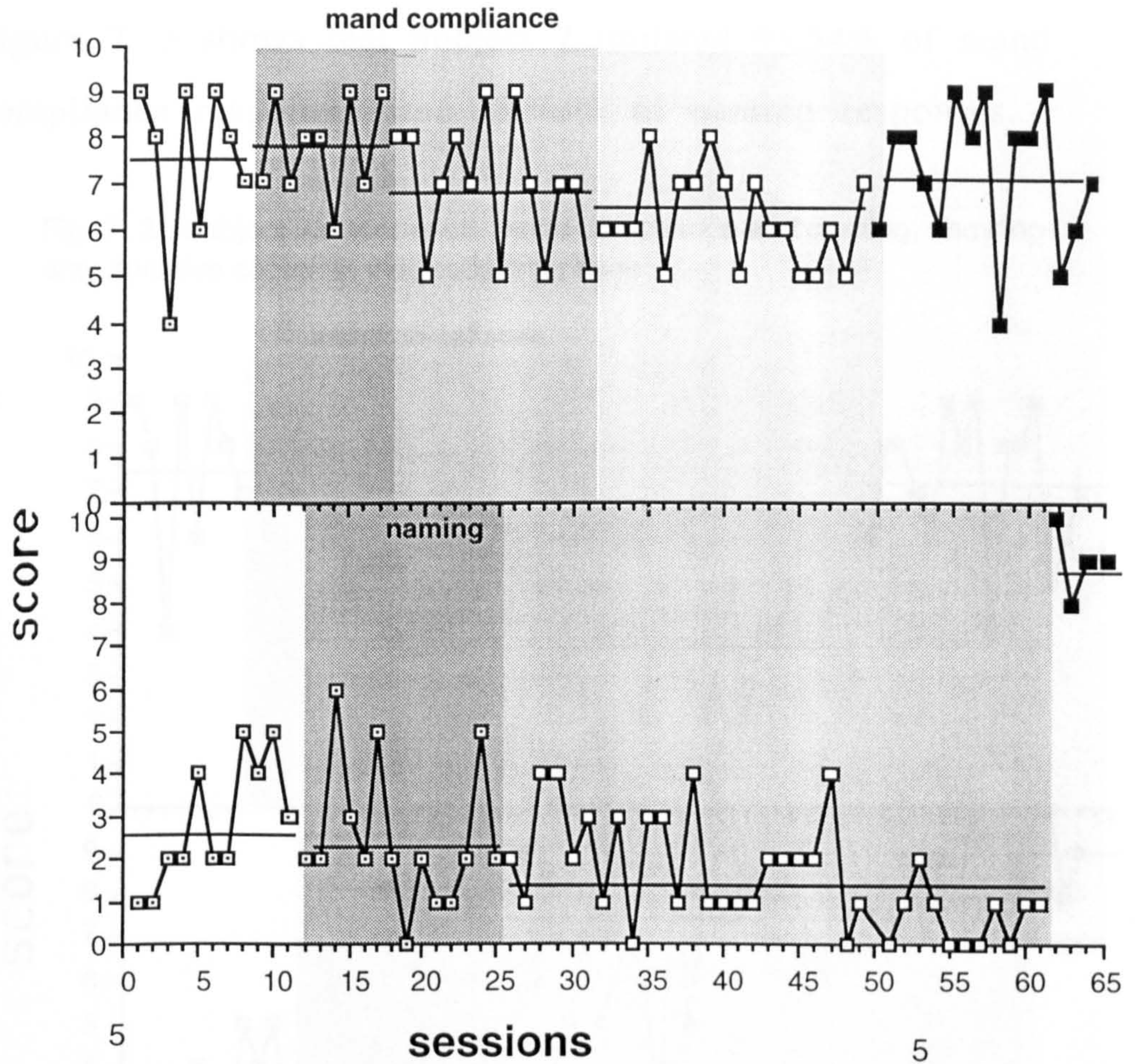




The data for the modelling phase and repetition of the model phase portrayed in Figure 7. 1 has been separated out in Figures 7. 2, 7. 3, and 7. 4, to allow for closer and clearer examination and analysis of the scores. Figure 7, 2 shows Subject 7's scores on mand compliance and naming, and in the modelling phases only non-imitative scores (responses the subject made in a session, before exposure to the model), are shown.



Fig. 7. 2. Subject 7's scores on mand compliance and naming, showing only non-imitative scores in the modelling phase.



key to phases:

- = baseline phase
- = reinforcement phase
- = modelling phase
- = repetition of model phase
- = written prompt phase

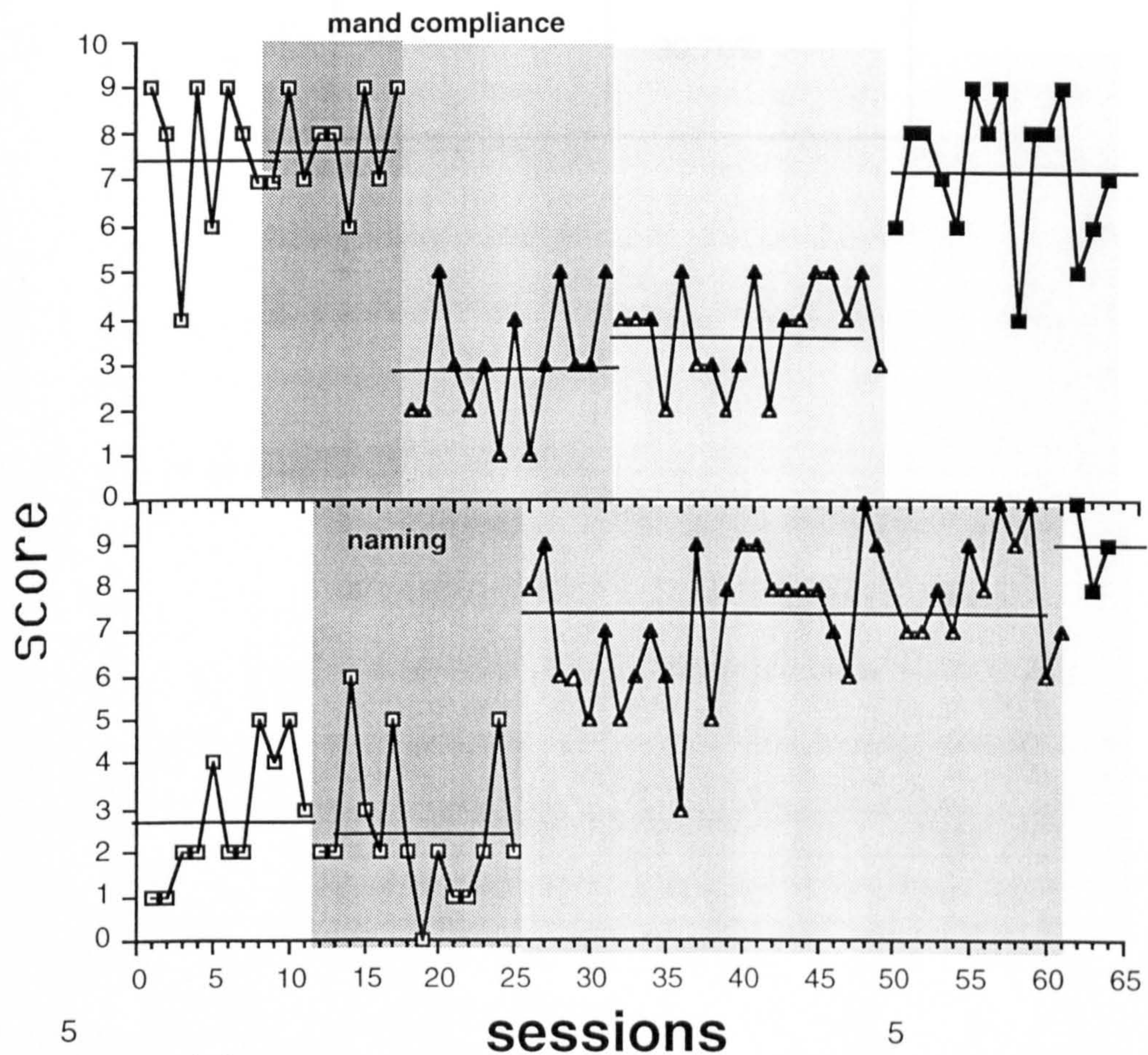
key to symbols

- = spontaneous score
- = response to written prompt



Figure 7. 3 shows Subject 7's scores on mand compliance and naming, showing only imitative responses in the modelling phases. Figure 7. 3 shows that Subject 7 imitated 93.54% of mand compliance responses, and 89.70% of naming responses.

Fig. 7. 3. Subject 7's scores on mand compliance and naming, showing only imitative scores in the modelling phase.



5  
key to symbols :

□ = spontaneous score

△ = imitative score

■ = response to written prompt

5  
key to phases:

□ = baseline phase

■ = reinforcement phase

□ = modelling phase

□ = repetition of model phase

□ = written prompt phase



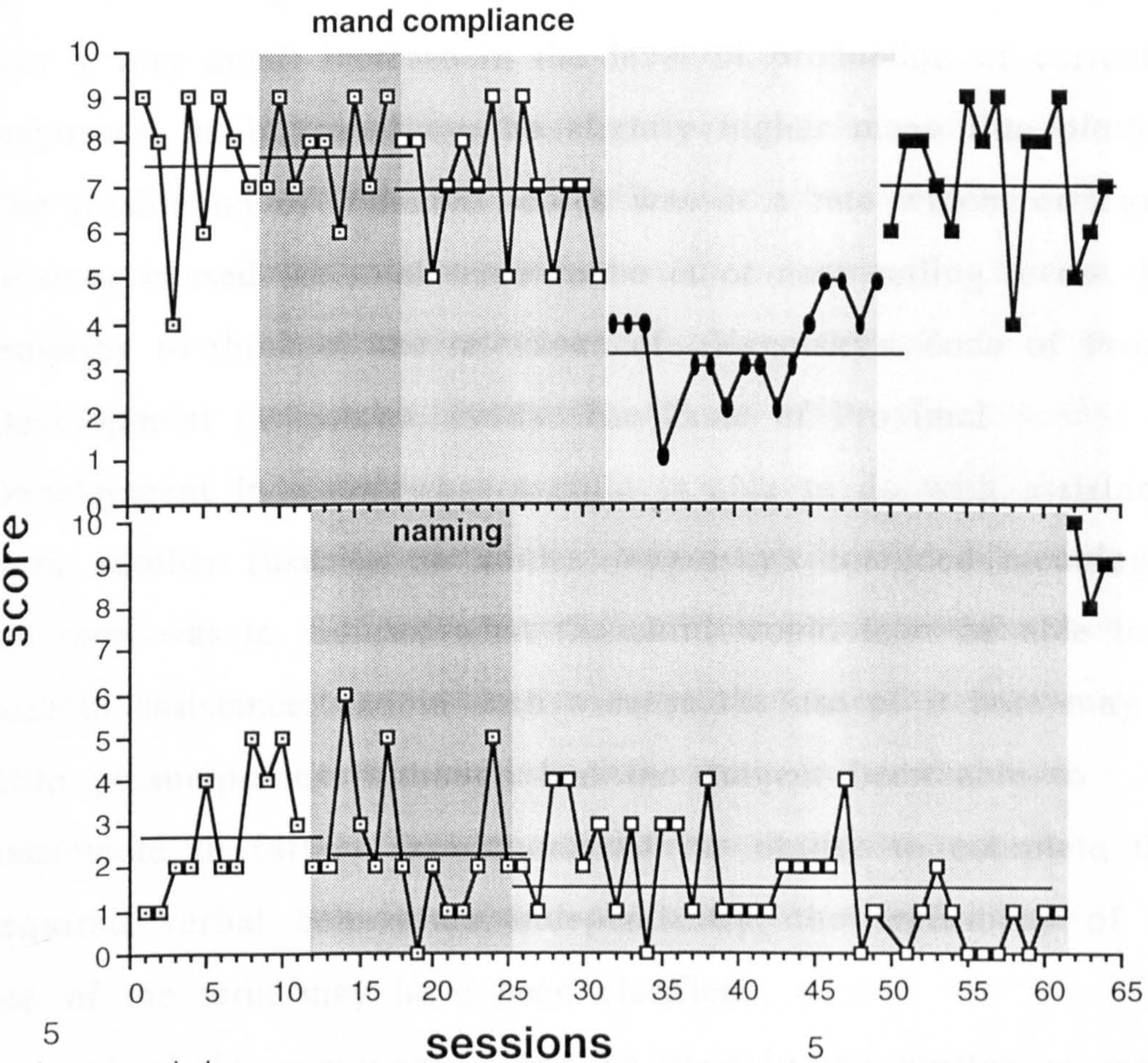
Table 7. 1 Percentage of mand compliance and naming models which were successfully imitated by Subject 7, in the modelling phase.

Percentage imitated	
mand compliance	naming
93.54%	89.70%



Figure 7. 4 shows Subject 7's scores on mand compliance and naming, showing only repeated responses in the repetition of the model phase (on the mand compliance response only).

Fig. 7.4. Subject 7's scores on mand compliance and naming, showing only repeated scores in the repetition of modelling phase on the mand compliance response.



- 5
- key to symbols:
- = spontaneous score
  - = response to repeated model
  - = response to written prompt
- 5
- key to phases:
- = baseline phase
  - = reinforcement phase
  - = modelling phase
  - = repetition of model phase
  - = written prompt phase



## Discussion

Subject 7 initially produced some high scores on the mand compliance behaviour during the baseline phase. During the 'reinforcement' phase, and during the modelling phase, the spontaneous responses continued at a similar level, although there was a very small increase in the level of production of correct responses, as indicated by the slightly higher mean line plotted. The production of imitative scores was at a rate which, on most sessions caused the total score to be at or near ceiling levels. It is tempting to think of the relevance of Vygotsky's Zone of Proximal Development (Vygotsky, 1978). The Zone of Proximal Development indicates what a child is able to do with assistance from another (usually an adult). Vygotsky's intended meaning of the term was to indicate what the child would later be able to do without assistance, and in such a sense the use of it here may be a little presumptuous, although had the subject been able to participate in further assessments of his ability to complete the required verbal behaviours independently, the legitimacy of the use of the term may have been clarified.

A slight improvement can be seen in the written prompt phase of the mand compliance assessment, and this improvement is also visible in the naming behaviour. The implications of this finding are discussed below.

A similar pattern can be seen in the naming response to that produced in the mand compliance response, through all the phases. The effect of the interventions was not, however, masked so much by high baseline scores in the naming assessment as it was in the mand compliance response, indeed, the trend, indicated



by the plotted mean line, of the responses in the reinforcement phase, was clearly upward. Also, imitative responses were produced at a higher level than non-imitative responses in the modelling phase. As in Experiment 2, non-imitative naming responses fell to below baseline levels, during the modelling phase. The reasons for the decline in these responses may be, as in Experiment 2, inadvertent reinforcement of incorrect responses by the experimenter's modelling of correct responses which followed them (see above). Additionally, imitative responses could be seen as delayed echoic responses, which are unlikely to be produced other than as responses to specific stimuli from the experimenter. Overall, it can be seen that the level of production of the verbal behaviours assessed in the case of Subject 7 did indeed change, due to the interventions applied to them, as described above. The argument put forward in previous experiments can only be reiterated: the behaviour of the dementing elderly is open to change through the techniques of behaviour analysis. Written cues were particularly helpful in aiding the subject to respond appropriately to objects, and hopefully this finding will assist care staff in their provision of therapeutic environments for the dementing elderly. Since there was no opportunity to determine the effects, if any, of this intervention on unprompted performance, the efficacy of this intervention for Subject 7 remains uncertain. The data do suggest, however, that where responses to textual cues are intact, this part of the verbal repertoire may be exploited by care staff to structure such therapeutic environments.

The large improvement from baseline production of correct responses in the written prompt phase of the naming response,

and the near return to baseline levels after a slight downward trend in mean scores in the mand compliance behaviour suggest a question: Did Subject 7 remember what the item was called when he correctly named it with the aid of the helpful stimulus word, or did he merely read out the written word with no real understanding of the word's meaning? Observation of his scores on mand compliance indicated that Subject 7 was indeed able to respond to a vocal verbal stimulus and select the appropriate item, and as he responded with the same verbal response (for example "cup"), it is likely that in all observable senses, he understood the meaning of the word. Skinner's term "the textual" (Skinner, 1957), is a useful description of such a response, as the term describes a verbal response to a non-auditory stimulus, but does not specify any underlying understanding of meaning. Appropriate responding to printed words is a developmentally more complex operation, than naming of objects, coming, as it does, at a later stage in the individual's development, and would have been expected to be, as a skill, lost earlier. Subject 7 was, however, clearly able respond appropriately to the printed word in the presence of the referent stimulus. For mand compliance, however, there is no evidence that the printed prompt increased the frequency of production of correct responses above baseline levels, so it is not possible to infer that Subject 7 was responding to the textual with appropriate listener behaviour, rather than to the preceding verbal stimulus ("give me the cup"). The high frequency of correct naming responses to the referent in the presence of the textual cue merely demonstrates that Subject 7's textual repertoire was at high strength. It is not clear whether his vocalisations when presented with the textual and object complex

were tacts, or also entailed appropriate listener behaviour, since this was not separately tested. Had a mand compliance assessment involved the presentation of the written prompt alone, without the spoken stimulus, it would have been clear whether the subject was responding as a listener to his textual response. The written prompt did, however, in the case of Subject 7, produce appropriate verbalisation, which, were it to come under the control of the accompanying object, would re-establish the tact. Also, a period of withdrawal of the written prompt would have to be instituted to assess whether stimulus control could then move from the written word to the object itself. This procedure was employed in Experiment 3B. A return to baseline on mand compliance and naming would have allowed a clearer assessment of the effect of the interventions on the behaviours, and in particular, whether the written prompt resulted in lasting learning or merely served as an immediate cue. Unfortunately, however, the physical health of Subject 7 was declining, as he became more and more vulnerable to intermittent chest infections and so on, which are a common feature of the later stages of a dementing illness. The assessments were therefore terminated for ethical reasons, and Subject 7 died quite soon afterwards.

Observation of the slight downward pattern in the free-running baseline taken of receptive prepositional relations indicates a possibility that Subject 7's dementia was worsening through the course of the study, and at least indicates that practice effects were unlikely to be responsible for the trends in the mand compliance and naming assessments.



### EXPERIMENT 3 (B).

DOES THE INTRODUCTION OF A PRINTED STIMULUS NAME LABEL  
WITH A STIMULUS, HAVE AN EFFECT ON THE LEVEL OF  
PRODUCTION OF DISCRETE CLASSES OF VERBAL BEHAVIOURS?

#### Introduction

The theoretical background to this experiment has been outlined above in Experiment 3 (A).

Extending the positive findings of Experiment 3(A) which suggested that printed cues may be useful in orienting the subject to his environment, this experiment examined the effects of reinforcement, modelling, and labelling, on the production of correct naming responses to objects, pictures, and printed textual stimuli. As in Experiment 3 (A), the effect of interventions on the behaviour of a single subject was observed. Since association between label and stimulus object may have been limited in Experiment 3 (A), by the spatially separate nature of their presentation, the effect on the production of appropriate verbal behaviours of affixing the label directly onto the stimuli was assessed here. The subject's responses to a compound stimulus of an object and its corresponding printed name were assessed, and in particular the effect of exposure to such a compound stimulus on responses to the same stimuli without the label.

## Method

### Subject

One male subject, Subject 8 (date of birth 1917), took part in this experiment. Subject selection, pre-experimental assessment and other subject details were as described in the General Method.

This subject, a retired engineer, attended a local psychogeriatric day centre as an outpatient, twice a week. He had been doing so since a stroke on New Year's Day some years previously had rendered him unconscious. On recovery from the stroke he had been progressively more disorientated, and confused, and had a diagnosis of dementia. His scores on the Graded Naming Test, the Mini-Mental State Exam and the Cognitive Assessment Scale of the Clifton Assessment Procedures for the Elderly, all indicated moderate to severe dementia (see Table 7 (b) 1, and psychiatric assessment suggested it was probably of the multi-infarct type. The classes of verbal behaviour chosen for assessment were naming of objects, pictures, and written words.

The subject was extremely co-operative and willing to participate in all manner of tests, and consequently a large body of data was obtained from him, some of which is presented elsewhere in this thesis (see Experiments 4 and 6).

### Setting

All sessions took place in a quiet room in the day centre which the subject attended.

### Materials

The ten household items referred to in the General Method were used. Also used were ten colour photographs of these items, and ten printed words corresponding to those items, as described in the General Method. Copies of these words were fixed onto the stimuli with adhesive tape in the labelling procedure. In addition to the Mini Mental State Exam, and the Cognitive Assessment Scale of the Clifton Assessment Procedures for the Elderly, the Graded Naming Test (McKenna and Warrington, 1983), was used to assess the subject's mental state. Ten 'abstract' words (referring to either actions or physical properties), selected from a list of word frequencies (Francis and Kucera, 1982), as having approximate equal frequency in the English language, were also used, in the same print format as the other written words, to assess the subjects' ability to name these.

### Design

The design was as described in the General Method.

### Procedure

The general procedure was the same as described in the General Method. The CAPE and the MMSE were administered, before the commencement of all the language assessments, and after the completion of the experimental period, the Graded Naming Test (GNT) was administered as well as the CAPE and the MMSE, and a test of naming of 10 abstract words. Each pre- and post-experimental assessment was administered twice to obtain a



clear picture of the subject's level of dementia. Assessment of the subject's ability to produce a wide range of verbal behaviours was carried out (see Table 7 1), and naming was selected as the most appropriate behaviour for long-term assessment and training. The procedure for assessment of these behaviours was as described in the General Method.

Assessment of naming of abstract words followed the same procedure as for Behaviour 3, Naming, as described in the General Method.

The classes of verbal behaviour chosen for assessment and training with Subject 8, were naming of objects, pictures, and printed words (the latter corresponding to the names of the ten household items). There were four phases in the assessment of the naming of objects behaviour. These were the baseline, reinforcement phase, modelling phase, and a labelling phase. The procedure for the reinforcement and the modelling phase was as described in Experiments 1 and 2.

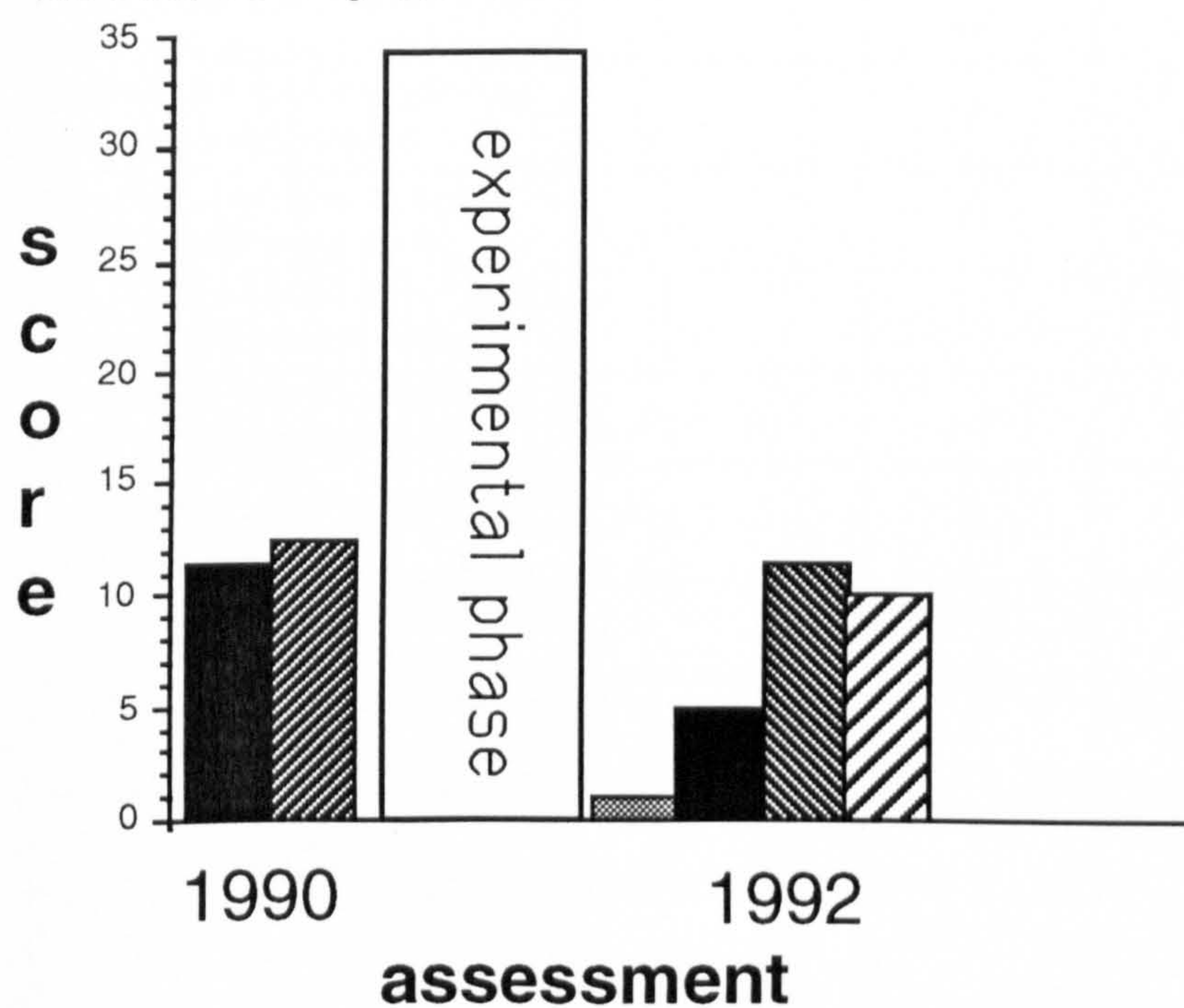
In the labelling phase, in some sessions on all trials a printed word corresponding to the name of the item, was attached to the item, and this compound stimulus was presented to the subject in the same manner as described previously for the assessment of naming. Labelling sessions of this kind were presented alternately with sessions where the item to be named was presented without the attached printed name.

In the assessment of naming of pictures, there were three phases. The phases were baseline, reinforcement, and an alternate session labelling phase, as described above. Assessment of naming of printed words constituted a free-running baseline.

## Results

The bar chart (Table 8), shows Subject 8's scores on the standard assessments, both before and after his participation in the naming assessment and training, and his score on an assessment of naming abstract words.

Table 8. Subject 8's mean scores on the M.M.S.E., C.A.P.E., G.N.T., and a test of naming abstract words.




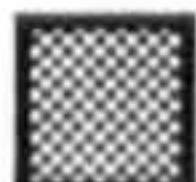


5	key:	Test:	max. score:
		abstract words	10
		mean GNT	30
		mean MMSE	35
		mean CAPE	35

Table 3 (B) (ii) shows Subject 8's scores on other language assessments which were conducted, but which were not selected for longitudinal assessment and training, showing the mean score, and where applicable, the standard deviation, and the number of occasions on which the verbal behaviour was assessed (session count).



Table 9. Subject 8's scores on other language assessments  
(not including naming).

task	session count	mean score	<i>S.D.</i>
echoic	2	5.50	6.36
mand compliance (objects)	4	8.75	0.50
mand compliance (pictures)	4	9.50	1.00
mand compliance (words)	3	9.33	0.58
conditional mand compliance with objects (bell cue)	1	0	
conditional mand compliance with objects (blocks cue)	1	1	
conditional mand compliance with objects (card cue)	1	0	
conditional mand compliance with objects (count cue)	1	0	
conditional mand compliance with pictures (bell cue)	1	0	
conditional mand compliance with pictures (blocks cue)	1	0	
conditional mand compliance with pictures (card cue)	1	1	
conditional mand compliance with pictures (count cue)	1	0	
conditional mand compliance with words (bell cue)	1	0	
conditional mand compliance with words (blocks cue)	1	0	
conditional mand compliance with words (card cue)	1	0	
conditional mand compliance with words (count cue)	1	0	
receptive prepositional relations (objects)	21	6.48	1.69
expressive prepositional relations (objects)	21	4.62	2.94
receptive prepositional relations (pictures)	1	3	
expressive prepositional relations (pictures)	1	3	
receptive prepositional relations (words)	2	1	1.41
expressive prepositional relations (words)	2	2	2.83

The results for Subject 8 on the naming assessments are illustrated graphically (see Figure 11), and can be described as follows:

The first display in Figure 11 shows performance on the naming of objects assessment. The mean score in the baseline was 4.64 (standard deviation 2.06), and the median was 4. In the 'reinforcement' phase that followed, the mean score decreased to 3.22 (standard deviation 2.22), with a median score of 2. In the modelling phase the mean score for the non-imitative responses was 1.43 (standard deviation 0.53), and the median was 1. The mean score for the imitative responses was 5.14 (standard deviation 2.48), and the median was 6. Sixty percent of modelled responses produced by the experimenter were imitated by Subject 8. The five data points resulting from the phase in which a return to baseline was briefly applied produced a mean score of 1.2 (standard deviation 0.84), and a median of 1.

The labelling phase resulted in an increase in correct responding when the items were labelled, with evidence of some carry-over effects early in this phase but not later. The effect of the label can be clearly seen in Figure 11, as the scores obtained during sessions on which the objects were labelled are represented by data points shaded black. The overall mean of the labelling-baseline reversal phase was 4.82 (standard deviation 3.23), and the median was 5. This score included the scores the subject achieved during sessions in which the objects were not labelled. The mean score for the labelling sessions in this phase was 7.15, and the median was 8, while the mean score for the baseline sessions in this phase was 2.56 (standard deviation 2.94), and the median was 1. The labelling phase was terminated two

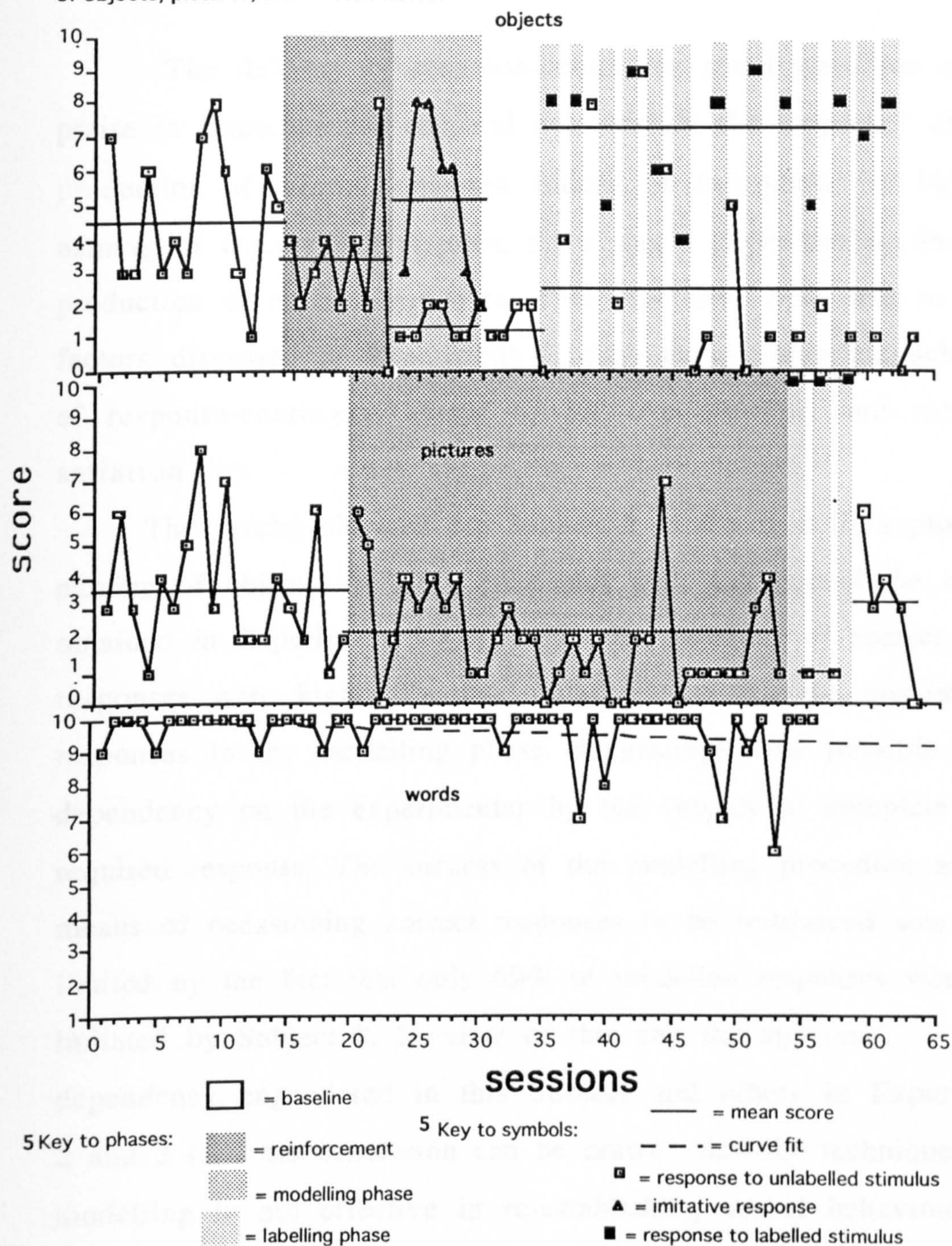
sessions before the end of the study, and the last two responses in baseline gave a mean score of 0.5.

Subject 8's scores on naming of pictures are shown in the second display. The mean score in the baseline phase was 3.53 (standard deviation 2.01), and the median was 3. In the 'reinforcement' phase, the mean score was 2.12 (standard deviation 1.78), and the median was 2. The labelling-baseline reversal phase produced a mean score of 10 in the labelled condition, and a median of 10. As with naming of objects, the scores obtained during sessions on which the stimuli were labelled, are represented by data points shaded black. The mean and median score for the sessions in which the items were not labelled was 1. This phase was terminated five sessions before the end of the study, and the mean in baseline fell to 3.2 (standard deviation 2.17), and the median to 3.

The third display, of naming of written words, shows a consistently high response pattern throughout the assessment. The mean score was 9.64 (standard deviation 0.84), and the median was 10. The simple curve fit applied to the baseline of naming of written words shows a slight downward trend.



Figure 11. The effect of delivery of response contingent small novelties and praise, modelling, and alternate labelling-baseline reversal on Subject 8's scores on naming of objects, pictures, and written words.





## Discussion

The delivery of response-contingent small novelties and praise in Experiment 3 (B), did not increase the frequency of production of correct responses, indeed, in this phase for both naming of objects and pictures, there was a slight decline in production of correct responses. This may have been due to factors discussed in Experiment 1, such as inappropriate selection of response-contingent events by the experimenter, and subject satiation.

The results obtained for Subject 8 in the modelling phase of naming of objects are fully consistent with and extend the results obtained in Experiment 3 (A). Again the numbers of correct responses were higher for the imitative than for the non-imitative responses in the modelling phase, suggesting some possible dependency on the experimenter by the subject to complete the required response. The success of the modelling procedure as a means of occasioning correct responses to be reinforced was also limited by the fact that only 60% of modelled responses were imitated by Subject 8. In view of this and the apparent dependency engendered in this Subject and others in Experiments 2 and 3 (A), the conclusion can be drawn that the technique of modelling is not effective in re-establishing verbal behaviours in this client group.

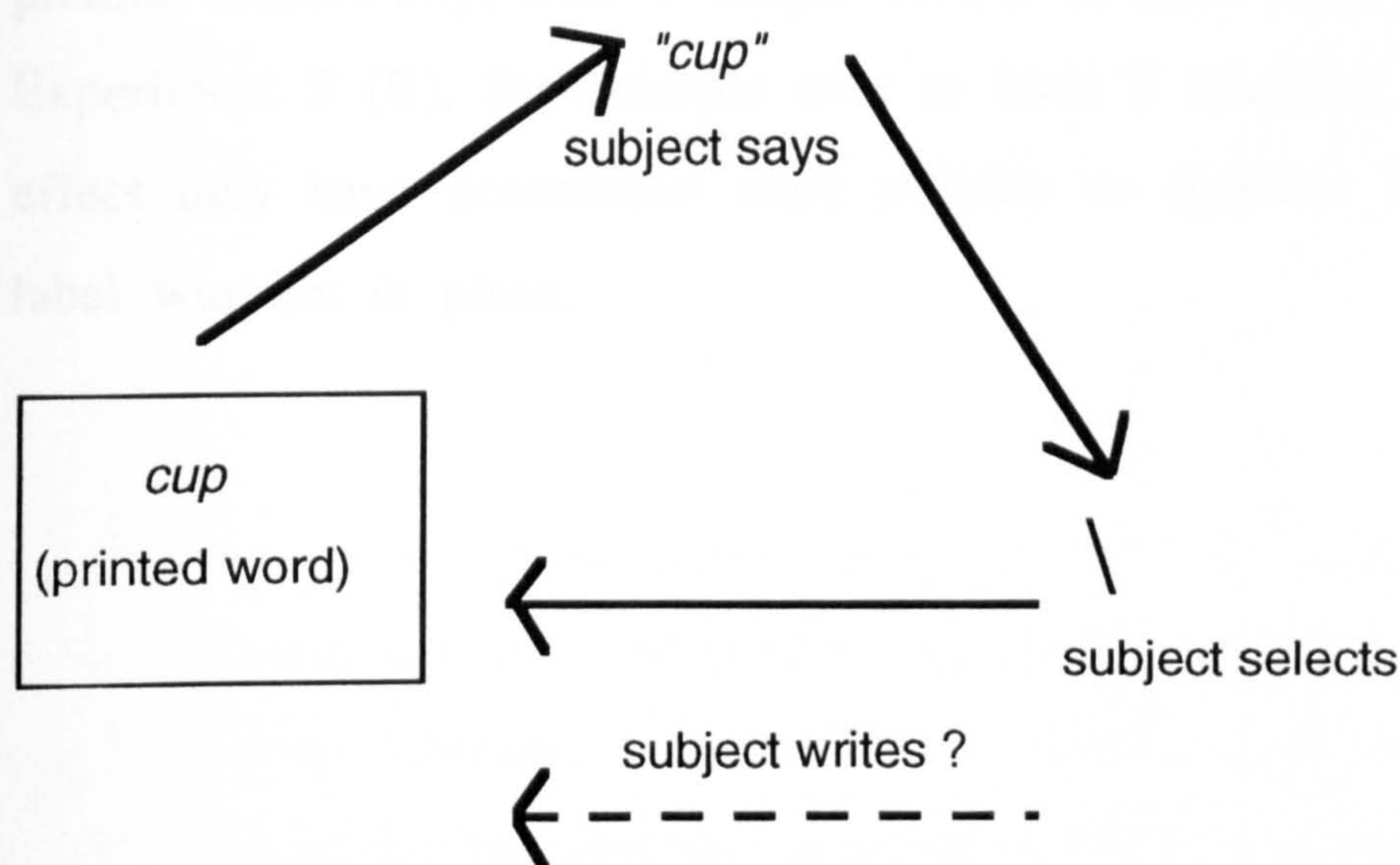
The scores in the labelling phase were high, but generally only when the label was attached to the object. In answer to the question as to whether the subject was responding to the object, or whether he was merely responding textually to a printed word,

the data produced in the labelling-baseline reversal phase suggests that only the latter response was reliably occurring.

A large body of information has been amassed here, however, to suggest that at least two subjects with dementia were aided in their attempts to respond correctly to compound stimuli which incorporated printed cues. Carry-over effects did occur, early in the labelling phase of this experiment, and these suggest that presentation of the compound stimulus of printed name and object might enable the subject, on some occasions, to respond with appropriate naming behaviour in the presence of the object alone. Comparison with baseline scores renders this conclusion uncertain, because, on the naming of objects assessment, pre-intervention baseline scores were high, although post intervention baseline scores were low. Also, on the naming of pictures assessment, pre-intervention and post intervention baseline scores were high. The issue could be investigated further by giving an instruction to the subject such as "Tell me what this is, and then find it for me." The subject could then be presented with the printed word and, after he names the printed word (which he has already shown himself able to do), his ability to select its referent, from an array of other items could be assessed. Would he then be able to name the item he had selected? A further question not specifically addressed in Experiment 3 (B) is: would he be able to *write* the appropriate word in such a context? Subject 8 had demonstrated that he had some residual writing skills when he was able to write his own name during the CAPE assessment, although he had not been able to respond correctly to the instruction "write a sentence," which was a sub-test of the



MMSE assessment. The behaviours described above may be illustrated by the following diagram.



The high scores in the free-running baseline of naming responses to written words from Subject 8 suggests that at least some dementia patients may retain appropriate textual responses to written words until late in the dementing process, after other responses, including other types of naming responses, have declined. If these textual responses give rise to appropriate listener behaviour, which appears to be the case for Subject 8, (see Table 9: mand compliance for printed words), this would lend experimental support to the practice (already in use to some extent), of clearly labelling items around the home and hospital, to aid dementia patients in their daily lives. The evidence here presented suggests that in order to capitalise upon residual verbal skills as far as possible, items in common use should be labelled, rather than just doors to different rooms, as is currently the case.

