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**STRUCTURED MUSIC WORKSHOPS
FOR INDIVIDUALS WITH
LEARNING DIFFICULTIES:
AN EVALUATION STUDY**

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Submitted for the degree of Doctor of Philosophy (Ph.D.) to the Faculty of Social
Science at the University of Glasgow

Research conducted in the Department of Psychology

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ABSTRACT

Music has been employed in numerous different therapeutic settings throughout history. However, there are few empirical studies and inadequate research guidelines in relation to investigating the process and outcomes of this intervention in a modern context. Anecdotal and descriptive accounts of improvements in psychological adjustment as a result of a music intervention exist but the need for empirical evaluation is paramount. The aim of this thesis is to evaluate the effect of structured music workshops on the musical ability, communication skills, self-esteem, self-perception, disruptive behaviour and short term memory of adults with learning difficulties. This series of studies employs previously validated assessments materials in addition to materials specifically designed and validated for use in this project. The first study utilises a two group design with 20 individuals in an experimental group and 20 individuals in a non-intervention control group. After all participants were assessed for communication skills, musical ability, disruptive behaviour and self-esteem the experimental group received 10 weekly, one hour music workshops focused on the playing of a Javanese Gamelan. After completion of the workshops individuals in both the experimental and control group were post-tested on the dependant variables. Results indicate significant improvements for the experimental group in musical ability and one measure of communication. No significant improvements in disruptive behaviour or self-esteem were obtained. The second study employs a similar design to study 1 in addition to controlling for experimenter effects and investigating cognitive developments and self-perception changes. Results indicate improvement in musical ability and communication skills, similar to the first experiment and improvements in self-perception of musical ability. No improvements in short term memory were obtained. The third study investigates communication and self-perception in a group of individuals participating in activities that contain similar group communication to the music workshops. These activities are communal cooking and art classes. Improvements in self-perception are obtained and no improvements in communication are observed. A longitudinal study highlights a maintenance effect in experimental group 1 for communication and musical ability. In the final study independent raters assess video clips of the participants in the pre- and post-test conditions. Results suggest that experimental group 2 made significant improvements in selected measures of non verbal communication. The improvements are attributed to artifacts of an experimenter effect. The final chapter of this thesis presents a general discussion of the empirical studies suggesting the results offer evidence supporting the efficacy of the intervention. The strengths and weaknesses of the research are considered and directions for future research are offered.

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**This thesis is dedicated with love and affection
to my parents Nadia and Hamish.**

"Research is Jazz" - David Aldridge

**I, Raymond Alfredo Rossi MacDonald, declare that this is an original thesis
conducted under normal terms of supervision.**

CHAPTER ONE

THERAPEUTIC APPLICATIONS OF MUSIC: A HISTORICAL PERSPECTIVE

The application of music for therapeutic purposes is a well documented and topical issue. Furthermore, the modern practice of music therapy has been influenced by the relationship between music and medicine in antiquity (Aldridge, 1993; Radhakishnan, 1991; Roskam, 1979). This chapter discusses the historical development of therapeutic applications of music. This will highlight how medical interventions throughout history have employed music in a variety of diverse settings. Moreover, this selective review provides a historical context for current debates presented in proceeding chapters.

1.1 The Ancient Greeks (4000 B.C. - 100 A.D.)

The Ancient Greeks developed rational concepts for the use of music in medicine and prescribed music within a holistic framework for alleviating medical disorders. Ancient Greece was also the first civilisation to advocate a somatic interpretation of disease emphasising the physiological component of illness. Pythagoras (c. 500 B.C.) suggested that a daily regime of singing and instrumental playing helped maintain a harmonious and healthy state of mind

(Prat and Jones, 1987). Alvin (1975) discusses the Greek use of music for both curative and preventative reasons with its application based upon Greek concepts of harmony and order. This is exemplified in Greek philosophy by the theory of the four elements (earth, water, air and fire) which, when augmented by the four qualities (heat, cold, dry and moist), resulted in the four humours; black bile, phlegm, blood and yellow bile (Foster and Anderson, 1978; Grossinger, 1980; Weldin and Eagle 1991). Galen (c. 30 A.D.) believed that these humours and their respective temperaments of melancholic, phlegmatic, sanguine and choleric could be positively affected by the correct type of music as prescribed by the appropriate person. (Meinecke, 1948; Munro and Mount, 1978). Music written in the Mixolydian, Dorian, Lydian or Phrygian modes were the most frequently prescribed types of music (Grout and Palisca, 1988).

Greek mythology also added to the belief in the power of music to promote good health. In particular, Apollo (the god of light, order and clarity, medicine, music and prophecy) had special healing powers. He exemplified the essence of the Greek ideal of harmony in body and soul in which music played an integral role (Vandenberg, 1982; McClellan, 1988). Given the importance placed on music by Greek society and the holistic applications of music it is not surprising that many writers refer to Greek civilisation as the first to use music in a therapeutic context (Alvin, 1975; Goodman, 1981).

1.2 The Ancient Hebrews (2000 - 200 B.C.)

Goodman (1981) provides a comprehensive historical review of therapeutic uses of music in early Hebraic cultures and notes that in contrast with the Greeks, the Hebrews held a demonological approach to disease with illness being viewed as a punishment from the Gods for inappropriate behaviour. Preventative medicine, hygiene and sanitation were of the upmost importance for the ancient Hebrews and the use of music in healing practises was highly valued. McClellan (1988) notes that the Hebrews were one of the first Western societies to use music therapeutically as opposed to recreationally. Berendt (1987) describes the practise of using specific songs to help prevent the spread of epidemics.

Another well documented example is of David playing his lyre or harp to relieve King Saul of his affliction by an evil spirit (Atkinson, 1956; Cook 1981; May and Metzger, 1977).

1.3 The Ancient Babylonians (1000-300 B.C.)

The ancient Babylonians employed music in a variety of therapeutic settings. They also had a demonological approach to disease which proposed that through suffering an illness an individual was made to atone for sins and for angering the gods. The gods of music and medicine were integrally related. A Babylonian priest/physician was involved not only in healing rituals but also in religious and educational activities (Boxberger, 1962)

1.4 The Ancient Egyptians. (2000-300 B.C.)

For the ancient Egyptians the power of music was such that physicians were also required to be musicians in order to have the authority to prescribe appropriate physical and musical interventions (Boxberger, 1962). The Egyptians applied music for medical and religious reasons. The goddess Isis was believed to be the source of all musical melodies which in turn governed human emotions and purified the soul. The earliest writings referring to the medical application of music appear in Egyptian medical papyri dating from 1500BC. These papyri contain incantations to be sung which had curative effects on the patient. The oldest of these papyri, discovered in 1899, contains an incantation concerned with female fertility. The Egyptians believed each tone in a melody had a particular sound and place which in turn would have a specific effect upon an individual (Boxberger, 1962; Davison 1899).

1.5 The Middle Ages (500-1500 A.D.)

With emergence of Christian monasticism in the middle ages music, medicine, education and religion were closely intertwined and a belief in the power of Christian religion to provide a means of attaining spiritual, mental and physical well being developed (Berendt, 1987; Hall, 1972). Thus, the ancient ideas that integrated music and healing still existed. Meinecke (1948) and Lang (1941) provide overviews of therapeutic applications of music during this period. In particular, these authors noted the influence of the philosopher and musician

Boethius (480-524 A.D.) who believed that music could affect all aspects of an individual's functioning. His ideas appear to have much in common with the Greek concepts of order and harmony and he proposed that the intrinsic order and harmony found in music could have therapeutic effects on a given individual.

1.6 The Renaissance (1450-1600 A.D.)

During the Renaissance the first accounts of physiological responses to music appear. Cause and effect relationships between music and breathing, blood pressure, muscular activity and digestion were all investigated (Munro and Mount 1978). The Greek concept of the four humours was adopted by numerous medical practitioners who described illness as a temporary disruption of a harmonious relationship within the body (Carpetyan, 1948; Feder and Feder, 1981).

1.7 The Baroque Classical Period (1600-1800 A.D.)

The concepts of Rene Descartes (1596-1650) were influential during the Baroque-Classical period. In particular, he proposed that the mind "res cogitans" and the body "res estensa" were separate entities and should be studied as individual concepts. From this philosophy of Cartesian Dualism, Francis Bacon (1561-1626) and Isaac Newton (1650-1690) helped the modern scientific method to evolve. These early empirical methods were used by physicians to obtain

data justifying the use of music in therapeutic settings. Music was subsequently used to improve specific physiological aspects of human behaviour rather than the spiritual, signifying a move away from earlier holistic approaches. In particular, a colleague of Descartes, Marin Mersenne, (1610-1674) described an approach that viewed a disease as a physiological dissonance that could be cured using musical consonance (Carapetyan, 1948).

1.8 The 19th Century

During this period medicine moved further towards a greater acceptance of the Cartesian scientific model (objectively measurable) and various examples exist of specific types of music being prescribed for specific illness. Davison (1899) cites examples of physicians noting that soft music reduced fever by two degrees. Another example describes the prescription of Chopin waltzes to treat a case of childhood insomnia. Physiological responses to music were also investigated in more detail. Rogers (1918) concluded that cardiac contractions and variations in blood pressure and respiration could be produced by the musical elements of pitch, loudness and tone colour.

Two other influential physicians of this period were also known to prescribe music in a curative manner. Pinel (1745-1826) believed that listening to music promoted good health and that musical participation also had curative possibilities (Boxberger, 1962). Feder and Feder (1981) describe an example of a French physician, Desbout, prescribing music as a cure for hysteria and in the treatment of convulsive and hypochondriacal disorders.

Herman Von Helmholtz (1821-1894) was also influential in developing the theoretical foundations of music medicine. Helmholtz, who investigated the physiological effects of music, is considered a pioneer of music psychology. (Garrison, 1948; Strohl, Jamieson and Diffenbaugh, 1974).

With the spiritual aspects of illness being rejected and the psychological aspects neglected, music was no longer as closely intertwined with medicine as in earlier periods of human history. However, the experimental work on physiology carried out during the 19th century laid the foundations for the development of therapeutic applications of music medicine in the 20th century.

1.9 Twentieth Century Applications

Vescelius (1918) advocated the use of music in therapy and medicine by classifying music as sedative, tonic, stimulative and narcotic. This physician prescribed music accordingly to treat fevers and insomnia. In 1903 she founded "The National Therapeutic Society of New York City". Subsequently, the therapeutic application of music in The United States has developed along four separate, but related lines (Tyson, 1981):

1. *In Functional Occupational Therapy (FOT):*

FOT was introduced to help in the rehabilitation of long term patients at military hospitals during the first World War. A major focus of this work was the development of motor co-ordination and it was suggested that instrumental playing aided this specific goal of the rehabilitation process.

2. *As an adjunct to psychiatric treatment:*

Gilman and Paperte (1952) found that music listening and participation could be used as an aid to psychiatric rehabilitation. In particular, these authors note that music was helpful in increasing the capacity to command attention, modify the mood and facilitate self expression.

3. *As a direct aid to anaesthesia:*

After the invention of the phonograph doctors observed that introducing music in the operating theatre relaxed patients and aided the process of anaesthesia (Tyson, 1981).

4. *As a psychological stimulus in the total hospital environment:*

In addition to the use of music in surgical settings, Altshuler (1956) reported that music appeared to enhance the relaxation process for patients in other hospital environments. It could be utilised during a variety of tasks such as remedial exercises, hydrotherapy and physical therapy. The therapeutic application of music in Britain followed a similar path with music being used in hospital settings to facilitate the convalescing process (Alvin, 1975).

1.10 Music Therapy as a Profession

The introduction of undergraduate courses in music therapy at American Universities signalled the beginning of professional music therapy (Boxberger, 1962). The developing influence of therapeutic applications of music culminated in the formation of "The National Association of Music Therapy" in 1950.

The British Society for Music Therapy was founded in 1950 and although to date no undergraduate music therapy courses exist in Britain this society remains an active and growing organisation (Bunt, 1984).

Articles and books focusing on the philosophical foundations and practical aspects of service delivery were published in the sixties and early seventies (Alvin, 1965, 1966; Nordoff and Robbins 1971). During this period music therapy became a recognised intervention available to a range of client groups in both Britain and The United States.

Finding a modern definition of music therapy which accurately captures the diversity of activities and approaches covered is difficult (Schalkwijk, 1994). Bunt (1994) offers a definition that focuses on the use of organised sounds and music within a developing relationship between therapist and client to support and encourage physical, mental, social and emotional well being. Although this definition is somewhat vague it does appear to encompass the majority of diverse situations within which music therapy is utilised (Wigram, 1995).

Modern definitions of music therapy usually stress the importance of a qualified music therapist being a facilitator within the therapeutic environment (Bunt, 1994). This definition has a political basis. Music interventions are conducted by many different professional groups such as musicians, occupational therapists, carers and other health care professionals. In order to maintain the identity of music therapy as a distinct intervention it is necessary to emphasise the presence of a qualified music therapist. However, many reviews of literature and descriptive accounts of the interventions have used a broader definition of

music therapy i.e. any music intervention with therapeutic objectives (Ansdell, 1995; Aldridge, 1993; Maranto 1991; Schalkwijk, 1994). For the purposes of this thesis the term music therapy will be used in a broad context referring to any music intervention with therapeutic objectives. This definition is utilised in order to provide a comprehensive review and evaluation of music interventions.

1.11 Summary

From the Ancient Greeks through to the Baroque classical period the use of music for therapeutic purposes appears to have been applied from within a holistic framework. That is, each civilisation employed music in a preventive or curative manner along with other medical or religious activities. However, the pervading zeitgeist of each historical period affected the relationship between music and medicine.

The ancient Greeks proposed a somatogenic interpretation of illness and therefore used music to influence physiological functioning. This is contrasted with the Hebraic, Babylonian and Egyptian philosophy which adopted a more demonological approach to illness with music subsequently being employed along with religious practices. Similarly, during the Middle Ages, there was also a demonological approach to illness. Influential during this period was the philosophy of Boethius who was closely aligned to the Ancient Greek concepts of physiological harmony. During the Renaissance (c. 1450-1600) the

disciplines of music and medicine became more diverse and consequently more separate with the holistic approach being replaced by Cartesian Dualism and a somatic approach to physical illness.

Although the growth of music therapy in the 20th century has been influenced by the historical relationship between music and medicine, evidence for the effectiveness of music as a valuable therapeutic agent, as well as a pleasurable art form, remains largely unavailable (Aldridge, 1993; Radhakishnan, 1991; Roskam, 1979). Modern scientific methods have not adequately investigated the relationship between music and its healing potential. These methods can help establish if an empirical basis exists for the application of music for therapeutic purposes. It is this relationship between music and therapeutic outcome that is evaluated within this thesis.

CHAPTER TWO

REVIEW OF RESEARCH LITERATURE

The research literature investigating therapeutic applications of music is discussed within this chapter. An overview of the published research is presented below, followed by a discussion of target populations for the intervention. This chapter goes on to discuss suggested intervention outcomes and concludes with experimental limitations of the existing literature.

2.1 Overview of Music Therapy Research

Many early texts outlining modern music therapy interventions (Alvin, 1966, 1975; Garrison 1948; Singer, 1962) focus on the emotional, creative and artistic elements of music therapy. The empirical and scientific aspects of research are seen as antagonistic to the process of therapy. However, this focus may create an isolated position for music therapists and make understanding the fundamental aspects of music therapy difficult Bunt (1984), Bunt and Hoskyns (1987) and Radhakishnan (1991).

As a consequence of negative attitudes towards scientific methods the majority of articles investigating therapeutic applications of music are descriptive in nature (Bunt 1984). These reports focus on case histories and contain speculative conclusions (Alvin, 1966, 1975; Nordoff and Robins, 1971, 1992). Bunt (1984) reports that only 8% of all published papers in the *British Journal of Music Therapy* were experimental in nature. The rest fell under the general headings of philosophical, historical or descriptive in accordance with a categorisation system proposed by Jellison (1973) and Gilbert (1979). This replicated earlier findings of Gilbert (1979) who reviewed Music Therapy research articles in the *American Journal of Music Therapy*.

This dearth of experimental reports in the literature poses a serious problem for music therapy as a profession. More empirical research is required if the profession is to advance and attain serious credibility. Furthermore, Bunt (1984) argues that it is important for music therapists to understand the process and possible outcomes of music therapy in order to improve the delivery of service and training standards.

The absence of empirical research in British music therapy was further discussed by Bunt and Hoskyns (1987) who reported that descriptive and anecdotal accounts were still the most abundant in the literature. These authors reiterate

the point that rigorous quantitative and qualitative methods are required in order investigate the process and outcomes of this intervention.

Empirical research within music therapy has a dual function: (1) Internal validity: evaluating the process and outcomes of music therapy will help increase the effectiveness of service delivery and improve the training of student music therapists. (2) External validity: by communication with the clinical and academic communities the credibility and status of music therapy will be enhanced (Bunt and Hoskyns, 1987).

Bunt and Hoskyns (1987) propose that research emphasis should develop along two broad theoretical positions. The first investigates the relationship between the intervention and outcome (i.e. does the intervention achieve the goals it set out to?). The second approach investigates the processes by which the effects of music therapy are achieved. The authors conclude that empirical research is not in conflict with the therapeutic aspirations of the intervention. Indeed, when undertaken in a rigorous manner this approach can help develop the therapeutic process and improve service delivery. Furthermore, by generating evidence to support the efficacy of the intervention, this type of research methodology will raise the profile of music therapy .

This argument is further developed by Radhakishnan (1991) in a review of music therapy research literature. The review asserts that music has been advocated as a treatment for an extensive range of populations through a variety of different mechanisms and is a functional, adaptable and aesthetic intervention applicable to all client populations. Despite the wide advocacy of music therapy this author points to a lack of experimental evidence to support the efficacy of the intervention. There are inherent difficulties in using a randomised control group design to investigate the process and outcome of music therapy. Issues such as isolating influencing variables, controlling confounding variables and measuring the changes in subjects are all major hurdles to be overcome by a music therapy researcher. In conclusion Radhakishnan (1991) asserts that in the absence of empirical evidence it will be difficult to raise the professional profile of music therapy from that of a largely marginalised therapeutic intervention.

In a more recent review of music therapy research, Aldridge (1993) also highlights the methodological shortcomings of much of the existing music therapy research. This author argues that there is a dearth of empirical research from which valid conclusions can be drawn. However, Aldridge (1993) concludes that although the empirical studies are flawed there is a growing body of research that advocates music interventions for a range of client groups with numerous possible benefits.