The effect of the labelling procedure, as it was applied, was clearly assessed by the use of the reversal procedure described

above, and indeed clear demonstration of effect was a primary intention. Had the label been applied to the object and/or the picture consistently, over a longer period of time than in Experiment 3 (B), for example over at least 5 sessions, the positive effect may have generalised more reliably to sessions in which the label was not in place.



## CHAPTER 8

## EXPERIMENT 4

WHAT EFFECTS DO CUEING AND INSTRUCTION HAVE ON  
CONDITIONAL DISCRIMINATION TASK PERFORMANCE?

## Introduction

Conditional discrimination tasks of the type commonly used to investigate matching to sample behaviour can involve discrimination learning, perceptual and mnemonic skills, and can be used to investigate certain concepts, in this case the subject's concepts of identity and oddity. It seems likely that some or all of these skills could be affected in dementia.

The task was thought to be useful in assessing the effect of rules or instructions and method of stimulus presentation on the conditional discrimination behaviour of demented individuals (see Morris, 1987, below). Morris has identified the task as problematic for dementing individuals, in that they may learn relationships between certain sample-comparison pairs, but not generalise their learning to novel sample-comparison pairs. Also conditional discrimination tasks can be relatively simple to administer, making them suitable for the demented population. They have been used extensively by Premack, (1976), to investigate the acquisition of a language system in chimpanzees, including the subjects' ability to understand such concepts as same-different, colour and name properties, *yes* and *no*, and so on. Conditional discrimination tasks test discrimination learning, and also conditional responding, since the subject has to learn to



respond correctly on the basis of behaviour that may be described by the rule "if A, *then* A" or "if A, *then* B," in the presence of different cues. As Premack points out, language itself is dependent on the ability to make conditional responses, for example, that in the presence of an apple, it is appropriate to say or write the word *apple*. The subject must, therefore, learn that in certain contexts, one stimulus 'goes with' another. The concepts of same and different seem so essential to our way of interpreting the world that we may assume, in a casual sense, that they are in use throughout species, and at least in all human behaviour. We assume that when a young infant sees it's mother approaching, it smiles or cries because it perceives her as *different* from strangers, the pigeon pecks at a piece of grain because it is the *same* as pieces it has previously found to be edible. However, there is no evidence to support this assumption. According to Premack, generalised matching to sample on the basis of same/different, is a necessary skill for language acquisition. We must be able to respond to the spoken word as to its referent; Premack gives the example of the child commenting "Mommy take flower." The child must appreciate that "*Mommy*" stands for, and is in a way the same as (within a system of language) Mommy, "*take*" refers to that relational behaviour, and "*flower*" refers to a particular class of objects, and the words can be used to refer to the items and behaviour. The child also learns that her spoken word "*flower*" is the same as the heard word "*flower*", and later, the written word. Experiment 4 thus investigates issues arising from the use of the textual and spoken word in Experiment 3, and asks whether conditional responding on the basis of "same" could be affected in dementia.

Even if two stimuli are classed as identical by the experimenter, it is not logically necessary that they will be responded to as such by the subject. Sidman, et al, (1982), point out that although workers in this area often assume, in their experimental procedures, that "the stimuli bear a relation to each other of sameness or identity", that this need not be so. For example, if the stimuli are presented in spatially different locations, perhaps they are not the "same" in all respects. This possibility, that stimuli classed as identical by the experimenter may not be responded to as such by the subject, was also investigated. Procedural constraints, discussed further below, described by Carter, (1976), and Cumming and Berryman, (1961), for example, may have had an influence on the results obtained.

Morris (1987), has conducted a study broadly similar to this experiment, also with dementing individuals.

He trained four subjects who were suffering from Alzheimer's Disease, to criterion (20 correct out of 24 trials), on identity and oddity matching. The stimuli in Morris's experiment were three colours, in the form of square shapes cut from plastic sheet, which the subjects were required to name. Morris then introduced novel stimuli (three *new* colours), into the task. The lack of transfer of training to the novel stimuli on the matching tasks led Morris to suggest that the Alzheimer subjects solved the task on the basis of stimulus-response associations, or stimulus-stimulus associations, rather than by the use of a rule. The task should have been easy for the subjects, as colours are simple properties, varying only along one dimension, which subjects have a wide experience of. There is also extensive evidence that non-human animals can match colours (Carter and Werner, 1978).

Normal control subjects had no difficulty in learning the task, in Morris's study, and also control subjects assessed by the present experimenter demonstrated an ability to learn a similar task. The present experiment sought to investigate the issue further, by assessing the effect of different stimulus presentations; and by the use of task-relevant instructions, in the case of simultaneous identity matching, with three dementia patients. Data from a group of normal elderly control subjects have been also presented for comparison purposes.

## Method

### Subjects

Nine members of the Department of Psychology's Subject Panel completed the identity and oddity conditional discrimination tasks with pictures, in order to provide normative data to compare with the dementia patients' results. The Subject Panel had been set up to recruit volunteers who would be willing to participate in experiments run by the Department of Psychology, in return for a small fee and payment of travelling expenses. Ten subjects were contacted by telephone and arrangements for their visit to the Department of Psychology were made. They were asked to complete a form which ensured that they had no major health problems, were not taking psycho-active drugs and to state which was their first language (see Appendix 2 for a copy of this form). They were told prior to their assessments, that they were taking part in a study which investigated memory



function in the elderly. The age range of the control subjects was from 70 to 87.

Three demented subjects also participated in Experiment 4, one male and two females. All three were resident in the community, with support services. All had diagnoses of dementia, but there was a possibility that Subject 9 was suffering from depressive pseudo-dementia.

In the case of all three dementia subjects, the first language was English. All other subject variables (pre-experimental testing etc.), were as described in the General Method. All subjects completed the three standard assessments.

Subject 8's mand compliance and naming skills have been described in Experiment 3(B). Naming and mand compliance performances for Subjects 9 and 10 for the 10 stimuli used in the task were good, and scores can be seen in Table 8. 1.

Table 8. 1. Subject 9 and 10's scores on mand compliance and naming.

Assessment	Subject	Score
mand compliance, objects	9, 10	10
mand compliance, pictures	9, 10	10
mand compliance, words	10	10
Naming objects	9, 10	10
Naming pictures	9, 10	10
Naming words	10	10

#### Subject 9 (date of birth, 1910)

This subject was referred to the study by her community psychiatric nurse. She was living alone in a sheltered housing flat,

and had a history of dementia (which could have been depressive in origin), for the three years prior to her participation in the study. The subject's scores on the standard assessments were as follows: her score on the CAPE was 34; on the MMSE, 25, and on the GNT, 6.

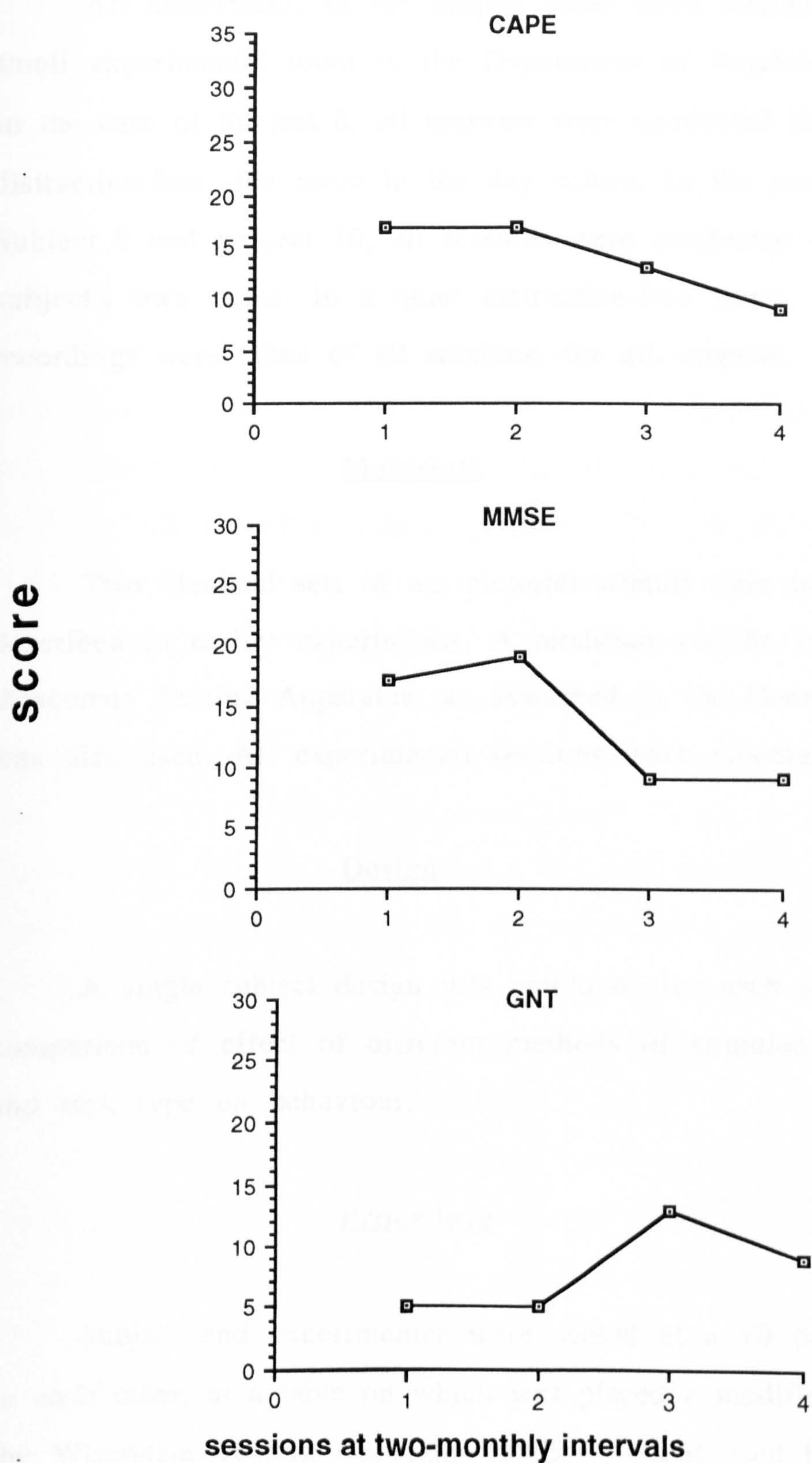
Subject 10 (date of birth, 1907)

This subject was referred to the study by her General Practitioner, who had diagnosed her as suffering from senile dementia. She lived alone in a warden-assisted flat in a Housing Association.

In the case of Subject 10, her achievements on the three standard assessments are represented in Figure 8. 1, below. A downward trend can be seen in all three of the standard assessments. These assessments were repeated twice, at the start and end of the study. The reasons for such repetition were as follows: Subject 10 *was* willing to co-operate at length with these assessments, which dementia patients often find stressful, seeing them as invasive and as a "test"; repetition ensures that a fair picture is obtained of the patient's abilities, because variation over time is accounted for; also, as Subject 10 took part in assessments over a period of many months, the experimenter was able to ensure that any improvement or deterioration in her mental state was documented.

In the case of the CAPE, and the MMSE, the maximum score is 35, and in the case of the GNT, the maximum score is 30.

Figure 8. 1. Subject 10's scores on the CAPE, MMSE, and GNT.





### Setting

All assessments of the subject panel were carried out in a small experimental room in the Department of Psychology. In the case of Subject 8, all sessions were conducted in a quiet distraction-free side room in the day centre. In the cases of Subject 9 and Subject 10, all sessions were conducted in the subject's own home, in a quiet distraction-free room. Audio-visual recordings were taken of all sessions, for all subjects.

### Materials

Two identical sets of ten pictorial stimuli were used, as described in earlier experiments. A modified version of the Wisconsin Testing Apparatus, as described in the General Method, was also used. All experimental sessions were videotaped.

### Design

A single subject design was employed for each subject, with comparison of effect of different methods of stimulus presentation and task type on behaviour.

### Procedure

Subject and experimenter were seated at a 90 degrees angle to each other, at a table on which was placed a modified version of the Wisconsin Testing Apparatus similar to that used by Morris, (1987). The seating position was selected so that the experimenter

could provide reassurance, observe the subject's responses, and control the presentation of stimuli. A screen was placed between subject and experimenter to reduce the possibility of cues that might influence the subject's task performance, such as the experimenter inadvertently looking at a particular stimulus. On each trial the experimenter slid the tray through the screen, and the subject was presented with one sample stimulus in the centre well of the tray, and two comparison stimuli in the two outer wells of the tray. A penny was hidden under the outer stimulus which was identical to the centre stimulus. The template surrounding the wells was blue, as an arbitrary cue for the subject that the task involved identity matching. The subject was instructed "Look at this one" (the experimenter pointed to the centre stimulus), and then "look at these ones" (the experimenter pointed to the outer two stimuli). The subject was then told "Now lift up the one you think the penny is hidden under." The subject then had to lift up one of the outer stimuli. If the subject attempted to lift the centre sample, she was reminded that "the penny will always be under one of these (the experimenter pointed to the outer two stimuli). If the subject was successful, she was able to retrieve the penny. The subject's attention was not drawn to the coloured template.

Production of correct responses resulted in praise from the experimenter ("That's right! Good!"), and the contingent presentation of pennies (hidden under correct comparison stimuli), which the subject was encouraged to exchange for small novelties at the end of each session.

## Interventions

A number of different interventions were instituted in order to investigate under what parameters learning in the matching to sample situation could take place. These can be described as follows:

Firstly, blocked trials of the same stimulus pair were presented, with the two comparison stimuli and the one sample stimulus in the same spatial location, until the subject achieved three correct scores in a row;

Secondly, the same comparison pair on each trial were presented, but *left* and *right* presentations of the matching comparison stimulus were alternated;

Thirdly, a verbal prompt to the subject was given, the prompt being "Look under the one that's the same," in the case of identity, and in the case of oddity, "Look under the one that's different." The prompt was different from the rule described below in that it was trial-specific and did not specify any governing principles about the nature of the task.

Fourthly, a faded prompt to the subject was given, which involved the experimenter merely saying the words "same," or "different," before the subject made his or her choice;

Fifthly, the subject was informed of the rule in operation. At the start of each of these sessions, the subject was told: "The way to get the pennies, is to look under the one [comparison] that's the same as the [sample] middle one," and at the start of each trial, the subject was told, "the penny will always be under the one that is the same." The occasions on which these interventions were applied are described below.



Additionally, Subject 10 completed a sorting task to ensure that her ability to respond to the instructions "same" and "different" was intact. The poor performance of the subjects on the conditional discrimination task had led the experimenter to suspect, by the time Subject 10 participated, that their dementia may have resulted in a deficit in their comprehension of these concepts. The test was presented on two sessions, before the commencement of the conditional discrimination tasks. On each session, the subject was given 2 sets of identical pictures, which had 4 in each set. The cards were randomly shuffled. At the start of the session she was told, "I am going to show you some cards which I want you to sort out for me." Then she was shown one card, and told to "make one pile of cards which are the same as this one, and one pile which are different."

All other procedural details were as described in the General Method.

## Results

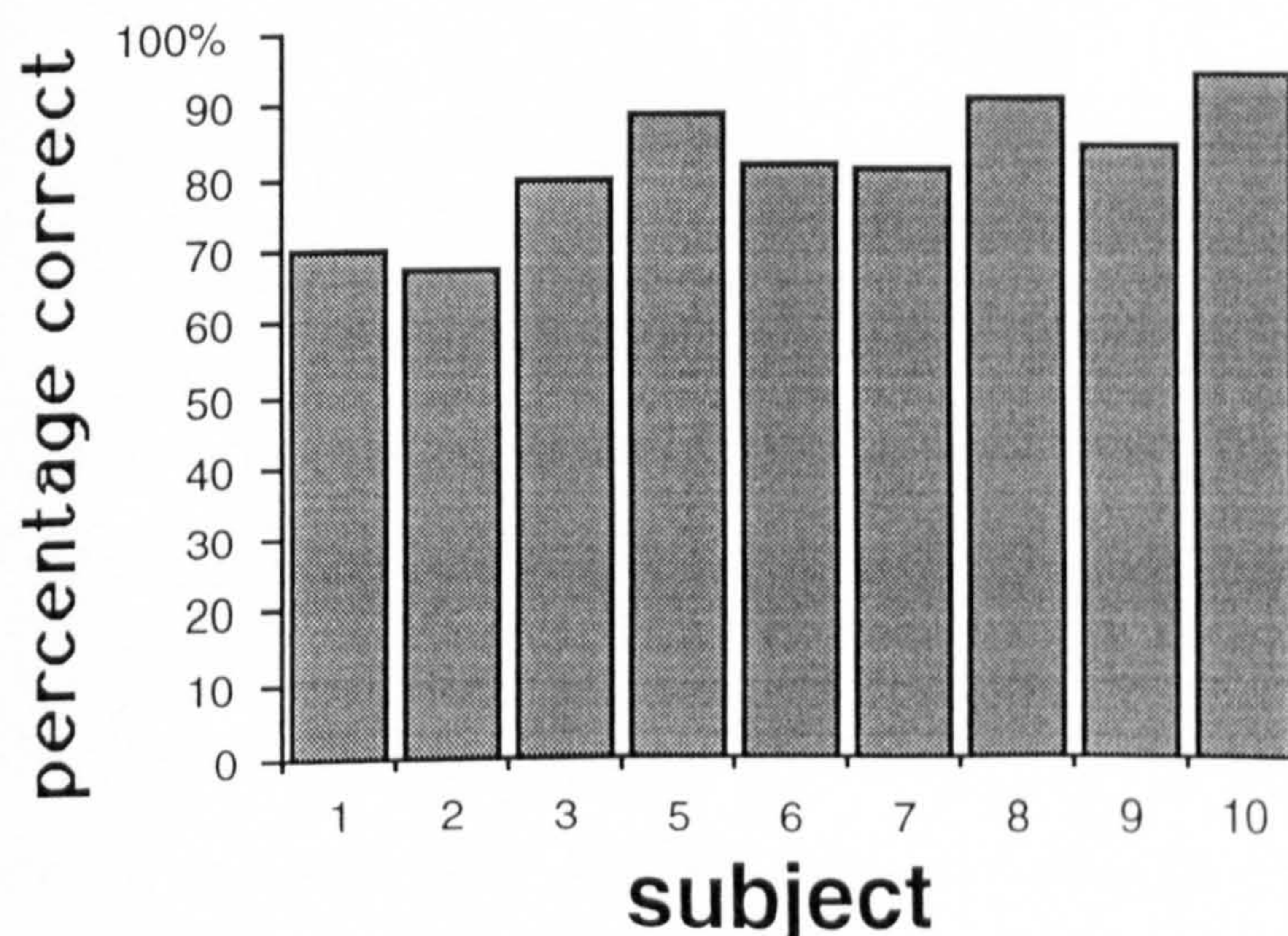
For all subjects, the results are presented as percentage scores, and for the 3 dementia subjects, also as absolute scores per number of trials. In each session, the number of trials conducted varied depending on when the subject achieved three correct responses in a row, and whether the subject was willing to continue the session. In order to compare performance across sessions, therefore, and to standardise these results with those in other experiments presented in this thesis, all scores were converted to a percentage. In all cases, sessions were presented with the task-contextual instructions described above.



### Control subjects' performance on simultaneous identity matching

Figure 8. 2 shows the control subjects' scores on simultaneous identity matching with pictures. All 9 subjects except for one, scored at or above 80% correct. All the subjects learned the task quickly and this is reflected in their high percentage scores. However, the red and blue background cues were not overtly helpful. Although subjects were not questioned after the task as to what they thought the purpose of the cues was, no subject spontaneously commented on the coloured cues. Few of the subjects correctly verbalised the rule in operation, and some data are available through records of subjects' on-task verbalisations, as to what they thought was going on. Selected examples are presented. One subject said he was "guessing", another "sensed" which well the penny was under, being under the impression that she was really participating in an experiment on extra-sensory perception, and another subject did verbalise the rule, but made no comment on the coloured cues.

Figure 8. 2. Subject panel's scores on simultaneous identity matching with pictures

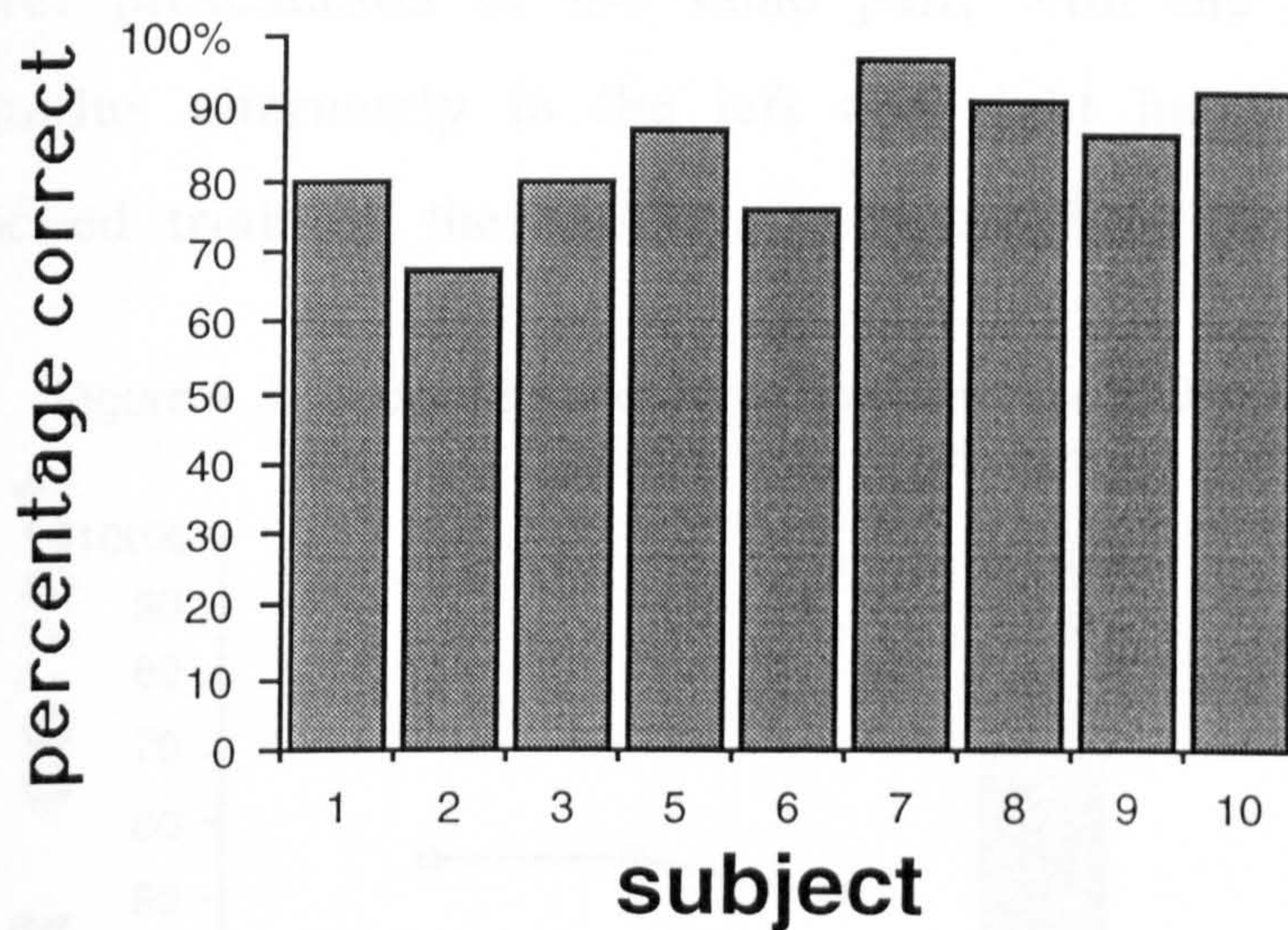




### Control subjects' scores on simultaneous oddity matching

Figure 8. 3 shows scores obtained from 9 subjects from the subject panel on simultaneous oddity matching with pictures, again using the blocked trials procedure, and as shown in Figure 14, all the subjects were able to complete the task successfully and all subjects were getting every trial correct by the end of the session.

Figure 8. 3. Subject panel's scores on simultaneous oddity matching with pictures





### Subject 8

The task studied in depth with Subject 8, was simultaneous identity matching with pictures. The subject was not told the rule throughout the procedure, but various different techniques were employed in an effort to investigate other parameters under which learning could take place. A number of different stimulus presentations were used, to investigate the effect on the subject's conditional discrimination performance on the above task. These were: presentation of the same pair, with the correct comparison stimulus alternately in the left and right hand position; and blocked trials of the same pair. Figure 8. 4 shows his performance.

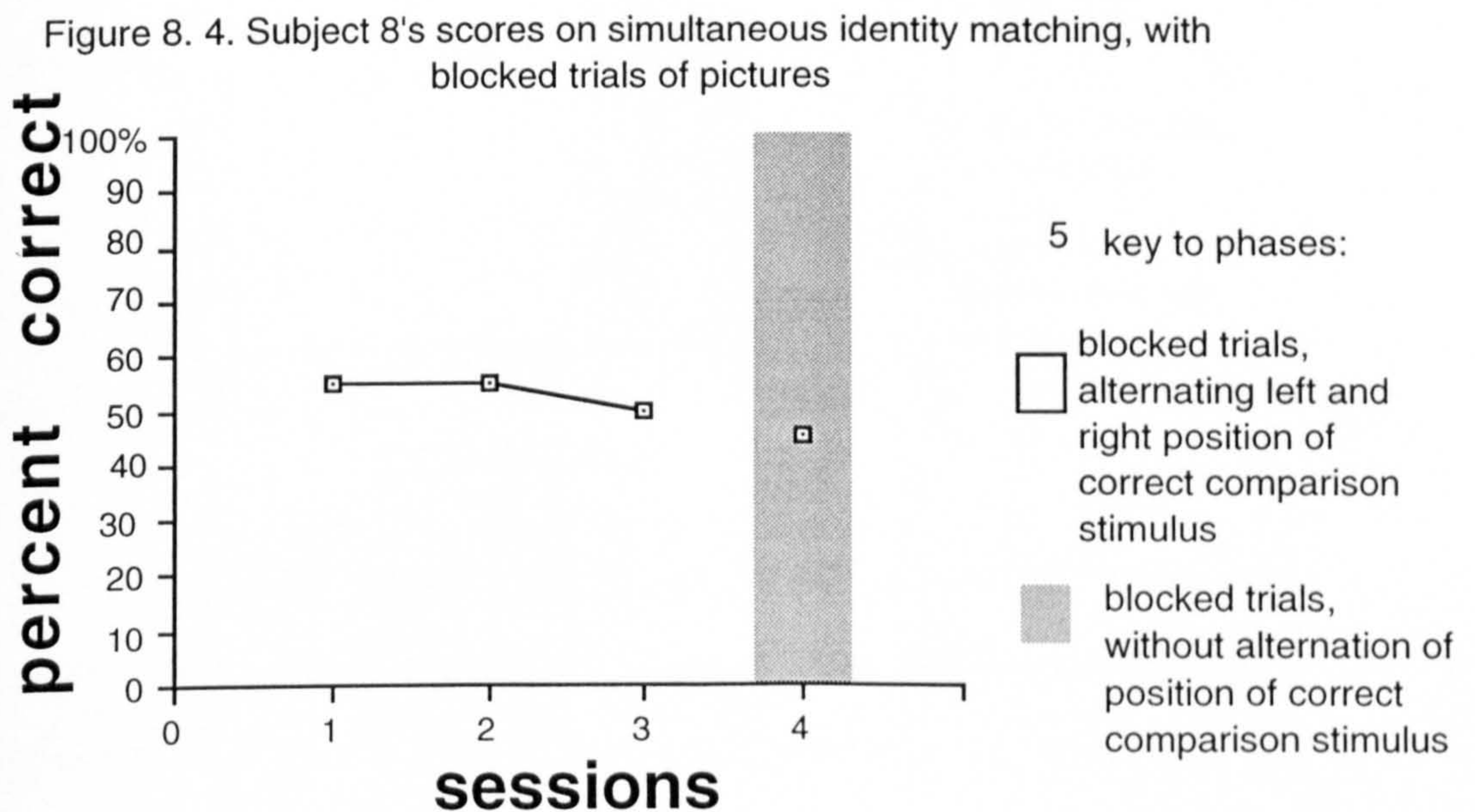


Figure 8. 4 shows that Subject 8's score on the simultaneous identity matching task (with pictures), was 55% on the first two sessions, each having 20 trials, in each of which he scored 11 correct. The score then fell to 50%, which resulted from a session of 38 trials (19 correct). When the task changed to the same

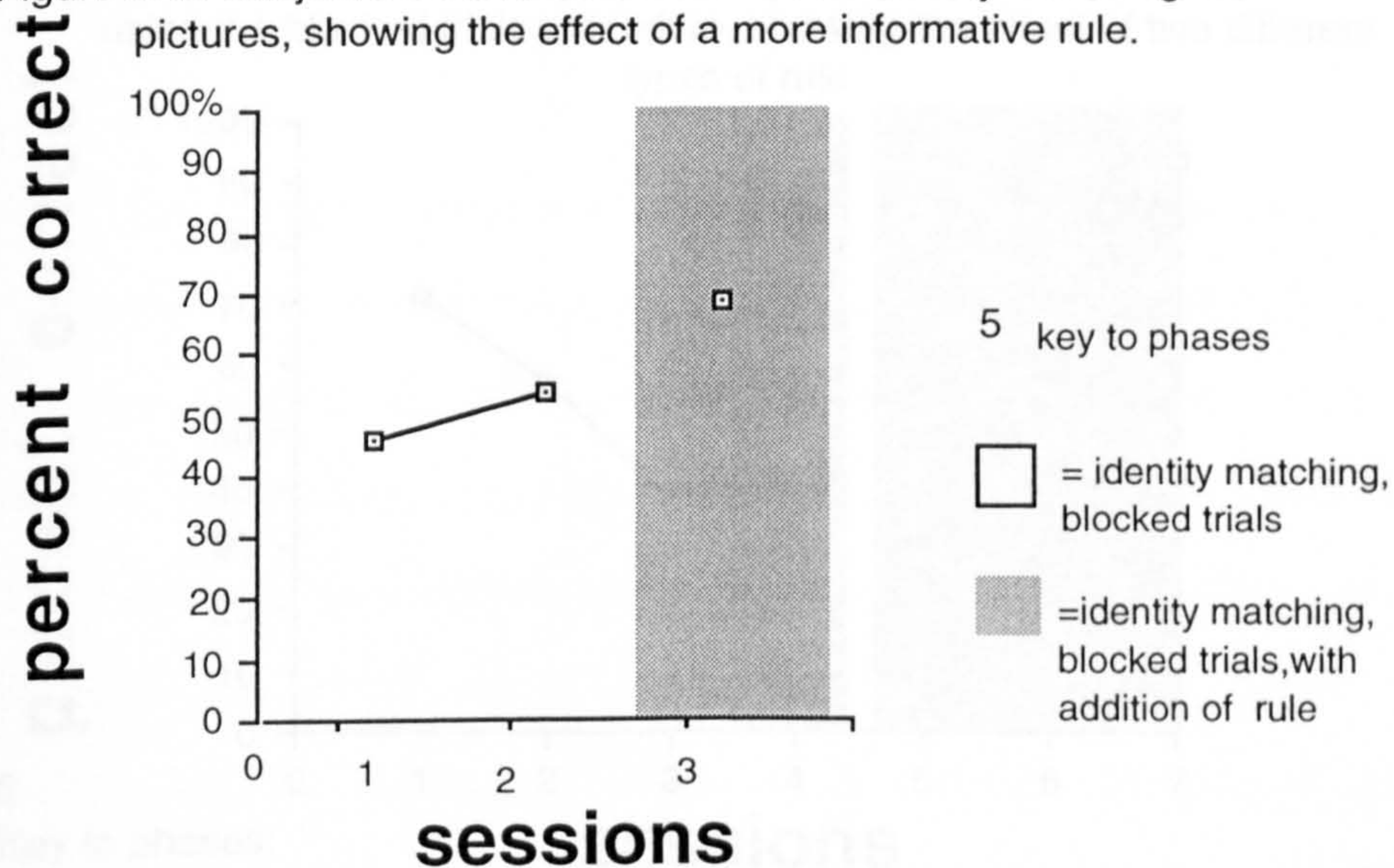
position of the correct comparison stimulus, from alternating left and right position sides, the score fell to 45%. Therefore all scores were below chance level, indicating that no learning had taken place.



Subject 9

The data collected (see Figure 8. 5), were not extensive, as the subject became unwilling to participate in the sessions (she said she thought they were "childish and boring"), and the investigation had to be terminated to avoid the subject becoming hostile. Figure 8. 5 shows her performance on simultaneous identity matching with pictures, showing the effect of the rule.

Figure 8. 5. Subject 9's score on simultaneous identity matching with pictures, showing the effect of a more informative rule.



In the first session 13 trials were presented, with one stimulus pair, and Subject 9's score was 6 (46% correct). The following trial she scored 6 out of a possible 11 trials (54% correct), and on the third session, when the explicit rule "the penny will always be under the one that's the same," was given, her score rose to 9, out of a possible 13 (69% correct), and despite this rather poor performance, she was able to articulate the rule.

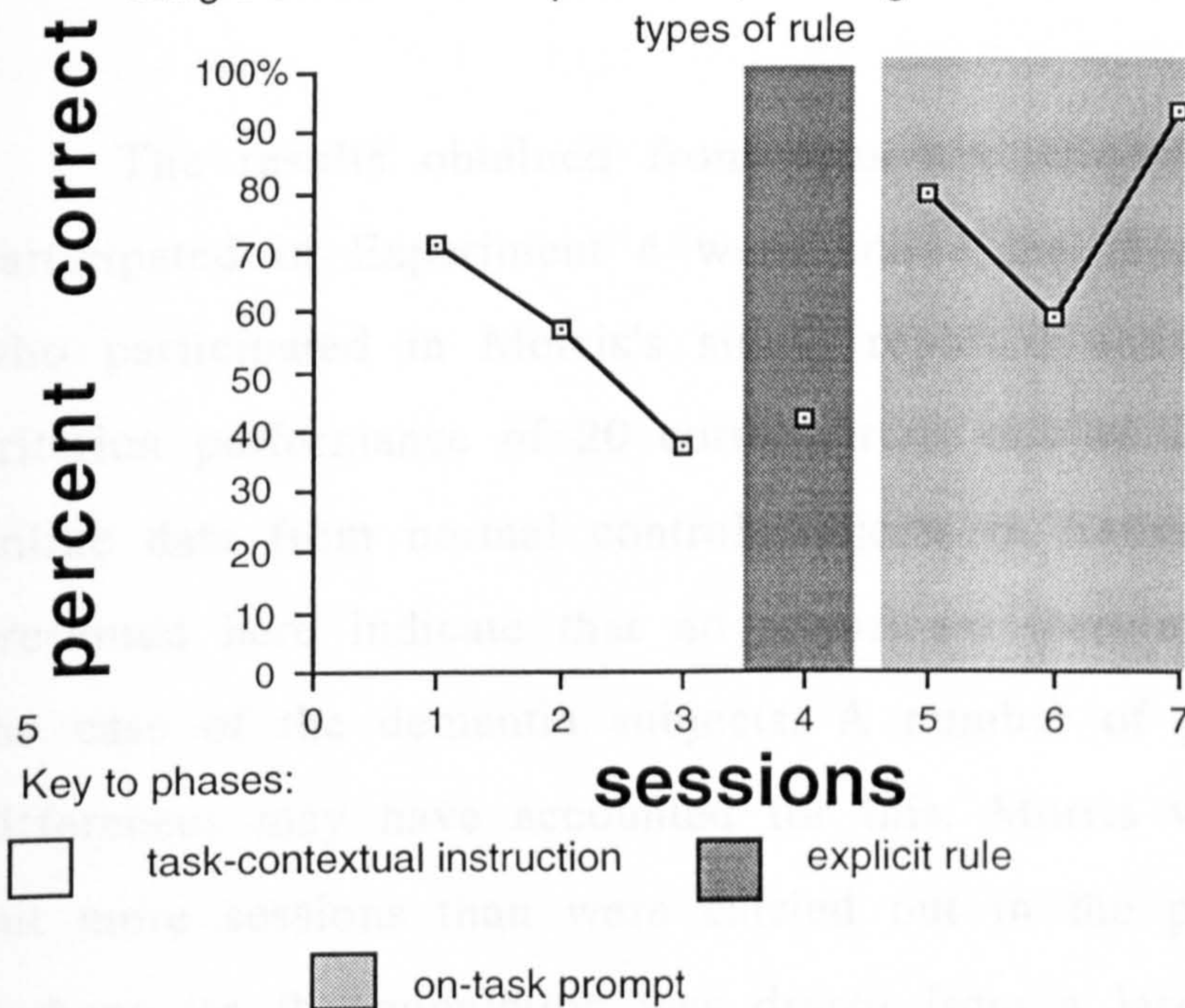


### Subject 10

Subject 10's performance on the sorting task was at ceiling levels on the first session, but on the second session, although she was able to sort the first 4 cards as "same", she was unable to complete the "different" task. The test was not repeated.

The task studied in depth with Subject 10, was simultaneous identity matching with pictures.

Fig. 8. 6. Subject 10's scores on simultaneous identity matching, using the blocked trials procedure, showing the effect of two different types of rule



As can be seen from Figure 8. 6, which shows her performance on simultaneous identity matching, a baseline of responding was taken, with blocked presentation of stimulus pairs, but no instruction other than the basic instruction "pick up the one you think the penny's hidden under," and this resulted in scores of 71% (5 correct of 7 trials), 58% (22 correct of 38 trials),



and 37% (6 correct of 16 trials). The introduction of the rule produced a score of 42%. On this session there were 24 trials, and 10 were correct. When an on-task prompt was applied, over 3 sessions, the trend improved, with initially, a score of 80% (16 correct of 20 trials), then a score of 59% (17 correct of 29 trials), and lastly, 93% correct (14 correct of 15 trials). From the data collected for Subject 10, the on-task prompt appeared to be the most effective of these strategies.

### Discussion

The results obtained from dementia subjects who participated in Experiment 4 were unlike the those of subjects who participated in Morris's study, reported above, who achieved criterion performance of 20 correct trials out of 24, and also unlike data from normal control subjects in Experiment 4. Data presented here indicate that no significant learning took place, in the case of the dementia subjects. A number of procedural differences may have accounted for this. Morris was able to carry out more sessions than were carried out in the present study. Perhaps, as the population was drawn from a large hospital, he may have had a wider access to suitably compliant patients, and as he was working in a hospital setting with them, rather than in their own homes, may have had more influence on the subjects to persuade them to participate. It is possible that had the subjects in the present experiment been exposed to more sessions, they would have achieved criterion performances. It was not possible, however, to persuade the three subjects who participated in Experiment 4 to continue the task further and so this question

must be left open. In the cases of Subjects 9 and 10, the experimenter was in the position of a guest in the subject's own home, and the subject had the opportunity, if she so wished, to ask the experimenter to leave!

Morris's task also differed in the nature of the stimuli, which were two sets of three colours. Photographs of household items (as used in Experiment 4), are more complex stimuli than the colour squares which Morris used, and although they represented objects which must have been familiar to the subjects, the additional complexity of the stimuli may have made the task more difficult than the task Morris conducted.

A final difference between Morris's procedure and the one reported here is that Morris asked the subjects, on each trial to name the stimuli, in order to ensure that they were attending to the relevant stimulus dimensions. This did not happen in the present experiment, although Subject 9 occasionally said the names of the stimuli during the task. This issue is relevant to a question raised in the Introduction to this Chapter: is conditional responding on the basis of "same", (which is an aspect of naming), affected in dementia? Evidence from Experiment 4 indicated that such conditional responding may well be affected.

Successful matching to sample performance is likely to be aided by the use of stimuli which are nameable, when verbally able subjects are participating (see Catania, Horne, and Lowe, (1989), for example), who used the matching to sample procedure to examine the formation of equivalence classes). Although the picture stimuli were quite obviously nameable, the likelihood that the subjects experienced a naming deficit may have compromised their use of the naming strategy. Naming behaviour in the case of



Subject 8 has been described extensively in Experiment 3(B), and was seriously compromised. For example, on baseline naming of pictures sessions his scores gave a mean of 3.53 (standard deviation 2.01) correct out of 10. In the cases of Subjects 9 and 10, their mand compliance and naming skills have been assessed (see above), and although their ability to name the 10 household items was not compromised (naming scores were 10 out of 10), their low scores on the Graded Naming Test indicates some naming impairment may have been present.