It is clear that the theoretical and methodological problems outlined by Bunt (1984) and supported by Bunt and Hoskyns (1987), Radhakishnan (1991) and Aldridge (1993) present major hurdles to be overcome if the process and outcomes of music therapy are to be understood in more detail. However, it is also clear that an understanding of these processes and outcomes will make it possible for this modern intervention to develop a professional identity and status.

One possible explanation for the continuing poor standard of music therapy research is offered by Wheeler (1995). In a review of several American studies this author highlights the fact that many music therapists see research as having no relevance to the clinical practice of music therapy. Although no such surveys have been published investigating British music therapists' attitudes to research it is reasonable to presume that the same lack of interest exists in Britain for the following reason: there are, at present, no undergraduate music therapy training programmes. The majority of music therapists in Britain are music graduates who study music therapy at the post-graduate level for one or two years, depending on the policy of their educational institution. Music therapists are musicians trained in clinical methods but this instruction does not include training in research methodology. This situation contributes to the general limitations of research literature to date.

2.2 Target Populations for Music Therapy

The previously mentioned reviews discuss methodological limitations within music therapy research literature at a general level. However, in order to develop a research context for this thesis it is important to discuss the existing empirical studies in more detail. The main target populations for which music therapy is employed have been discussed by various authors (Aldridge, 1993; Maranto, 1991; Radhakishnan, 1991; Schalkwijk, 1994). This section discusses these populations and gives detailed accounts of some of the research methodologies employed to investigate the effects of music therapy. While it is not practical to include every research article investigating music therapy selected examples covering all target populations and research methodologies are presented.

2.2.1 *Psychiatric Patients*

The majority of published articles which focus on using music for psychiatric patients utilise the intervention within a hospital setting (Palmer, 1990).

Courtright et al. (1990) investigated the influence of taped music at meal times for a group of 109 chronic psychiatric patients. It was hypothesised that taped music would significantly reduce the occurrence of disruptive and violent behaviour. The experiment employed a two group design with the experimental group receiving 30 minutes of taped music during lunch from Monday to Friday for 16 weeks. The taped music was chosen according to two criteria: (1) it was

unknown to the subjects and (2) contained specific elements conducive to promotion of relaxation. The authors do not give any detail as to what these elements were and why they should produce the relaxed effect. Four psychiatric nurses collected observational data relating to the target behaviours. Following the 16 weeks of music intervention the occurrence of the disruptive target behaviour was compared between the two groups with the experimental group demonstrating a significant reduction in observed disruptive behaviour.

There are various published articles that target individuals with schizophrenia for music interventions. Pavlicevic and Trevarthen (1989) demonstrated that music therapy had a positive effect on a group of 21 individuals diagnosed with chronic schizophrenia compared with a matched no treatment control group. The experimental group received ten weeks of music therapy and showed improvements both in the levels of engagement with the therapist and on objective psychiatric measures.

Schmuttermayer (1983) utilized four different types of music therapy (listening, singing, dancing and playing instruments) in a study that investigated the influence of the intervention on communication, anxiety and disruptive activity in a group of schizophrenic patients. The music therapy sessions had a significant positive effect on these variables. In particular, communication, as

measured by observation and self report using a checklist of adjectives, significantly improved. Disruptive activities were significantly reduced during the instrumental playing, but not during the other types of music therapy employed.

2.2.2 Individuals with a Learning disability

Oldfield and Adams (1990) compared music therapy with play therapy in a population of 12 individuals with a profound learning disability. The aims of the study were to use music towards the achievement of non-musical goals including the development of communication, the control of movement and the expressing of emotions. Video tapes of the treatment sessions were analyzed using a time sampling method to record the occurrence of behaviours indicating the achievement of the particular treatment objectives. For each subject the aims of the therapy were agreed via consultation with carers and key workers. Music therapy, on a range of measures, proved to be more effective than play therapy in meeting these objectives. Although the experiment provided support for the efficacy of the intervention the subject number was small and no control group was utilised. The authors conclude that further investigation with this population is clearly required.

2.2.3 Neurological Problems

The physical and mental impairments that accompany many neurological diseases can be very traumatic for sufferers since many of them have an acute onset (Clair and Bersntein, 1990). Various authors have advocated the use of music as a means of recovering former cognitive capacities. In particular, music therapy has been used in aphasia rehabilitation. A particular type of music therapy, melodic intonation therapy has been developed to fulfil such a rehabilitative role (Sparks and Deck, 1986; O'Boyle and Sanford, 1988). It involves embedding short spoken propositional phrases into simple, often repeated melody patterns accompanied by finger tapping. The inflection patterns of pitch changes and rhythms of speech are selected to parallel the natural speech prosody of the sentence. The singing of previously familiar songs is encouraged as it helps articulation and fluency. Melodic intonation therapy motivates the patient to communicate through the stimulation of singing and promotes the activation of internal verbal behaviour.

Aphasia is a common disorder suffered by elderly stroke patients. Several case study reports have outlined the use of music therapy in conjunction with speech therapy in the rehabilitation process of such patients (Lehman and Kirchner, 1986). Jacome (1984) describes a case study of a stroke patient who was dysfluent and had difficulty finding words. The patient would often whistle tunes

and sing songs without prompting with excellent pitch, melody, rhythm and intonation. The author advocates that more detailed empirical research investigating the therapeutic potential of music for this population is required. This supports similar conclusions presented by Morgan and Tilluckdharry (1982).

Aldridge, Gustoff and Hannich (1990) reports several case studies of patients in comas who were treated with music therapy. When the therapist's singing was matched to the breathing patterns of the patient, changes in consciousness were apparent both to the attending consultant and also on objectives measures of brain activity.

Music and musical activities may help slow down the progressive deterioration of Alzheimer's disease through the development of social relationships demonstrated during involvement in musical participation and listening (Brotons and Picket-Cooper, 1994; Swartz, Hantz and Crummer, 1989). Other possible benefits of music therapy interventions for individuals with Alzheimer's disease include exercise, anxiety reduction, maintenance of memory functions and increased positive affect (York, 1994). Social and recreational activities provided by trained therapists are important for individuals with Alzheimer's disease Beatty, Zavdil and Baily (1988). These authors suggest that although

language deficits are apparent musical abilities appear to be preserved for certain individuals. In one case study a woman with Alzheimer's disease displaying aphasia, memory disfunction and apraxia was able to sight read an unfamiliar song on the xylophone (Brotons and Picket-Cooper, 1994). Clair, Bernstein and Johnston (1995) describe therapeutic examples where individuals whose cognitive, physical and social skills had severely deteriorated but who were still able to participate in structured musical activity.

No empirically controlled studies have investigated these potential benefits and many authors recognise that research investigating the essential elements of the process and expected outcomes is essential (Clair, Bernstein and Johnston, 1995).

2.2.4 Autism

Barison, Pradetto and Valer (1984) discuss the uses of music therapy with autistic children. Music allows people with severe language problems, such as autism, to communicate. Children exhibiting autistic behaviours appear to prefer a musical stimulus to a visual one when compared with non-autistic children (Thault, 1987). In a more recent study, Thault (1988) demonstrated how autistic children produce spontaneous tone sequences almost as well as normal children and better than adults with learning difficulties.

2.2.5 Cancer Therapy and Pain Management

A variety of diverse applications such as the reduction of anxiety in terminally ill patients and pain reduction have been suggested (Standley and Hannser, 1995). In a review of the therapeutic applications of music in medicine, Standley (1986) reported that music has been used to facilitate pain reduction in cases involving dentistry, obstetrics, post-operative care, terminal cancer, cardiac care, abortion, spinal fusion and kidney dialysis. The author notes however that there is a lack of empirical evidence to support its use for these methods. The combination of music and relaxation techniques had a significant positive effect on the pain perceptions of five patients suffering from severe burns (Barker, 1991). Although the small sample size in this study reduces the impact of the results, no previous empirically based research has been completed in the use of music therapy with burns patients. However, the findings support anecdotal evidence provided by Christenberry (1979).

Stein (1991) investigated the influence of music on the experience of anxiety for patients undergoing caesarean section. Thirty subjects were allocated to one of three experimental conditions. Experimental group one listened to music of their own choice prior to undergoing a caesarean section. Group two listened to white noise, while a control group had no intervention. Results suggest that music was influential in reducing anxiety for experimental group one in

comparison with the white noise and control conditions. However the authors state that the experiment was a pilot study and future research should investigate expectancy effects and possible experimenter bias.

In a study of patients undergoing long term bronchoscopy procedures music was found reduce anxiety (Metlzer & Berman, 1991). Twenty one subjects were allocated to either an experimental or control group. The experimental group listening to 45 minutes of classical/semi-classical music while the control group received no music. Physiological measures of anxiety such as heart rate and respiration were taken. The authors conclude that the results are supportive of previous anecdotal reports of the anxiety reducing potential of music (Kendall, 1983; Kendal and Hollan, 1981; Prokop and Bradley, 1981; Wallace, 1984).

2.2.6 Coronary Care

Several studies that investigate this anxiety reducing potential of music for patients with heart dysfunction warrant attention in this section. Bonny and McCarron (1984) suggest that tape-recorded music played through headphones to patients may have the ability to reduce anxiety and help relaxation in overcoming the stressful environment of a coronary care ward.

This suggestion was supported in an experiment that investigated physiological responses to music listening (Updyke, 1990). In this study 20 cardiac patients in an intensive care unit listened to 30 minutes of sedative music. Results indicated a reduction in systolic blood pressure and a mood change towards a more desirable state. Although the results are supportive of the efficacy of the intervention, there are several confounding variables. The intervention may have produced an expectancy effect and no control group was utilised.

Bolwerk (1990) investigated the influence of listening to classical music on state anxiety of patients in a myocardial infraction ward. Forty adults were randomly assigned to either an experimental group or a control group. The experimental group listened to relaxing music during the first four days of hospital treatment while the control group received no music. State anxiety was reduced in both groups after the four days of hospital treatment. However the most influential variable may have been the fact that patients had become more familiar with the hospital environment after the four days.

2.2.7 Anaesthesia

The capacity to induce calm and well being has been utilised in general anaesthesia and its use is advocated in surgical wards and in recovery rooms (Keegan, 1987). In one particular study Bonny and McCarron (1984) note that

patients expressed pleasure at awakening to music in the operation theatre where music was played openly at first and then through earphones during the operating procedure. No control group was utilised and the sample size of eight limits the impact of the results and conclusions.

2.2.8 Rehabilitation

Music therapy has particular relevance to rehabilitation in that music may help individuals who have difficulty expressing themselves and communicating with others (Haag and Lucius, 1984). Ba (1988) discussed anecdotal evidence to support the use of music therapy in helping individuals with psychotic mental illness to express themselves in more socially desirable ways and consequently improve their inter-personal relationships.

2.2.9 Children

The use of music for children may constitute one environment in which speech production may be encouraged and practised (Wylie, 1983). Steele (1984) discusses music therapy as a community resource that has useful applications for children with special needs.

Several studies have investigated the use of music with speech delayed children.

Thault (1985) discusses the problem of finding efficient remedial teaching methods for children with gross motor dysfunction. This author presents an experiment where the use of auditory rhythm significantly aided muscular control in children with gross motor dysfunction. Twenty four children participated in three experimental sessions over a three week period. All sessions were focused on developing the subjects' motor co-ordination. The experimental group were given a musical stimulus in the form of an auditory rhythm to help motor production while the control group received no rhythm aid. Results showed that subjects aided by auditory rhythm performed with significantly better motor rhythm accuracy than those unaided by auditory rhythm.

A combination of music therapy and speech therapy for a child with profound language deficits produced improvement in ability to name body parts and construct sentences (Lathom, 1965). Seybold (1971) used a variety of musical activities to reinforce and enhance the teaching of specific concepts and language patterns in addition to stimulating spontaneous speech in pre-school children with language deficits. Results indicated that children who participated in music therapy sessions showed greater increase in the use of spontaneous speech than those who did not.

Cartright and Huckaby (1972) report significant improvements in speech for children with language deficits after participating in a preschool music programme designed to improve socialization, stimulate verbalisation and develop body image concepts. Hoskyns (1988) used musical activities to enhance the language capacity of 16 developmentally delayed children. All subjects received 90 minutes of music therapy for ten weeks but no control group was used.

2.2.10 Adolescent Populations

Group activities are the principal form of music intervention for this client group. Creative therapies, including music therapy, have been used in the treatment of drug abuse in adolescents as they encourage activity, motivate the client's response and foster a culture for free expression (Friedman and Glickman, 1986). The authors suggest that these behaviours are positive outcomes they aid the clients' motivation to modify the addictive behaviour as part of a general rehabilitation process.

An instructional music therapy approach aimed at teaching individuals to sing and play musical instruments was found to improve self-esteem in a group of disadvantaged problem students (Michael & Martin, 1970). This study, the first empirical investigation of the influence of music on self-esteem, contained 15

subjects. Over an eight week period 14 individuals received 15 music lessons lasting approximately one hour. A non-intervention matched control group also contained 14 subjects. Following the eight weeks music lessons the subjects in the music group showed significant improvements in self-esteem as measured by the Coopersmith self-esteem inventory. Various confounds were noted by the authors. Behavioural reinforcements such as confectionary and musical instruments were given to the subjects as an inducement for continued participation. In addition, many subjects had difficulty in comprehending the Coopersmith self-esteem inventory. A community choir programme aimed at recognising and re-channelling disturbed behaviour patterns was found to foster the development of decision-making skills and to increase self-esteem (Ragland & Apprey, 1974). Twenty two individuals participated in a two year project with group singing activities taking place once a week for two hours. The experiment contained no control group or empirical assessments of subjects. The reported results are anecdotal observations and no information is given as to level of attendance over the two year period.

Haines (1989) investigated the effects of music therapy on self-esteem levels of 19 emotionally disturbed adolescents. Ten subjects received six weeks of music therapy while nine subjects received speech therapy. Each group received twelve 30 minute sessions over the six weeks. Self-esteem was measured using

the Coopersmith self esteem inventory with the researcher also being the therapist for both groups. Although the objective measures showed no significant effects, there were observations suggesting that music therapy worked better than the control condition verbal therapy.

2.2.11 The General Public

Broucek (1987) states that conventional music therapy takes place in institutional setting such as hospitals and argues for the deinstitutionalisation of music therapy. Influenced by the work of Abraham Maslow, this author proposes that the freedom of expression inherent in music may have therapeutic potential for not only the traditional target populations of music therapy, but also for the public at large. This humanistic approach suggests that through musical participation individuals can explore new experiences and discover a new potential for intellectual and emotional growth.

2.3 Suggested Benefits of Music Interventions

The previous review of published literature has outlined different target groups that are the focus for music interventions. Table 2.1 summarises the suggested outcomes for the previously reviewed papers into five general categories.

Table 2.1 Suggested outcomes for music interventions

Behavioural Improvements	Improved self-esteem	Reduction in anxiety	Improved communication	Improved motor co-ordination
Ba (1988)	Haines (1989)	Barker (1991)	Aldridge et al 1990	Thault (1985)
Courtright et al (1990)	Michael and Martin (1970)	Bolwerk (1990)	Ba (1988)	
Pavlicevic and Trevarthen (1990)	Ragland and Apprey (1974)	Bonny and McCarron (1984)	Cartright and Huckaby (1972)	
Ragland and Apprey (1974)		Meztler and Berman (1991)	Haag and Lucius (1984)	
		Schmutterm-ayer (1983)	Hoskyns (1988)	
		Stein (1991)	Jacome (1984)	
		Updyke 1990)	Lathom et al (1965)	
			Oldfield and Adams (1990)	
			Schmuttermayer (1983)	
			O'Boyle and Sandford (1998)	
			Sparks and Deck (1986)	

The majority of text books and articles written on music therapy do not explicitly state why music interventions should produce the previously mentioned outcomes. Thus, the key features of music listening and participation that are influential in the observed developments have not been effectively investigated (Radhakishnan, 1991). The following sub-sections summarise existing ideas that offer explanations about why music should produce these therapeutic outcomes.

2.3.1 Behavioural Improvements

Behavioural improvements are common goals for many music interventions (Tyson, 1981). This goal is related to the fact that music listening and participation can take place within a therapeutic environment that offers positive reinforcement through music for appropriate behaviour (Nordoff and Robbins, 1992).

2.3.2 Improved Self-Esteem

The two most commonly shared goals of practising music therapists are: (1) The establishment and re-establishment of interpersonal relationships; (2) The bringing about of self-esteem through self-actualization (Tyson, 1981).

Anecdotal accounts of improved self-esteem have also been reported by researchers in this field (Nordoff & Robbins, 1992). Gaston (1968) also

discusses, without empirical evidence, the potential for music interventions to bring about self-esteem improvements. This benefit is based on the suggestion that musical participation may allow individuals an opportunity to communicate meaningfully when they have difficulty expressing themselves verbally (Nordoff & Robbins, 1992).

2.3.3 Improvement in Communication

While stressing the importance of developing interpersonal relationships Tyson, (1981) asserts that the improvement of communication skills is also a key feature in this development. Many individuals who are targeted for music therapy have experienced difficulty in verbal communication. The continuing relationship between the therapist and client is essentially musical and free from the constraints of natural language such as syntax and phonetics. Nordoff and Robbins (1992) suggest that this freedom from failure in natural language combined with abstract patterns of musical communication may provided the catalyst for changes such as improvements in verbal and non-verbal behaviour.

2.3.4 Reduction In Anxiety

The majority of the research literature suggesting a reduction in anxiety as a result of a music intervention focuses on music listening as opposed to participation (Aldridge, 1993). This author suggests that the key feature of in

producing this anxiolytic effect is that music listening is essentially an enjoyable activity that commands the listener's attention. This assertion is supported by other authors advocating this use of music (Barker, 1981; Metlzer and Berman, 1981; Tyson, 1981).

2.4 Design Problems in Existing Literature

Various authors have commented on the design problems of the research literature (Aldridge, 1993; Bunt, 1984; Bunt and Hoskyns, 1987; Hoskyns, 1988; Radhakishman 1991). This section highlights the specific design problems of the research carried out to date.

2.4.1 Descriptive and Anecdotal Accounts

Many of the previously quoted articles do not employ an empirical research design but offer descriptive accounts and anecdotal observations of the music therapy process (Friedman and Glickman, 1986; Ba, 1988; Bonny and McCarron, 1984; Jacome, 1984). Although descriptive and anecdotal accounts are important in gaining initial insight into the problems it is important to move towards empirical investigations in order to draw substantiated conclusions about the process and outcomes of music therapy (Bunt, 1984; Bunt and Hoskyns, 1987).