Despite the use of verbal cues and rules, conditional discrimination seemed a very difficult task for all subjects in the present experiment. This may be due to the complex skills involved in performing the task successfully, as mentioned in the introduction. We can observe the effect of the rule on the behaviour of Subject 9, in the final session when the rule was applied, her scores improved (see Figure 8. 5). However, the improvement was only to 70%. Given the explicit nature of the rule, it is surprising that performance didn't improve more dramatically. The experimenter observed that Subject 9's on-task verbalisations often contained the names of the stimuli, yet she was unable to succeed on those sessions on the matching to sample tasks. It must be noted that this subject's dementia may not have been irreversible (possible depressive pseudo-dementia), and this may have confounded the results, in her case. She was unable to formulate the identity principle, before she was informed of the rule.

The application of the rule in the case of Subject 10 produced no improvement at all (see Figure 8. 6). She was aided to some extent by the on-task prompt, suggesting that verbal cues

could be of some assistance. The finding that Subject 10 was slightly impaired on her ability to sort the items in the sorting task on the basis of the cues "same", and "different", in that she was unable to complete the "different" sort on the second session, indicates a possibility that her concepts of "same" and "different", were not intact. Chimpanzees, and pigeons, have been found able to classify or sort items on the basis of colour and shape, and to complete a matching task which used identity as the matching criterion (Premack, 1976, and Carter and Werner, 1978), suggesting that sorting or classification is not a developmentally complex skill, and that (for simple stimuli at least) naming is not necessary for sorting to occur.

The fact that the procedure used *simultaneous* identity matching may have adversely affected the results. Simultaneous matching was used because it was considered to place less demands on the subject's declining memory capacities. However, there is little evidence in the literature that subjects are able to quickly learn a simultaneous matching task without instruction of some form, although the control subjects who participated in Experiment 4 were able to. The control group which Morris used, completed *delayed* matching to sample tasks, but were able to successfully complete the task. The fact that sample and comparison stimuli were presented simultaneously may have added to the subject's confusion. Some support for this hypothesis comes from the observation that the subject very often chose the centre sample stimulus, as his or her choice, even though he or she had previously been reminded that the two outer wells were the appropriate choices.

Impairment on the conditional mand compliance response could also have implications for the subjects' performance on conditional discrimination, which also requires the production of conditional responses. Subject 8's performance on conditional mand compliance tasks was zero, Subject 9's performance was 4 on the "bell cue" task, but 10 on the other tasks. Subject 10's performance varied but in initial baseline sessions resulted in scores of 3, 0, 2, and 9 (see Experiment 5). If conditional responding of the form specified in Experiment 4 was impaired, what would be the implications for other forms of conditional responding which included temporal and/or spatial topographies? If a functional analysis of such conditional responding could be developed, would it be possible to develop therapeutic interventions which might re-establish conditional responding? The kind of interventions and procedures used in Experiment 4 were not effective, and so Experiment 5 sought to develop a conditional mand procedure which might be used to investigate the issue further.



## CHAPTER 9

### EXPERIMENT 5

#### WHAT EFFECTS DO IMPULSIVE RESPONSE PREVENTION AND MANIPULATION OF DELAY PERIOD HAVE ON CONDITIONAL MAND COMPLIANCE TASKS?

##### Introduction

The conditional mand compliance task used in the present study is based on the mand compliance behaviour which Skinner discusses in his book 'Verbal Behavior' (see Chapter 4). The mand is the behaviour of verbally demanding something from another member of the verbal community. Skinner gives the example of a speaker asking for bread (manding) and the listener giving bread (complying with the mand). The mand becomes conditional (my example) when the speaker specifies some condition or cue which is to occur before the listener should give the bread. So to convert Skinner's example into the conditional mand compliance, the speaker would not simply ask for bread, but ask that the bread be given at a certain moment in time, for example, "*when I set the table, give me the bread.*" Experiment 5 developed the issues raised in Experiment 4 in order to investigate further the difficulties dementia patients might experience in performing conditional responses.

There is some evidence from the literature that the frontal lobes of the brain are involved in the performance of conditional tasks of this nature. For example, an experiment which was broadly similar to Experiment 5, was conducted by Petrides

(1985), with patients who had frontal lobe lesions which had been introduced to relieve epilepsy. The apparatus he used involved six white cards, placed in a row, and six identical small blue lamps, arranged behind the cards. The subject had to touch one of the cards when one of the lamps lit up. A particular card had an arbitrary correspondence to a particular light. If the patient touched the correct card he was told that his response was correct. Petrides found that persons with frontal lobe lesions were impaired in their ability to perform this task. In another experiment, the subjects were required to produce specific hand postures corresponding with a particular light, as in his first experiment. The frontal lobe patients showed impairment on this task too, suggesting that the deficit was in the ability to do the conditional task, and not simply an inability to respond to spatial stimuli (the position of the lights in the first experiment). The author pointed out that the frontal cortex has been shown in the monkey to be involved in conditional learning tasks, and although the subject population in the present study is rather different, it is possible that dementia patients may also suffer from frontal lobe damage.

The present task examined the production of various responses. The subject was required to be able to respond correctly to a verbal stimulus by selecting the appropriate referent from an array of ten stimuli. He or she also had to be able to mediate the interval before the occurrence of the conditional cue which indicated that a response should be emitted. Rather than merely asking the subject to wait until the experimenter said "Go!" for example, tasks which were designed to provide simple mediating activity to prevent impulsive

responding were requested. The counting and the blocks task (see below) may have functioned (although this possible effect was not intentional), as distraction tasks, thus rendering the mediation process particularly difficult for the memory-disordered subject. Having "mediated" the interval between instruction and presentation of the conditional cue, the subject had to respond appropriately to the cue. A normal subject will perform each of these steps correctly, in response to the conditional instruction, but the possibility exists that demented subjects will respond impulsively, that is, fail to wait for the cue to be presented, or select the wrong item or no item when the conditional cue is presented.

## Method

### Subjects

Three subjects participated, one male and two females. In the cases of Subjects 10 and 11, the first language was English, and in the case of Subject 12, the first language was Welsh. All other subject variables were as described in the General Method.

### Subject 10

This subject also participated in Experiment 4, (see above for details).



Subject 11 (date of birth 1911)

The subject was resident in a local psychogeriatric hospital. He was a retired school-teacher. The Consultant Psychogeriatrician had diagnosed Subject 11 as suffering from possible multi-infarct dementia. He had previously had at least one stroke.

He was unable to remember the experimenter's name throughout the course of the study, and claimed, at the start of many sessions, that he couldn't remember doing the "game" before, despite the fact that it was conducted at weekly intervals. He was, however, able to recite passages of poetry, and hold a relatively sensible conversation, about, for example, schools at which he had taught. He also enjoyed playing card games, and, when prompted, drawing pictures.

Subject 12 (date of birth 1932)

This subject attended a local Day Care Centre for the elderly. She was extremely confused and her dementia progressed rapidly throughout the course of the study. Her dementia was diagnosed to be a mixture of the Korsakoff's Syndrome type, and the early onset Alzheimer type, by the Consultant Psychogeriatrician.

Setting

Setting details were as described in the General Method.

## Materials

The stimulus materials for the conditional task were the ten photographs of household items used in previous experiments. To provide the conditional cues the following items were used; an old-fashioned alarm clock of the ringing type rather than the electronic type (for the "bell cue"), three red wooden blocks (for the "blocks cue"), and a blue card 11 cm in length and 7 cm in width (for the "card cue"). A round tray was also used which was approximately 35 cm in diameter, to prevent impulsive responding. A Panasonic video-camera system was used to record sessions for Subject 10 only. Other materials were as described in the General Method.

## Design

The design was as described in the General Method.

## Procedure

The conditional mand compliance tasks were selected for assessment and training after the administration of all the language assessments and standard assessments described in the General Method. The procedure for the four conditional mand compliance tasks has been described in the General Method. Additional procedural details are described below.

### Impulsive response prevention

To prevent the common error of impulsiveness, where the impulsive response was pointing to the stimulus before the occurrence of the conditional cue, the pictures were covered with a circular tray until the cue had occurred. The effect of this intervention was assessed as part of a multiple baseline design across behaviours.

### Manipulation of delay period.

A simpler version of the task was used in the case of Subject 12. This was because the subject had great difficulty in following the instructions for the conditional tasks as described above, and appeared confused and distressed (although reassurance was provided), by the complexity of the tasks. For example, she became tearful, and attempted to leave the experimental setting. Assessment of her responses on the conditional tasks described above was conducted, and her scores were generally at floor level. The simpler task, which was completed without obvious distress, used in the case of Subject 12 was one which involved the experimenter covering the pictures with a tray, for different lengths of time: 10 seconds; 5 seconds; 3 seconds; and 1 second. After the elapse of the period of time, the cover was removed from the pictures, and Subject 12 had the opportunity to select the required picture. At the start of each session the instruction given to the subject was as follows:



"I'm going to cover the pictures up with the tray. *When* I uncover the pictures, I want you to point to one of them. I will tell you which picture to point to."

Then at the start of each trial the experimenter told the subject, "*when* I uncover the pictures I want you to point to the (cup)."

The effect of the manipulation of delay period was also assessed as part of a multiple baseline design across behaviours. The simple mand compliance task was assessed as a free-running baseline.

## Results

### Scores on assessments of other verbal behaviour

The subjects' scores on the other language assessments which were not selected for assessment and training, are presented in Table 9. 1. All the language assessments in Table 9. 1 have a maximum score of 10. Table 9. 1 shows that Subject 12 was impaired on all the language assessments except the echoic, mand compliance with words and naming words, in contrast to Subjects 10 and 11, who scored 10 on all the assessments shown in Table 9. 1. Exceptions to these ceiling scores were scores of 9 on the echoic, and of 9 on mand compliance with pictures, and of 8 on receptive prepositional relations with objects, from Subject 10.

Table 9. 1. Language assessments *not* selected for longitudinal assessment and training for Subjects 10, 11, and 12.

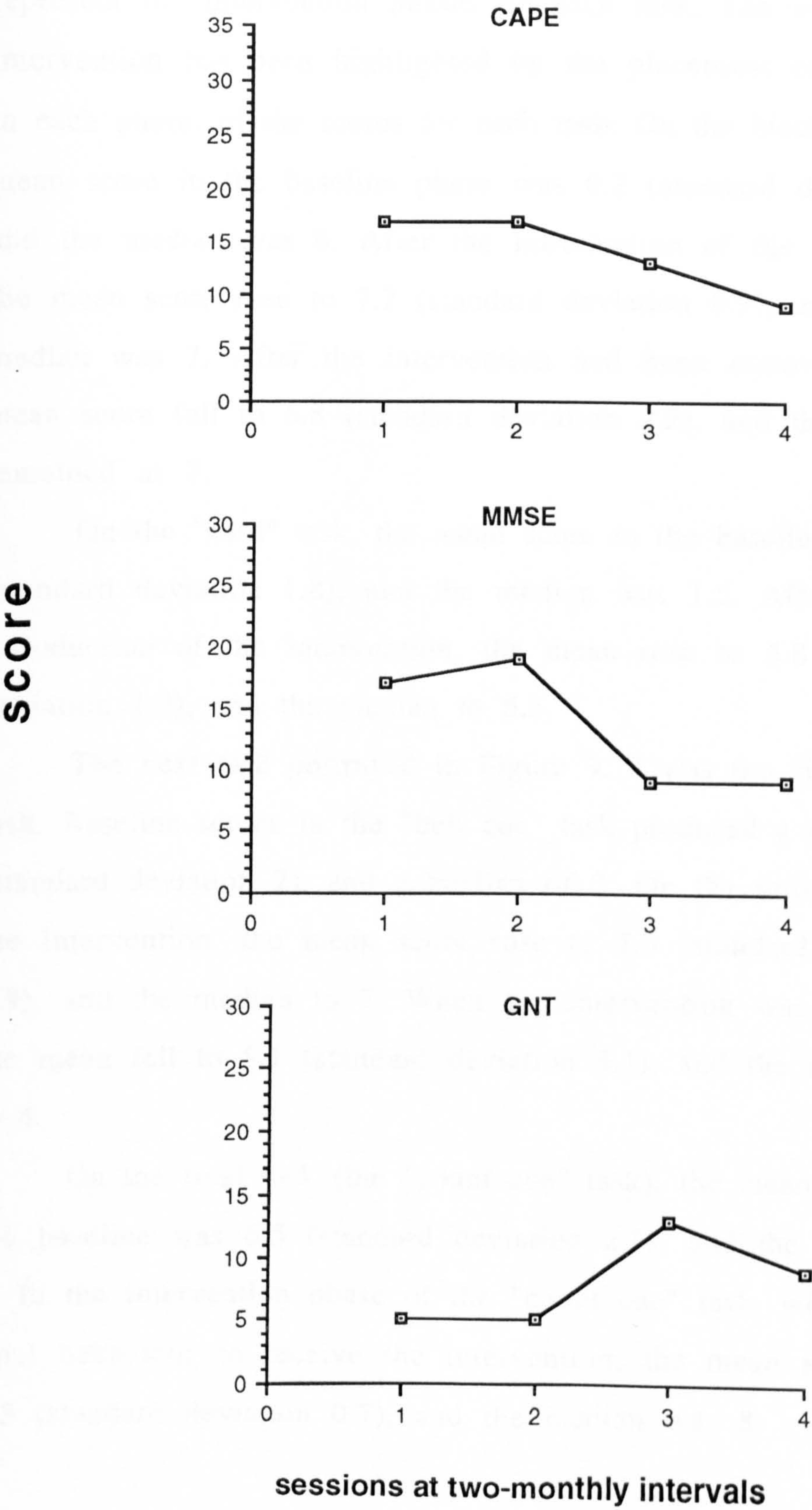
<i>ASSESSMENT</i>	<i>SUBJECT AND SCORE</i>		
	<i>10</i>	<i>11</i>	<i>12</i>
echoic	9	10	10
mand compliance with objects	10	10	9
mand compliance with pictures	9	10	8
mand compliance with words	10	10	10
naming objects	10	10	9
naming pictures	10	10	8
naming words	10	10	10
receptive prepositional relations (objects)	8	10	7
receptive prepositional relations (pictures)	10	10	9
receptive prepositional relations (words)	10	10	9
expressive prepositional relations (objects)	10	10	5
expressive prepositional relations (pictures)	10	10	6
expressive prepositional relations (words)	10	10	8

Subject 10

In the case of Subject 10, her achievements on the three standard assessments are represented in Figure 9. 1, below. A downward trend can be seen in all three of the standard assessments. In the case of the CAPE, the maximum score is 35, and in the case of the MMSE, and the GNT, the maximum score is 30.



Figure 9. 1. Subject 10's scores on the CAPE, MMSE, and GNT.



The results for Subject 10, on the conditional mand compliance tasks, are presented in Figure 9. 2. The shaded areas represent the intervention phases on each task. The effect of the intervention has been highlighted by the placement of mean lines in each phase, of the scores for each task. On the blocks task, the mean score in the baseline phase was 6.2 (standard deviation 2), and the median was 6. After the introduction of the intervention the mean score rose to 7.2 (standard deviation 0.9), and the median was 7. After the intervention had been removed, the mean score fell to 6.8 (standard deviation 2.2), and the median remained at 7.

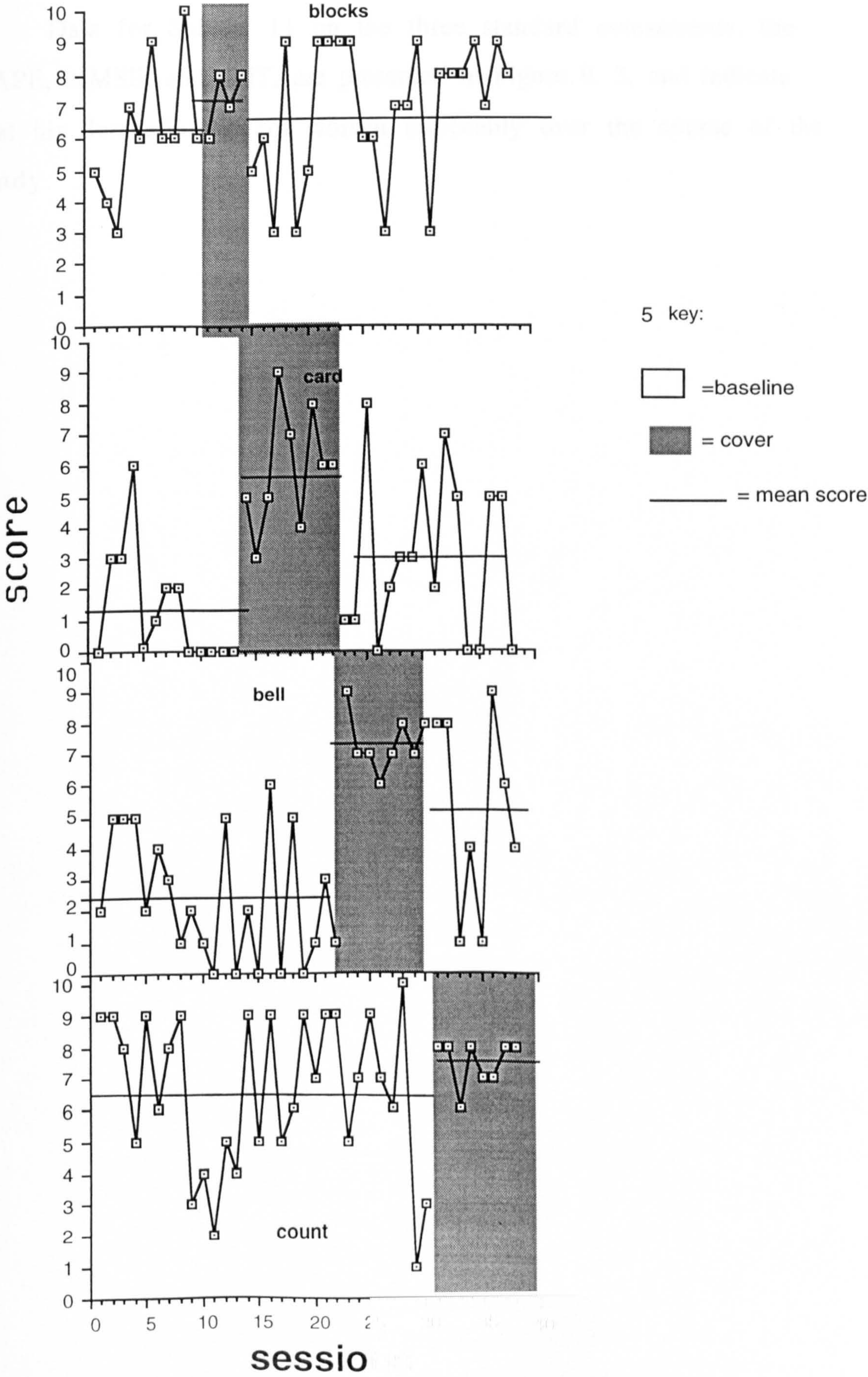
On the "card" task, the mean score in the baseline was 1.3 (standard deviation 1.8), and the median was 1.5. After the introduction of the intervention, the mean rose to 5.8 (standard deviation 1.9), and the median to 5.5.

The next task portrayed in Figure 9. 2 was the "bell cue" task. Baseline scores in the "bell cue" task produced a mean of 2.4, (standard deviation 2), and a median of 2. On the introduction of the intervention, the mean score rose to 7.3 (standard deviation 0.9), and the median to 7. When the intervention was withdrawn, the mean fell to 5.1 (standard deviation 3.1), and the median fell to 4.

On the final task (the "count cue" task), the mean score in the baseline was 6.5 (standard deviation 2.5), and the median was 7. In the intervention phase of the "count cue" task, which was the final behaviour to receive the intervention, the mean score was 7.5 (standard deviation 0.7), and the median was 8.



Figure 9. 2. Subject 10's scores on four conditional mand compliance tasks with pictures, showing the effect of impulsive response prevention.

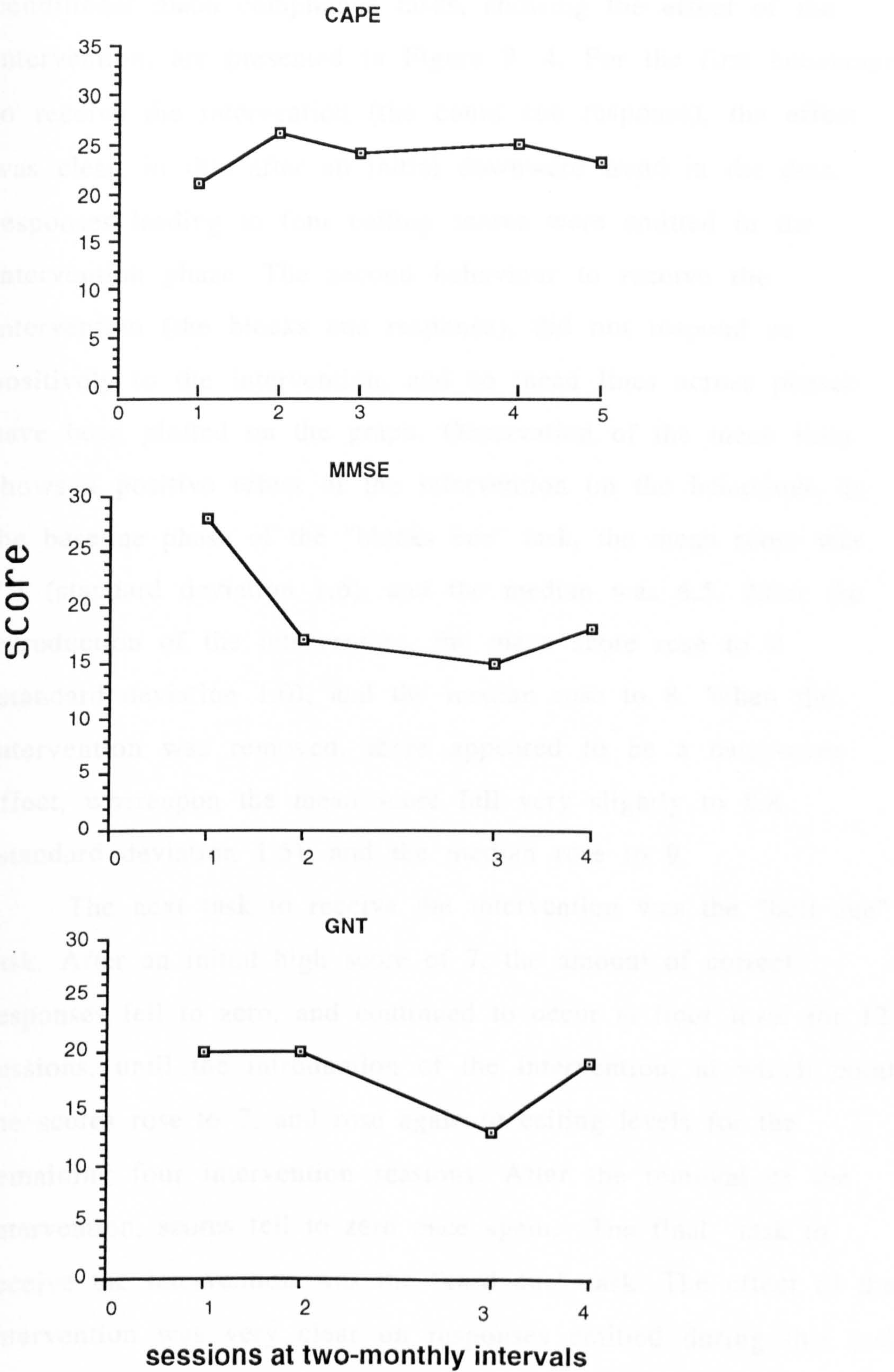




Subject 11

Data for Subject 11 on the three standard assessments, the CAPE, MMSE, and GNT, are presented in Figure 9. 3, and indicate that his dementia did not worsen noticeably over the course of the study.

Figure 9. 3. Subject 11's scores on the CAPE, MMSE, and GNT.



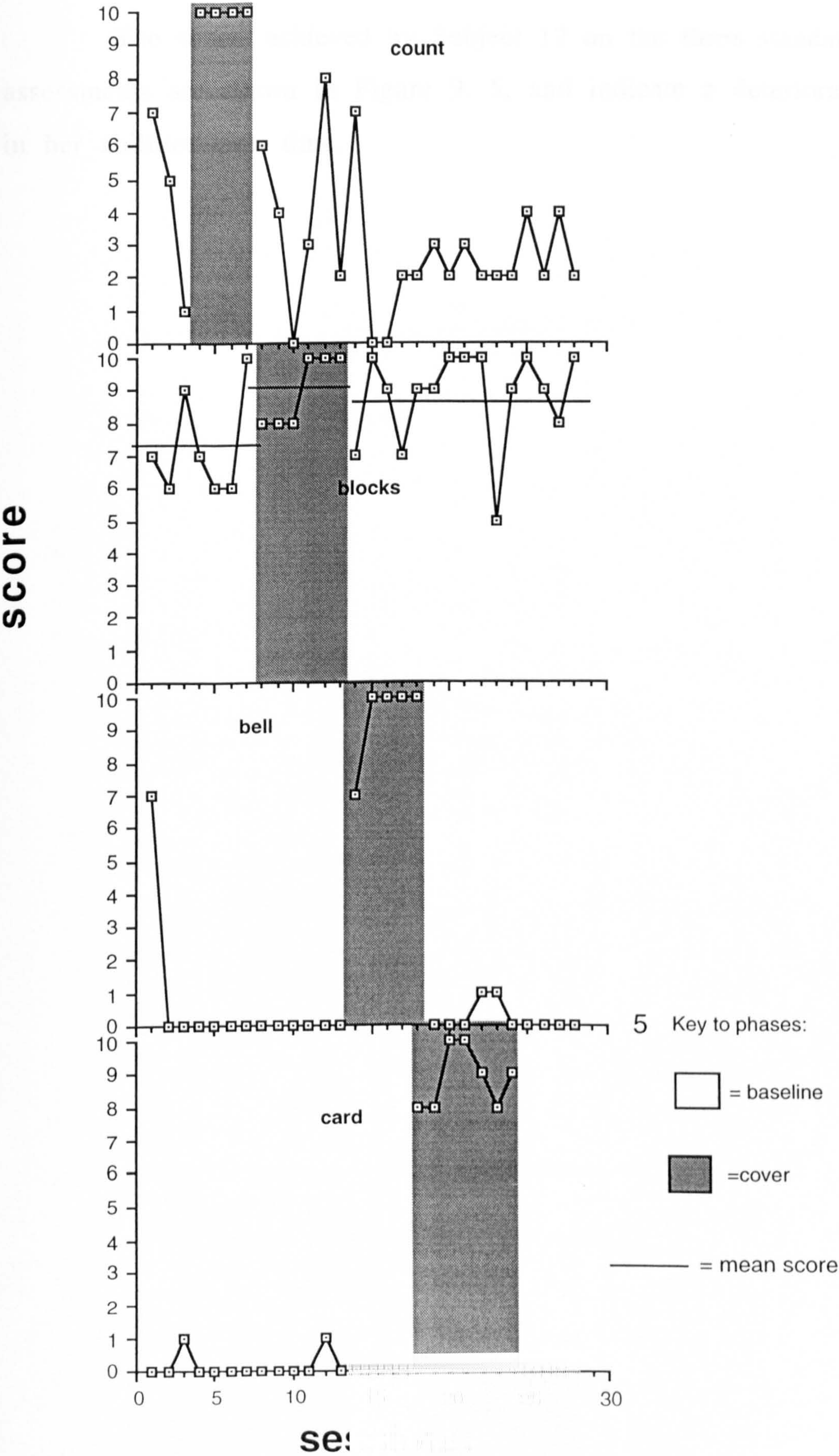
The results of Subject 11's performance on the four conditional mand compliance tasks, showing the effect of the intervention, are presented in Figure 9. 4. For the first behaviour to receive the intervention (the count cue response), the effect was clear, in that after an initial downward trend in the data, responses leading to four ceiling scores were emitted in the intervention phase. The second behaviour to receive the intervention (the blocks cue response), did not respond so positively to the intervention, and so mean lines across phases have been plotted on the graph. Observation of the mean lines shows a positive effect of the intervention on the behaviour. In the baseline phase of the "blocks cue" task, the mean score was 7.3 (standard deviation 1.6), and the median was 6.5. After the introduction of the intervention, the mean score rose to 9 (standard deviation 1.0), and the median rose to 8. When the intervention was removed, there appeared to be a carry-over effect, whereupon the mean score fell very slightly to 8.8 (standard deviation 1.5), and the median rose to 9.

The next task to receive the intervention was the "bell cue" task. After an initial high score of 7, the amount of correct responses fell to zero, and continued to occur at floor level for 12 sessions, until the introduction of the intervention, at which point the scores rose to 7, and rose again to ceiling levels for the remaining four intervention sessions. After the removal of the intervention, scores fell to zero once again. The final task to receive the intervention was the "card cue" task. The effect of the intervention was very clear on responses emitted during this task, with a noticeable difference in level from scores of zero and one,



to scores of 8 and over in the intervention phase. Scores fell to floor level again after the removal of the intervention.

Figure 9. 4. Subject 11's score on four conditional mand compliance tasks with pictures, showing the effect of impulsive response prevention.

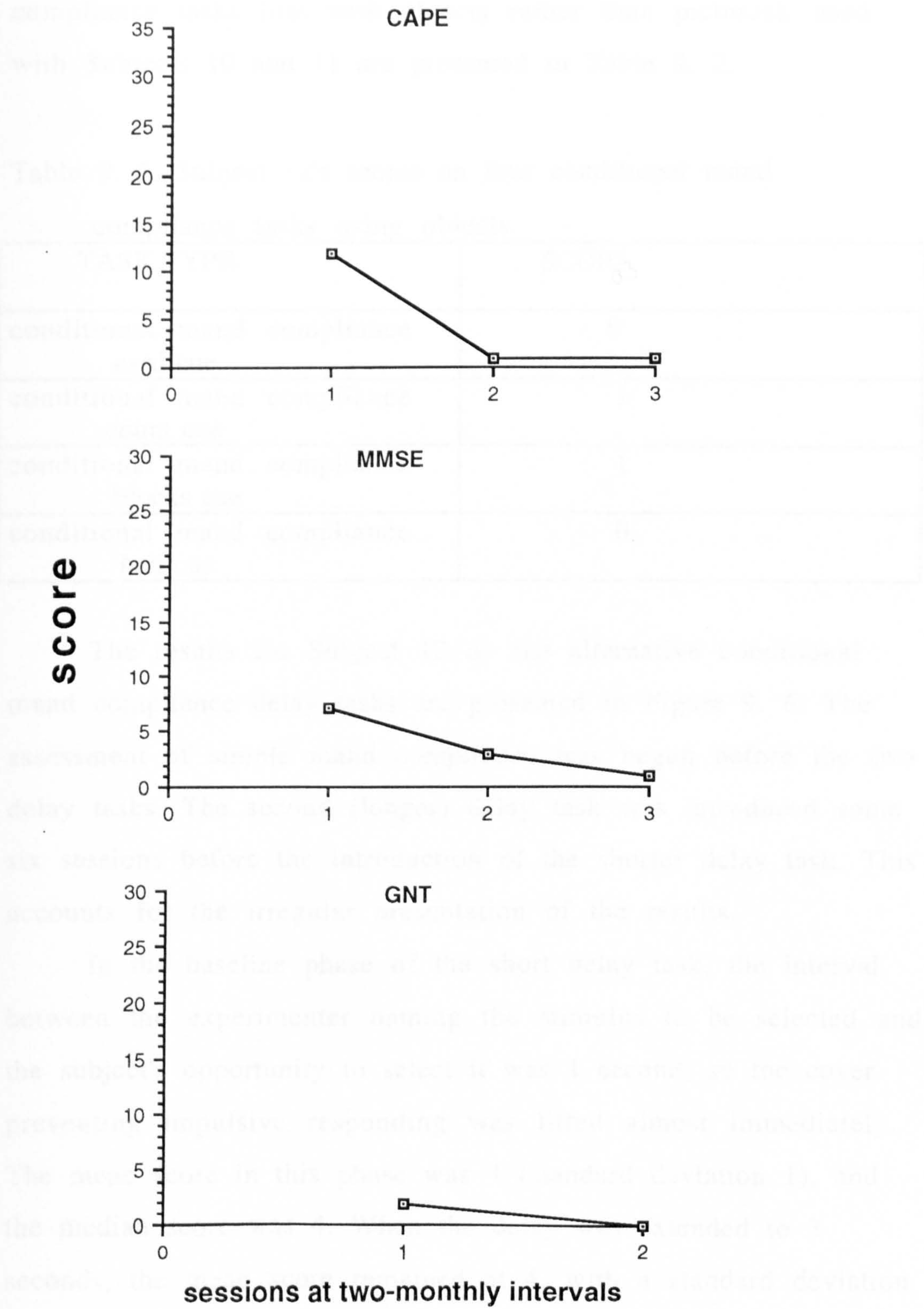


Subject 12

The scores achieved by Subject 12 on the three standard assessments are shown in Figure 9. 5, and indicate a deterioration in her abilities over time.



Figure 9. 5. Subject 12's performance on the CAPE, the MMSE, and the GNT.



The results of Subject 12 on the conditional mand compliance tasks (but with objects rather than pictures), used with Subjects 10 and 11 are presented in Table 9. 2.

Table 9. 2. Subject 12's scores on four conditional mand compliance tasks using objects.

TASK TYPE	SCORE
conditional mand compliance card cue	0
conditional mand compliance count cue	1
conditional mand compliance blocks cue	1
conditional mand compliance bell cue	0

The results for Subject 12 on the alternative conditional mand compliance delay tasks are presented in Figure 9. 6. The assessment of simple mand compliance was begun before the two delay tasks. The second (longer) delay task was introduced some six sessions before the introduction of the shorter delay task. This accounts for the irregular presentation of the results.

In the baseline phase of the short delay task, the interval between the experimenter naming the stimulus to be selected and the subject's opportunity to select it was 1 second, so the cover preventing impulsive responding was lifted almost immediately. The mean score in this phase was 4 (standard deviation 1), and the median score was 4. When the delay was extended to 3 seconds, the mean score remained at 4, with a standard deviation of 2, and a median of 4. When the interval was extended to 5 seconds, the mean score fell to 1, (standard deviation 1), and the median score also fell to 1. When the period of delay was returned

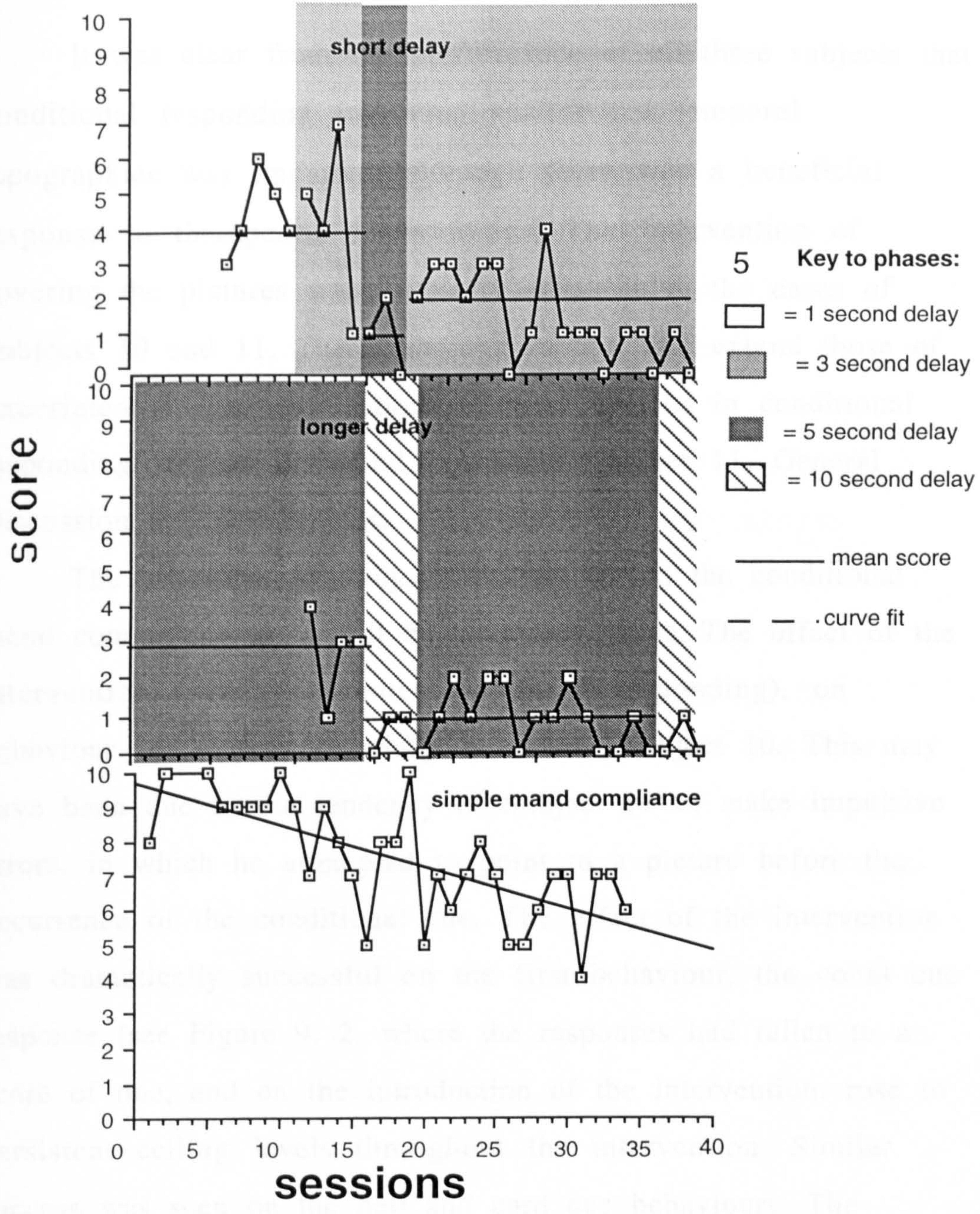
to 3 seconds, the mean score rose to 2 (standard deviation 1), and the median remained at 1.

The delay period on the longer delay period task, began at 5 seconds. The mean score in this phase was 3 (standard deviation 1), and the median was 3. When the delay was increased, for three sessions, to 10 second, the mean score fell to 1 (standard deviation 1), and the median also fell to 1. The mean score remained at 1 (standard deviation 1), and the median remained at 1. When a second 10 second delay period was instituted for the final 3 sessions, the scores fell, to zero, 1, and zero, the median score becoming zero.

On the simple mand compliance task, in which the subject was required to select a picture at the experimenter's request, the scores were initially fluctuating around 9 and 10 (see Figure 9. 6), but after 9 sessions they began to decline. The simple curve fit plotted on the graph for this behaviour shows a downward trend.



Figure 9. 6. Subject 12's scores on three conditional mand compliance tasks with different delay periods.





## Discussion

It was clear from the performance of all three subjects that conditional responding involving spatial and temporal topographies was impaired, although there was a beneficial response to therapeutic interventions. The intervention of covering the pictures was markedly effective in the cases of Subjects 10 and 11. These findings support and extend those of Experiment 4. The implications of these deficits in conditional responding will be discussed further in Chapter 11, General Discussion and Conclusions.

The behaviour of Subjects 10 and 11 on the conditional mand compliance tasks will be considered first. The effect of the intervention (which prevented impulsive responding), on behaviour was clearer for Subject 11 than Subject 10. This may have been due to the tendency of Subject 11 to make impulsive errors, in which he attempted to point to a picture before the occurrence of the conditional cue. The effect of the intervention was dramatically successful on the first behaviour, the count cue response (see Figure 9. 2, where the responses had fallen to a score of one, and on the introduction of the intervention, rose to persistent ceiling levels throughout the intervention. Similar success was seen on the bell and card cue behaviours. The intervention could have affected task performance in a number of ways. It prevented impulsive responding, but may also have increased the frequency of inappropriate responding, that is, selecting the incorrect stimulus. In the condition where stimuli were not covered, the subject may have been able to remember which picture to point to, or to be guided by a self-mediated

discriminative stimulus, that is, looking at the target stimulus during the delay, as a mnemonic strategy. Covering the pictures would clearly have prevented this strategy from being used.

All the conditional tasks may have served as distraction tasks, preventing rehearsal or other mnemonic strategies from being used. If this was the case, doing the conditional part of the task (counting, or carrying out another of the specific behaviours), would have added to the effect of the time delay in making the task more complex and difficult. Some conditional tasks could have had this effect more than others. Support for this possibility is given by the difference in performance on the different conditional tasks. For example, in the case of Subject 10, overall performance appeared to be better on the counting task, perhaps illustrating the automatic and over-learned nature of this behaviour. In the case of Subject 11, performance was overall better on the blocks task. Covering the cards did improve his overall performance, and also, an improvement in performance can be seen on sessions after the intervention, showing weak support for the suggestion that the intervention may have had an informative function, as a secondary cue to respond. The lack of carry-over effect of the intervention on the other behaviours indicates that this may have been a task-specific effect. This prompts the question: How did the subjects' manage to remember which stimulus to point to? Investigation of possible mnemonic strategies could be done by using another intervention, *prompted rehearsal*. The subject, at the start of each session in the intervention phase, could be asked (for example), "say 'cup, cup, cup....' while you are waiting for the bell to ring." A number of possible effects could occur. The subject's production of correct



responses could increase, due to the helpful effects of rehearsal, or decrease, due to the negative effect of a more complicated instruction. Alternatively the strategy may have no effect, if dementing subjects are not able to respond appropriately as listeners to their own verbal behaviour.