2.4.2 Control Group Issues

Of the studies that do employ an empirical design many of them have no control group with which to compare results (Schmuttermayer, 1983; Michael and Martin, 1970, Ragland and Apprey, 1974; Hines, 1989; Updyke, 1990; Bonny and McCarron, 1990). Research using a randomised control group design is of vital importance to understanding the process and outcomes of music therapy (Radhakishman, 1991; Gfeller, 1987)

2.4.3 Experimenter Bias

In concurrence with Radakisan (1991) this review of literature also highlights the point that in many of the experiments the researcher also acts as therapist (Hoskyns, 1988; Michael and Martin 1970; Oldfeild and Adams, 1990, Pavlicevic and Trevarthen, 1990; Ragland and Apprey 1974). Moreover, numerous studies do not specify if the therapists acted in this dual capacity. However, experimenter bias is an important methodological problem regularly encountered during not only music therapy research but health science research in general (Mosely, 1986). When the researcher is also the clinician the issue of objectivity becomes a relevant variable.

2.4.4 Single Subject Designs

Although single subject experimental designs are a valuable research tool (Barlow and Hersen; 1984), an over reliance on this type of design limits generalisation to the population from which this individual is a sample. Several of the papers reviewed here employed a single subject design and suffer from this limitation (Aldridge et al 1993; Jacome, 1984; Lathome, 1965).

2.4.5 Operational Definition of Variables

There are at present no standardised assessment instruments for use in objectively evaluating previously mentioned outcomes for individuals involved in music therapy. In addition, there are no published articles replicating any results from previous research using similar assessment instruments.

2.4.6 Lack of Generalisability

An important issue to be investigated by music therapy research is the generalisability of observed improvements in the therapeutic environment to other situations. To date, no empirical research has attempted to answer this question (Radhakishnan, 1991).

2.4.7 Stability

Another limitation of existing research is that it does not focus on the maintenance aspects of improvements. A significant research question relating to the efficacy of the intervention must investigate to what extent the therapeutic effects are maintained over time.

2.5 Summary and Conclusion

In conclusion, there is anecdotal evidence supporting the benefits of music therapy over a range of possible client groups. Definitive evidence is still lacking due to the previously mentioned limitations of: descriptive and anecdotal methods of investigation, control group issues, experimenter bias, over reliance on single subject designs, inconsistent operational definition of variables, no investigation into generalisability or stability of results. By reporting experiences and observations, the previously mentioned findings contribute to the body of information relating to the way in which people respond to musical stimuli. In order to evaluate the possible effects of music interventions a more empirical and rigorous account of the participants' experiences must be given. This is the major research question addressed by the research presented in this thesis.

2.6 Experimental Overview

Table 2.2 summarises the experimental chapters within the thesis.

Table 2.2 Experimental Overview

Chapter	Group	No. of subjects	No. of dependant variables
3	Experimental Group 1	20	7
	Control Group 1	20	7
4	Experimental Group 2	20	5
	Control Group 1	20	3
	Control Group 2	20	2
5	Control Group 3a	6	2
	Control Group 3b	6	2
6	Experimental Group 1	20	3
7	Experimental Group 1	20	8
	Experimental Group 2	20	8
	Control Group 1	20	8

The above table highlights that various experimental and control groups are utilised more than once during the experimental periods. Chapter 3 contains 40 participants; 20 in experimental group 1 and 20 the non-intervention control group 1. Chapter four utilises the scores for control group 1 on three dependant measures. In addition, a second non-intervention control group is used for two new dependant measures. Chapter 5 investigates communication and self-perception changes in two intervention control groups. Chapter 6 is a

longitudinal study investigating selected dependant measures of experimental group 1 six months after the intervention. Chapter 7 is a video analysis investigating eight dependant measures of nonverbal communication for experimental groups 1 and 2 and control group 1. The method section in each chapter will outline this structure in more detail.

CHAPTER THREE

FIRST STUDY

Chapter three presents the first empirical study of this thesis. In response to Aldridge (1993), Bunt (1984), Bunt and Hoskyns (1987) and Radhakishnan (1991) this study addresses methodological shortcomings of previous research by incorporating the following design features: (1) adequate control group (2) validated and reliable empirical assessment materials (3) appropriate sample size (4) removal of experimenter bias.

3.1 Music Therapy for Individuals with a Learning Difficulty

Individuals with learning difficulties were chosen as the target population for this research project. The review of literature presented in chapter two highlighted this population as one of the main target groups for music interventions (Aldridge, 1993; Oldfield and Adams, 1990). However, Wigram (1995) suggests that this population represents an area in need of empirical evaluation.

Modern definitions of learning disability emphasise a physically induced impairment which inhibit the development of specific cognitive and physical capacities (Schalkwijk, 1995). Precisely which capacities are limited is dependent upon the

specific learning difficulty. Although the disability is itself incurable, various faculties remain which can be developed. Finding interventions which target these faculties is of paramount importance in improving the quality of life for individuals with a learning difficulty (Andsell, 1995). Despite the methodological problems with the research literature the findings suggest that music interventions may offer an environment to help individuals with a learning difficulty develop social, cognitive and physical skills that may enhance their life experiences (Aldridge, 1993; Oldfeild and Adams, 1990; Schalkwijk, 1995; Wigram, 1995).

The organisation and implementation of this type of research is complicated both logistically and financially (Aldridge, 1993). Strathclyde Regional Council and Greater Glasgow Mental Health NHS Trust both stated that this population were of particular interest to them and offered organisational and financial assistance with the research. To these ends there was an opportunistic aspect to the research.

3.2 Outcome Measures

The previous review of literature highlighted five general categories of outcome measures. The research contained within this thesis investigates the following four categories: (1) communication skills, (2) self-esteem, (3) behavioural improvements and (4) motor coordination. The fifth category, reduction in anxiety, is not investigated as previous research suggests this is an outcome measure for other music interventions that involve listening to music. The following sub-

sections outline why these four particular outcomes are important for music interventions and specifically how these outcome measures are operationally defined within the present research.

3.2.1 Communication Skills

The development of communication skills is an important goal not only of music interventions but of many different interventions for individuals with a learning difficulty. Speech therapists, occupational therapists, art therapists and clinical psychologists all aim to develop communication skills through various diverse types of intervention. In terms of developing basic self-care skills, independence and self-determination the development of communication skills is crucial.

Various authors have commented on the growing interest in and research into the communicative abilities of adults with a mental handicap (Bedrosian and Pruttingn, 1979; Leudar and Fraser, 1985; Leudar, 1988; Sabsay, 1975; Van Der Gaag, 1989). There are motivating factors for this growing interest and research. One is the advent of the normalisation movement which strives for the social integration of individuals with a learning difficulty. In order to increase the quality of life for such individuals greater acceptance by the general public must be achieved. The development of communication skills is a key feature of this goal for social integration (Wolfenberger, 1972; 1983).

Price, Williams and Sabsay, (1979) divide communication skills into two separate sub-categories termed linguistic competence and pragmatic competence. Linguistic competence refers to the ability to produce and interpret language both syntactically and phonologically. Pragmatic competence is defined as the ability to use language to express meaning effectively. Linguistic competence has received far more attention than pragmatic competence in the research community resulting in an oversimplification in investigating the communication skills of adults (Price Williams and Sabsay, 1979).

This view is supported by Calculator and Bedrosain (1979) in a critique of research methods used to investigate communication skills. These authors found that many studies of communication concentrated on linguistic competence but revealed nothing about pragmatic competence. A crucial point here is that adults with a learning difficulty appear to have greater pragmatic competence than linguistic competence. Bedrosian and Prutting (1978) reported that adults with a learning difficulty could take part in conversations and utilize pragmatic concepts to the same extent as adults without a learning difficulty despite the apparent difference in linguistic competence.

Other studies have also offered evidence supporting this view. Ronald and Lambert (1983) examined the communicative competence of 22 adults with a learning difficulty. They concluded that the conversations in which these adults engaged had

information value despite the fact that the subjects were using simple language that contained many linguistic errors. Specifically, on measures such as mean length of utterance, use of compound verbs and subordinate clauses the participants performed poorly compared with adults with no mental handicap. However, these individuals with learning difficulties were able to express meaning effectively during discourse. Studies of this nature highlight the fact that adults with a mental handicap are able to express themselves more effectively than their formal linguistic skills would suggest.

There are no reliable and validated assessment materials for either scientists or practitioners to employ in the evaluation of communication skills of adults with a learning difficulty (Van Der Gaag, 1989b; 1990). Cottam (1986) reported that 96% of speech therapists interviewed in a comprehensive U.K. study were dissatisfied with current empirical methods for assessing communication skill of adults with a learning difficulty. Picket and Flynn (1983) conducted a comparable study in the U.S.A. and reported similar findings to that of Cottam (1986). In particular, Picket and Flynn (1983) noted that most clinicians were using informal assessment methods without known psychometric properties such as reliability and validity. These authors concluded that the development of an assessment instrument for effectively evaluating the communication skills of adults with a mental handicap was of paramount importance.