In the case of Subject 12, there appeared to be a trend for her scores to be worse when the length of the delay period was increased (see Figure 9. 6). It may well be the case that the longer the time gap between stimulus and opportunity for responding, the less efficiently demented subjects may respond.

Performance of Subjects 10, 11, and 12 on the conditional mand compliance tasks can be compared to the performance of Petrides' subjects described in the Introduction to Experiment 5. As has been pointed out, damage to the frontal lobes may also occur in Alzheimer's Disease (see Mahendra, 1984, and Chapter 2, this thesis), and may occur to such an extent that atrophy is visible on C.T. scans. In multi-infarct dementia, however, cortical atrophy is generally not so pronounced, if it is present at all, and the damage may be from lesions in widespread areas. In the case of Pick's disease (see Chapter 2), cortical atrophy in the frontal lobes is extremely pronounced, more so than in Alzheimer's Disease. It would have been interesting to observe the performance of a subject with a diagnosis of Pick's Disease on the tests in Experiment 5. It may on the basis of these speculations, be possible to relate the subjects' diagnosis of type of dementia to their performance on the tasks. Interestingly, the worst performance was exhibited by Subject 12, and she had a diagnosis of Alzheimer's Disease and Korsakoff's Syndrome, which would probably have particularly affected her frontal lobes. An

alternative explanation of her poor performance in comparison with Subjects 10 and 11, is that unlike Subjects 10 and 11, her first language was Welsh. Communication difficulties, both receptive and expressive, which may have arisen through the loss of her second language in the course of her dementia, may have been a factor influencing her performance.

Subject 11's performance was most improved by the interventions, although overall performance was worse than that of Subject 10. As his diagnosis was of possible multi-infarct dementia, he may have been somewhat spared in his frontal lobe functions. Subject 10's diagnosis was of senile dementia only, so little speculation as to the role of her psychiatric condition in her inability to successfully complete the tasks may be possible.

## Chapter 10

## EXPERIMENT 6

A COMPARISON AND ANALYSIS OF DEMENTIA PATIENTS'  
AND NORMAL SUBJECTS' PERFORMANCE ON EXISTING AND NEW  
ASSESSMENT MEASURES.

## Introduction

Experiment 6 was designed to address the following questions. Firstly, can the assessment procedures developed in this thesis be used to distinguish the changes of normal ageing from those of dementia? This question was investigated by observation and comparison of normal group and dementia group profiles on assessments of verbal behaviour. The language deficits which occur in dementia were utilised as criteria in distinguishing the changes of normal ageing from those of dementia. Assessment measures which had been developed in previous experiments described in this thesis were administered to a sample of dementia patients and a sample of normal elderly volunteers, and the results were compared, with the intention of isolating dementia patients on the basis of lower scores.

Secondly, the experimenter sought to investigate whether the assessments of simple classes of verbal behaviour developed in this thesis may be used productively to provide descriptive profiles of subjects' functional language skills. Such profiles could provide useful information to care staff. Examples of the use of such information would be in the provision of therapeutic interventions, and design and modification of the patient's environment in order to maximise existing skills.



The third question addressed by the present Experiment was whether the interchangeable use of the Mini Mental State Exam, Cognitive Assessment Scale of the Clifton Assessment Procedures for the Elderly, and Graded Naming Test, by clinical and research staff can be justified. To what extent can the results of one test predict results of another, in the cases of participating subjects?

The Mini Mental State Exam (see Chapter 2), has been shown to be reliable and valid as a test of "cognitive defects in a neurological setting" by its authors, who administered it to a group of psychiatric patients, including patients with dementia syndromes, pseudo-dementia, and other disorders, and also a sample of 63 normal subjects (Folstein, Folstein, and McHugh, 1975). In Folstein et al's study, scores were compared with the results of the Wechsler Adult Intelligence Scale (Wechsler, 1958), the Wechsler Memory Quotient (Wechsler, 1945), and the results of CAT scans. The MMSE scores were as follows. The mean score for patients with dementia was 9.7 (range 1-22), and the mean score of the normal group was 27.6 (range 24-30). In a later study in which the Mini Mental State Exam (MMSE) was administered to patients on a neurological ward, the presence of abnormality on CAT scans was found to be correlated with low scores on the MMSE, further indicating that the test is a good indicator of the "cognitive defects" referred to above. Another well-established test of psychological impairment commonly used with dementia patients is the Cognitive Assessment Scale of the Clifton Assessment Procedures for the Elderly (CAPE), (see Chapter 2). The mean score for normal elderly people in Pattie and Gilleard's (1979) sample was 30.4 (standard deviation 3.8). The mean scores for the "dependent" groups tested by Pattie and Gilleard were as follows: for those with mild impairment,

probably living in supervised independent living arrangements such as warden supervised flats, the mean score was 28.4 (standard deviation 5.3); for those with moderate dependency, such as people living in residential homes, the mean score was 23.2 (standard deviation 7.9); and for those in the "acute organic" group, who most often are those living in psychogeriatric wards, the mean score was 12 (standard deviation 8.6).

In the experience of the experimenter, one or other of these tests was commonly used by clinicians to describe the patient's level of dementia and also, in the case of the CAPE, level of functional ability (for example, severe dependency).

Another test sometimes used in the assessment of dementia and other neurological disorders is the Graded Naming Test (see Chapter 2). The Graded Naming Test aims to be "a test of naming ability with the discriminative power to detect degrees of deficit before this becomes merely a statement of the obvious" (McKenna and Warrington, 1983). In their study, the mean score of their normal sample was 22.54 (standard deviation 4.3), and the mean score of the left hemisphere lesion group was 15.15 (standard deviation 7.15).

To have value, a test must be reliable and valid. One of the elements of reliability is test-re-test reliability. This means that on different occasions, the test will give the same result (given that the subjects have not changed). Unfortunately, dementia patients tend to fluctuate in their day to day levels of performance, and sometimes deteriorate rapidly. According to Pattie and Gilleard "assessment of mental state in the elderly may be expected to produce results of varying stability over time". Indeed, such test-retest validity is generally required for tests which measure *stable* characteristics, such as intelligence. The second major requirement is validity. Put simply, a test is

valid if it measures what it claims to measure. The first aspect of validity is face validity. A test has face validity if it *appears* to measure what it purports to measure. Adults will generally not co-operate on tests which appear 'silly' or 'insulting', and therefore, face validity is an aid to subject co-operation. Another element of test validity is concurrent validity. This is assessed by correlating the test with other tests (Kline, 1986). As Kline points out, the other tests must be known to be valid measures. So, the new test should have some valuable feature not possessed by the tests with which it is correlated.

The CAPE, MMSE, and GNT tests were administered to the subjects at the start of the language assessments in order to gain a picture of their level of dementia. In order to assess the validity of the tests and to assess whether the use of one might substitute for the use of another, correlation coefficients of the three tests were calculated.

## Method

### Subjects

#### Dementia patients (Group 1)

These were recruited from the same pool of subjects as those who participated in Experiments 1-5, and additional subjects were recruited through the same channels (for exclusion criteria, and other subject details, please refer to the General Method). The total number of subjects in the dementia group was



38, but not all subjects attempted all the assessments. The age range of the subjects was from 60 to 90 years.

### Healthy elderly control subjects (Group 2)

These were recruited from the Department of Psychology subject panel (see Experiment 4).

### Setting

The dementia patients were tested in the hospital, day centre, or their own home. The control subjects were tested in a small experimental room in the Department of Psychology. All other setting details were as described in the General Method.

### Design

The design was a matched groups type (Plutchik, 1983), in that the two groups of subjects were approximately matched by age range (see above). Descriptive statistics were used to compare the scores of the normal elderly control group with those of the experimental (dementing) group. Neither group was randomly selected, due to the small size of the available population of subjects.

### Materials

The ten household items, pictures, and printed words, which composed the materials in Experiments 1-3, and 5, were used, and additional materials necessary for the conditional mand compliance assessments. In addition the CAPE, MMSE, and GNT

assessments were administered (see previous experiments for details). Some sessions were recorded on a video-camera recording system, as in Experiments 3-5. Additional materials comprised two plastic bowls, each of which was approximately 30 cm in diameter and 5 cm in depth, and a bunch of keys on a key-ring. Small novelties were provided to strengthen participatory behaviour in the case of the dementia patients. Response sheets were used to indicate and record random presentation of trials.

### Procedure

Subjects were first administered the CAPE, the MMSE, and the GNT. The language tests all also followed the same procedure as in Experiments 1- 5, except that in the case of the control group each assessment was only administered on one occasion. The control group had the same assessments as the dementia group, apart from exceptions noted in the Results. The receptive and expressive prepositional relations assessments followed a slightly different procedure to that described in the General Method, because of the methodological problems which had been encountered in Experiment 1. In the revised procedure for the receptive prepositional relations tasks the subject was initially presented with two large plastic bowls. One bowl was turned upside down on the table, in order that the subject would be able to place items *on* top of it. The other was placed the other way up, so that the subject would be able to put items *in* to it. The two bowls were placed on the table before the subject, equidistant from the subject's line of vision. The subject was told at the start of the session, "I'm going to ask you to put one of these things *in* or *on* one of the bowls," and at the start of a trial, to "put the (cup) in [or on] the bowl." The ten household items

were arranged in front of the subject, as described in the General Method.

In the expressive prepositional relations assessment, the experimenter, at the start of a session, told the subject, "now I'm going to ask you, whether one of these items is *in* or *on* the bowl." Then at the start of a trial, the experimenter placed the item in or on one of the two bowls, and then gave the instruction to the subject to "tell me, is the (cup) *in* the bowl or *on* the bowl?" As described in the General Method, the order of the items and the presentation of "in", and "on", was randomised.

The procedure in the conditional mand compliance assessment differed in the case of the subject panel assessments, in that instead of the conditional cue being an alarm clock ringing, a bunch of keys was jingled, and the phrase "keys jingle" replaced "bell sound", in the instruction.

For all subjects, the language assessments were administered in the order in which they were described in the General Method, that is, the assessment began with the echoic, and ended with conditional mand compliance.

### Results

Scores from all assessments were stored in Cricket Graph and Statview (Abacus Concepts, 1991), database programmes, thus rendering tabular and graphical presentation of the data accurate and simple. Descriptive statistical analysis was done using Statview.



Results of Standard Assessments and Correlational Analyses

Table 10. 1 shows the correlation between all the subjects' scores on the MMSE and on the CAPE.

Table 10. 1.  
Corr. Coeff. X<sub>1</sub> : Standard Score of mmse Y<sub>1</sub> : Standard Score of C...

Count:	Covariance:	Correlation:	R-squared:
31	.87	.916	.838

Note: 17 cases deleted with missing values.

The count shows the number of pairs of scores which were included in the calculation (only the scores of subjects who completed both these tests). The covariance shows the degree to which the two variables vary together. For example, in Table 10. 1, the covariance of 0.87 shows that the two variables do vary together to a large extent (the nearer the statistic is to 1.00, the closer the relationship). Additionally, the correlation of 0.916 is close to 1.00, and indicates that scores on the MMSE are a good indicator of scores on the CAPE. A positive correlation coefficient (close to 1.00) can be understood as indicating that as the observed values on one variable increase or decrease, so do the values of the other variable, and for a negative correlation, the opposite would be the case. The R-squared value is the square of the coefficient, and in this case indicates that 0.838 of the variation in CAPE scores may be predicted given the MMSE scores. Standard scores have been calculated because the two tests have different maximum scores, therefore a low score on one would not describe the same degree of impairment as a low score on another test, had raw or percentage scores been compared. This summary of Table 10. 1 describes the role of each

statistic in the table, but further descriptive summaries will only consider the statistic of concern to this aspect of the investigation, the correlation.

Table 10. 2 shows the correlation between the standard scores of all the subjects on the MMSE and the GNT.

Table 10. 2.  
Corr. Coeff. X<sub>1</sub> : Standard Score of mmse Y<sub>1</sub> : Standard Score of GNT

Count:	Covariance:	Correlation:	R-squared:
30	.891	.873	.762

Note: 18 cases deleted with missing values.

The correlation of 0.873 indicates that the two tests are highly related.

Table 10. 3 shows the correlation coefficient between all subjects' scores on the CAPE and the GNT, and the correlation of 0.76 is the lowest of the three comparisons calculated.

Table 10. 3.  
Corr. Coeff. X<sub>1</sub> : CAPE Y<sub>1</sub> : GNT

Count:	Covariance:	Correlation:	R-squared:
29	82.714	.76	.578

Note: 19 cases deleted with missing values.

In summary, then, it may be observed that the three standard assessments are highly related, though the GNT and CAPE are least so (see Table 10. 3).

All data obtained from the two groups of subjects have been grouped together by collating control subjects' scores on a

particular test and presenting them together, and doing the same for the dementia subjects' scores. In this way, an overall picture of performance on that particular assessment for each group was obtained. It is then possible to compare and contrast the control group's scores on a particular assessment with the dementia group's, by observation of the relevant figures, and to follow the progress of a particular subject throughout the assessments. The dementia subjects completed the assessments which the experimenter considered appropriate to each individual's level of dementia. Severely demented subjects, for example, were not asked to attempt the more complex tasks, if they had performed poorly on, or had not been able to attempt simpler tasks.

Table 10. 4 shows summary statistics, including the mean, and standard deviation, of the results of the subject panel group on the MMSE. As can be seen the mean score is 28.9 , which is slightly higher than that of Folstein, et al's normal sample (whose mean score was 27.6). This summary table of descriptive statistics also indicates the minimum and maximum score in the data set, which gives an indication of the spread of the level of ability on that measure. The minimum score is 27, and the maximum is 30, which compares well with the scores obtained by the normal sample tested by Folstein, et al (their normal range was 24-30). The spread of the scores is also indicated by the range. Also included are figures on how many scores were included and how many were missing, which shows how complete the data set is. It also gives the sum total of the scores, and also the variance of the data, which is a measure of how much the scores vary from the mean.

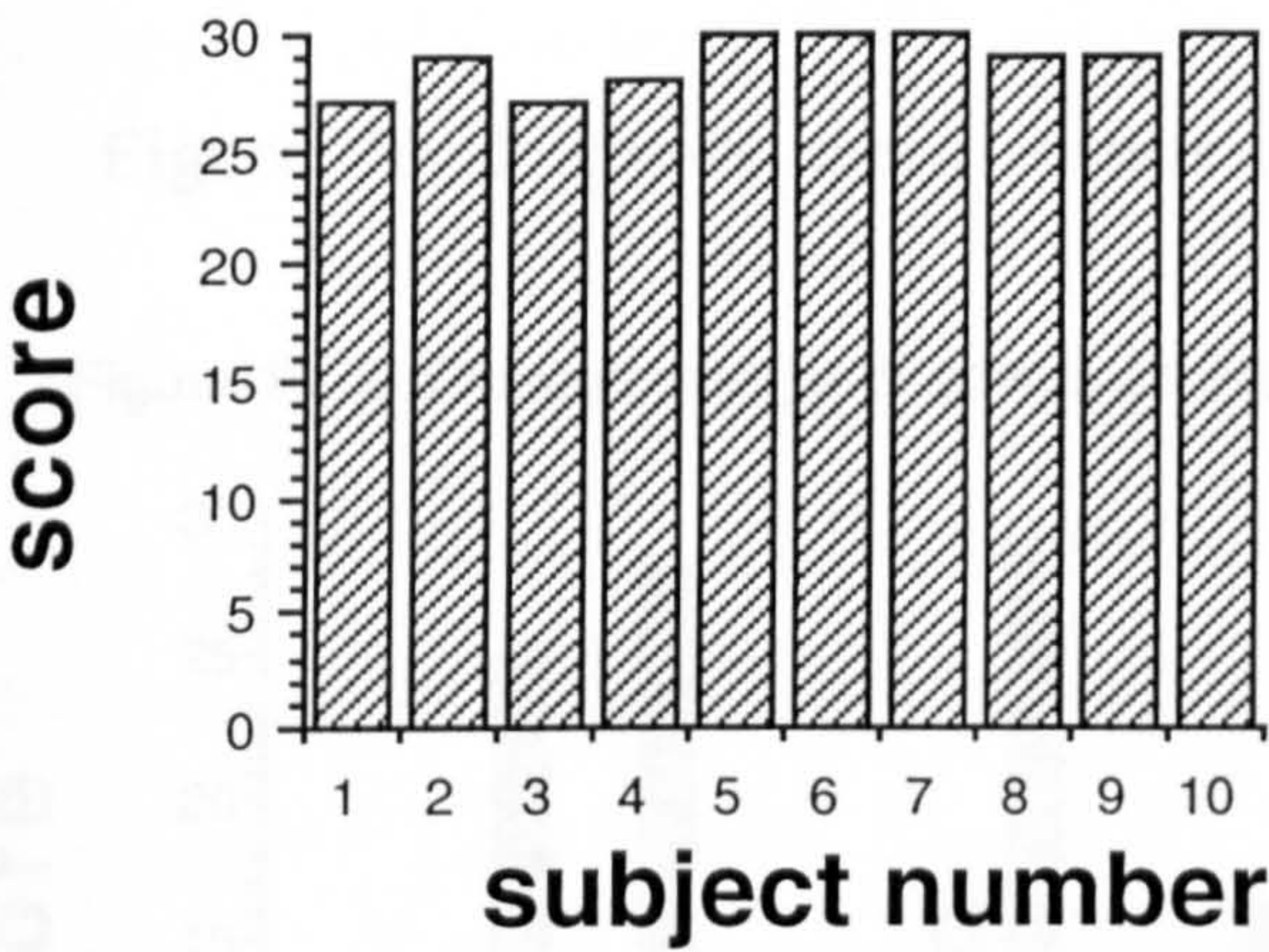


Table 10.4. Subject panel's scores on the MMSE.

Mean:	Std. Dev.:		Variance:		Count:
28.9	1.197		1.433	4.143	10
Minimum:	Maximum:	Range:	Sum:		# Missing:
27	30	3	289		0

Figure 10. 1 shows the subject panel's individual scores on the Mini Mental State Exam, and their scores are all at or near ceiling.

Figure 10. 1. Subject panel group's scores on the MMSE



In contrast, Table 10. 5 shows the dementia subjects' scores on the Mini Mental State Exam, and the mean score of 11.6 and range of 29 is comparable with Folstein, et al's results (see Introduction, this Chapter). These data may also be compared with those of the subject panel shown in Table 10. 4. Thirteen subjects did not attempt this assessment, for a variety of reasons. One patient was certainly too severely impaired to attempt the test, the others would not co-operate, for a variety of reasons, such as an unwillingness to take part in what they perceived as formal testing. It is not appropriate to assume that had the subjects been persuaded in some way to attempt and complete the test, that they would have scored zero, but, as such subjects were in general the less co-operative, it is likely that their scores would have been lower. Throughout the experiment, some subjects did not complete or attempt certain assessments for



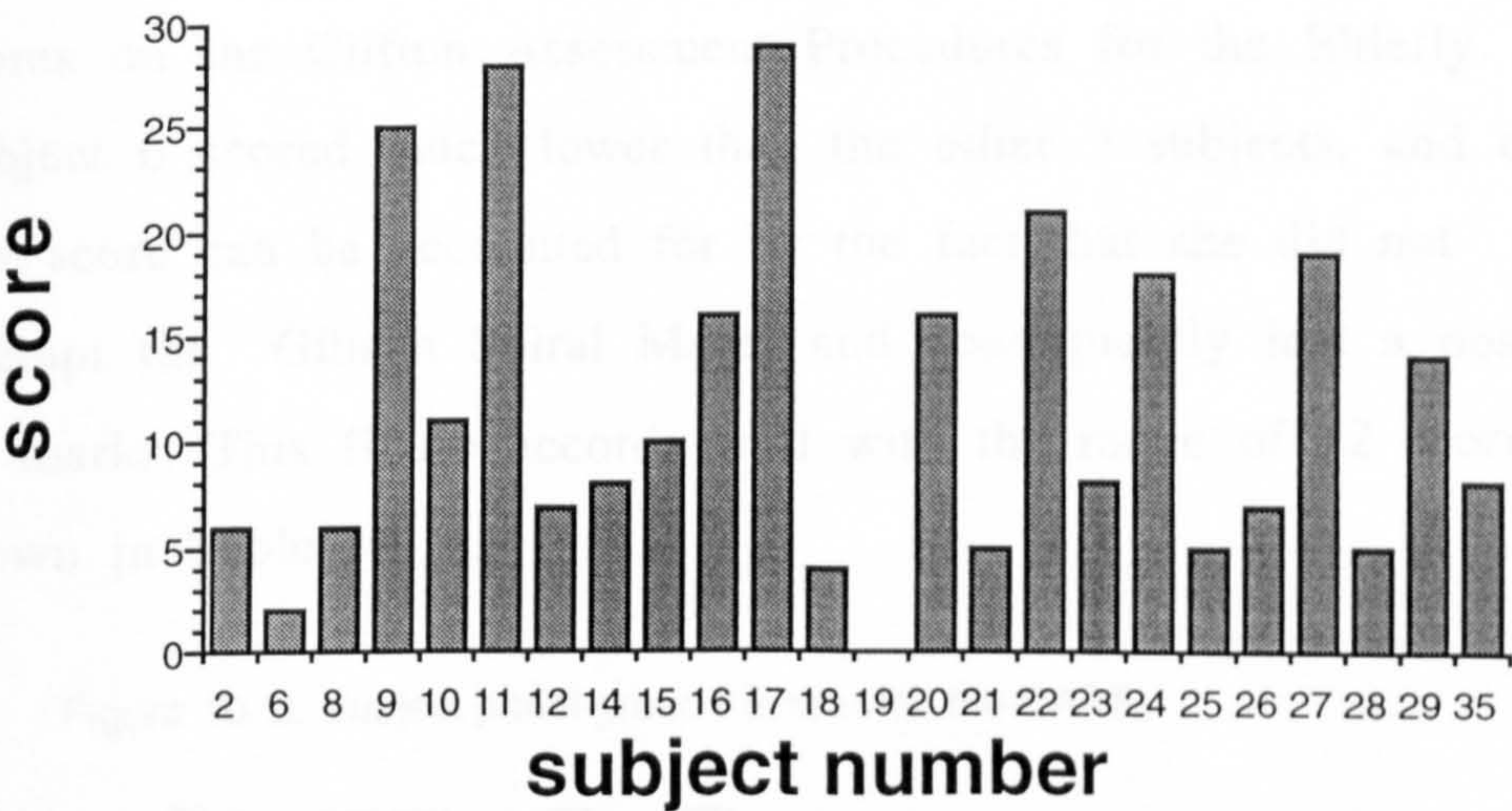
similar reasons, and the inclusion of more able and co-operative subjects' data in this way, has undoubtedly influenced the results. Such findings are not, however, without precedent in clinical research.

Table 10. 5. Dementia subjects' scores on the MMSE.

Mean:	Std. Dev.:		Variance:		Count:
11.667	7.889		62.232		24
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	29	29	280		14

Figure 10. 2 shows these results in more detail.

Figure 10. 2. Dementia subjects' scores on the Mini Mental State Exam.



These variable data may be compared to the high scores of the subject panel shown in Figure 10. 1.

The three highest scores were produced by Subjects 9, 11, and 17 (the reader may compare these scores with those subjects' results on the CAPE, below). Subject 11 has been described in Experiment 5, and was another of the higher scoring subjects.

Table 10. 6 shows the mean, and standard deviation, of the results of the subject panel group on the CAPE. As can be



seen the mean score is 32.9 (standard deviation 3.635), which is slightly higher than that of Pattie and Gilleard's normal sample. The minimum score is 23, which has lowered the mean score. This score will be discussed below. The spread of the scores is also indicated by the range of 12.

Table 10. 6. Subject panel's scores on the CAPE

Mean:	Std. Dev.:		Variance:		Count:
32.9	3.635		13.211		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
23	35	12	329		0

Figure 10. 3 shows the subject panel group's individual scores on the Clifton Assessment Procedures for the Elderly. Subject 6 scored much lower than the other 9 subjects, and this low score can be accounted for by the fact that she did not attempt the Gibson Spiral Maze, and consequently lost a possible 12 marks. This figure accords well with the range of 12 scores shown in Table 10. 6.

Figure 10. 3. Subject panel group's scores on the CAPE

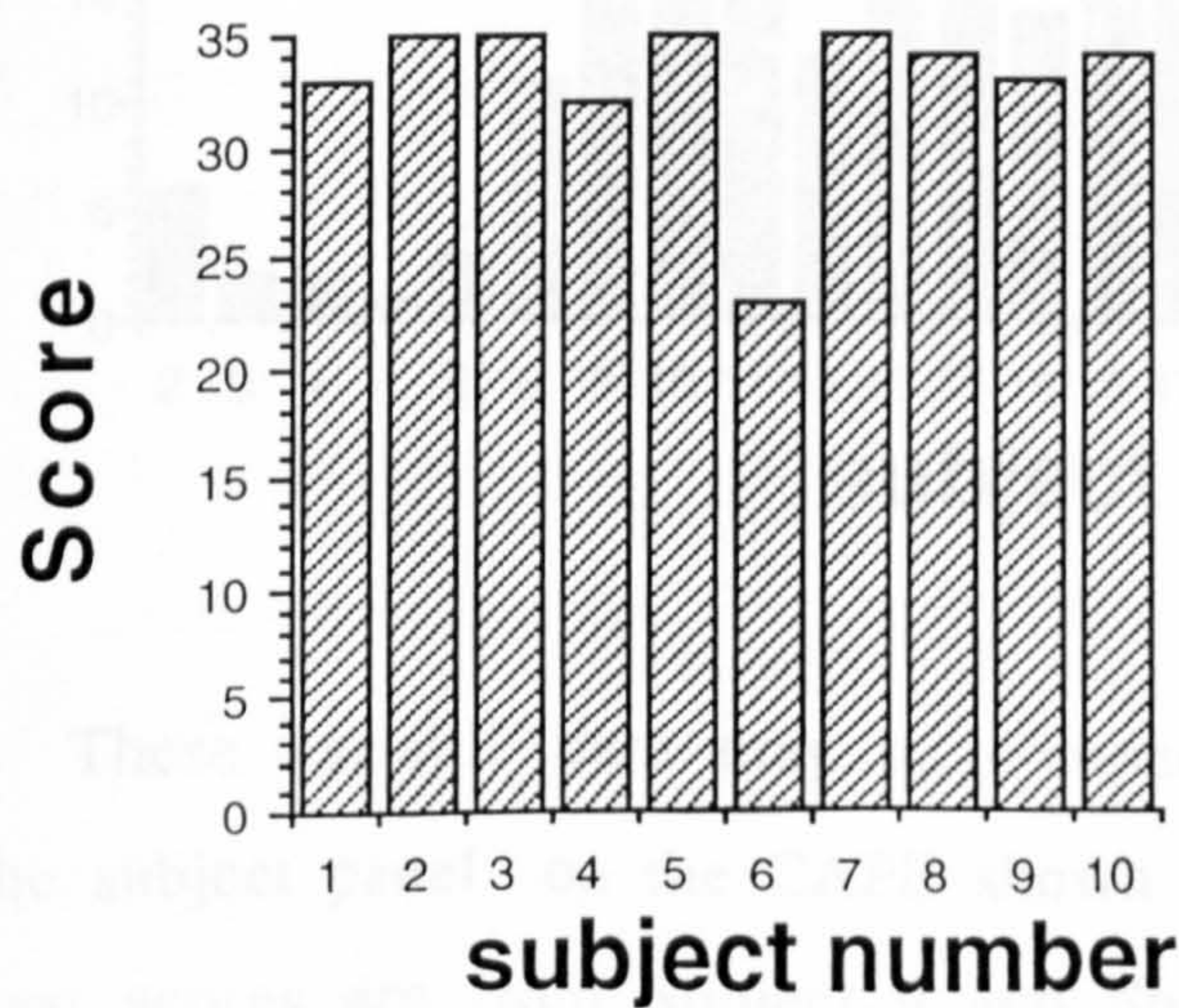


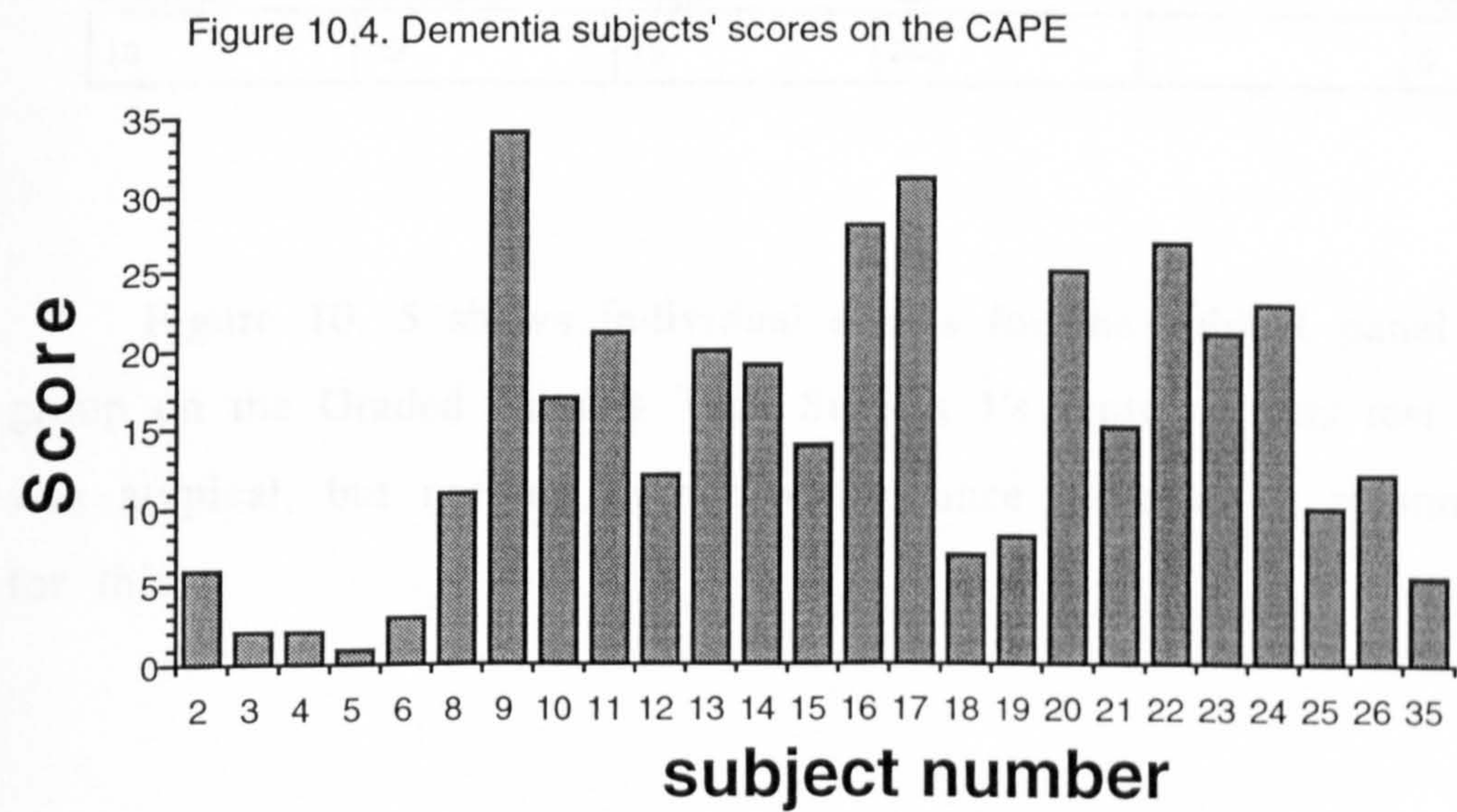
Table 10. 7 summarises the dementia group's results on the Cognitive Assessment Scale of the Clifton Assessment Procedures



for the Elderly (CAPE). These data may be compared with those of the subject panel shown in Table 10. 6. Twenty-five of the 38 dementia patients completed this assessment, and, as the summary table shows, the range of scores was large, indicating that the mean is not an appropriate statistic to describe this result.

Table 10. 7. Dementia subjects' scores on the CAPE					
Mean:	Std. Dev.:		Variance:		Count:
15	9.626		92.667	64.176	25
Minimum:	Maximum:	Range:	Sum:		# Missing:
1	34	33	375		13

Figure 10. 4 shows individual scores on the CAPE for the dementia group.



These variable data may be compared with the high scores of the subject panel on the CAPE shown in Figure 10. 3. The two highest scores are from Subject 9 and Subject 17. Subject 9's performance has been described in Experiment 4, and the possibility that her dementia may have been due to a functional



depressive disorder may have been a factor influencing the high scores shown here. Subject 17 had been referred to the study by her General Practitioner, who had diagnosed her as suffering from the *early* stages of a mild dementia, and her low level of impairment is noticeable throughout the assessments.

Table 10. 8 shows a summary of the subject panel's scores on the Graded Naming Test, and, as can be seen, the scores compare well with those of McKenna and Warrington, whose normal subjects' mean score was 22.44 (standard deviation 4.3). It should be noted that this assessment contains items which are extremely uncommon, and which the present experimenter, in pilot studies, had found college students unable to name.

Table 10. 8. Subject panel's scores on the GNT.					
Mean:	Std. Dev.:		Variance:		Count:
24.5	5.442		29.611		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	29	19	245		0

Figure 10. 5 shows individual scores for the subject panel group on the Graded Naming Test. Subject 1's score on this test was atypical, but nothing in her performance indicated a reason for this.

Figure 10. 5. Subject panel group's scores on the GNT.

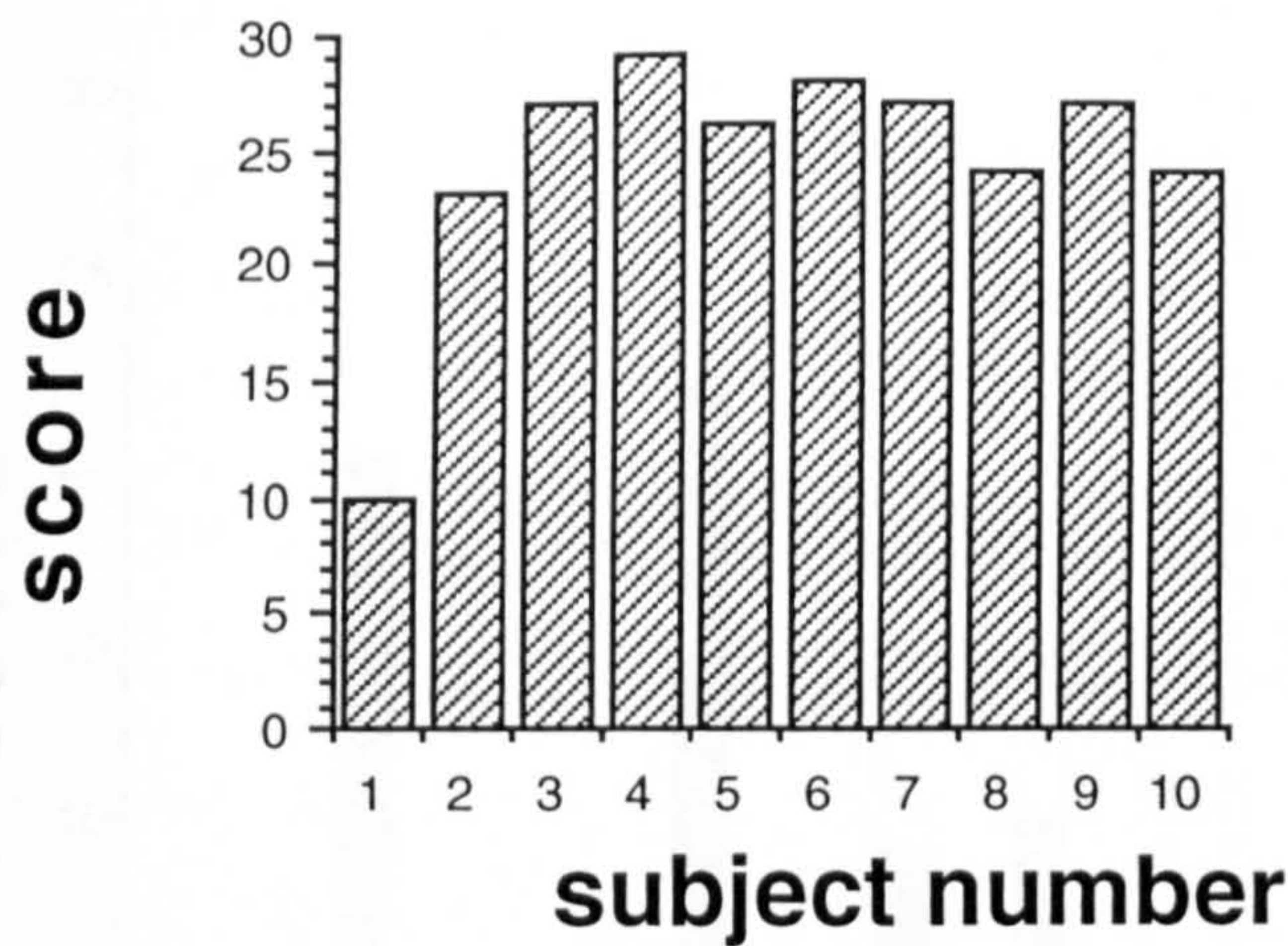


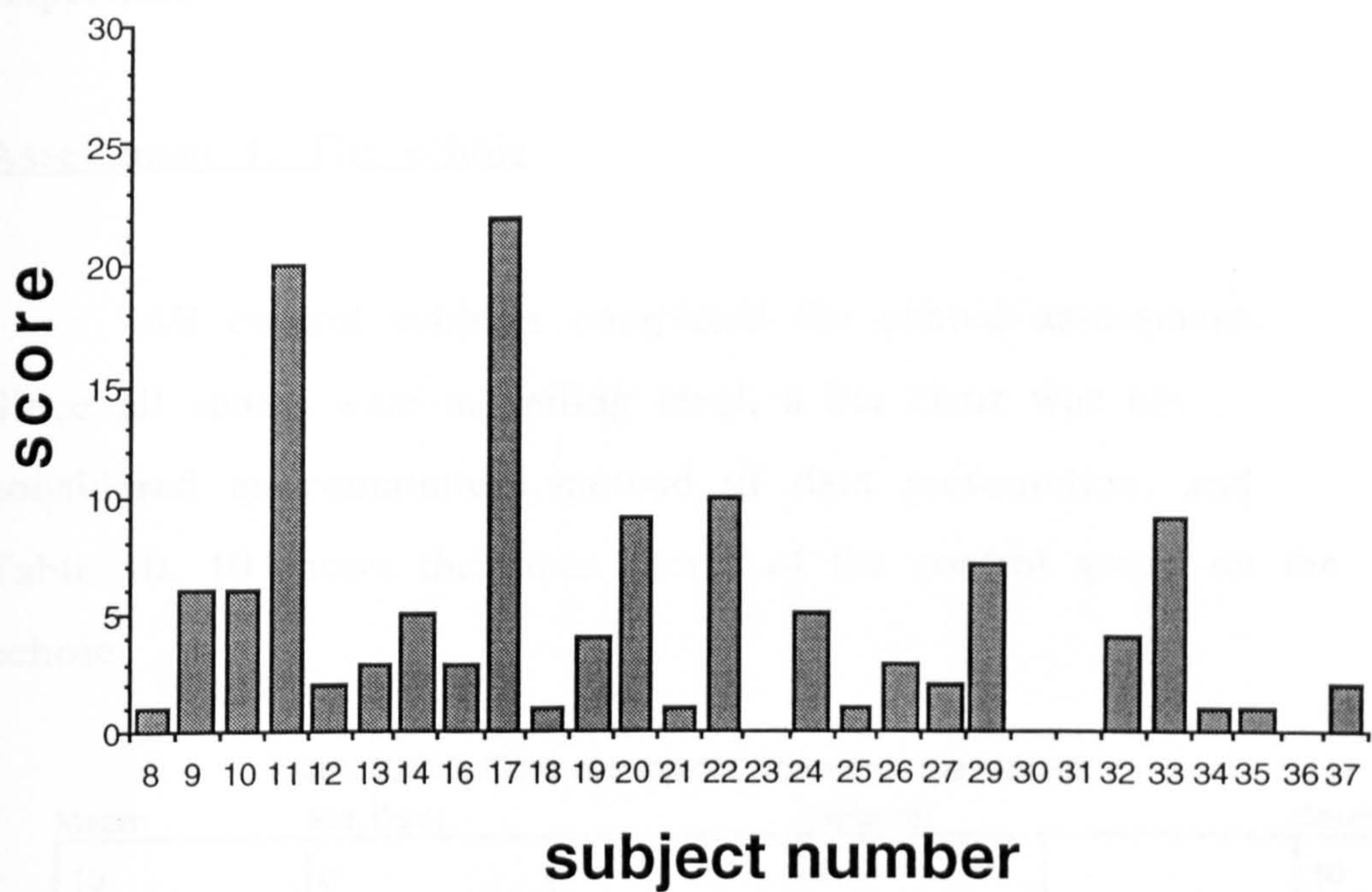
Table 10. 9 shows the dementia subjects' scores in summary on the Graded Naming Test. These results (mean score 4.552, standard deviation 5.376), do not compare well with McKenna and Warrington's "left hemisphere" subjects, whose mean score was 15.15 (standard deviation 7.15). These data may also be compared with those of the subject panel shown in Table 10. 8.