The Communication Assessment Profile for Adults with a Mental Handicap (CASP) was developed by Van der Gaag (1988) in response to these criticisms. This assessment instrument was chosen to evaluate the communication skills of participants in the study. The development of CASP and related psychometric properties are reported by Van Der Gaag (1989a, 1990). CASP has three main parts with corresponding sub-sections. Part One is a questionnaire to be completed by the client's key worker or equivalent. The questionnaire examines the communicative style of the client and investigates how well the client communicates on a daily basis. Part Two includes sub-sections which examine five key elements of communication: (1) conversational skill, intelligibility, knowledge of events (pragmatics, phonology, syntax, semantics), (2) hearing and auditory discrimination, (3) understanding of single words (semantics), (4) understanding of sentences of varying complexity (syntax and semantics) and (5) functional use of communication skills in different environments. It is designed to be completed by a speech therapist or psychologist. Part Three is a joint assessment consisting of a summary sheet to be completed by the keyworker/carer and a speech therapist together. It is a record of the client's strengths and weaknesses and corresponding priorities for change.

Due to time constraints it was not possible to use CASP in its entirety during this research. The following subsections were selected to evaluate the pragmatic communication competence of the participants in this study:

- (i). Part One contained 33 questions scored on a three point scale. For example "Q.7 Can he/she give his/her name and address". The corresponding answers are "yes" - 2 points, "sometimes" - 1 point or "no" - 0 points. The total score for each subject was calculated and entered for analysis. Completion of this section takes approximately 10 minutes. Maximum score was 66 and the minimum score was zero.
- (ii). Part Two, section three examines understanding and expression at the single word level and contains 30 questions. Participants were shown 4 photographs on a single page and were asked to identify one of the photographs by pointing to it. If the object was identified correctly one point was given and no points were given for an incorrect response. Participants were then asked to verbally identify one of the photographs. This section takes approximately 30 minutes to complete. The maximum score was 30 and the minimum was zero.
- (iii). Part Two, section seven provides an overview of how the client uses communication skills in a natural setting, examining the functional uses of communication skills and knowledge about conversation. It contains 12 questions with each question being scored on a four point scale, and takes approximately 10 minutes to complete.

3.2.2 Self-Esteem

Although a universally accepted definition of self-esteem is elusive the concept remains a topical issue for both academic and popular culture (Bandura, 1986). For the purposes of this research the operational definition used by Pervin (1989) will be utilised. This definition views self-esteem as personal judgements of worthiness and is composed of all the evaluations an individual makes and maintains about the self.

Self-esteem improvements are important objectives for music interventions for a number of reasons. Self-esteem influences behaviour in many ways. Maintaining high levels of self-esteem is an important aspect of daily living associated with well adjusted individuals (Wells and Marwell, 1976). Bandura (1986) highlights the impact of the self concept upon behaviour, asserting that individuals who have high levels of self-esteem enjoy better social functioning.

Hiroto (1974) demonstrated the influence of low self-esteem on behaviour. In this research one group of undergraduate students heard a loud noise which could be stopped by the push of a button. A second group heard the same noise but could not stop it and a third group heard no noise. When all groups were placed in a situation where they could stop a loud noise by pushing a button individuals from groups two and three stopped the noise while individuals in group one made no attempt to stop the noise.

Although this experiment demonstrates the environmental factors that influence situational specific learned helplessness (Abramson and Seligman, 1978), it also highlights how negative expectancies produce negative outcomes. An individual with low self-esteem expects negative outcomes consistently and this negative expectancy has a resultant effect on behaviour producing negative outcomes (Bandura, 1986).

Similar to communication skills, the evaluation of self-esteem in adults with a learning difficulty has provoked controversy and assertions that effective assessments materials need to be developed (Seligman et al 1981a; 1981b; 1981c; 1982). Moreover, reviews of literature have highlighted a dearth of research investigating self-esteem for this population (Laurence and Winschel, 1973; Morrison, MacMillian and Bothwick, 1980; Schurr, Joiner and Towne, 1970; Zetlin, Turner and Gallimore 1981)

Zetlin, Heriot and Turner (1985) discuss the adaptation of conventional self-esteem rating scales for adults with a learning difficulty. These authors sampled 46 mentally handicapped adults who completed modified versions of The Coopersmith Self-Esteem Inventory (Coopersmith 1967) and "The Way I Feel About Myself" Self-Concept Scale (Piers and Harris 1969). These particular scales were the most popular scales for assessing the self-esteem of adults with a learning difficulty, extensively used in many studies (Lawernce and Winschell, 1973; Mink, Nihira and Meyers, 1983; Schurr, Joiner and Towne, 1970; Silverman and Zigmond 1983).

In the Zetlin, Heriot and Turner (1985) study each subject was tested individually during two to four 30 minutes sessions (within 2 weeks), depending on the time needed for administration of the measures. Seven subjects met with the examiners twice. All sessions were tape recorded and transcribed. To reduce examiner effect, subjects were randomly assigned to one of four examiners so that each subject was seen by at least two examiners. The results of this study highlighted that the majority of subjects had highly positive self-concepts. However fine grain analysis of the results revealed that many of the responses did not yield themselves to scoring within the prescribed format. The assessment of self-esteem in individuals with a learning disability requires the development of new methods which can be utilised specifically for this population (Zetlin, Heriot and Harris, 1985) .

Khalid (1985) addressed this issue of population specific measures of self-esteem in a doctoral thesis which designed and validated a new measure for primary school children. The Khalid semantic differential technique (appendix A; Khalid, 1985) was chosen to quantify self-esteem empirically in this study. The questionnaire is simple to understand and administer, taking about 15 minutes to complete. The scale is composed of ten items with five possible responses for each item. The items were read aloud to compensate for any reading difficulties. Only the adjectives contained in the questionnaire were read to subjects and no definition of those adjectives were given. Khalid (1995) reports test-retest reliability, using a Spearman correlation co-efficient, of .94 for this assessment instrument.

3.2.3 Motor Co-ordination

Music interventions with a therapeutic emphasis do not view musical developments as a concern (Alvin, 1978; Nordoff & Robbins, 1992; Schalkwijk, 1995).

However, the type of intervention utilised for this study had both an educational and therapeutic focus. The organisational vehicle for delivery of the musical intervention was *Strathclyde Orchestral Productions* (S.O.P.), a music and theatre company which draws 75% of its musicians from within the special needs sector. The company encourages musicians to develop their skills to the highest standard and ultimately aims to challenge existing views of disability. S.O.P. conduct music workshops in which the emphasis is on involving every member of the group and not on individual performance.

The experience of individuals with learning disabilities working with S.O.P. suggests that certain musical developments may take place as a result of this type of intervention. Several musicians, after working with S.O.P., are now performing in a professional capacity with music and theatre companies. Given the educational emphasis of the S.O.P approach it is suggested that musical developments are a possible outcome for participants in this study. Other British music companies, for example "The Drake Music Project", also employ musicians with special needs in a professional capacity.

A significant aspect of musical ability is motor co-ordination. In order to play a musical instrument various complex physical motor co-ordination tasks are required. It is proposed that developments in musical ability represent developments in certain motor co-ordination tasks. Given that an improvement in musical ability is one of the suggested outcomes of the intervention, the question of how to measure musical ability is paramount.

In a comprehensive review of all published and unpublished tests of musical ability Shuter-Dyson and Gabriel (1981) discuss issues of concern for researchers interested in assessing musical ability. For example, the overall capacity of musical ability may be composed of many unrelated sub-factors such as pitch perception, rhythm awareness, and compositional ability. In order to accurately assess musical ability these factors must be taken into account.

Seashore (1919) developed a test of musical ability based on the premise that musical capacity can be defined by a number of precise abilities. These measures were the first standardised tests of musical ability to be published (Shuter-Dyson and Gabriel, 1981). The test involved memory for melodies, pitch discrimination and intensity discrimination.

Other authors (Wing, 1968) have offered a contrasting definition of musical ability. This definition emphasises a general ability for music. Wing developed a series of assessments measuring aural acuity and musical preference. One precondition on item inclusion was that the score for each item correlated with the overall score on the test, emphasising Wing's belief in the existence of a general capacity for music which is related throughout all sub-factors.

The Wing and Seashore tests of musical ability remained the most popular tests of musical ability in Britain until the sixties. Bentley (1985) developed a test of musical ability that had similarities to both the Wing and Seashore approach. The pitch discrimination tests have similarities with Seashore except pitch discriminations of less than a semitone are required. The chord analysis aspect of the test has similarities to Wing although it contains a higher proportion of two note chords. The revised version of this test (Bentley, 1985) contains the same items as the original.

Mills (1988) focused on the identification of children with unusual potential as performers of orchestral instruments as an objective in the development of "The Mills Group Tests of Musical Ability". The Arnold Bentley measures of musical ability and The Mills Group tests of Musical Ability are currently the most popular tests employed in Britain.

The fact that no empirical measure of musical ability exists for populations with a learning difficulty is of particular relevance to the present research. All previously discussed assessment instruments are designed for group completion. Using the previous research as a point of departure the Elmes test of musical attainment was developed for use in this study. It is administered on a one to one basis due to the pragmatic problems of group administration when working with a population of individuals with a learning difficulty make group administration difficult.

Parallels that exist between intelligence and musical ability (Davies, 1978).