Table10. 9. Dementia subjects' scores on the GNT.					
Mean:	Std. Dev.:		Variance:		Count:
4.552	5.376		28.899		29
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	22	22	132		9

Figure 10. 6 shows the dementia subjects' individual scores on the Graded Naming Test.



Figure 10. 6. Dementia subjects' scores on the Graded Naming Test



Again, high scorers were Subjects 11 and 17, although on this measure Subject 9 did not join the high scorers, this outcome possibly due to this test's particular sensitivity to the naming deficit of dementia. These extremely variable scores may be compared with those of the subject panel shown in Figure 10. 5. Interestingly, it can be seen that high scorers in the demented sample did better than Subject 1 in the normal sample, as shown in Figure 10. 5.

From the data described in Figures 10. 1 to 10. 6, it may be observed that these results are typical for a normal sample who would be expected to score at or near ceiling levels, and for a sample with a wide range of severity of dementia who would be expected to produce correspondingly variable scores.

Having described the two groups' scores on the three previously developed assessments, this descriptive analysis of functional abilities now turns to the assessments of classes of



verbal behaviour which were developed by the experimenter in Experiments 1-3 and 5.

Assessment 1. The echoic

All control subjects completed the echoic assessment. Since all scores were at ceiling level, a bar chart was not considered an economical method of data presentation, and Table 10. 10 shows the mean scores of the control group on the echoic.

Table 10. 10. Control subjects' scores on the echoic.

Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

In contrast to the data described in Table 10. 10, the dementia group's scores had a range of 10 and a mean of 7.815, as shown by Table 10. 11.

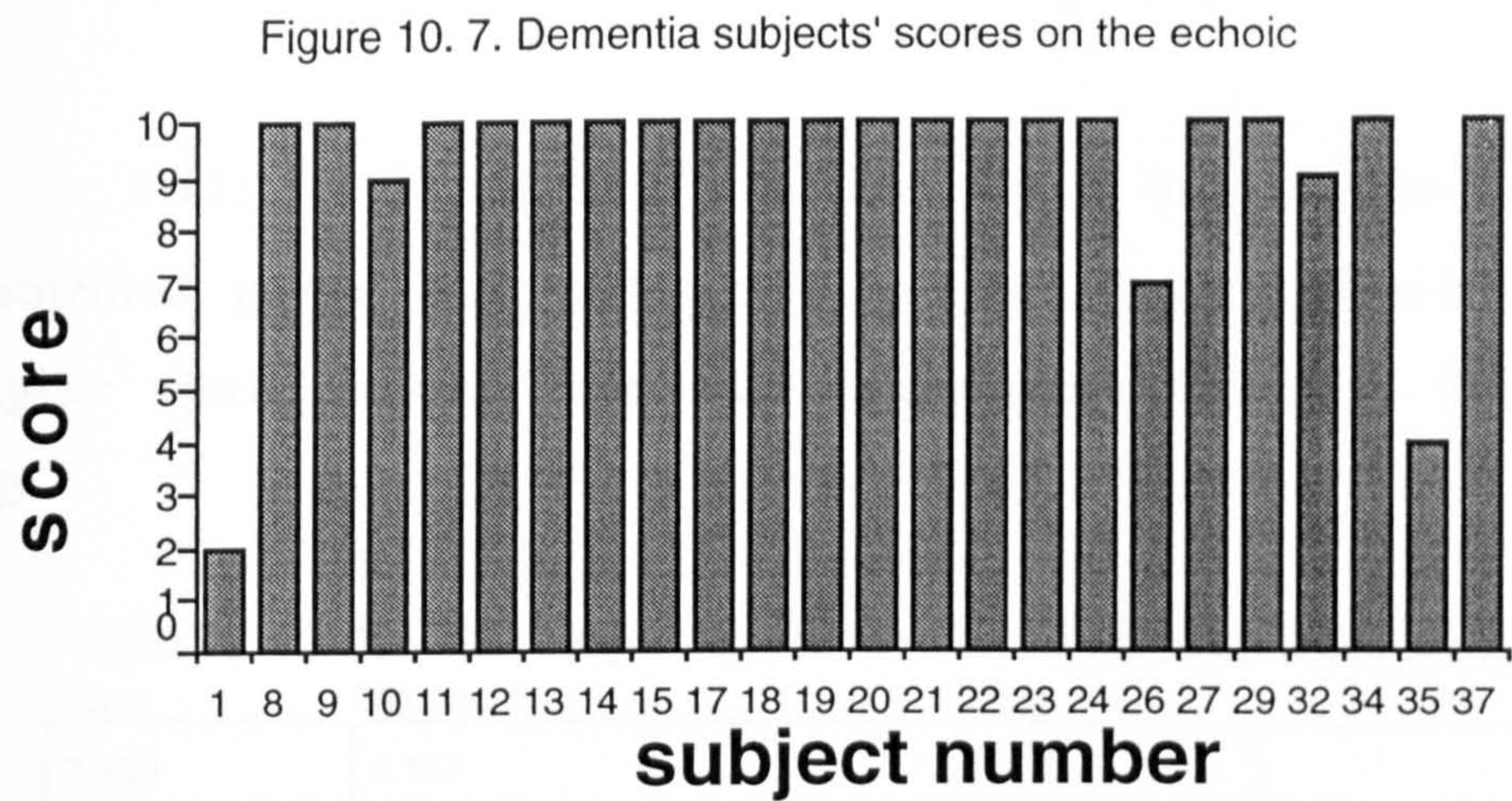
Table 10. 11. Dementia subjects' scores on the echoic.

Mean:	Std. Dev.:		Variance:		Count:
7.815	3.833		14.695		27
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	211		11

Eleven dementia subjects did not complete this assessment because of various circumstantial reasons, based on observation of their behaviour during other sessions and from naturalistic observation. Examples of such reasons were subject hostility to the procedure, and other assessments assuming a higher priority within a limited time span, such as those assessments which were conducted in Experiments 1-5.



The dementia subjects' scores on the echoic are represented in more detail in Figure 10. 7.



These data indicate a high level of echoic ability in the dementing sample.

Assessment 2. Mand compliance

The control group produced ceiling scores, in the version of mand compliance using objects (see Table 10. 12).

Table 10. 12. Control subjects' scores on mand compliance with objects					
Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

Despite clearly being able to hear and repeat the name of the object they were required to select, as evidenced by their



echoic scores, there was much more variability (as shown by the large standard deviation of 3.137) in the demented group's scores on the mand compliance measure. Like the echoic, however, this was a measure which produced a lot of high scores.

Table 10. 13 shows a summary of this measure for the demented group. The reader may compare these data with the higher score summary from the subject panel shown in Table 10. 12.

Table 10. 13. Dementia subjects' scores on mand compliance with objects					
Mean:	Std. Dev.:		Variance:		Count:
7.739	3.137		9.838		23
Minimum:	Maximum:	Range:	Sum:	# Missing:	
0	10	10	178	15	

Fifteen subjects did not attempt this assessment because they left the study before the assessment could be conducted. The results summarised in Table 10. 13 are presented in more detail in Figure 10. 8. Figure 10. 8 shows that 7 subjects performed as well on mand compliance with objects, as in the echoic (see Figure 10. 7 for the echoic), 4 subjects performed worse, and the performance of 3 subjects was better.

Figure 10.8. Dementia subjects' scores on mand compliance with objects.

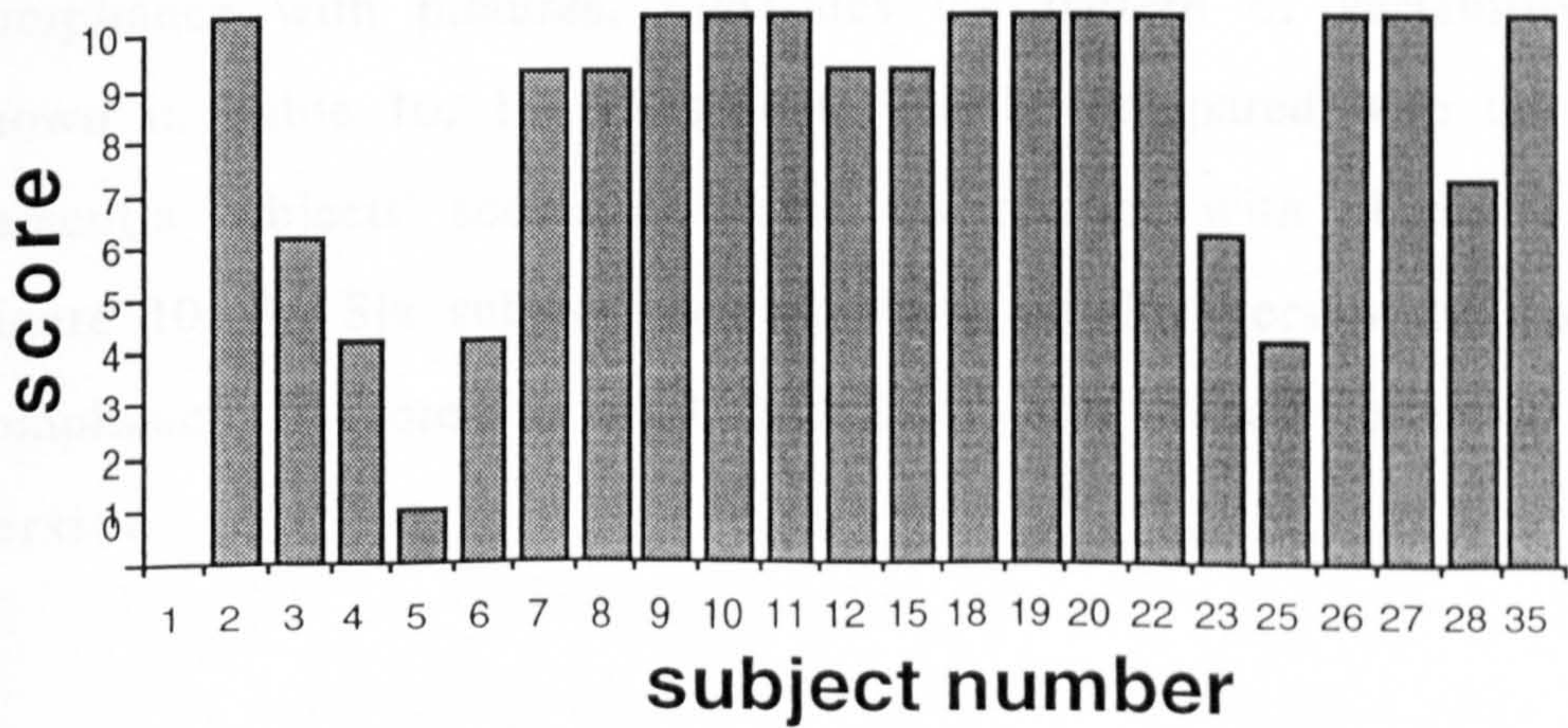




Table 10. 14 shows a summary of the results of the control group on mand compliance with pictures, and all scores were at ceiling except for that of one subject who scored 9.

Table 10. 14. Control subjects' scores on mand compliance with pictures.

Mean:	Std. Dev.:		Variance:		Count:
9.9	.316		.1		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
9	10	1	99		0

In contrast to Table 10. 14, Table 10. 15 shows a summary of the results of the dementia group on this measure. The large standard deviation of 2.962 and range of 10 indicate a large amount of variability within the data.

Table 10. 15. Dementia subjects' scores on mand compliance with pictures

Mean:	Std. Dev.:		Variance:		Count:
8.043	2.962		8.771		23
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	185		15

Fifteen subjects did not attempt this assessment because they left the study before the assessment could be conducted.

Figure 10. 9, showing the demented group's scores on mand compliance with pictures, illustrates the pattern of variability shown in Table 10. 15. These data can be compared with the dementia subjects' scores on mand compliance with objects (see Figure 10. 8). Six subjects scored worse on this version of mand compliance, 6 scored as well, and 2 subjects scored better on this version.



Figure 10. 9. Dementia subjects' scores on mand compliance with pictures.

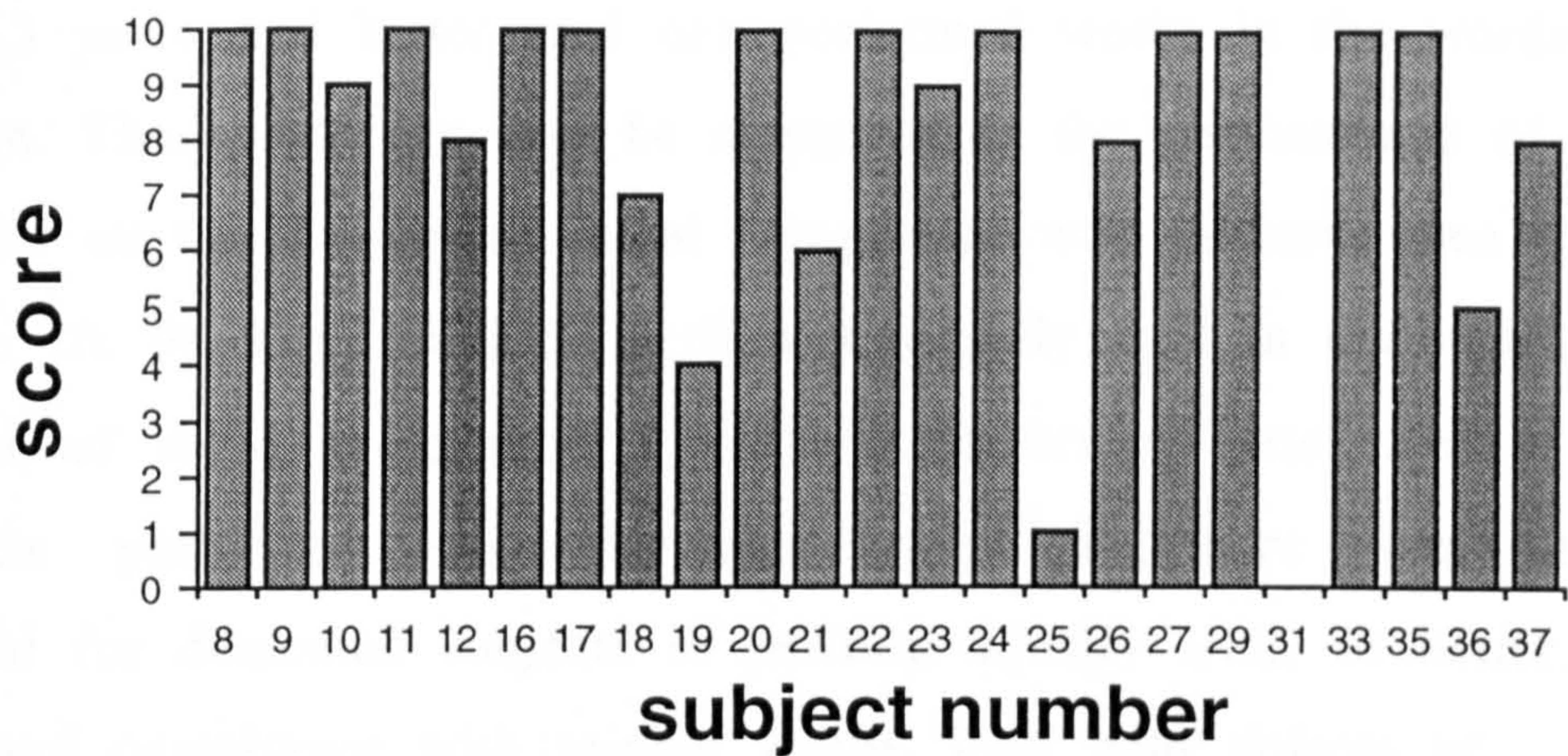


Table 10. 16 shows the control subjects' scores on mand compliance with printed words, and as all scores are at ceiling, no further description of the data is required.

Table 10. 16. Subject panel's scores on mand compliance with words					
Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

These data may be compared with the summary of scores of the dementia subjects on mand compliance with printed words presented in Table 10. 17. The range of scores was 10, and the standard deviation was 2.679, indicating a wide variety of ability on this measure.

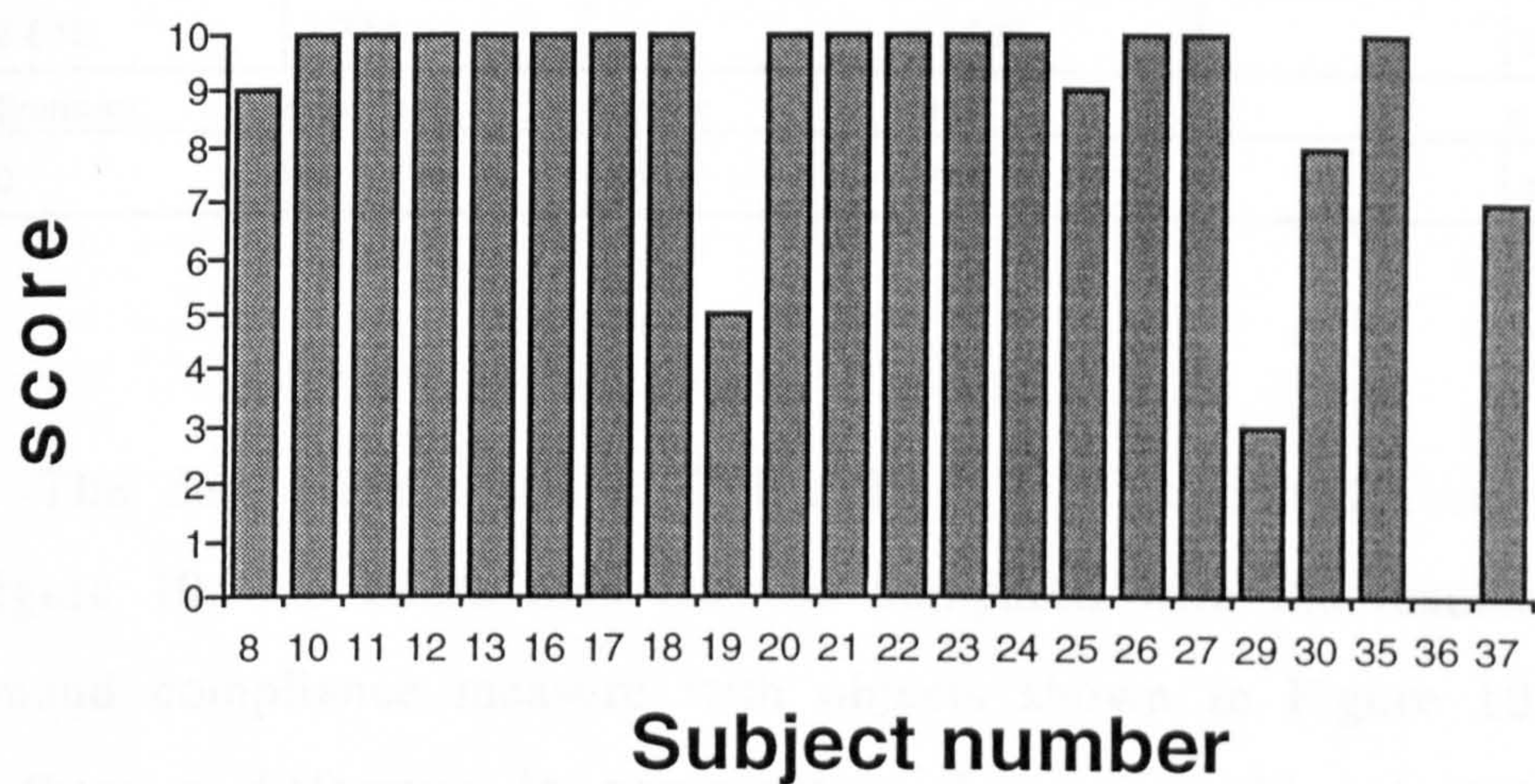
Table 10. 17. Dementia subjects' scores on mand compliance with words					
Mean:	Std. Dev.:		Variance:		Count:
8.682	2.679		7.18		22
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	191		16

The data in Table 10. 17 have been also presented in Figure 10. 10. In comparison with the version of this measure with



objects (see Figure 10. 8), 9 dementia subjects performed equally well, 3 performed better, and one performed worse in the words version. These data can also be compared to the performance of subjects on the version of mand compliance with pictures (see Figure 10. 9). Eight subjects performed equally well in the words version of mand compliance, 8 subjects performed better, and 2 subjects performed worse. For mand compliance, there clearly is a trend for demented subjects to perform equally well, or better, on mand compliance with printed words, than with objects or pictures. Implications of this finding will be discussed below.

Figure 10. 10. Dementia subjects scores on mand compliance with printed words



The dementia subjects' scores on mand compliance may be summarised as follows. For objects the mean score for the group was 7.739; for pictures it was 8.043; and for printed words it was 8.682. As small advantage was present in the case of printed words.

Assessment 3. Naming

Table 10. 18 shows the control group's scores on naming of objects, and all but one of the subjects scored at ceiling levels.



Table 10. 18. Subject panel's scores on naming objects.

Mean:	Std. Dev.:		Variance:		Count:
9.9	.316		.1		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
9	10	1	99		0

Table 10. 18 may be contrasted with Table 10. 19, which shows the dementia subjects' scores on naming of objects. Like previous results from this group, the data shows a large range of scores (10), and a high standard deviation (3.337), from the mean of 6.818.

Table 10. 19. Dementia subjects' scores on naming of objects.

Mean:	Std. Dev.:		Variance:		Count:
6.818	3.737		13.965		22
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	150		16

The data summarised in Table 10. 19 is described further in Figure 10. 11. These data may be compared with the results on the mand compliance measure with objects shown in Figure 10. 8 Was there a difference in participating dementia subjects' ability to select the required item when presented with the spoken referent, and their ability to respond with the conventional name of the item when presented with it? Comparison of the two Figures shows that in some cases there was a difference.

Comparison of Figure 10. 11 (naming) with Figure 10. 8 (mand compliance) shows that 7 subjects scored equally well on naming as on mand compliance, 8 scored worse on naming, and 5 scored better.



Figure 10. 11. Dementia subjects' scores on naming objects.

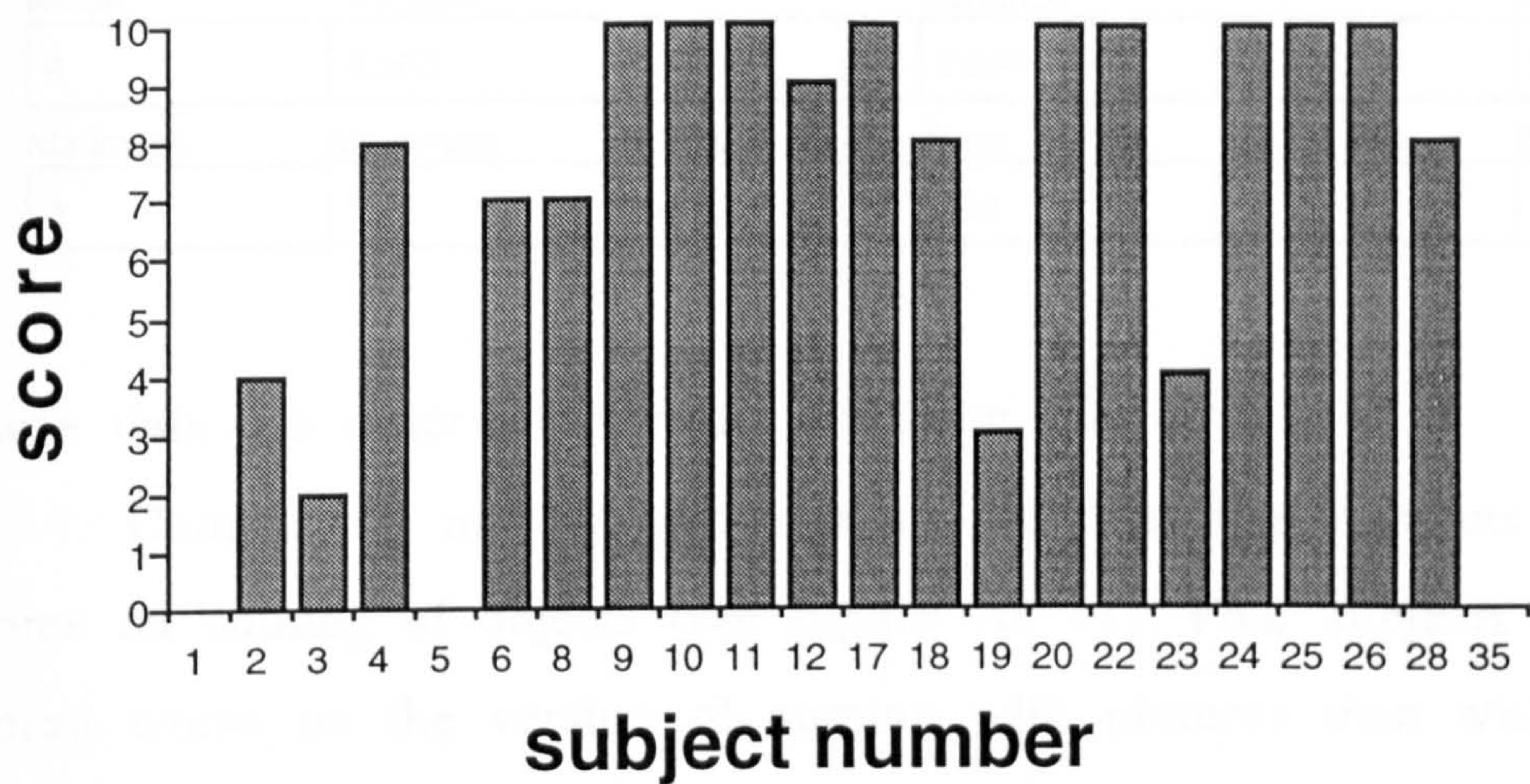


Table 10. 20 shows the control subjects' scores on naming pictures, and, once again, all subjects scored at ceiling levels.

Table 10. 20. Subject panel's scores on naming pictures.

Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

In contrast to the results summarised in Table 10. 20, Table 10. 21 shows the dementia subjects' scores on naming pictures, and, as before, the variability in the data is large, with a range of 10, and a standard deviation of 3.065.



Table 10. 21. Dementia subjects' scores on naming pictures.

Mean:	Std. Dev.:		Variance:		Count:
8	3.065		9.391		24
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	192		14

These data are described further in Figure 10. 12.

Comparison may be drawn with the demented subjects scores on naming of objects (see Figure 10. 11). Four subjects scored worse on the version of naming with pictures than with objects, 6 subjects scored equally well, and 4 subjects scored better.

These data may also be compared with the dementia subjects scores on mand compliance with pictures (see Figure 10. 9). Twelve subjects scored equally well on mand compliance as on naming, 6 scored better on naming, and one scored worse.

Figure 10. 12. Dementia subjects' scores on naming pictures.

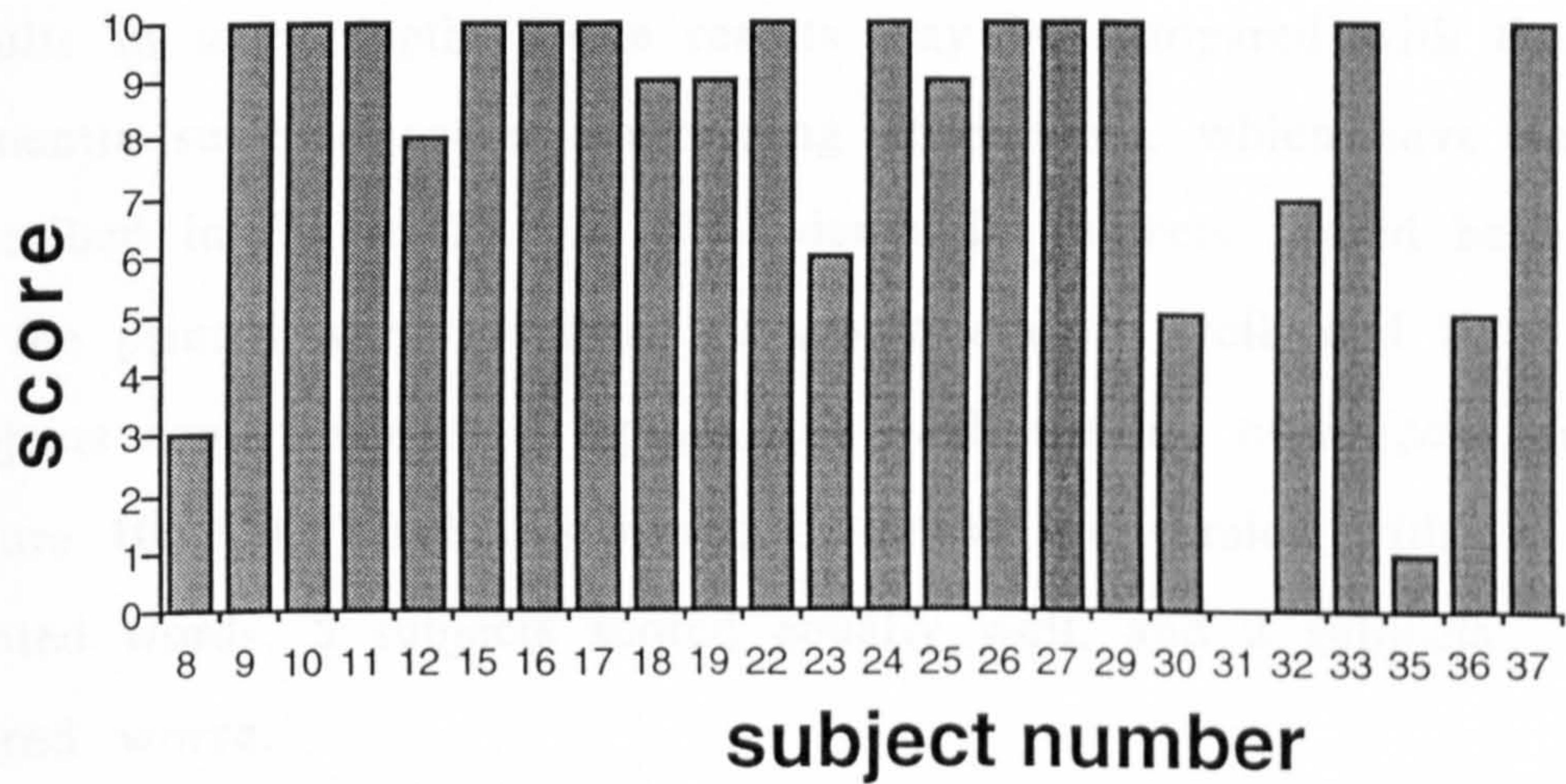


Table 10. 22 shows the control subjects' scores on naming printed words, and yet again, all scores were at ceiling.



Table 10. 22. Subject panel's scores on naming words.

Mean:	Std. Dev.:	Variance:		Count:	
10	0		0		10
Minimum:	Maximum:	Range:	Sum:	# Missing:	
10	10	0	100		0

Table 10. 23, in contrast to Table 10. 22, shows the dementia subjects' scores on this measure.

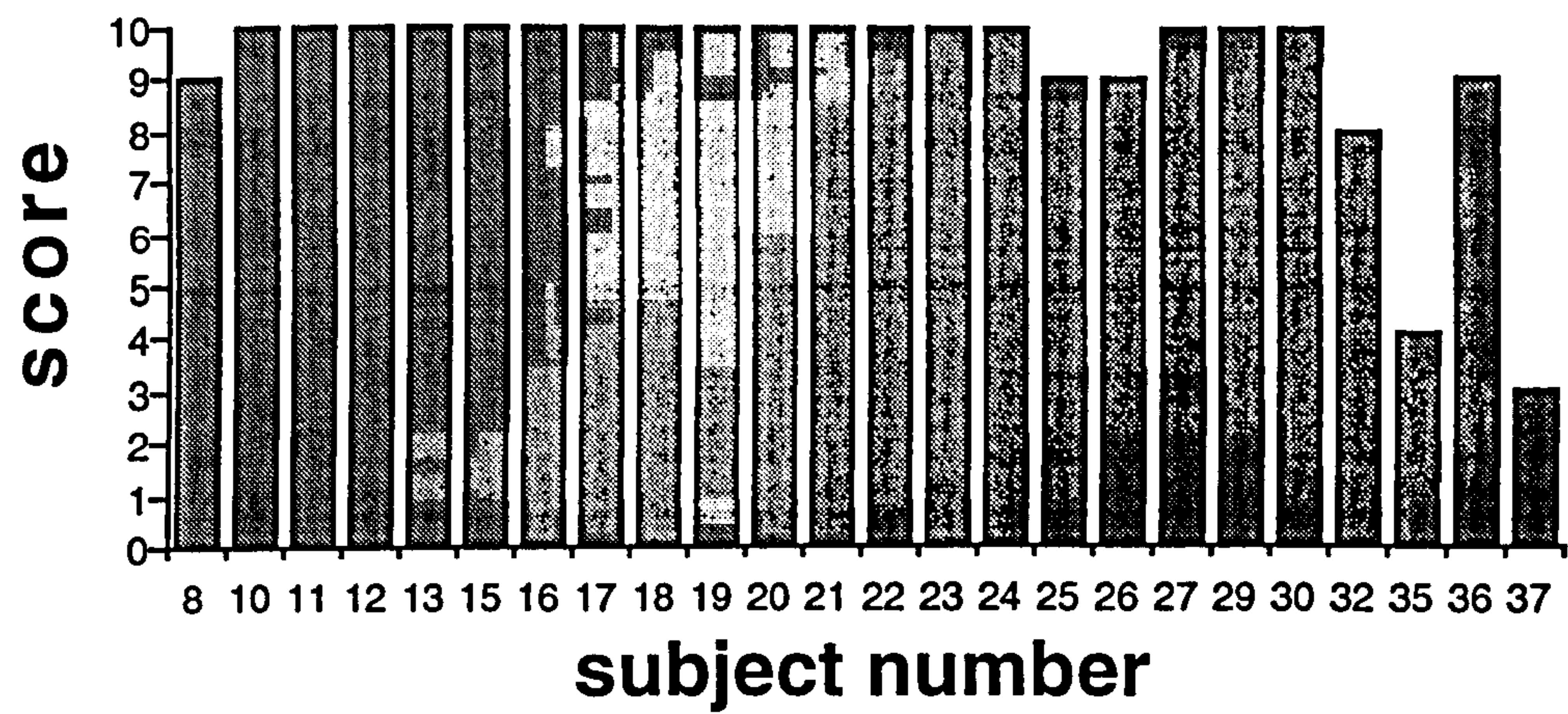
Table 10. 23. Dementia subjects' scores on naming words.

Mean:	Std. Dev.:	Variance:		Count:	
9.208	1.841		3.389		24
Minimum:	Maximum:	Range:	Sum:	# Missing:	
3	10	7	221		14

Many dementia subjects were able to accurately complete this task. The mean for these scores was high (9.2), and the standard deviation was not large in comparison with previous dementia group results (1.841), but the range of scores was large (7), so a bar chart (Figure 10. 13), was necessary to describe the results in more depth. These results may be compared with the dementia subjects' scores on naming of pictures, which have been described in Figure 10. 12. Nine dementia subjects scored better on the printed words version, 10 scored equally well, and 2 subjects scored worse. In comparison with naming of objects (see Figure 10. 11), 7 subjects scored better on the version with printed words, 5 subjects scored equally well, and 2 subjects scored worse.

In comparison with the mand compliance assessment with printed words (see Figure 10. 10), 5 subjects scored better on naming than on mand compliance, 5 scored equally, and 3 scored worse on naming.

Figure 10. 13. Dementia subjects' scores on naming of printed words.



We may summarise the dementia group's scores on naming as follows: the mean score with objects was 6.818; with pictures it was 8; and with printed words it was 9.208. Clearly there was a trend for these subjects to be able to respond more correctly when presented with a printed word than when presented with an object or a picture.

Assessment 4. Receptive prepositional relations

Table 10. 24 shows the subject panel's scores on receptive prepositional relations with objects, and all but one of the subjects' scores were at ceiling, the remaining subject scoring 9/10.

Table 10.24. Subject panel's scores on receptive prepositional relations with objects.					
Mean:	Std. Dev.:		Variance:		Count:
9.9	.316		.1		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
9	10	1	99		0



Table 10. 24 can be compared to Table 10. 25, which shows the dementia subjects' scores on receptive prepositional relations with objects.

Table 10. 25. Dementia subjects' scores on receptive prepositional relations with objects.					
Mean:	Std. Dev.:		Variance:		Count:
5.211	3.293		10.842		19
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	99		19

The variability in this set of data was large. This was indicated by the range of scores (10), and the standard deviation of the mean (3.293). In order to view the data in more detail, it has been presented in a bar chart of subjects' individual scores on receptive prepositional relations with objects (see Figure 10. 14).

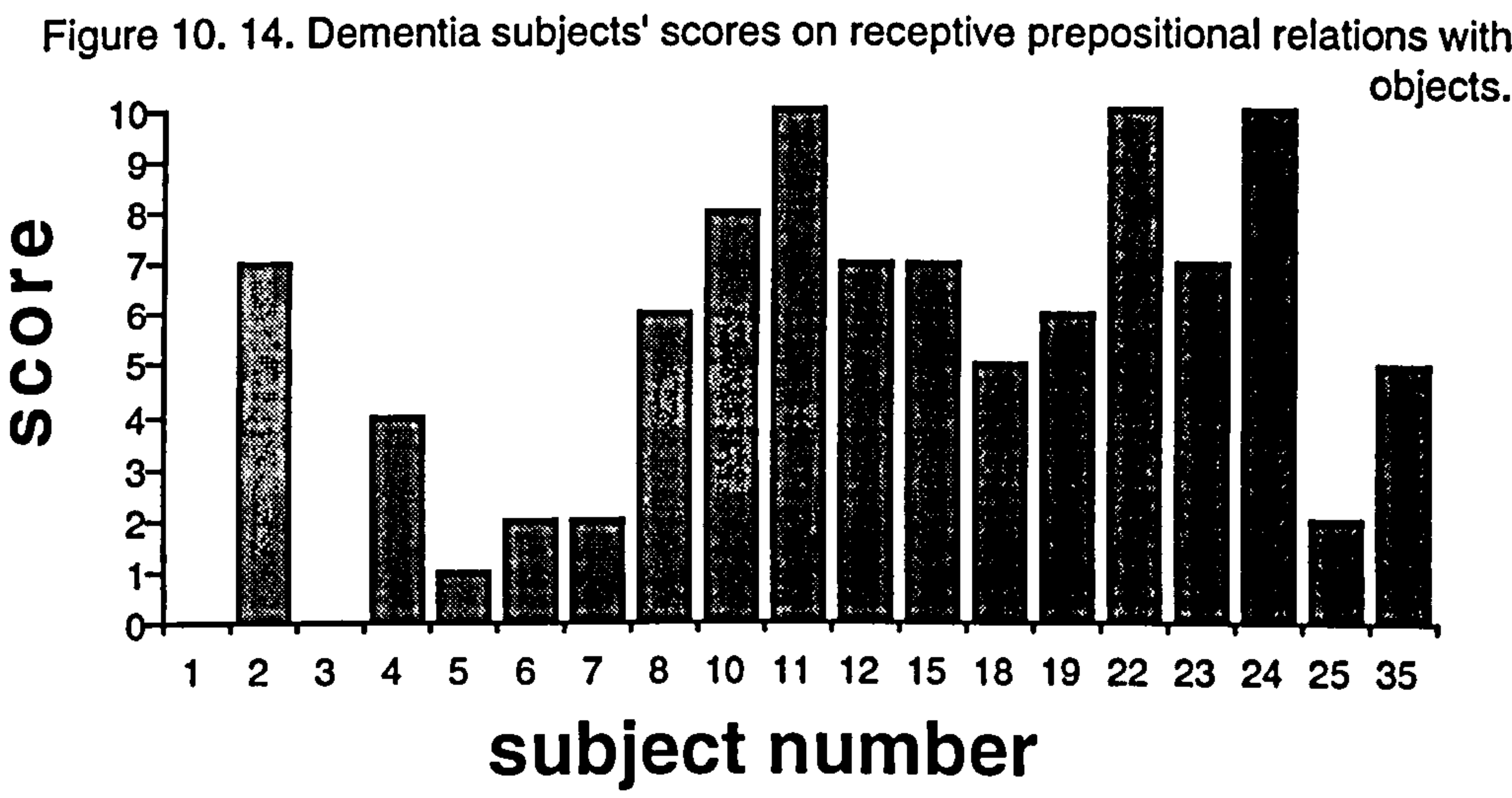


Table 10. 26 shows the subject panel's scores on receptive prepositional relations with pictures, and, once again, all subjects scored at ceiling levels.

Table 10. 26. Subject panel's scores on receptive prepositional relations with pictures.

Mean:	Std. Dev.:	Variance:			Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:	# Missing:	
10	10	0	100		0

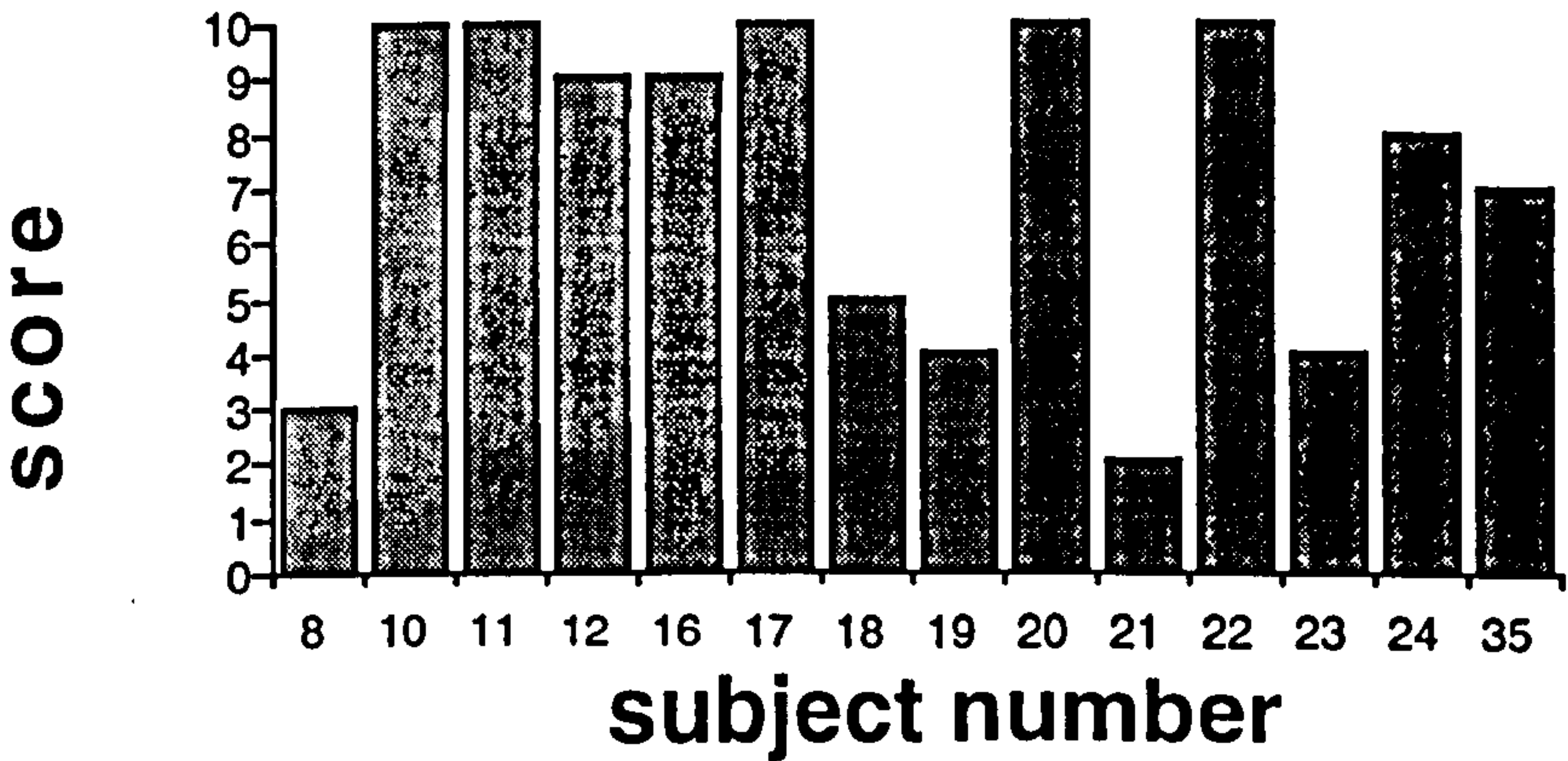
In contrast, Table 10. 27 shows summary statistics of the dementia subjects' scores on receptive prepositional relations with pictures, and, as can be seen, there is a lot of variability in the data, with a range of 8, and a standard deviation of 2.992.

Table 10. 27. Dementia subjects' scores on receptive prepositional relations with pictures.

Mean:	Std. Dev.:	Variance:		Count:
7.214	2.992		8.951	14
Minimum:	Maximum:	Range:	Sum:	# Missing:
2	10	8	101	24

These data may be more clearly presented in the form of a bar chart.

Figure 10. 15. Dementia subjects' scores on receptive prepositional relations with pictures.



The data in Figure 10. 15 can be compared with the dementia subjects' scores on the receptive prepositional relations



with objects measure which is described in Figure 10. 14. Three subjects scored better on the version of this measure with pictures than with objects, 3 scored equally well, and 4 subjects scored worse.

This assessment was also administered using printed words. Table 10. 28 shows the subject panel's scores on receptive prepositional relations with printed words.

Table 10. 28. Subject panel's scores on receptive prepositional relations with words.

Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

Once again, all 10 subjects' scores were at ceiling level, and this summary can be contrasted with the summary of the dementia subjects' scores on this measure, which is presented in Table 10. 29. Again, the range of these scores was high (10) and also the standard deviation (3.688), indicating a more detailed presentation of the data is required.

Table 10. 29. Dementia subjects' scores on receptive prepositional relations with words.

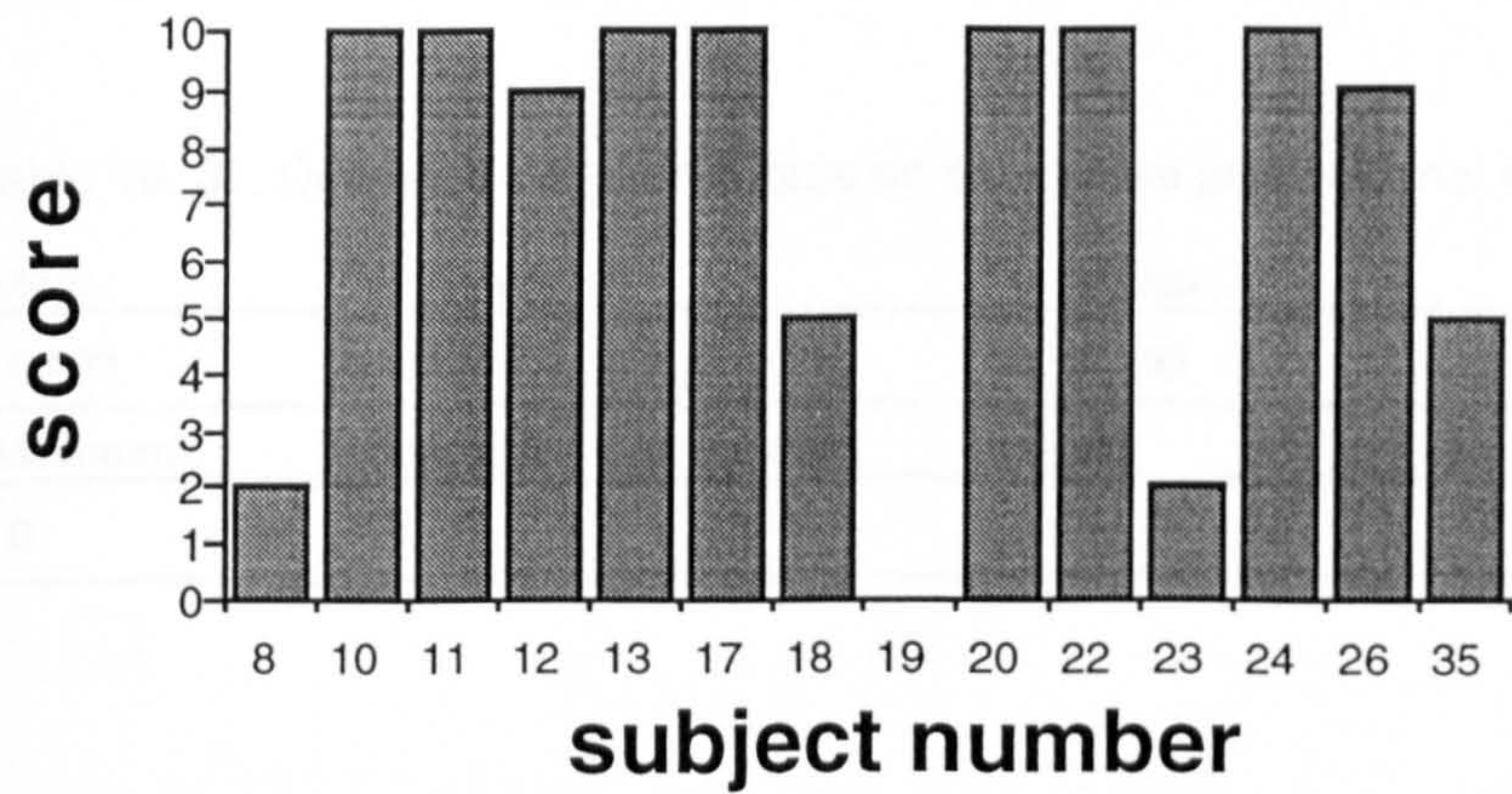
Mean:	Std. Dev.:		Variance:		Count:
7.286	3.688		13.604		14
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	102		24

These data can be examined more closely by observation of Figure 10. 16. The data represented in Figure 10. 16 can be compared to the dementia subjects' scores on the versions of this measure with objects and pictures (see Figures 10. 14 and 10. 15). In comparison to the objects version (in Figure 10. 14), 2 subjects scored better, 5 scored equally well, and 3 subjects scored worse. In comparison to the pictures version (shown in



Figure 10. 15), one subject scored better, 6 scored equally well, and 4 scored worse.

Figure 10. 16. Dementia subjects's scores on receptive prepositional relations with printed words



The dementia subjects' scores on receptive prepositional relations may be summarised as follows: For objects the mean score was 5.211; for pictures it was 7.214; and for printed words it was 7.286. Again, there was a trend for subjects to perform better on the version of this task which utilised printed words.

Assessment 5. Expressive prepositional relations

Table 10. 30 shows summary statistics of the subject panel's scores on expressive prepositional relations with objects, and all scores were at ceiling levels.

Table 10. 30. Subject panel's scores on expressive prepositional relations with objects.

Mean:	Std. Dev.:	Variance:		Count:
10	0		0	10
Minimum:	Maximum:	Range:	Sum:	# Missing:
10	10	0	100	0



Table 10. 31 shows, in contrast, to Table 10. 30, the dementia subjects' scores on expressive prepositional relations with objects, and, as Table 10. 31 indicates, the variability in the scores was high, with a range of 10 and a standard deviation of 3.767.

Table 10. 31. Dementia subjects' scores on expressive prepositional relations with objects.

Mean:	Std. Dev.:		Variance:		Count:
6.231	3.767		14.192		13
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	81		25

These data are presented in more detail in Figure 10. 17. The subjects' scores on expressive prepositional relations can be compared with the scores on receptive prepositional relations with objects (see Figure 10. 14). Seven subjects scored equally, 3 scored worse, and 3 scored better, on *expressive* prepositional relations.

Figure 10. 17. Dementia subjects' scores on expressive prepositional relations with objects.



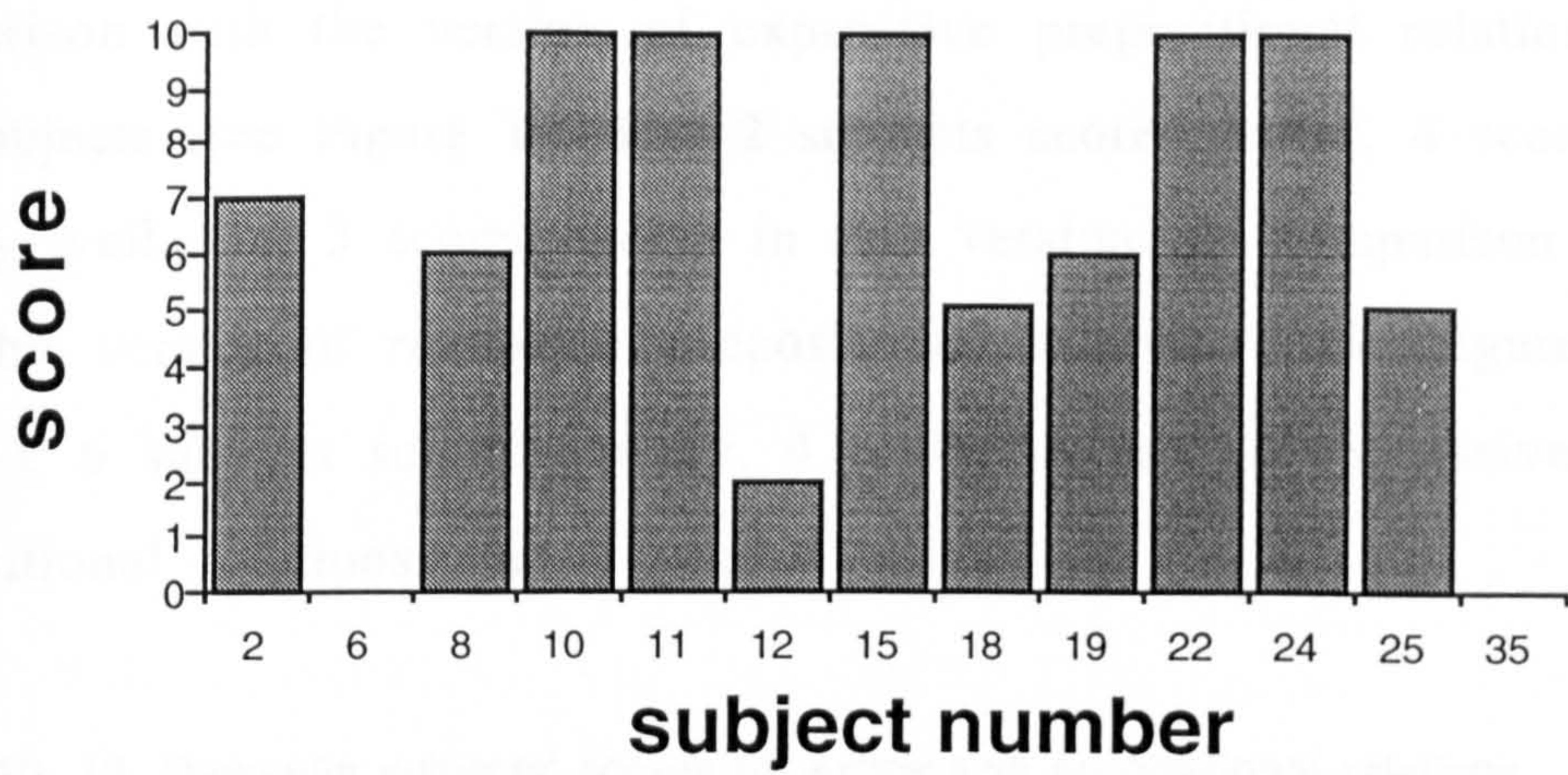


Table 10. 32 shows the subject panel's scores in summary, on the expressive prepositional relations assessment with pictures, and once again, all scores were at ceiling levels.

Table 10. 32. Subject panel's scores on expressive prepositional relations with pictures.

Mean:	Std. Dev.:	Variance:	Count:	
10	0	0	10	
Minimum:	Maximum:	Range:	Sum:	# Missing:
10	10	0	100	0

Table 10. 33, in contrast to Table 10. 32, shows data for this assessment in the case of the dementia patients. Once again, the variability in the data is large, with a range of 10 and a standard deviation of 3.353.

Table 10. 33. Dementia subjects' scores on expressive prepositional relations with pictures.

Mean:	Std. Dev.:	Variance:	Count:	
7.167	3.353	11.242	12	
Minimum:	Maximum:	Range:	Sum:	# Missing:
0	10	10	86	26



These data are described in more detail in Figure 10. 18. In comparison with the version of expressive prepositional relations with objects (see Figure 10. 17), 2 subjects scored better, 4 scored equally well, and 3 scored worse in this version. In comparison with this version of *receptive* prepositional relations (see Figure 10. 15), 6 subjects scored equally, 4 scored worse on expressive prepositional relations, and 1 scored better.

Figure 10. 18. Dementia subjects' scores on expressive prepositional relations with pictures.

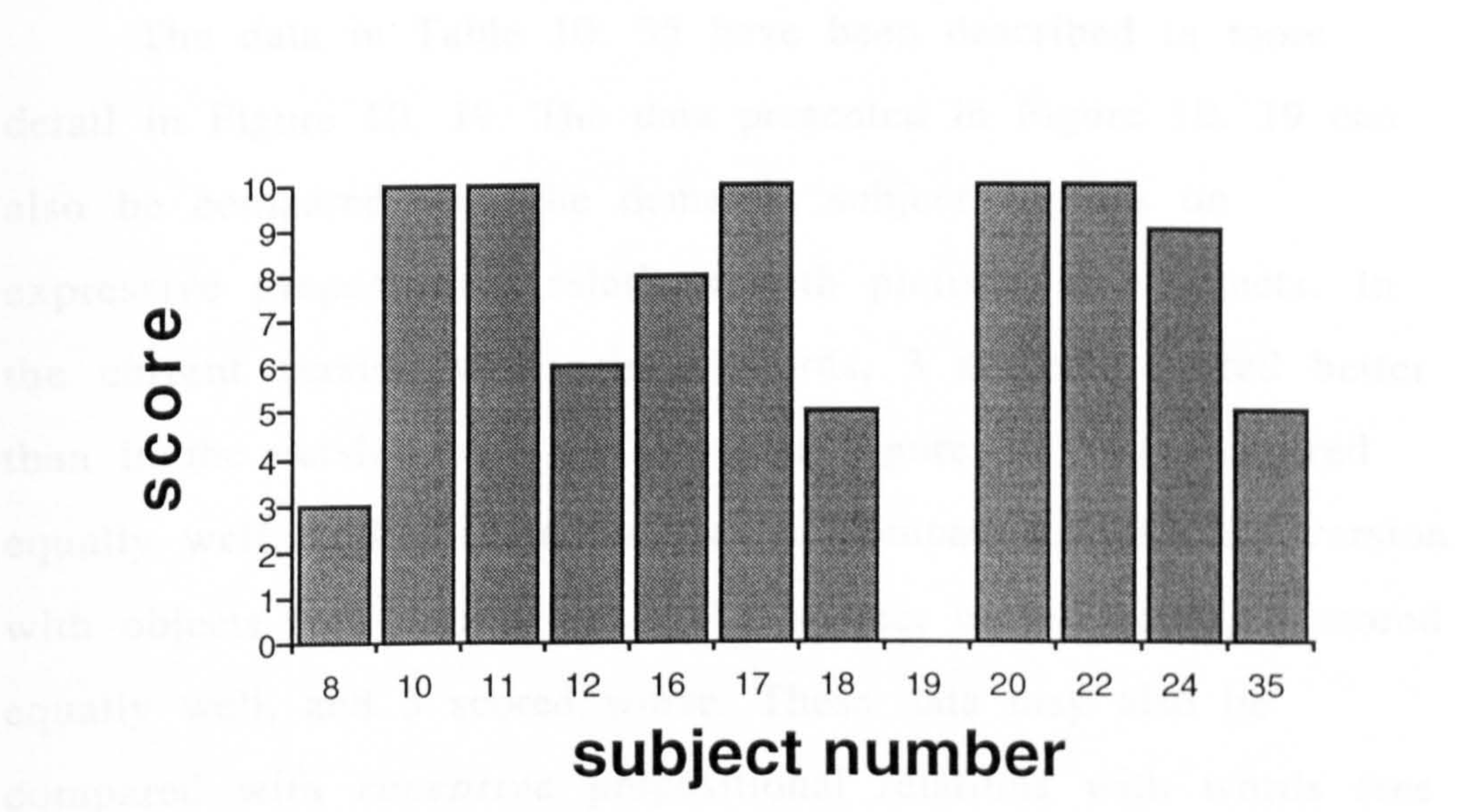


Table 10. 34 shows the subject panel's scores in summary on expressive prepositional relations with printed words. On this measure, once again, all control subjects scored at ceiling levels.

Table 10. 34. Subject panel's scores on expressive prepositional relations with words.

Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0



In comparison with Table 10. 34, Table 10. 35 shows the dementia subjects' scores on this measure. As can be seen there was a range of 10 in the scores, and a standard deviation of 3.826.

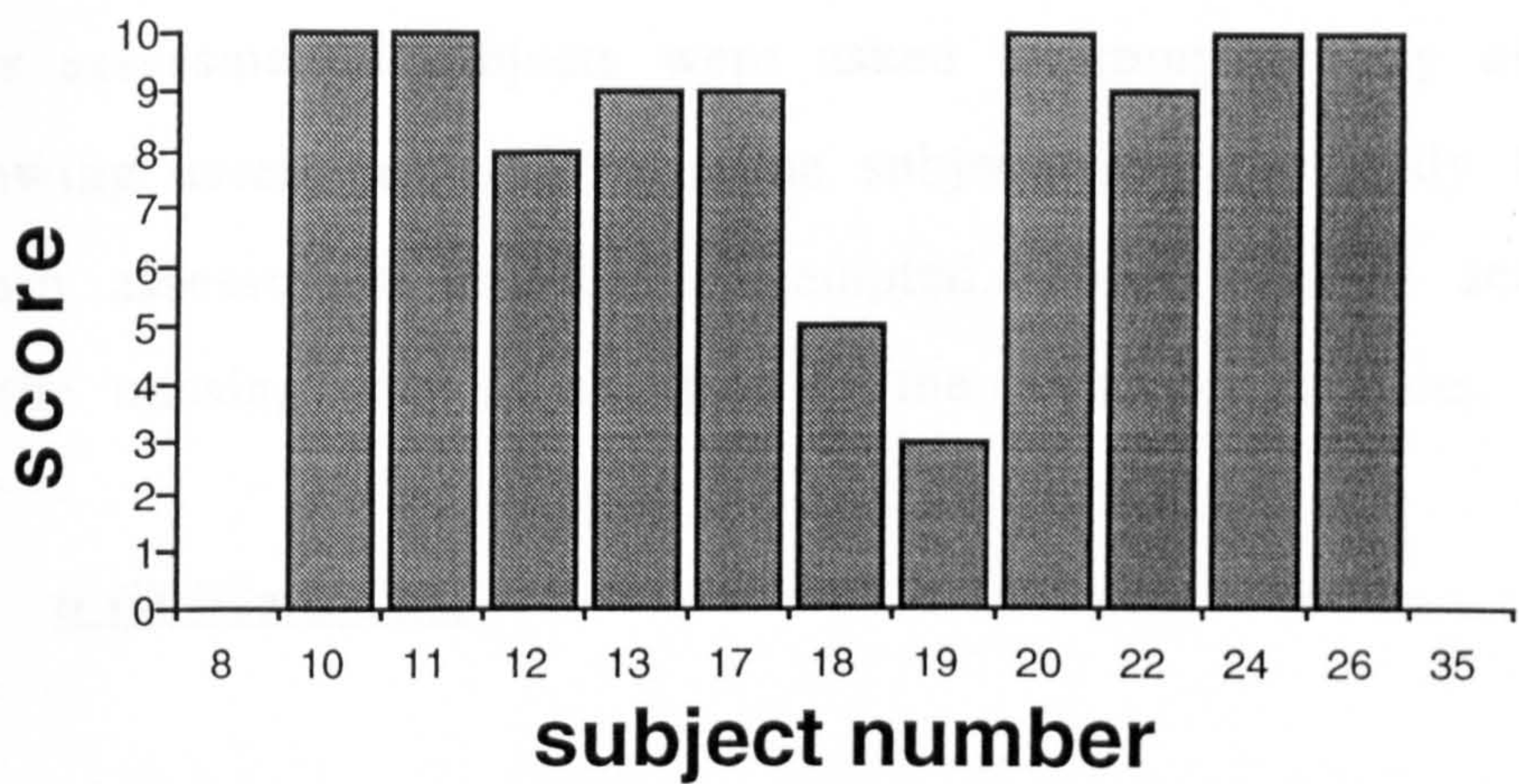
Table 10. 35. Dementia subjects' scores on expressive prepositional relations with words.

Mean:	Std. Dev.:		Variance:		Count:
7.154	3.826		14.641		13
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	93		25

The data in Table 10. 35 have been described in more detail in Figure 10. 19. The data presented in Figure 10. 19 can also be compared with the dementia subjects' scores on expressive prepositional relations with pictures and objects. In the current version with printed words, 3 subjects scored better than in the version with pictures (see Figure 10. 18), 4 scored equally well, and 4 scored worse. In comparison with the version with objects (see Figure 10. 17), 1 subject scored better, 5 scored equally well, and 3 scored worse. These data may also be compared with *receptive* prepositional relations with words (see Figure 10. 16). In the present assessment, 5 subjects scored equally, 2 scored better, and 6 scored worse.



Figure 10. 19. Dementia subjects' scores on expressive prepositional relations with printed words.



A summary statement about the dementia group's scores on expressive prepositional relations may be made. The mean of their scores on the version of this task with objects was 6.231, with pictures it was 7.167, and with printed words it was 7.154. This was the first measure on which this group did not perform best on the version of the task which used printed words.

Comparison of listener versus speaker behaviour shows that the trend of mand compliance (receptive) behaviour to be produced at a higher rate than naming (expressive) was not typically observed in the expressive and receptive prepositional relations assessments (see Figures 10. 14 to 10. 19, and Tables 10. 25, 10. 27, and 10. 29, for the receptive tasks, versus Tables 10. 31, 10. 33, and Table 10. 35, for the expressive tasks). These show mean scores of 5.211 (receptive), and 6.231 (expressive) for the version of the tasks with objects, and means of 7.214 (receptive), and 7.167 (expressive) for pictures. The mean scores for the two different tasks with printed words were 7.286 (receptive) and 7.154 (expressive). Implications of this finding will be discussed below.



Assessment 6. Conditional mand compliance

Only the more able (as assessed by their performance on other assessments) subjects were asked to complete any of the following assessments. Also, some subjects left the study before certain assessments could be attempted. These reasons account for the missing data on the part of the dementia subjects.

6 (i) "Card Cue."

Table 10. 36 shows the subject panel's scores in summary on conditional mand compliance (card cue), with objects. All 10 subjects' scores were at ceiling levels.

Table 10. 36. Subject panel's scores on conditional mand compliance (card cue).

Mean:	Std. Dev.:		Variance:		Count:
10	0		0		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
10	10	0	100		0

Table 10. 37, in contrast to Table 10. 36, shows the dementia subjects' summary scores on conditional mand compliance with objects, using the card cue. These data were similar to the other assessment results in that there was a lot of variability in the dementia group's scores, the range being 10, and the standard deviation being 2.833. It was clear from subjective observation of individual subjects' performance on this measure, that it was a measure which resulted in many failures. It was also clear from objective comparison of the mean score on this measure with the mean score of the subject panel, that it was a measure which discriminated between the two groups. Indeed, data from 25 subjects is missing because the experimenter did



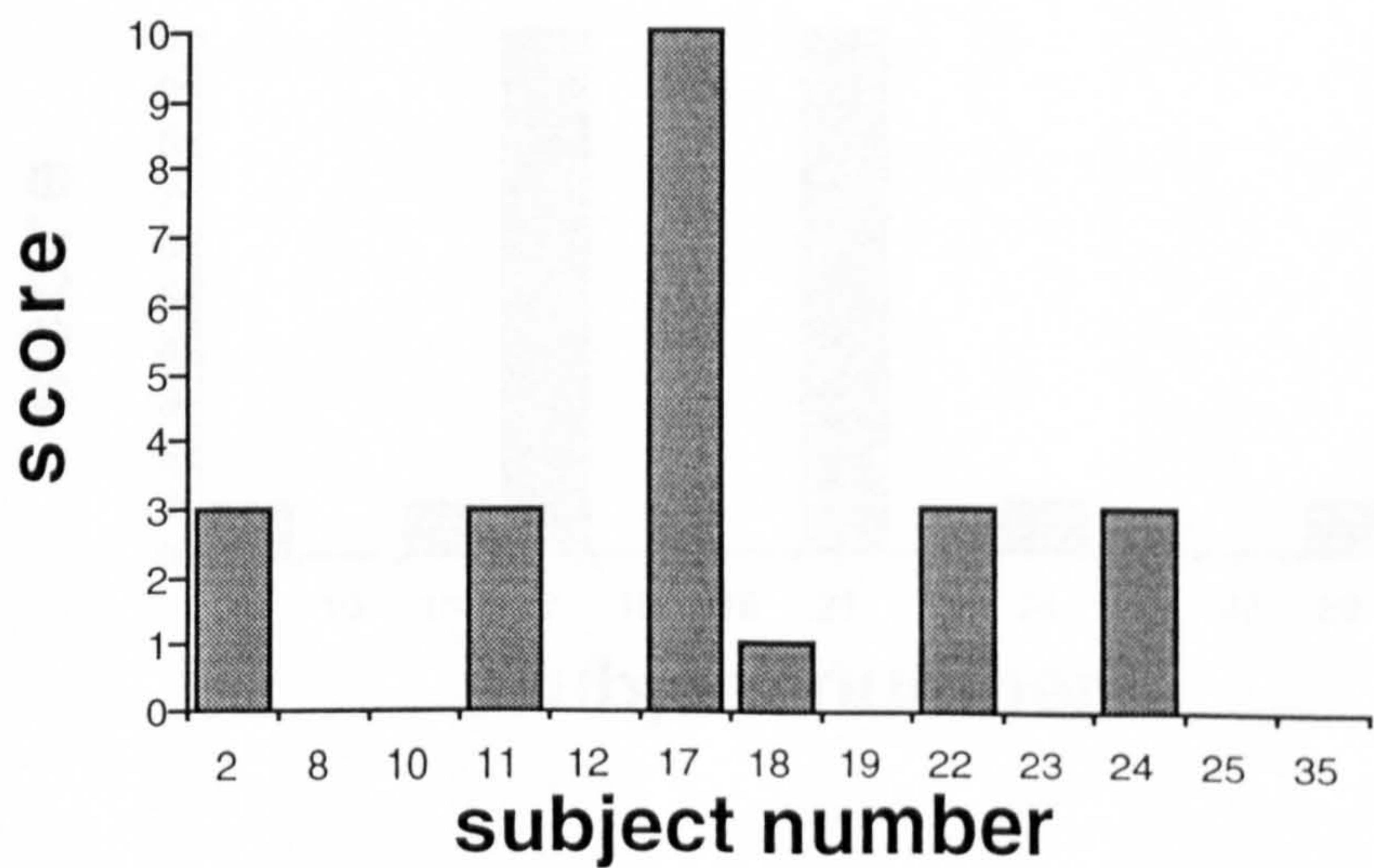
not judge these subjects able to even attempt the assessment, because, for example, of their poor performance on more simple assessments such as mand compliance and naming, as discussed above.

Table 10. 37. Dementia subjects' scores on conditional mand compliance (card cue).

Mean:	Std. Dev.:		Variance:		Count:
1.769	2.833		8.026		13
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	23		25

Figure 10. 20 shows the dementia subjects' scores on this measure in more detail. Subject 17 scored at ceiling levels on this measure, Subjects 2, 11, 22, and 24 scored 3 correct out of 10 trials, Subject 18 scored one correct, and Subjects 8, 10, 12, 19, 23, 25 and 35 attempted the assessment but scored zero.

Figure 10. 20. Dementia subjects' scores on conditional mand compliance (card cue) with objects.



Unfortunately the subject panel group did not complete this assessment using pictures, but Table 10. 38 shows summary



statistics from the dementia group's scores on conditional mand compliance (card cue), with pictures.

Table 10. 38. Dementia subjects' scores on conditional mand compliance (card cue).

Mean:	Std. Dev.:		Variance:		Count:
1.846	3.648		13.308		13
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	24		25

Figure 10. 21 shows these results in more detail. Subject 17 and also Subject 21 scored at ceiling levels on this measure. From 11 other subjects, a pattern of scores of 1 out of 10, and complete failures, which was even poorer than the pattern obtained from the subjects illustrated in Figure 10. 20, was obtained. In comparison with this version of conditional mand compliance with objects (see Figure 10. 20), 1 subject scored better in the version with pictures, 6 scored equally, and 2 scored worse.

Figure 10. 21. Dementia subjects' scores on conditional mand compliance (card cue) with pictures.

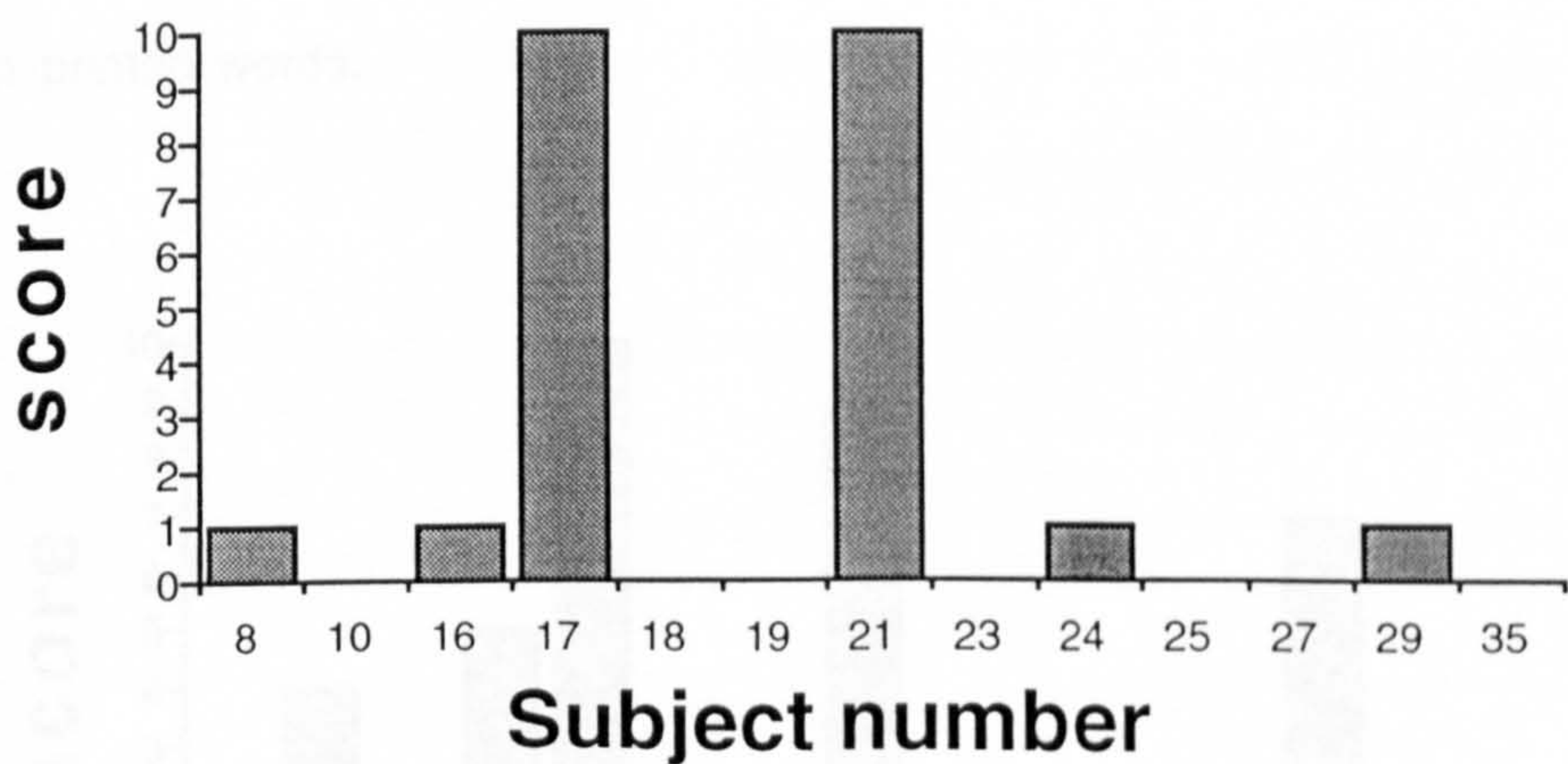


Table 10. 39 shows the dementia subjects' scores on conditional mand compliance (card cue), with printed words. As



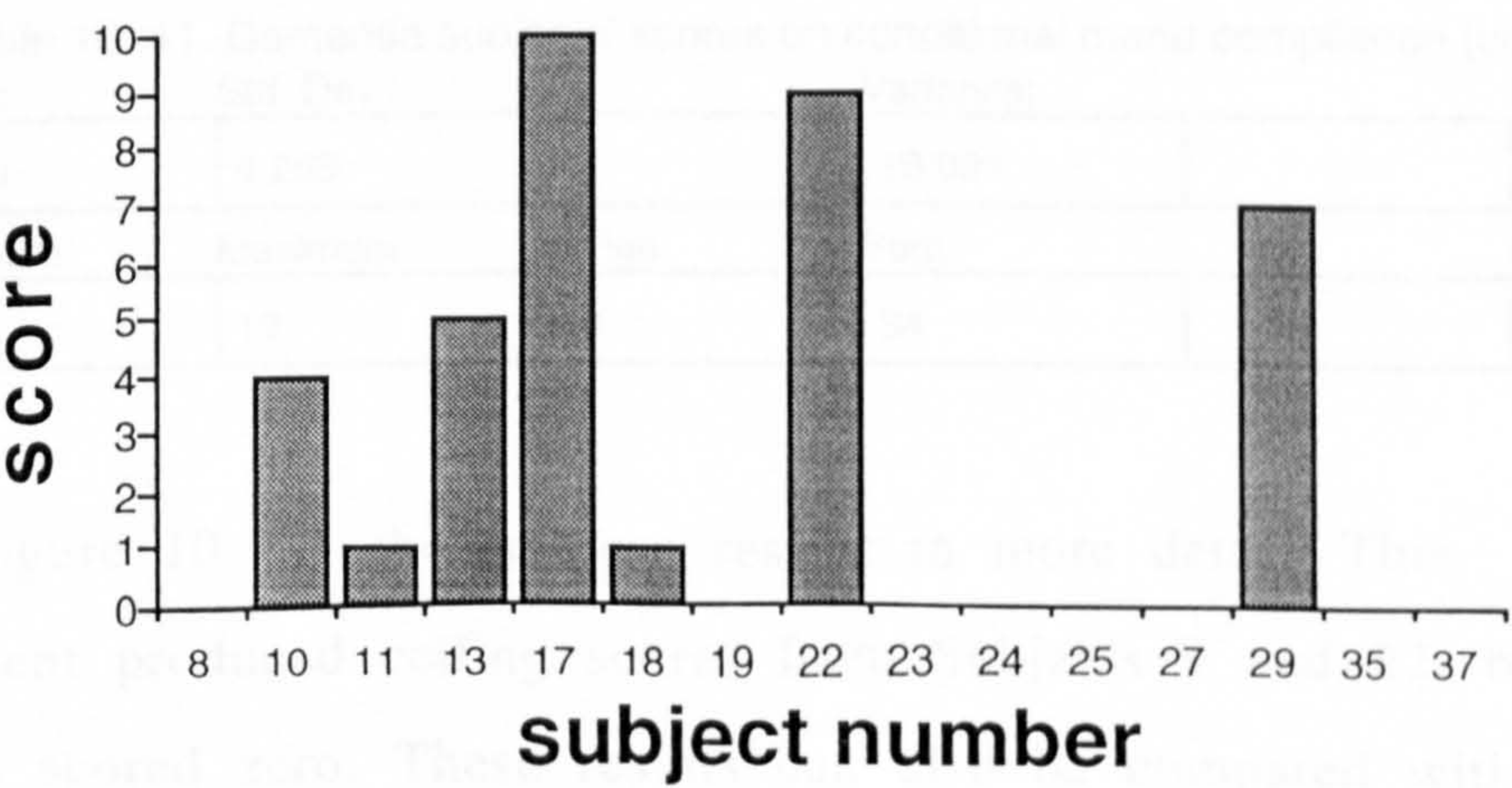
with pictures, the subject panel group's scores on this test, with words, are missing.

Table 10. 39. Dementia subjects' scores on conditional mand compliance (card cue).

Mean:	Std. Dev.:		Variance:		Count:
2.467	3.603		12.981		15
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	37		23

Figure 10. 22 shows these results in more detail. Subject 17 also scored at ceiling level on this measure. Eight subjects attempted the assessment but scored zero, two subjects scored 1, and the remaining subjects scored 4, 5, 7, and 9. These data may be compared with the dementia subjects' scores on the version of this assessment with objects (refer to Figure 10. 20). Two subjects scored better in the version with printed words, 7 scored equally, and 2 scored worse. In comparison with the version with pictures (refer to Figure 10. 21), 3 scored worse in the printed words version, 5 scored the same, and 3 scored better.