Although there is much speculation about the nature of intelligence, there is broad agreement that intelligence is composed of two basic components. The first is an environmental factor whereby the level of intellectual functioning in an individual is dependant on cultural and environmental influences. The second is a genetic component which is free of environmental influence. The crucial point here is that an accurate measure of intelligence must specify the type of intelligence that is being measured. A common criticism of many intelligence tests is that they are

culturally biased and that scores reflect a certain type of cultural upbringing as well as a certain level of intelligence. Any intelligence test devised to measure general intelligence should therefore be free of cultural bias.

This argument is influential in deciding which test to employ in the assessment of musical ability. The Elmes test of musical attainment was devised to measure an individual's level of ability at playing a *Javanese Gamelan* (see section 3.4.4 for brief description). The test reflects the workshop environment and involves tasks of the nature that are required at the workshops. Validation procedures carried out during the development of this scale provided a test re-test Spearman correlation coefficient of .86 for Simple Rhythm Production, .94 for Instrumental Rhythm Production and .94 for Pitch Discrimination. Inter-rater reliability, based upon two raters observing participants at time 1, produced a Spearman correlation coefficient of .88 for Simple Rhythm Production, .91 for Instrumental Rhythm Production and .94 for Pitch Discrimination. The test takes approximately 45 minutes to complete and contains three separate sections detailed below.

(1). Pitch Discrimination (appendix B)

This section makes use of a *Saron Barung* which is a single octave metallophone with a trough resonant. It is struck with a wooden mallet and forms part of a *Javanese Gamelan* (ibid). Participants were played two notes on the *Saron* and asked to identify which of the notes were higher in pitch or if both notes were the

same. The experimenter played the *Saron* in such a way so as to avoid giving visual cues to the participants. There are 20 questions of this type and each question was given 1 point for a correct answer and zero for an incorrect answer.

(2) Simple Rhythm Production (appendix C).

Participants were asked to reproduce 15 rhythms as clapped by the experimenter, paying attention to the variation in tempo and accent. The experimenter rated performance on each item on a three point scale. Two points for the correct response, one point for a response that contained only minor errors (e.g., correct number of beats but with the wrong stresses) and zero points for a completely erroneous response. The maximum score possible was 30 and completion time was approximately 15 minutes.

(3). Instrumental Rhythm Production (appendix D).

Subjects were asked to reproduce a rhythm played by the experimenter on a *Saron*. This was scored on the same three point scale as the rhythm test and contained a maximum score of 30.

3.2.4 Disruptive Behaviour

The reduction of disruptive behaviour is an outcome objective for many music therapists (Aldridge, 1993). Espie, Montgomery and Gillies (1988) discuss the available instruments for objective assessment of disruptive behaviour in this population. These authors assert that there are a large number of measures available for assessing the dysfunctional behaviours of individuals with a learning disability.

The Adaptive Behaviour Scale (Nihira et al 1975) provides a comprehensive profile of functioning across a wide range of domains. The Behaviour Disturbance Scale (BDS) targets more specific behaviours but provides detailed analysis of them. Leuder and Fraser (1985) and Dickens and Stallard (1987) also provide detailed reviews of current methods of assessing disruptive behaviour. Although these tests may have been appropriate for use in this study they were both unavailable for use.

The Psychosocial Behaviour Scale (Espie, Montgomery and Gillies 1988) (appendix E) was developed to assess dysfunctional behaviours in individuals with a learning difficulty who also have pseudoseizure problems. While it is recognised that the target population for this study did not necessarily exhibit seizures this scale was chosen as it was easy to administer, had proven psychometric properties outlined by Espie, Montgomery and Gillies (1988) and targeted the types of

behaviour discussed by other researchers interested in therapeutic outcomes of music intervention (Aldridge, 1993). The questionnaire is completed by a carer or keyworker and contains 36 questions scored on a 4 point scale. Completion time is approximately 10 minutes.

3.3 Experimental Hypothesis

The aim of this project is to empirically examine the effects of a music intervention for individuals with a learning disability. The study investigates the effects of a specific type of music intervention on communication, musical ability, disruptive behaviour and self-esteem measures in a population of mildly and moderately mentally handicapped individuals. The music intervention is group based as a structured course experience playing the Javanese Gamelan. The experimental hypothesis states that the experimental group will exhibit significant improvements in musical ability, communication skills, disruptive behaviour and self-esteem.

3.4 Method

3.4.1 Design

A between group design incorporating pre- test and post-test assessment techniques was employed. The experimental group received music intervention and the control group received no intervention.

3.4.2 Subjects

In total, 40 individuals participated in this study. These individuals had either mild or moderate learning difficulties and attended Adult Training Centres (A.T.C.s) in the Glasgow area or were attending the Occupational Therapy Department at Lennox Castle Hospital, Glasgow. Participants were randomly assigned to either the experimental or control group. The experimental group contained 15 individuals from Lennox castle hospital and 5 individuals from an A.T.C. Although 20 individuals (11 males and 9 females) were originally pre-tested in the experimental group, due to illness, only 16 subjects were post-tested and used in the analysis. The chronological age ranged from 17 to 58 years and their mean age was 39.7 years (S.D.=11.79). The control group contained 15 individuals from an A.T.C. and 5 individuals from Lennox Castle Hospital. Twenty subjects were originally pre-tested for this control group but due to illness only 16 were post-tested and subsequently used in the analysis. The chronological age ranged from 21 to 37 years and the mean age was 28.9 years (S.D.=5.28). The group consisted of 9 males and 11 females.

3.4.3 Assessment Instruments

The following three assessment instruments were used to monitor the effects of the workshop environment.

- (1) The Elmes Test Of Musical Attainment (appendices B,C and D)
- (2) The Khalid Semantic Differential Technique (appendix A)
- (3) The Communication Assessment Profile for Adults with a Mental Handicap (CASP): Part 1, part 2 section 3, part 3 section 7.
- (3) The Psychosocial Behaviour Scale (appendix E)

3.4.4 The Gamelan

Gamelan is a generic name for a set of percussion instruments consisting of tuned gongs, metallophones, cymbals and drums. These can be found throughout Malaysia and Indonesia and range in size from four to forty instruments (Lindsay, 1989). In Gamelan music there is no conductor present, instead all communications are accomplished musically by one drum player leading all the other musicians. Effort is therefore required by everyone to follow the variations in tempo that occur and emphasis is therefore placed on group based communication. Another important feature of the Gamelan with a special needs population is accessibility. Complicated digital dexterity is not required to commence playing the instrument. Given these particular characteristics, the Gamelan caters for all levels of ability and is therefore an ideal instrument to use for therapeutic applications of music.

This use of the Gamelan for a population of individuals with learning difficulties was outlined by Sanger and Kippen (1987). These authors describe a particular musical and social event in which a Gamelan was used as part of a two week music course for the physically handicapped. By reporting their experiences and observations these authors contribute to the body of information relating to the way in which people respond to musical stimuli. Although the observations are descriptive the Gamelan appears to be ideally suited for individuals with learning disabilities. However, in order to evaluate the possible effects of music interventions a more empirical and detailed account of the participants experiences must be given and this is one of the major issues addressed in the present study.

3.4.5 Procedure

Ethical approval was obtained from The Greater Glasgow Research and Ethical Committee (appendix F) and participation in both the experimental and control group was voluntary. Subjects were able to withdraw at any time. After all individuals were pre-tested, the 20 subjects in the experimental group attended weekly workshops for ten weeks. These workshops lasted approximately one hour and began with rhythm exercises. The purpose of this warm up session was to relax the group and help set up cohesive group dynamics which are essential to the success of a workshop. The rest of the time was usually given over to playing the Gamelan.

Various methods were employed by the workshop leader to communicate the musical ideas to the subjects. Initially participants were asked to repeat a rhythmic pattern being played on one of the Sarons. More complex patterns were played as the workshop progressed and there was opportunity for improvisation within the context of any piece of music. It was important to cater for the individual needs of each participant. In certain cases a tutor (either an occupational therapist or a professional musician) would hold an individual's hand and perform the rhythms with the subject. After this support and encouragement, many individuals were able to play unaided with the rest of their group. Participants were also given the opportunity to play a chosen part of the Gamelan. The emphasis was on group involvement and rhythmic awareness through musical participation. Following the ten weeks of workshops all subjects were re-tested on the assessment measurements.

3.5 Results

3.5.1 Descriptive Statistics

Descriptive statistics for the experimental and control groups are summarised in tables 3.1 and 3.2. These tables display the total mean scores and standard for both groups across six of the seven dependent measures. A ceiling effect was observed in the pre-test and post-test measure of self-esteem. All the subjects rated themselves as being at the top end of the scale. In other words they all felt very good, very friendly, very clean, etc. This data was therefore excluded from further analysis.