Figure 10. 22. Dementia subjects' scores on conditional mand compliance (card cue) with printed words.





The reader is reminded of the mean scores for different versions of this task. On the version using objects, the dementia group's scores gave a mean of 1.69. With pictures, the mean was 1.846, and with printed words it was 2.467. Again, the performance of the dementia subjects was better when printed words were used.

Assessment 6 (ii) Count cue.

Table 10. 40 shows the subject panel group's scores in summary on conditional mand compliance (count cue), with objects.

Table 10. 40. Subject panel's scores on conditional mand compliance (count cue).

Mean:	Std. Dev.:		Variance:		Count:
9.9	.316		.1		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
9	10	1	99		0

In contrast, Table 10. 41 shows the dementia group's summary scores on this measure. The mean of 9.9 from the normal group can be contrasted with the mean score of the dementia group on conditional mand compliance with objects (count cue) on this measure, which was much lower at 3.091.

Table 10. 41. Dementia subjects' scores on conditional mand compliance (count cue)

Mean:	Std. Dev.:		Variance:		Count:
3.091	4.253		18.091		11
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	34		27

Figure 10. 23 shows these results in more detail. This assessment produced ceiling scores from Subjects 9 and 22, but 6 subjects scored zero. These results can also be compared with the dementia subjects' scores on conditional mand compliance (card



cue), also with objects (see Figure 10. 20). Two subjects scored worse in the "count cue" assessment than in the "card cue" assessment, 4 scored equally badly, and 4 subjects' scores were better, in the count cue assessment.

Figure 10. 23. Dementia subjects' scores on conditional mand compliance (count cue) with objects.

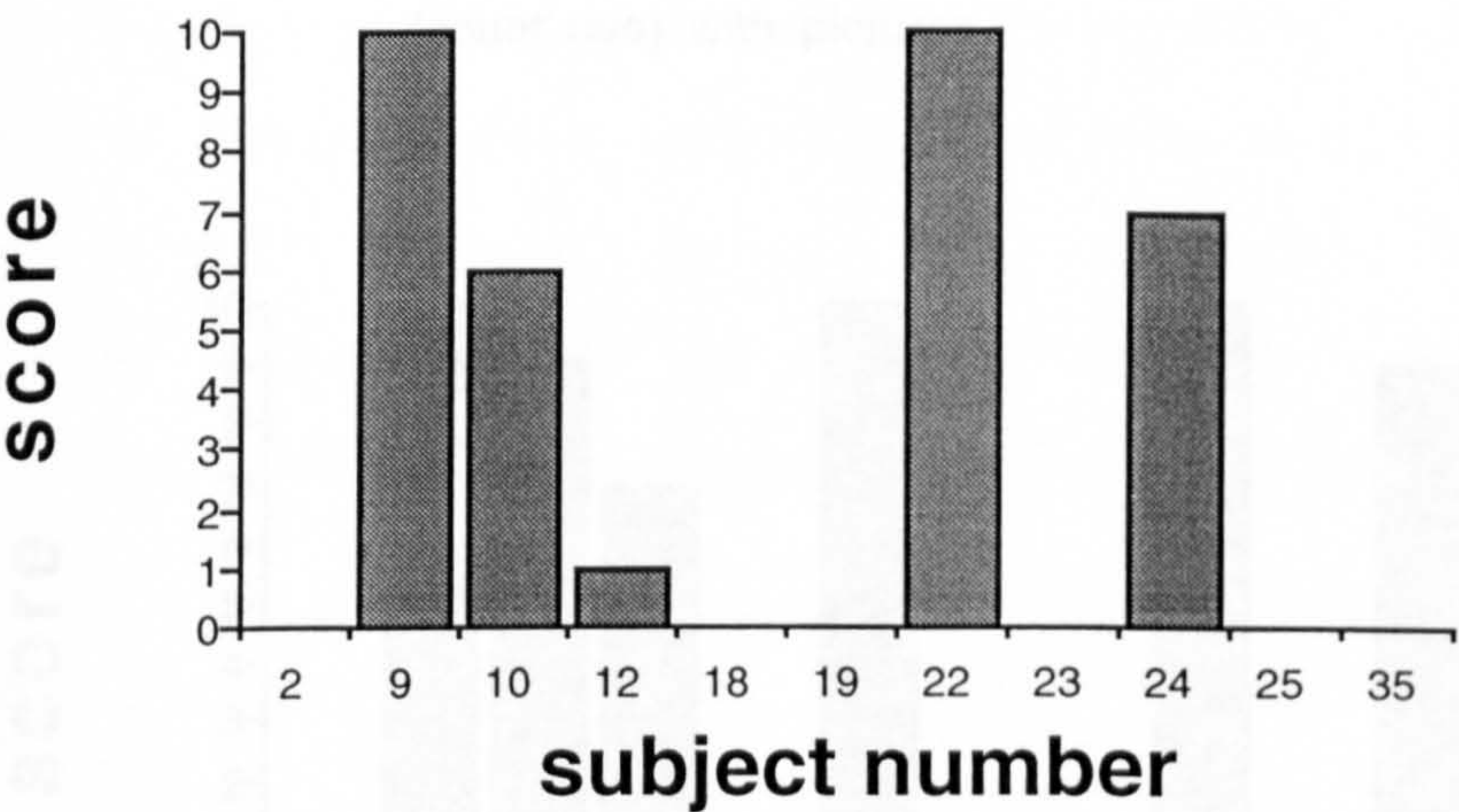


Table 10. 42 shows summary statistics of the dementia subjects' scores on conditional mand compliance (count cue), with pictures. Again, the range was large (10), and also the standard deviation of the mean (4.816).

Table 10. 42. Dementia subjects' scores on conditional mand compliance ( count cue).

Mean:	Std. Dev.:	Variance:		Count:
4.231	4.816		23.192	13
Minimum:	Maximum:	Range:	Sum:	# Missing:
0	10	10	55	35

Figure 10. 24 shows these results in more detail. Of the 13 scores, 5, were at or near ceiling. There were also 6 subjects who scored zero. These data may also be compared with the demented subjects' scores on conditional mand compliance (card cue) with



pictures (refer to Figure 10. 21). Two subjects scored better in the count cue assessment than in the card cue assessment, 2 scored worse, and 6 scored equally. In comparison with scores on the version of this measure with objects (see Figure 10. 23), 7 scored equally well on the version with pictures, and 2 scored better.

Figure 10. 24. Dementia subjects' scores on conditional mand compliance (count cue) with pictures.

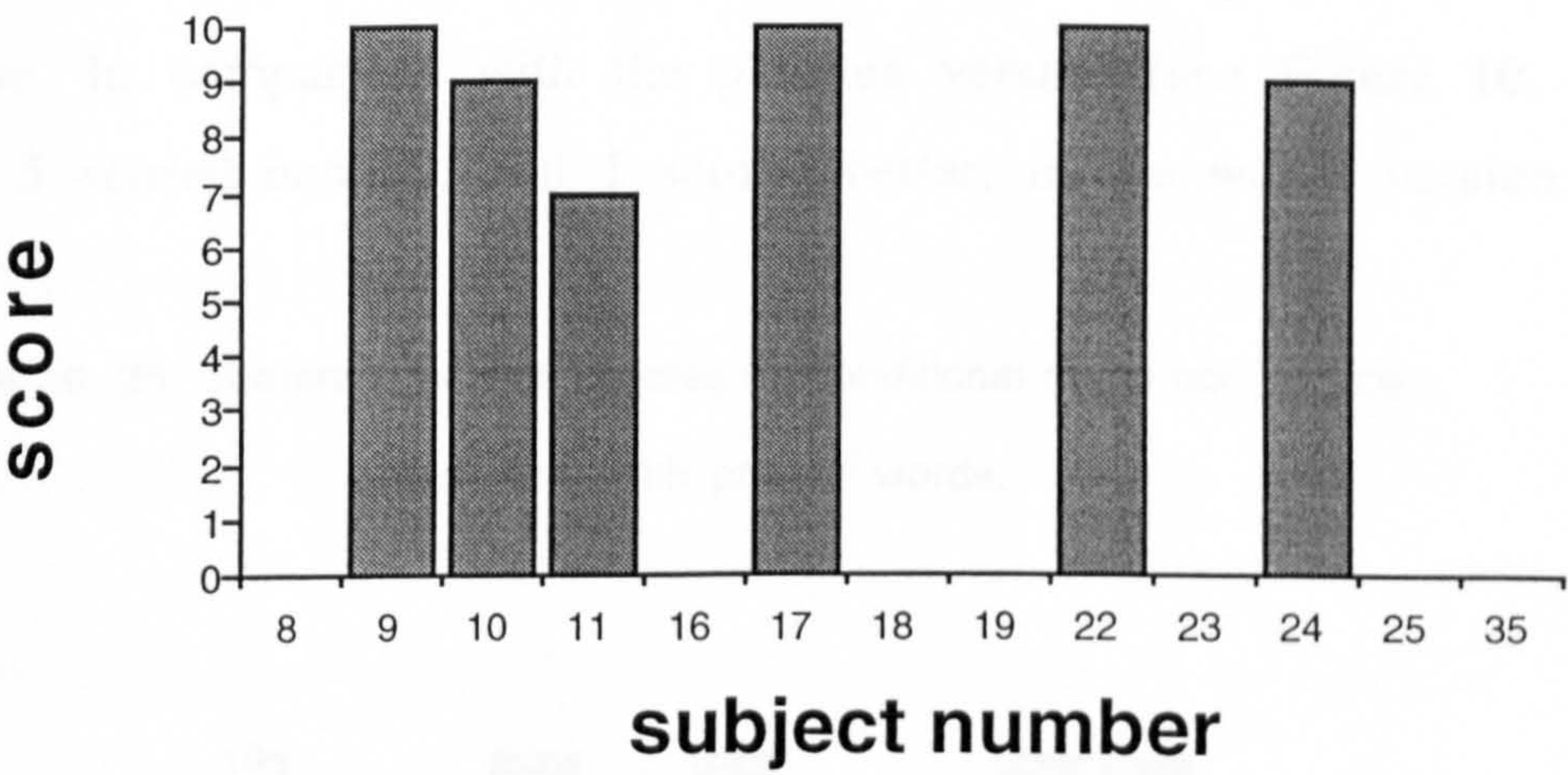


Table 10. 43 shows summary statistics of the dementia group's scores on conditional mand compliance (count cue) with printed words. The range is large (10), and the standard deviation of the mean is also large (4.562), indicating a lot of variability in the data.

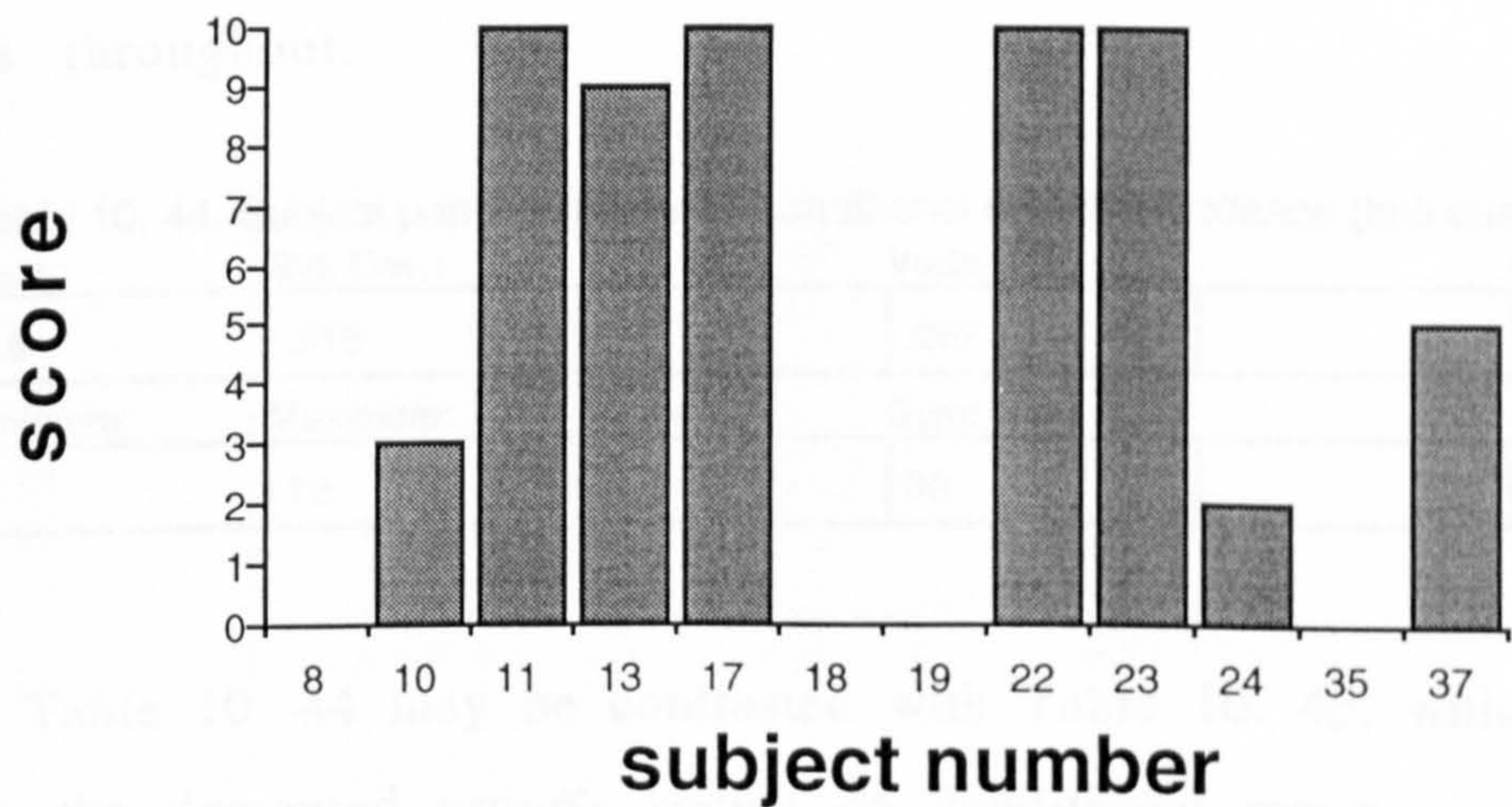
Table 10. 43. Dementia subjects' scores on conditional mand compliance (count cue) with words.

Mean:	Std. Dev.:	Variance:		Count:	
4.917	4.562		20.811		12
Minimum:	Maximum:	Range:	Sum:	# Missing:	
0	10	10	59		26



Figure 10. 25 shows these results in more detail. Again, Figure 10. 25 shows some extreme scores, with Subjects 11, 17, 22, and 23, scoring at ceiling levels, but also 4 subjects scoring zero. These results may be compared with the demented subjects' performance on conditional mand compliance (card cue) with printed words (see Figure 10. 22). Six subjects scored better in the count cue assessment than in the card cue assessment, 4 scored equally, and 2 scored worse. In comparison with the version of the task which used objects (see Figure 10. 23), 1 scored better in the words version, 4 scored equally, and 2 scored worse. In comparison with the pictures version (see Figure 10. 24), 5 scored equally, and 1 scored better, in the words version.

Figure 10. 25. Dementia subjects' scores on conditional mand compliance (count cue) with printed words.



Scores on the count cue task tended to be higher than on the previous card cue task. Possible reasons for this outcome will be discussed below.

The dementia subjects' scores on conditional mand compliance (count cue) can be summarised as follows: on the version of the task which used objects, the mean score was 3.091. With pictures it was 4.231, and with printed words it was 4.913. Again, there was a slight trend for subjects to score better on the version of this task which used printed words.

Assessment 6 (iii) Bell cue.

Table 10. 44 shows the subject panel group's scores in summary on the conditional mand compliance (bell cue) assessment, with objects. Once again almost all scores were at ceiling levels, and two subjects scored 9 out of 10.

We may summarise the subject panel's performance on the conditional mand compliance tasks as being at or near ceiling levels throughout.

Table 10. 44. Subject panel's scores on conditional mand compliance (bell cue).

Mean:	Std. Dev.:		Variance:		Count:
9.6	.516		.267		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
9	10	1	96		0

Table 10. 44 may be contrasted with Table 10. 45, which shows the demented group's scores on conditional mand compliance (bell cue) with objects.



Table 10. 45. Dementia subjects' scores on conditional mand compliance (bell cue).

Mean:	Std. Dev.:		Variance:		Count:
2.5	3.503		12.273		12
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	9	9	30		26

Figure 10. 26 shows these results in more detail. No subject in the dementia group scored at ceiling levels on this assessment, although Subjects 11 and 17 managed to obtain scores of 9. There were also 5 scores of zero. These data may also be compared with the dementia subjects' scores on conditional mand compliance (card cue), with objects (see Figure 10. 20). Two subjects scored better with the bell cue, 7 scored equally, and 2 scored worse. In comparison with their performance on conditional mand compliance (*count cue*) with objects (see Figure 10. 23), one subject scored better, 4 scored equally, and 4 scored worse.

Figure 10. 26. Dementia subjects' scores on conditional mand compliance (bell cue) with objects.

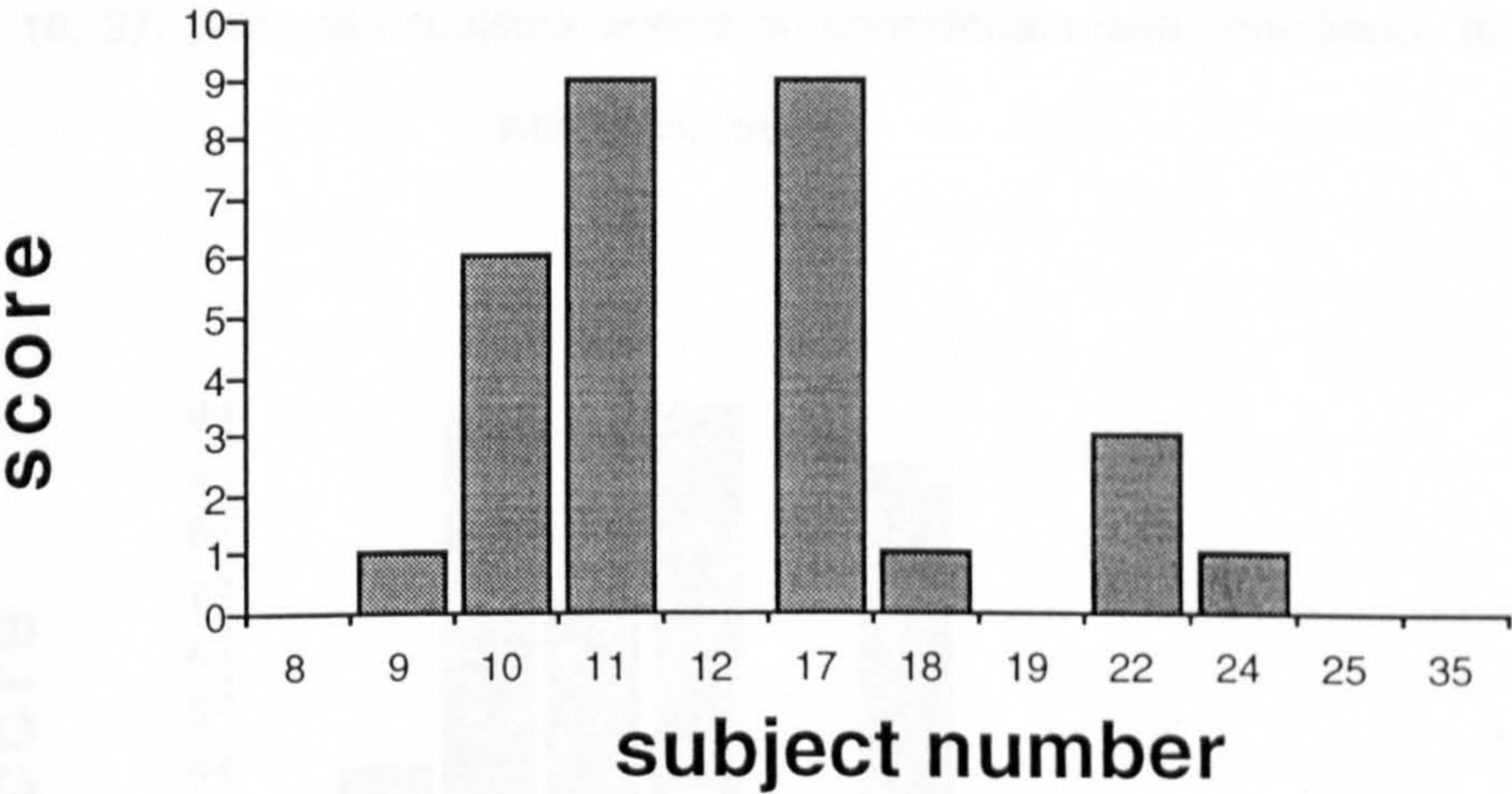


Table 10. 46 shows summary statistics of the dementia group's scores on conditional mand compliance (bell cue), with pictures, and, once again, there was a large amount of variability



in the data, indicated by the range of 10, and the standard deviation of 4.355.

Table 10. 46. Dementia subjects' scores on conditional mand compliance (bell cue).

Mean:	Std. Dev.:	Variance:	Count:
3.818	4.355	18.964	11
Minimum:	Maximum:	Range:	Sum:
0	10	10	42

These data are presented in Figure 10. 27, in more detail. Subjects 10 and 17 scored at ceiling on this assessment, and 5 subjects scored zero. These data may be compared with the dementia subjects' scores on conditional mand compliance (card cue), with pictures (see Figure 10. 21). One subject scored better with the bell cue, 5 scored equally, and 2 scored worse. In comparison with the conditional mand compliance (count cue) version with pictures (see Figure 10. 24), 6 subjects scored equally, and 3 scored worse.

Figure 10. 27. Dementia subjects' scores on conditional mand compliance (bell cue) with pictures.

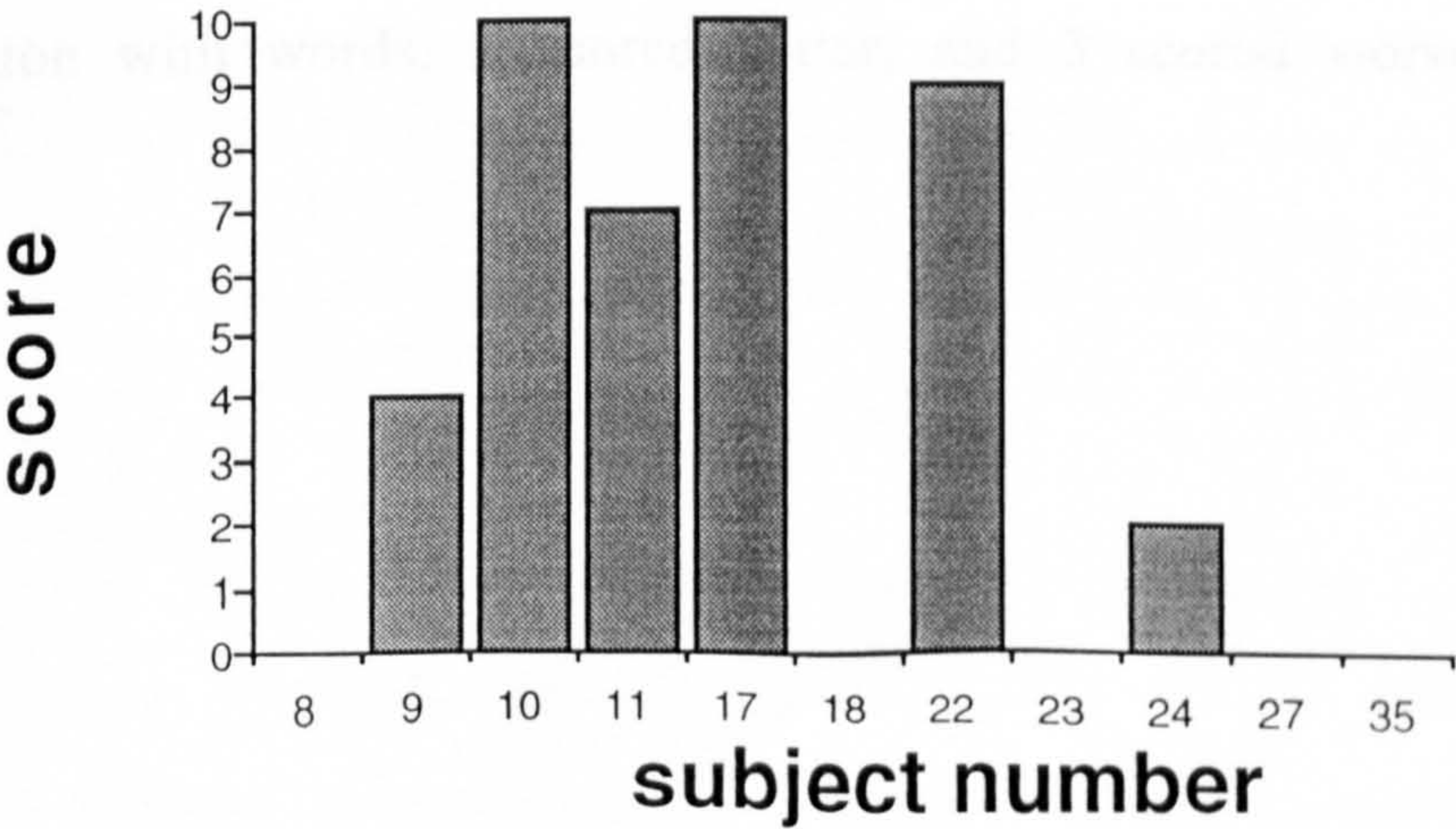




Table 10. 47 shows the dementia group's scores in summary on conditional mand compliance (bell cue) with printed words.

Table 10. 47. Dementia subjects' scores on conditional mand compliance (bell cue).

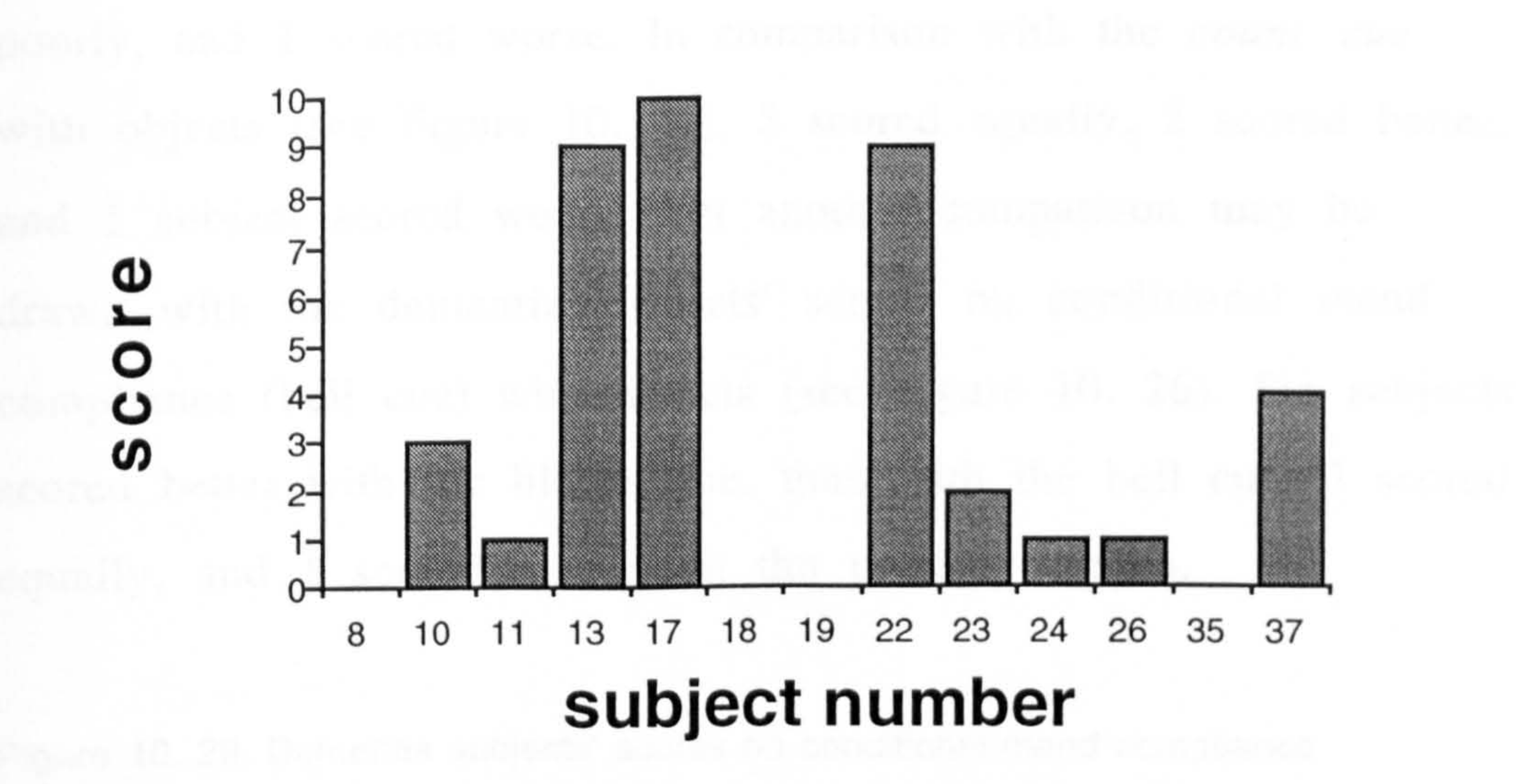
Mean:	Std. Dev.:		Variance:		Count:
3.077	3.774		14.244		13
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	40		35

Figure 10. 28 shows these results in more detail. Subject 17 alone scored 10 out of 10 on this measure, Subjects 9 and 22 scored 9, and 4 subjects scored zero.

These results may be compared with the dementia subjects' scores on conditional mand compliance (card cue) with printed words (see Figure 10. 22). Four subjects scored better in the bell cue version than in the card cue version, 6 scored equally, and 2 scored worse. In comparison with the count cue version with printed words (see Figure 10. 25), 1 subject scored better, 6 scored equally, and 4 scored worse. These results may also be compared with the version of this task using objects (see Figure 10. 26). Two scored better in the words version, 3 scored equally, and 4 scored worse. In comparison with the bell cue version with pictures (see Figure 10. 27, above), 4 scored equally in the version with words, 1 scored better, and 3 scored worse.



Figure 10. 28. Dementia subjects' scores on conditional mand compliance (bell cue) with printed words.



The dementia group's scores on conditional mand compliance (bell cue) can be summarised as follows: their mean score on the version of the task which used objects was 2.5; with pictures it was 3. 818; and with printed words it was 3.077.

Assessment 6 (iv) Blocks cue.

Table 10. 48 shows a summary of the dementia group's scores on conditional mand compliance (blocks cue), with objects. The subject panel group did not attempt this assessment.

Table 10. 48. Dementia subjects' scores on conditional mand compliance (blocks cue).

Mean:	Std. Dev.:		Variance:		Count:
3.4	4.6		21.156		10
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	34		28

Figure 10. 29 shows individual subjects' scores on this assessment. Three subjects, Subjects 10, 11, and 22, scored 10, and 4 subjects scored zero. These results may be compared with the dementia subjects' scores on conditional mand compliance



(card cue) with objects (see Figure 10. 20). Six subjects scored better with the blocks cue than the card cue, 3 scored equally poorly, and 1 scored worse. In comparison with the *count cue* with objects (see Figure 10. 23), 5 scored equally, 2 scored better, and 1 subject scored worse. Yet another comparison may be drawn with the dementia subjects' scores on conditional mand compliance (bell cue) with objects (see Figure 10. 26). Six subjects scored better with the blocks cue, than with the bell cue, 3 scored equally, and 1 scored worse, on the present version.

Figure 10. 29. Dementia subjects' scores on conditional mand compliance (blocks cue) with objects.

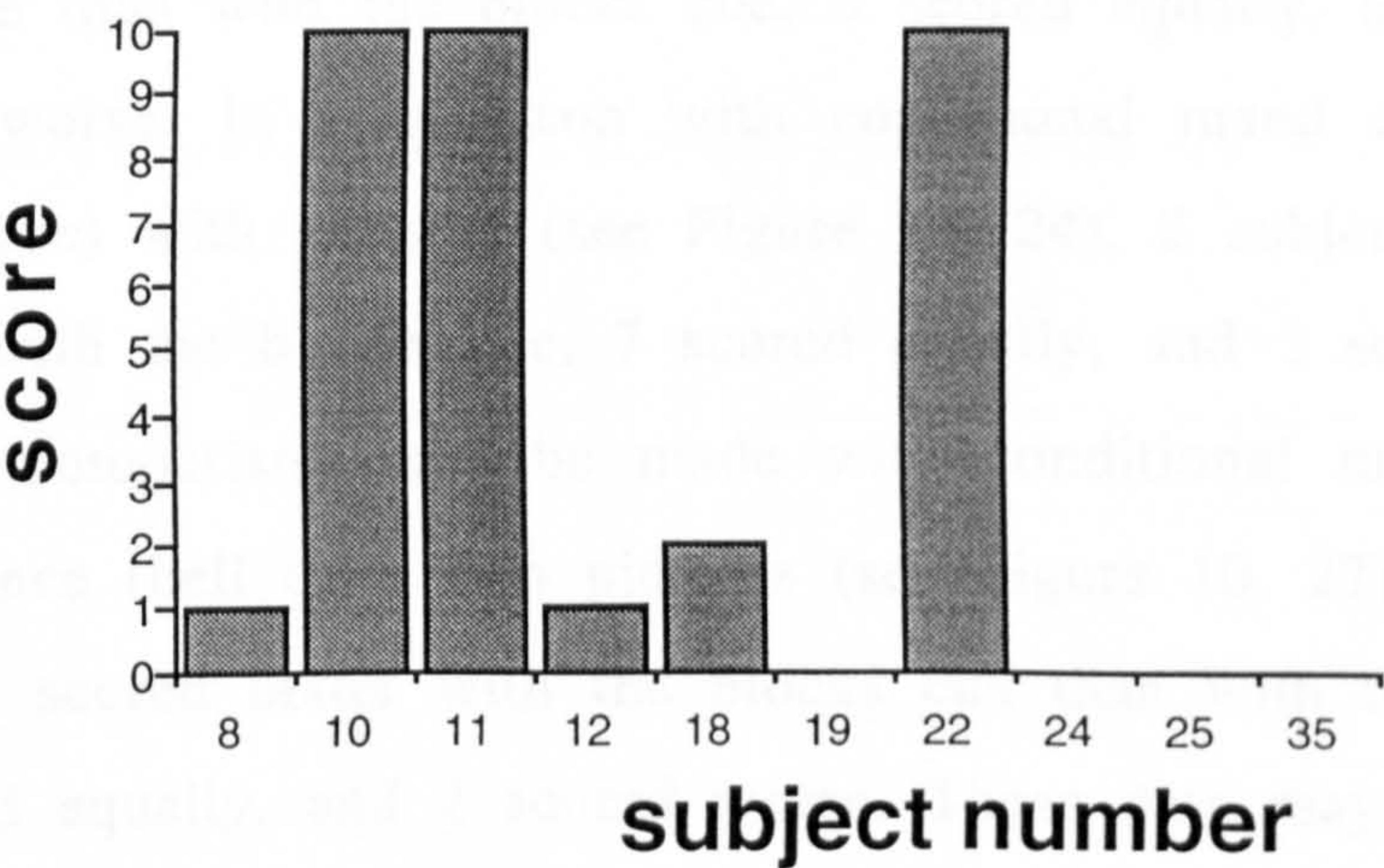


Table 10. 49 shows the dementia group's scores in summary on conditional mand compliance (blocks cue) with pictures.

Table 10. 49. Dementia subjects' scores on conditional mand compliance (blocks cue).

Mean:	Std. Dev.:		Variance:		Count:
3.455	3.959		15.673		11
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	38		27

Figure 10. 30 shows these results in more detail. Subject 17 scored at ceiling levels on this measure, and 5 subjects scored zero. These data may also be compared with the dementia subjects' scores on conditional mand compliance (card cue) with pictures (see Figure 10. 21). Three subjects scored better with the card cue than with the blocks cue, 5 scored equally, and 1 subject scored worse. In comparison with conditional mand compliance (*count* cue) with pictures (see Figure 10. 24), 2 subjects scored better, with the blocks cue, 7 scored equally, and 2 scored worse. Further comparison may be made with conditional mand compliance (bell cue) with pictures (see Figure 10. 27). Two subjects scored better with the blocks cue than with the bell cue, 4 scored equally, and 2 scored worse. These data may also be compared with the version of the task which used objects (see Figure 10. 29, above). Two subjects scored better in the pictures version, 1 scored equally, and 6 scored worse.



Figure 10. 30. Dementia subjects' scores on conditional mand compliance (blocks cue) with pictures.

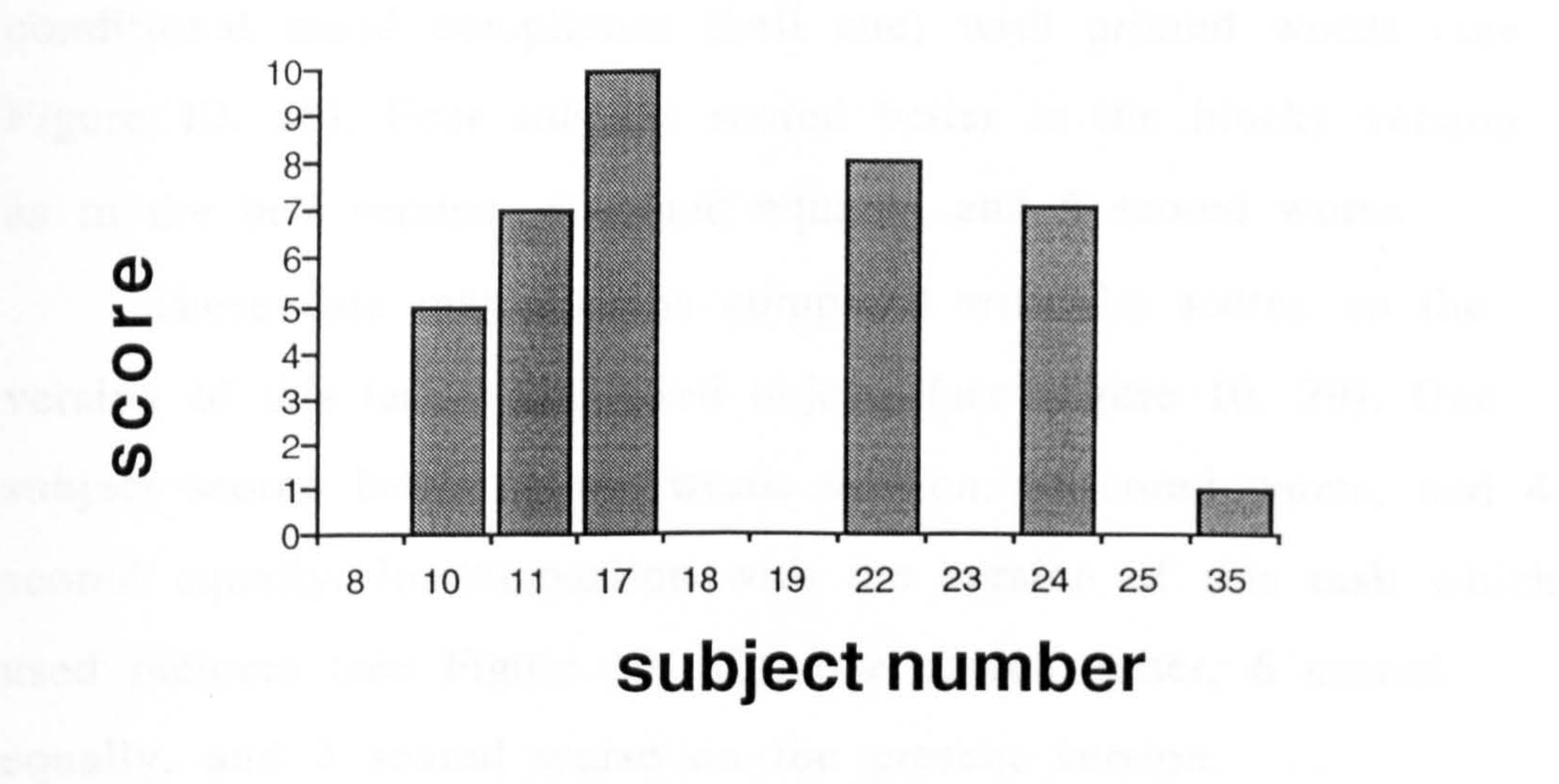


Table 10. 50 shows the dementia group's scores on conditional mand compliance (blocks cue), with printed words.

Table 10. 50. Dementia subjects' scores on conditional mand compliance (blocks cue).

Mean:	Std. Dev.:		Variance:		Count:
4.25	4.33		18.75		12
Minimum:	Maximum:	Range:	Sum:		# Missing:
0	10	10	51		26

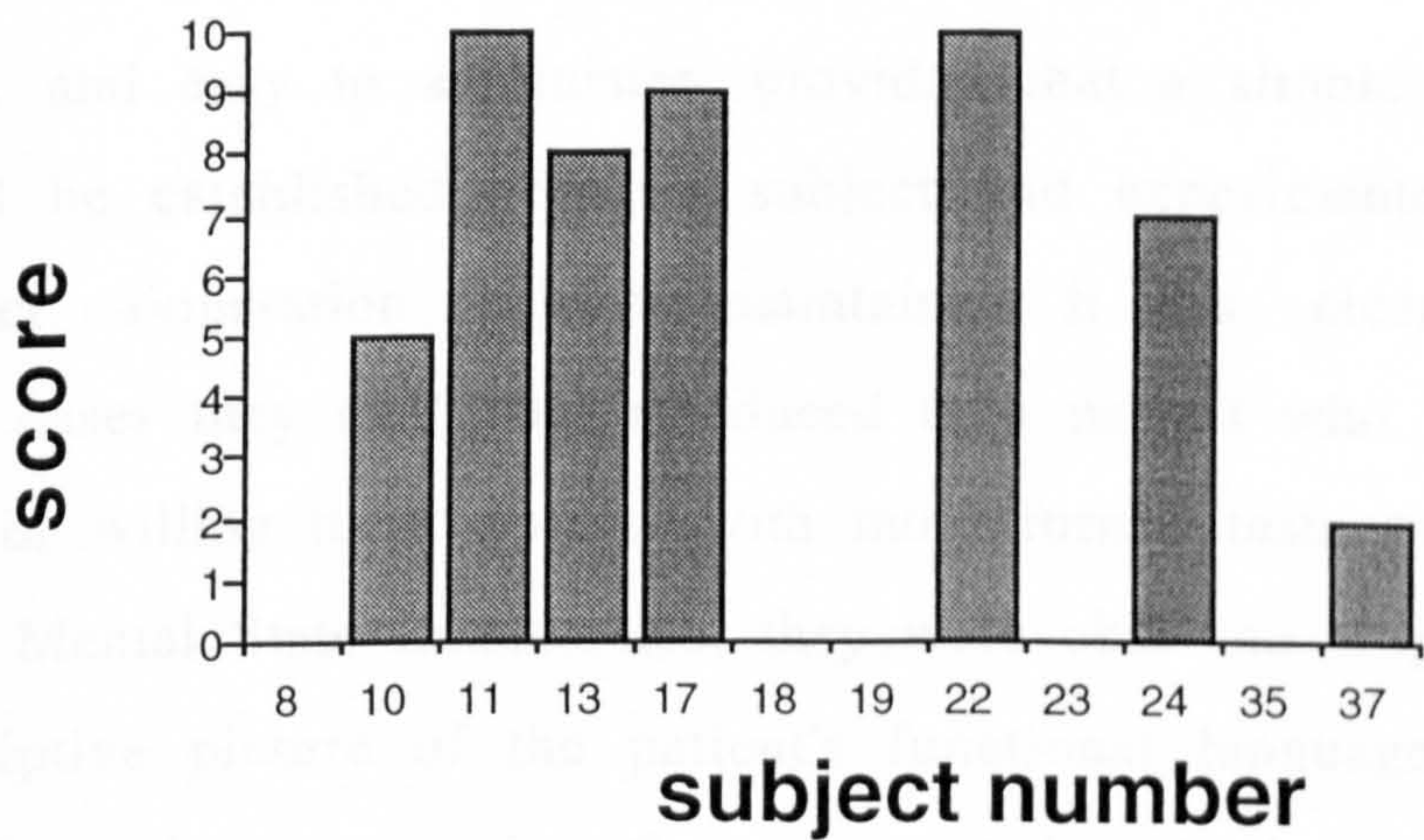
Figure 10. 31 shows the dementia group's scores on conditional mand compliance (blocks cue), with printed words, in more detail. Subjects 11 and 22 scored at ceiling levels on this measure. The high scoring Subject 17 only managed 9, and there were 5 scores of zero. These data may be compared with the dementia subjects' scores on conditional mand compliance (card cue) with printed words (see Figure 10. 22). Six subjects scored better with the blocks cue than with the card cue, 4 scored equally, and 2 scored worse. In comparison with their scores on conditional mand compliance (count cue) with printed words (see Figure 10. 25), 1 subject scored better with the blocks cue, 6 scored equally, and 4 scored worse. An additional comparison



which may be made is between conditional mand compliance (blocks cue) with printed words (see Figure 10. 31) , and with conditional mand compliance (bell cue) with printed words (see Figure 10. 28). Four subjects scored better in the blocks version as in the bell version, 4 scored equally, and 4 scored worse.

These data may also be compared with the scores on the version of this task which used objects (see Figure 10. 29). One subject scored better in the words version, 3 scored worse, and 4 scored equally. In comparison with the version of this task which used pictures (see Figure 10. 30), one scored better, 6 scored equally, and 3 scored worse on the present version.

Figure 10. 31. Dementia subjects' scores on conditional mand compliance (blocks cue) with printed words.



The dementia subjects' scores on conditional mand compliance (blocks cue) can be summarised thus: with objects the mean score was 3.4, with pictures the mean score was 3.455, and with printed words it was 4.25. A slight advantage was conferred on this assessment by the use of printed words.



## Discussion

### Discriminative measures.

Observation of the above Figures and Tables shows that on all measures the control subjects' scores were higher than the demented group's. The assessment measures, therefore, would be useful in aiding the diagnosis of dementia. The measures have been shown to discriminate between a small sample of 10 normal elderly persons, and a larger group of 38 dementia patients, fulfilling the primary aim of Experiment 6. Further studies, perhaps with a larger sample, could develop the measures in more detail.

### Ease of administration.

The assessments developed in this thesis were extremely quick and easy to administer, provided that a simple rapport could be established between subject and experimenter, and subject co-operation could be maintained. It was clear that in most cases they could be introduced to a patient who may not be able or willing to co-operate with more formal tests such as the Mini Mental State Exam. Also, they were observed to give a descriptive picture of the patient's functional language abilities, therefore, the second aim of Experiment 6 was also successful.

### Inter-correlation of standard assessments.

The high correlations between the three standard assessment procedures, the CAPE, MMSE, and GNT, indicate that the interchangeable use of these assessments may be justifiable. Results from all three could indicate a subject's level of impairment, but the GNT may measure more the ability to produce the correct spoken referent to a series of line drawings,

rather than a wider range of behaviour, as in the cases of the CAPE and MMSE. Some evidence that the GNT assessed a more specific class of behaviour (naming), was in that it had the lowest correlation with the other two assessments. The calculation of correlations between the results of these three tests on a larger sample of dementia subjects would clarify this issue.

### Levels of ability

Some general considerations arising from Experiment 6 may be relevant to all three issues under investigation. The dementia group's scores were interesting in that measures involving more complex task-contextual instructions and verbal behaviour on the part of the experimenter and subject, produced lower scores. The conditional mand compliance assessment was a very good example of this. Subjects who were unable to complete or attempt the conditional mand compliance assessment had simple mand compliance skills (see Figures 10. 8, 10. 9, and 10. 10). Evidently, the conditional element of the assessment was the behaviour which they were unable to comply with (comprehend or produce). It is unclear whether the complexity of the instruction or the conditional element of the assessment, or the temporal delay, rendered the assessment impossible (see below for further discussion of this issue). This could be clarified by the development of an assessment which involved instructions as complex (containing as many instructional elements which the listener is required to comply with) as those in Assessment 6, but which did not have a conditional element. Comparison can be made with studies carried out with children aged 2 years and 7 months to 3 years and 4 months by Sofroniou (1992). He used a matching to sample task, giving conditional instructions about the stimuli, such as "When it's the king, touch the bucket."



The children were able to respond correctly, after a great deal of training. However, it is possible that from the point of view of the subjects who participated in Experiment 6, theirs was a more complex response, particularly as Sofroniou's task did not contain a time delay. Comparison may also be drawn with one of the items in the Rivermead Behavioural Memory Test (Wilson, Coburn, and Baddeley, 1985), in which an item belonging to the patient is hidden and the patient is requested to ask for it back at the end of the interview (see Chapter 2, Understanding Dementia).

The possibility that the temporal delay may be an important factor in the demented subjects' difficulties with conditional mand compliance becomes more likely when the performance of Subject 12 in Experiment 5 is recalled. Subject 12's performance became worse as the delay period was extended.

#### The echoic as the simplest unit of verbal behaviour.

The large amount of ceiling scores on the echoic, and the observation that this class of verbal behaviour was present in the repertoire of even subjects whose dementia was far advanced, support Skinner's (1957), assertion that the echoic is the simplest verbal behaviour under the control of verbal stimuli. Although there was some consistency in the echoic data, not *all* scores were at ceiling, as was the case with the control group. Although this measure could be useful, for example when deciding whether to include the subject in a modelling programme (see Experiment 2), or in assessing basic hearing ability, the high level of ceiling scores present in this sample indicate that it would not be useful for inclusion in an assessment programme intended to screen for the presence of dementia.

### A naming deficit?

Although there were some naming deficits in the demented group, the present study did not find the extensive naming deficits found by Bayles, (1982), and other workers (see Chapter 3). The familiarity of the stimuli may have accounted for this result.

### Mand compliance and naming: the relevance of the tact.

There appeared to be a tendency for subjects to be able to select a stimulus when presented with its spoken referent, more readily than they were able to produce the conventional name of the stimulus when asked to by the experimenter, however, this trend is not clear from examination of the data here presented. Mean scores on mand compliance were higher than naming in the case of objects (6.818 for naming, 7.739 for mand compliance, see Tables 10. 19 and 10. 13). In the case of pictures, naming had a higher mean score than mand compliance (the mean score was 8 in the case of naming and 7.955 in the case of mand compliance, see Tables 10. 21 and 10. 15). In the case of printed words, the mean score for naming was 9.208 and the mean score for mand compliance was 8.682 (see Tables 10. 23 and 10. 17). The inconsistent results described above may be due to the fact that many subjects' data were not included in Experiment 6, because they were not able to complete the assessment procedure, because, for example, they would not even examine the stimulus items, or would not stay in the experimental setting for more than a few minutes (see Experiment 1 for details of subject characteristics relevant to this behaviour). Also, some subjects were excluded from assessments on the basis of their low scores or uncooperative behaviour on other assessments. It was likely



that these uncooperative subjects would have produced scores which were very low, or at zero, had they been persuaded to complete the assessments, but consideration of this issue must remain hypothetical. The observation that some subjects' naming skills were not equivalent to their mand compliance skills, and vice-versa, indicates that naming is a complex verbal behaviour, which may more appropriately in this study be entitled labelling or tacting (see Chapter 4). A subject who could respond appropriately with the conventional name of the item when presented with the item and prompted, but who could not select the item when the name was spoken by the experimenter, could not be said to "know the name of" the item, in the usual sense of the phrase.

#### Receptive and expressive prepositional relations: the role of additional instructional elements.

In terms of the procedures, these two types of assessments could be re-entitled as naming of prepositional relations, which is speaker behaviour, (expressive), and mand compliance with prepositional relations, which is listener behaviour (receptive). There was little observable difference in these scores, unlike the more noticeable differences in scores on mand compliance and naming. This finding may well have been due to the additional instructional and spatial elements involved in the procedures of the prepositional relations tasks.

#### Appropriate responses to the textual.

The subjects' ability to respond appropriately to the printed word is worthy of comment. In many cases the subjects' scores were higher in the assessments which utilised the printed word, for example, the mean score for naming of printed words was 9.208, as opposed to naming of pictures at 7.955 and naming of

objects at 6.818. The only behaviours on which the use of the textual did not confer an advantage were expressive prepositional relations, and conditional mand compliance (bell cue). This finding supports those of Experiment 3, this thesis, in which the textual was found to be a highly relevant stimulus for prompting appropriate verbal behaviour in the cases of two dementia patients. If this clear finding were substantiated by further experiments (conducted using the same procedure) it would have important implications for the design of therapeutic communicative strategies for use with dementia patients. An example of such a therapeutic strategy would be the application of intensive labelling techniques in psychogeriatric hospitals and other care facilities. Textual prompts can be an economical and easy method of improving the environment in such facilities and their use could be extended. Flash-cards on which relevant stimulus words are printed could aid the communication process. For example, at dinner time patients could be reminded to enter the dining room by the use of a "dinnertime" flash-card.

#### The role of subject variables in task selection.

Assessment selection was based on the experimenter's judgement of the subject's ability to attempt each measure. The smaller number of subjects who were able to attempt the later measures was due to the small size of the sub-group of the sample of dementia patients who were considered *able* to attempt these measures. The complexity of the instruction involved, possibly ensured that the sample selected contained subjects of higher ability levels, and this may of course have had an influence on the quality of their responses. This point has relevance for consideration of all the data in Experiment 6, as subject selection for participation in each test was based on the



experimenter's judgement of the subject's ability to attempt the assessment. This judgement was necessary however, as had the experimenter pressed a subject to attempt an assessment which was beyond his or her capabilities, this may have caused the subject considerable distress, and may have led to his or her refusal to participate in subsequent assessments.

The role of subject variables: clinical diagnoses.

It is also clear from observation of the demented groups' scores on the assessments, that within the demented group, the scores were variable, that is, there was a lot of inter-group variability. This may have been due to the fact that the subjects had different levels of dementia, mild, moderate, and severe, and also, in some cases, diagnoses of different types of dementia, AD, MID, and Korsakoff's type, for example. The assessment measures, and the results presented in Experiment 6, may, therefore, be a good starting point for further development of a useful diagnostic test battery.

## CHAPTER 11

### GENERAL DISCUSSION AND CONCLUSIONS

A wide range of data has been considered in the present thesis, and a number of implications for the understanding of verbal behaviour, and for the assessment of the dementing patient, can be drawn.

#### Methodological considerations

Certain conclusions may be drawn about the use of testing and assessment procedures currently in use with the dementing elderly population. These conclusions will be considered below.

#### Repeated administrations of assessments

Results from experiments conducted in the present thesis indicate that a single administration of a language test to a demented patient will often not be adequate, in that it will not provide a representative indication of the subject's abilities. Dementia patients show large variability in abilities over time, and thus, repeated administrations of a test, providing an indication of the subject's performance *range* should be the rule rather than the exception. Possible practice effects, which have been discussed in Chapter 2, should also be borne in mind, however.



### The Gibson Spiral Maze

The inclusion of the Gibson Spiral Maze in the Cognitive Assessment Scale (CAS), of the Clifton Assessment Procedures for the Elderly (CAPE), was thought to be a flaw by the present author. The reason for this was as follows. The total score possible on the CAS is 35, and 12 of these points can be obtained if the patient scores at a maximum level on the Gibson Spiral Maze. The patient's ability to do the maze could be compromised by factors such as poor visual acuity, poor manual dexterity, and so on. If, consequently they were unable to complete the maze, a large proportion of their possible marks would be lost. Therefore, if comparing the scores of patients who did complete the maze with those who did not, the 'maze factor' should always be taken into account.

### Other issues arising from the author's use of standard assessments

Extensive use of the three assessment procedures by the present author uncovered other important problems. The first problem related to *information and orientation*, both major parts of the CAS and the MMSE. Information about the date and the patient's whereabouts are requested. A patient who does not know the date, the day of the week and so on, may be considered to be disorientated in time. Elderly people who have been living in a psychiatric hospital for long periods are unlikely to have the same kind of cues to place and time that other people have. Each

day will seem the same for them, and Monday's routine may not differ from Saturday's routine. It is unlikely that they will look at a daily paper to remind themselves of the date, and sensory impairment may make it difficult for them to perceive the world around them. The view outside the window, for example, (which may be their only indicator of the passing seasons), faces of people working around them or visiting the ward, and the flickering images on the television screen, will not be correctly perceived if sensory impairment is present. Orientation boards are often provided to remind patients of the date and location, but a patient who does not adequately perceive his or her environment is unlikely to be aided by such cues without extensive prompting. Withdrawal from reality is to be expected in an environment which is lacking in stimulation. Often this lack of stimulation may be due to the patients' declining sensory capacities rather than lack of effort on the part of staff. What reason has a patient who is no longer considered part of active society, to know the date, or the names of current politicians? This kind of information, required by many assessments, is very context-dependent, the context being interaction within society, and when the appropriate context is removed, it is not surprising that patients cannot respond appropriately to such questions. The failure of many institutionalised patients to answer adequately to questions of *information and orientation*, may be more of a lack of context to fit the questions into, than an indication of cognitive impairment. The present author suggests that such tests should carry more weight when used with groups who are still living in the community. Such groups would have more reason and opportunity to be aware of the social context around them. It is clear that



when a patient has been living for some time in a psychiatric hospital or other continuing care facility, tests which are based more on items which the patient is familiar with, and interact frequently with, which are administered by someone who is familiar to the patient, and who they do not feel anxious in the presence of, are going to yield more reliable information about the patient's mental state. An example of such a person would be a nurse or care assistant, who has been instructed in the use of such tests.

### The role of task instructions

Speculation about the role of instructions in task performance is always a feature of experimental research. The role of instructions in experimental research with dementia patients has been introduced in Chapter 3.

If subjects cannot comprehend instructions, this may be a reason for their failure to perform certain tasks, or respond optimally on assessment; clearly the more complex instructions necessary to explain the task, the greater the problem. This is particularly relevant in the case of research into language, because when language skills decline, their very decline makes it difficult to devise procedures to assess language competence. The present author also found that in some cases subjects who participated in the experiments reported in this thesis appeared to have difficulty following even simple experimental instructions, and often verbal instructions had to be repeated. A recommendation can be made for the simplification of all test

instructions and procedures, as far as is possible, in clinical and research work with dementia patients.

### Therapeutic Outcomes of the Study

The two very broad aims of the work reported in this thesis were successful. A clearer understanding of the deficits in verbal behaviour of the dementias of old age was reached, and a number of moderately successful therapeutic strategies were developed. It is clear from examination of the data presented in this thesis, that the strategies for changing the verbal behaviour of the dementing elderly which were assessed: reinforcement; modelling; labelling; instruction; and prompting, need further investigation. However, certain points may be made about their effectiveness.

#### The delivery of contingent 'reinforcers'

Experiments 1 and 2, reported in Chapters 5 and 6, demonstrated that the delivery of 'reinforcers' contingent upon production of correct responses, was effective in changing the verbal behaviour of Subjects 1 (the echoic), Subject 2 (conditional mand compliance), Subject 4 (mand compliance and naming), Subject 6 (mand compliance), and Subject 7 (mand compliance and naming), in a positive direction. Production of correct and appropriate verbal behaviour did indeed increase when reinforcement was applied. These findings support those of Ankus and Quarrington, 1972, (cited in Chapter 4), which suggested that reinforcers, when they are individually and appropriately tailored, can improve the performance of dementia patients.



Therefore it is clear that praise, and other potential reinforcers, should be given, when patients are able to complete appropriate behaviour independently.

It was clear however, that many items and events commonly used as 'reinforcers' with human subjects were not appropriate for use with demented elderly subjects. It was important, as had been suggested in Chapter 4, to tailor reinforcement to individual subjects' requirements. Indeed, a suggestion may be made to future researchers, that an entire session might be set aside at the start of an individual's assessment, in order to identify and select appropriate reinforcers for each individual subject, as described in the General Method. Also, it would be appropriate, once such effective reinforcers had been identified, to continue to assess their effectiveness, and to ensure that subjects had not become satiated with the reinforcers. This might have been done by periodically introducing a novel behaviour to be assessed, such as performance on a lever-pulling task, and assessing the effect of the putative 'reinforcer' on the novel behaviour.

### The use of modelling

Investigation of the use of modelling procedures, in Experiments 2 and 3, reported in Chapters 6 and 7, did not show positive effects. To reiterate the findings for imitation which have been discussed in Experiment 6, imitation rates on the mand compliance assessment ranged from 75% (Subject 6), to 45% (Subject 4). On naming, rates ranged from 53% (Subject 6), to 30% (Subject 5).

Subject 7, however, imitated 93% of mand compliance responses, and 89% of naming responses. Subject 8, like Subject 7 and other subjects with whom modelling was used as an intervention, also produced imitative responses at higher rates than non-imitative responses, and the reader is reminded that only 60% of modelled responses were imitated by Subject 8, who in other respects was an extremely co-operative subject. In view of this and the apparent dependency engendered in this Subject and others in Experiments 2 and 3 (A) and (B), the conclusion can be drawn that the technique of modelling is not effective in re-establishing anything other than imitative verbal behaviours in this client group. An additional point may be made, that *were* subjects unable, as has been shown to be the case in a large percentage of instances, to produce immediate *imitative* responses, modelling as a therapeutic technique is unlikely to have a significant beneficial effect. Indeed, the results may suggest that modelling could cause 'dependency' of the subject, upon the model, leading to a decrease in production of spontaneous correct responses. An alternative explanation is that incorrect or non-responses were reinforced by the receipt of the experimenter's modelling behaviour, which as a social interaction, could well be classed as a putative 'reinforcer' (see Chapter 4). Even in the cases of subjects such as Subject 7, who was able to imitate the majority of the models provided by the experimenter, there was no positive effect on learning of the target relation. In all the subjects with whom modelling was investigated as a therapeutic intervention, this was the case.

A recommendation could be made to carers of dementing individuals, that prompting with reinforcement would be a more



effective strategy than modelling, to preserve communication skills.

Further research might establish a programme in which, at the start of a training programme, subjects are taught to model selected simple behaviours by the experimenter, and are rewarded for so doing. There is a possibility that this might merely generate an increased frequency of imitative behaviour, which is not the desired effect, and so, an alternative procedure might involve presenting a model after both correct *and* incorrect responses, thus removing the possibility that the model might serve as a social reinforcer only for incorrect responding, as discussed above. Used in this manner, the effect of the model would not be exclusive to incorrect responses.

#### Therapeutic application of the textual

The present author observed that one subject, Subject 8, had a tendency to examine the stimulus items he was required to name, and if he could find any lettering on them, he would automatically read this aloud, despite the fact that he was unable, in baseline sessions, to produce the correct name for the stimulus. For example, when given a fork, he read out the small engraving "Firth Stainless", on the back of the fork, but did not produce its correct name. Such behaviour is reminiscent of the textual behaviour described by Skinner, in which, "one is likely to find oneself reading not only letters, books and newspapers, but unimportant labels on packages, subway advertisements and billboards" (Skinner, 1957, p. 66).

This behaviour on the part of Subject 8, was an additional reason which led the experimenter to consider the application of the textual as a therapeutic intervention. The effects of written prompts and labelling in Experiment 3, reported in Chapter 7, were positive, and led to the increase in production of specific classes of appropriate verbal behaviour on the part of Subjects 7 and 8, in the presence of the textual. Textual responses were produced at higher rates than responses to objects and pictures in Experiment 6 also. Such a finding suggests that, in care facilities, the clear labelling of salient features of the environment, and stimuli which patients may need to use, should be extended. Such an extension would be an economical and potentially very therapeutic modification of the environment. Hanley, (1981), had found that large signposts in a psychogeriatric hospital had reduced disorientation among residents (see Chapter 4). Hanley's signposts were pictorial rather than written and it is interesting to speculate what his findings would have been if his stimuli had been textual, given the appropriate responses to textual stimuli in the present study. Additional supporting evidence for the preservation of textual skills was that for mand compliance and naming, there clearly was a trend for subjects to perform equally well, or better, on tasks with printed words, than with objects or pictures, in Experiment 6. This result did not consistently extend to measures administered later in the sequence of assessments, however. These findings support those of Overman, (1979), who found that his subjects were better at naming printed letters and numbers than pictures (see Chapter 3). The application of the textual in Experiments 3 and 6 did not allow the subject to demonstrate generalisation of learning to other classes of verbal



behaviour. Further investigation of the potential therapeutic application of the textual would involve massed trials of textual and object (for example), and then the assessment of the subject's ability to respond correctly in the presence of the object alone.

### Implications for the Understanding of Verbal Behaviour

#### Differential Production of Discrete Classes of Verbal Behaviour

It was quite clear that dementia subjects experienced difficulty with more complex classes of verbal behaviour, often producing scores at, or near, floor level if they were able to attempt the more complex verbal behaviours at all. This was clear from the results of Experiment 6 in particular. In Experiment 6, there was a clear trend for fewer subjects to participate in more complex assessments, because they had scored too poorly, or at floor level, on more simple assessments. Mand compliance responses were in general produced at a higher level than naming responses, for Subjects 3, 5, 6, and 7, all of whom received intensive longitudinal assessment of both mand compliance and naming. For Subject 4, however, naming was produced at a higher level. This finding was not supported by results from Experiment 6, in which the results showed that in the cases of subjects who attempted both mand compliance and naming, 16 scored better on naming than on mand compliance, 24 scored equally, and 12 scored worse on naming than on mand compliance. This indicates that the author's original hypothesis that mand compliance is a behaviour retained until later in the dementing process could be unsubstantiated. Results obtained from further studies designed

to assess a larger sample of dementia patients' mand compliance and naming behaviour would clarify this issue.

### Receptive and Expressive Verbal Behaviour

Findings from the longitudinal assessments of Experiments 1-3, however, give weight to and are consistent with the developmental position that receptive language skills or verbal behaviours, are learned before, and are simpler, than expressive language skills or verbal behaviours. In this way, we can say that receptive verbal behaviour comes before productive verbal behaviour, and simpler skills are acquired before more complex ones. Evidence from the present study supports this finding, because the developmentally more complex skills which the child acquires later, were in many cases lost earlier in the process of the dementing decline.

Receptive language skills have also been shown by the present author to be affected by the dementing process. There is evidence of this from subjects' impaired performance on mand compliance, and receptive prepositional relations, for example.

### Functional relations

It was clear that subjects could, in some cases, respond with the spoken name of an object, and not be able to select it, or as was more often the case, be able to select it but not say its name. Also, in some cases, subjects could respond appropriately to a textual (printed or written word), but not to a three-dimensional stimulus, or photograph. This finding indicates that the functional



relationships between objects and their conventional spoken names has been broken down. Skinner describes such instances in the following way: "The aphasic may not be able to name an object, though he will emit the name immediately in manding it; or he may be able to name an object though he cannot repeat the name after someone else [produce an echoic response] or read it from a text as he once was able to do.....The aphasic has lost some of the functional relationships which control his verbal behavior. A response of a given form may no longer be under the control of one functional relation, although it is still under the control of another." (Skinner, 1957, p.190). Similarly, it was clear that in some of the instances reported here, subjects could comply with a mand but not produce a corresponding tact. Also, in some cases subjects could produce an echoic, but not a tact (see Experiments 1, 2, 3, and 5). The subjects' ability to mand was not intensively assessed (see Chapter 4), therefore no experimental conclusions can be drawn about the mand. These findings suggest a conclusion that it may be more accurate to discuss subjects' *performance on the tact* rather than their naming skills. Dugdale and Lowe's (1990) definition of naming specifies certain behavioural requirements for naming, which may not be present in the verbal repertoires of all dementia patients. According to Dugdale and Lowe, for verbal behaviour to be called naming, "a particular stimulus [should] control a subject's verbal response [tact], [and] the subject's verbal response should also exert control over other behaviour (e.g. selection) [mand compliance] with respect to that particular stimulus. Naming would thus involve both language production and comprehension, and it would require the subject to function both as a speaker and a listener." (Dugdale and Lowe,

1990, p. 133). Within this definition of naming, the actual behaviour of some patients did not meet the bi-directional or speaker-listener requirements of naming, but was more like the tact.

### The Preservation of Classes of Verbal Behaviour in Dementia

The results of this thesis taken as a whole, and especially the results of Experiment 6, indicate that some classes of verbal behaviour are more resistant to the adverse effects of the dementing process. Such results suggest that the assessments devised in this thesis could be incorporated into a test battery for the assessment and diagnosis of dementia.

The potential therapeutic applications of these findings will be discussed below.

### The Use of Compensatory Strategies

There was some evidence of the use of compensatory strategies where naming difficulties were present. A subject who could not respond with the precise exemplar of the common name of an item would use another word similar in meaning, for example, Subject 8 occasionally (but not consistently), referred to spectacles or "glasses," as "spy-glasses". On other occasions, he would put them on, and after doing so, would be able to name them. Standard approximations, such as that described above, were allowed in the language assessments devised by the experimenter, because word meanings are not precisely defined,



they vary with context and of course with individual learning history.

Such a tolerant policy, which allowed for the use of compensatory strategies, was not followed in scoring the GNT, however, because the requirements of the test for the words to be produced were precise, and there was a list in the Appendix of the GNT, of common "errors". Many of these "errors" corresponded to the kind of errors produced by the subjects who participated in the experiments reported in this thesis, errors which often resulted from the subject's description of the *function* of the item (for example, the response "ballet dress," was often given instead of the correct response "tutu"). These observations back up the findings of Barker and Lawson, (1968), described in Chapter 3, who found that if the experimenter demonstrated the use of an object, it was more easily named. Barker and Lawson interpreted their results as indicating that the primary disorder was one of perception, but an alternative interpretation is that subjects were unable to name in response to the physical appearance of objects, but were responding to the behaviour the object evoked, that is, the object's function, rather than with conventional names. They were therefore using compensatory strategies to preserve their own communicative behaviour. Subject 8, in particular, was able to name items more accurately when their use was clear. One of the stimuli was a pair of spectacles. He would put them on, and *after* doing so, would be able to name them. A further example of the influence of prior learning history (or contextual cues) on the use of compensatory strategies was that many subjects responded to the stimulus "boar", with the response "pig", but this had been the response of some normal subjects who had taken

part in pilot studies. Further evidence for the use of compensatory strategies in dementia comes from Subject 10, who, in conversation with the experimenter, consistently used the word "previous," instead of "late," or "too late," when such terms would have been much more appropriate. Skinner describes such processes under the heading "Solecistic extension of the tact", and gives the example of the person who says "dilemma", when the situation is merely difficult, and explains that "solecistic extension [of the tact] is commonest when no other response is available" (Skinner, 1957, p. 102). Viewed in this way, solecistic extension of the tact on the part of dementia patients can be seen as a type of compensatory strategy, since a word similar in sound or meaning is substituted, when a more appropriate one is unavailable. Such compensatory strategies were also described by Alzheimer, (1907), whose patient is reported to have substituted the response "milk pourer," for "jug," in a naming exercise. It may be argued that the eccentric verbal responses described here may be merely a function of the responses modelled by the local verbal community of the subject, and should not be viewed overtly as compensatory strategies.

### The Influence of Historical and Cultural Factors on Productive Verbal Behaviour

One of the stimuli in the GNT was a line drawing of a leotard, which many patients named as "bathing costume", an appropriate response from a population who would have gone bathing in a high-necked, long-sleeved garment which may have looked much like a leotard. A conclusion may be drawn that the GNT is not well



designed for coping with cultural and historical differences. Word meanings are precisely defined in dictionaries, but in naturally occurring verbal behaviour, words are replaced, mutated, and substituted depending on cultural and historical context and situation. Vygotsky gives an example of such mutation of word meanings. "Russian has a term for day-and-night, *sutki*. Originally it meant a seam, the junction of two pieces of cloth, something woven together; then it was used for any junction....it began to be used metaphorically for twilight, "where day and night meet"; then it came to mean the time from one twilight to the next, i.e., the 24-hour *sutki* of the present." (Vygotsky, 1986).

### The Echoic

The loss of the echoic in some instances described in this thesis (see Experiment 1, for example), is worthy of comment. The echoic is developmentally the most primitive verbal production skill (see Chapter 4). A subject should, therefore, be severely demented to have lost echoic skills (assuming that developmentally simple skills are lost later in the dementing process). A lack of echoic skills would fit in with Skinner's account of aphasia, however (see above). Skinner suggests that due to the breakdown in functional relations between stimulus and response, which the aphasic appears to experience, he or she may be able to, for example, name a stimulus but not be able to repeat the name after someone else has spoken it. In general the echoic was a preserved behaviour in the sample reported in the present thesis, and this may have been due to the differences in patterns of impairment experienced by aphasic and demented patients. Mand

compliance and naming behaviours which have already been discussed above, were less well preserved than the echoic, and the point may be restated that the more complex verbal behaviours such as expressive and receptive prepositional relations showed a trend to be less well preserved (see Experiments 1, 2, and 6, for example).

### Conditional Responses

The implications of the deficits in conditional responding shown by the dementia subjects are wide. An example illustrating the severity of potential deficits in conditional responding is in the performance of Subject 8, who was unable to do simultaneous identity matching, even with the blocked trials procedure and instruction. Marked deficits were found on the conditional mand compliance task too (see Experiments 1, and 5), for all dementia subjects who attempted this task. Indeed, Experiment 5 showed a very clear demonstration of a key area of difficulty for dementia patients. Subjects who participated in Experiment 5 demonstrated that their deficits in conditional responding were not responsive in the long term to simple remediation, since improvements in performance were not maintained over time, once interventions had been withdrawn. Awareness of the deficit in conditional responding in patients with dementia, on the part of carers, might lead to the modification of communicative procedures in such a way as to remove conditional elements from instructions. In this way, the instruction "when I set the table, it's time for tea" would be simplified to the information "I have set the table, and now it's time for tea!".



Further documentation of the deficits in conditional responding on the part of dementia patients would lead to an understanding on the part of carers that these deficits are a recognised part of the patient's condition, and this would hopefully lead to a reduction in possible distress at the patient's inability to respond appropriately.

Considering that conditional responding may be necessary for language use (See Premack, 1976, and Chapter 4, this thesis), a deficit in conditional responding could be fundamental to a deficit in language use. According to Linda Hayes (1991), verbal behaviour differs from all other behaviour because *every* instance of it is conventional [conditional], and all referential behaviour depends on a conventionality [conditionality] of response form. In this way, it can be suggested that the dementia subjects showed deficiencies on the simplest conditional tasks, for example on mand compliance (selection of an item by the subject was conditional upon the name spoken by the experimenter). Further experiments could investigate dementia patients' conditional responses in more depth, for example their ability to match printed words to pictures and sounds could be investigated, or their ability to respond to printed words conditionally upon the presentation of spoken names. Performance on the conditional discrimination or matching to sample tasks in Experiment 4 was so poor that a conclusion may be drawn that this conditional discrimination task, in its present form, is not useful in assessing the performance of dementia patients. Procedural difficulties may have led to the lack of success in Experiment 4, and these would need to be addressed by

future researchers wishing to use the matching to sample procedure with dementia patients.

### Stability of Free-running Baselines

What conclusions may be drawn from the observation that in many cases (see Experiments 1-3, and 5), the free-running baselines did not deteriorate greatly? Returning to Wood's statement that re-learning may have been a feature of the success of Reality Orientation programmes, it may be suggested that positive practice of simple verbal behaviours in a supportive and non-judgmental environment resulted in maintenance of existing skills, and practice overrode the negative effects of the dementing process. It was clear, however, from observation of the simple curve fits plotted on the free- running baselines, that behaviour was indeed deteriorating. Improvements shown in the classes of behaviour which did receive the interventions is all the more impressive when contrasted with these gradual declines.

### Future Directions

It has been demonstrated that the techniques of behaviour analysis are useful as strategies for assessing and remediating the verbal behaviour of this clinical group. Certain areas of further investigation may, however, be recommended.

### Classes of behavior or units of behaviour?



One further point of practical and theoretical interest is whether the delivery of reinforcers contingently upon correct responses, had its effect in these experiments by effecting a change in level of production of a particular *class* of verbal behaviour, or of *specific units* of verbal behaviour. In other words, was it the case that reinforcement of correctly naming "cup," ensured that "cup" was more likely to be named correctly in the next session, or that correct naming responses in general (that is, during the session then in progress and in the next session), were more likely to be produced? In any given session, two possible effects could occur. Firstly, correctly naming "cup," on the first trial in a session including ten trials (each trial using a different stimulus), would increase the probability that the other stimuli in the following nine trials would be correctly named. This is the more attractive possibility. The second possibility is that only specific units of verbal behaviour are reinforced. Therefore, reinforcement of correct naming of "cup," would only have an effect on future production of that specific response, and so of course the effect of reinforcement would not be visible until the following session. If the latter effect of reinforcement was the effect in operation, then one session in which reinforcement was applied would not be enough to produce a change in behaviour. Unfortunately this issue was raised after the studies on reinforcement had been completed, but further investigation of it would be useful. This could be done by administering a ten-trial assessment of (for example), naming, with a different stimulus presented on each trial, as in the experiments reported in this thesis. Reinforcers would be presented contingently upon the production of correct responses, and a record would be made on

each of the ten trials, of whether the subject responded correctly with a specific unit of verbal behaviour, for example, whether he or she correctly named the cup. Results would then be analysed to determine whether production of *discrete units* of verbal behaviour increased on subsequent trials.

### Therapeutic application of the textual

Further studies could investigate the effect of textual stimuli on production of verbal behaviour by utilising textual prompts as described in Experiments 3 (A) and (B), with a larger sample of subjects. Were therapeutic outcomes to be similar to those of Experiments 3 (A) and (B), clear recommendations could be made for extensive labelling of the environment in care facilities. It must be pointed out, however, that beneficial effects are only likely to be achieved if the subject is able to respond to the textual sign or stimulus with an appropriate behavioural repertoire of responding, which could be described as comprehension. Simple textual vocal textual responses would not necessarily aid the subject to negotiate his or her environment.

### Development and assessment of communication strategies

It is suggested that an educational programme be begun for carers, of awareness of the strengths and weaknesses in dementia patients' verbal behaviour (for example, the differences between their expressive and receptive verbal behaviour). Suggestions could be made in how to aid the communication process, for example by the use of reinforcement and the avoidance of



modelling. Awareness of such issues on the part of the carers of dementia patients could lead to the use of more effective communication processes and strategies. Education of carers in these issues could be implemented by Community Psychiatric Nurses, Social Workers, General Practitioners, the Alzheimer's Disease Society, and other groups who assist carers. A qualitative study could then assess the effect of modification of communicative strategies on patients' verbal behaviour.

In conclusion, the verbal behaviour of dementia patients in so far as it was assessed in the present thesis, appears to be amenable to analysis and modification. Further investigations of classes of verbal behaviour with this clinical group will provide a further grounding for therapeutic understanding of verbal behaviour, and the wider field of human learning.

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## *Appendix 1*

### QUESTIONNAIRE FOR ALL CARE STAFF AT MAES Y COED

*You may already be familiar with the kind of work I am doing with the clients here, but here's a quick summary.*

When people start dementing, one of the first things they lose the ability to do, is to use words in a functional way. They may talk a lot, but the talk doesn't communicate much.

A lot of research has shown that the names of items are forgotten in dementia, but one of the aims of our research project is to see whether we can stop this happening.

So, it would be helpful if you could give us an idea of what items it would be most helpful for all your clients to know the names of (please don't take into account whether you think they already know the names of these items or not).

Tick ten items, if you can, that clients should know the names of.

- 1.cup
- 2.hat
- 3.spectacles
- 4.fork
- 5.pill/tablet
- 6.tie
- 7.chair
- 8.dish
- 9.underclothes
- 10.socks
- 11.soap
- 12.knife
- 13.spoon
- 14.shirt/blouse
- 15.hairbrush
- 16.coins
- 17.food
- 18.leaf
- 19.shoe/slipper
- 20.any part of the body(e.g. hand)
- 21.key
- 22.paper
- 23.clock
- 24.coat
- 25.pen

26.anything else not listed here(please say what)

Thanks very much        *Lynne*



*Appendix 2**Referral Form for inclusion in Department of  
Psychology/Welsh Office Research Project.*

Name of patient

Address

Age

Date of Birth

First language

Name of next of kin or carer

Name of G.P. and practice.

Approximate date first presented with memory  
problems or possible dementia

Psychiatric diagnosis of dementia/Organic Brain  
Syndrome etc.?

Sight/hearing problems?

Any other major physical disability?

Any relevant medication prescribed(e.g.tranquilliser)?

## Appendix 3

Dear .....

Gwynedd Health Authority has recently approved a research project that is to be conducted with elderly people. We are hoping to recruit a number of such persons with possible memory problems to participate in the study. I am a psychology researcher, conducting research at Ysbyty Gwynedd, and hope to involve your .....in the project, as we think it might be of possible benefit to her. The study would involve assessing Mrs ..... memory for a number of words, and her ability to use the words in different ways. Recordings would be taken of the interview sessions for purposes of experimental reliability, but these would only be viewed by the research project. We are asking you to give your consent as next of kin to your mother's participation in the study, subject of course, to the provision that if she herself was unwilling to participate at any point, she would be free to leave the study. Therefore, we are asking you to complete the consent slip overleaf, and indicate whether you wish your mother to be included in the study.

Yours sincerely,  
Dr. P.J.Horne  
Ms. L.M.Henry



Please complete this section and return to  
 Dr.P.J.Horne, Department of Psychology, 41 College  
 Road, Bangor, Gwynedd. LL57 2DG

As next of kin, I, (Full  
 name:.....)

\*consent \do not consent to the participation of my  
 relative,

(Full name:

.....  
 ....)

in the Department of Psychology study of memory in  
 elderly people.

Date: ..... Signature:

.....

\*please delete as appropriate