Table 3.1 Study 1: Control group means and standard deviations

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
PITCH	7.38	3.20	8.13	3.74
SRP	9.50	4.70	9.06	5.72
IRP	12.69	6.99	12.50	7.74
CASP1	2.49	0.21	2.55	0.29
CASP2	25.12	3.70	24.56	4.84
CASP3	3.07	0.47	3.28	0.41
PSYSOC	0.27	0.43	0.41	0.30

- PITCH - total score on pitch production test
- SRP - total score on simple rhythm production test
- IRP - total score on instrumental rhythm production
- CASP1 - total score on part one section one CASP
- CASP2 - total score on part one section three CASP
- CASP3 - total score on part three section seven CASP
- PSYSOC - total score on psychosocial behaviour scale

Table 3.2 Study 1: Experimental group means and standard deviations

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
PITCH	7.87	1.69	7.00	1.48
SRP	5.94	5.8	13.69	7.3
IRP	5.31	3.32	15.56	5.35
CASP1	2.24	0.24	2.25	0.71
CASP2	16.47	5.16	21.40	6.71
CASP3	3.47	0.39	3.03	0.34
PSYSOC	0.67	0.47	0.61	0.47

PITCH - total score on pitch production test
SRP - total score on simple rhythm production test
IRP - total score on instrumental rhythm production
CASP1 - total score on part one section one CASP
CASP2 - total score on part one section three CASP
CASP3 - total score on part three section seven CASP
PSYSOC - total score on psychosocial behaviour scale

3.5.2 MANOVA

In accordance with criteria discussed by Anastasi (1990) the descriptive statistics allow for further parametric investigation with the sample having normal distributions, equal variance and measurements made on the interval scale. Due to the multiple dependant measures a 2x2x7 MANOVA was calculated. This was computed in order to avoid a type 1 error. Group (experimental/control) was a between groups independent variable. Point of testing (pre/post) was an independent repeated measures variable. The dependent measures were mean total

scores on the following: CASP Part 1 section 1 (CASP1), CASP Part 1 section 3 (CASP2), Casp part 3 section 7 (CASP3), Instrumental Rhythm Production (IRP), Simple Rhythm Production (SRP) and total score on psychosocial behaviour. This was computed in order to investigate overall significance before proceeding with univariate F-tests. The results are summarised in table 3.3.

Table 3.3 Study 1: MANOVA summary

Effect	Wilks' Lambda	Rao's R	df 1	df 2	p
Group	0.09	15.08	7	10	.00
Time	0.24	116.99	7	10	.00
Interaction	0.28	3.72	7	10	.03

This table shows significant main effects for group and point of testing (time) in conjunction with a significant interaction effect highlighting that the intervention has differentially effected the dependent measures both between the groups and over the two testing periods.

3.5.3 ANOVAs

Given the complex nature of interpreting the MANOVA, six 7x2 ANOVAS were computed to further investigate the specific and interaction effects. Group (experimental/control) was the first independent variable and point of testing (pre/post) was the second independent variable. The dependent measures were mean total scores on the following: CASP Part 1 section 1, CASP Part 1 section 3 Casp part 3 section 7. Instrumental Rhythm Production, Simple Rhythm Production and psychosocial behaviour. Significant effects are summarised in tables 3.4 - 3.9

Table 3.4 Study 1: ANOVA Simple Rhythm Production (SRP) summary

Effect	MS Effect	MS Error	F(1,30)	p-level
Group	4.52	62.96	.07	.79
Time	213.89	7.62	28.09	.00
Interaction	268.14	7.62	35.21	.00

The main effect for time indicates that there is a significant difference between the mean total scores on SRP between the pre-test and post-test condition. The significant interaction effect demonstrates that the control group and experimental group are differentially affected by the intervention. Post-hoc Neuman-Keuls analysis investigated these effects in more detail. The results are summarised in table 3.5

Table 3.5 Study 1: Neuman-Keuls SRP summary

				Comparison P Value			
Group	Time	Mean	Label	{1}	{2}	{3}	{4}
Experimental	1	5.94	{1}		>.01	>.01	>.01
Experimental	2	13.69	{2}	>.01		>.01	>.01
Control	1	9.50	{3}	>.01	>.01		.66
Control	2	9.06	{4}	>.01	>.01	.66	

The above table highlights that there is no significant difference between the pre-test and post-test conditions for the control group ($p=.66$) indicating that the control group mean for SRP did not significantly change after the ten week period. There is a significant difference between the pre-test and post-test scores for the experimental group ($p<.01$). With a mean pre-test score of 5.94 and a mean post-test scores of 13.69 this significant difference shows that the experimental group significantly improved on the SRP measure. In addition, there are significant differences between the experimental and control group both in the pre-test ($p<.01$) and in the post-test ($p<.01$) conditions. This indicates that the control group had a significantly higher base point score than the experimental group. However the experimental group have a significantly higher post-test score than the control group. This analysis is summarised in figure 3.1.

Figure 3.1 Study 1: Simple Rhythm Production (SRP)
summary

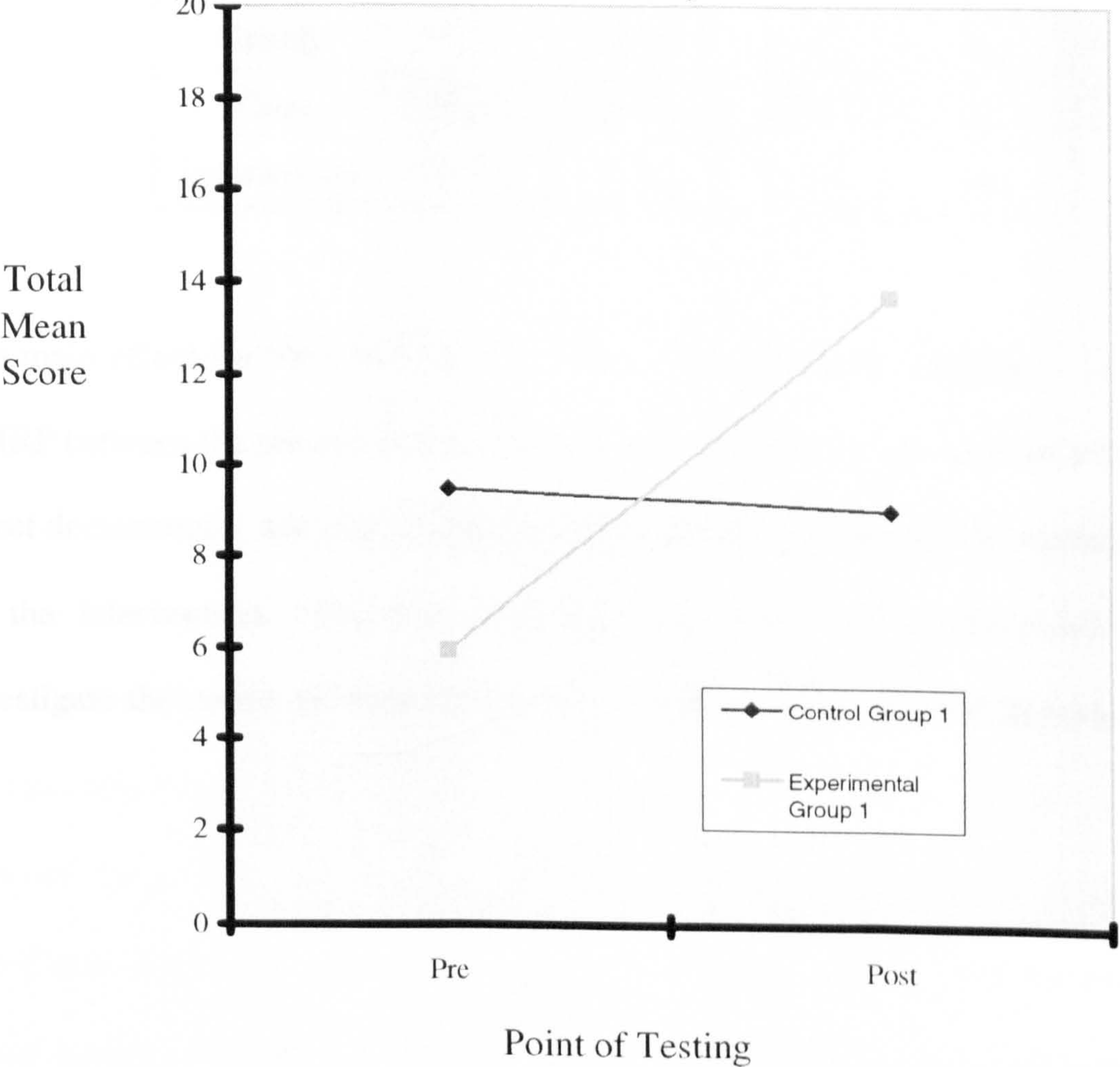


Table 3.6 Study 1: ANOVA Instrumental Rhythm Production (IRP) summary

Effect	MS Effect	MS Error	F(1,30)	p-level
Group	74.39	68.45	1.09	.31
Time	405.02	5.72	70.76	.00
Interaction	435.77	5.72	76.13	.00

The main effect for time indicates that there are significant differences in the scores on IRP between the pre-test and post-test scores. In addition, the significant interaction effect demonstrates that the experimental and control groups are differentially affected by the intervention. Post-hoc Neuman-Keuls analysis was computed to further investigate the nature of these effects. The results are summarised in table 3.7

Table 3.7 Study 1: Neuman-Keuls IRP summary

				Comparison P Value			
Group	Time	Mean	Label	{1}	{2}	{3}	{4}
Experimental	1	5.31	{1}		>.01	>.01	>.01
Experimental	2	15.56	{2}	>.01		>.01	>.01
Control	1	12.69	{3}	>.01	>.01		.82
Control	2	12.50	{4}	>.01	>.01	.82	

This table highlights that there is no significant difference for the control group between the pre-test and post-test conditions ($p=.82$). However, there is a significant difference for the experimental group between the pre-test and post-test condition ($p<.01$). With the experimental group having a pre-test mean of 5.31 and a post-test mean of 15.56 this significant difference highlights that the experimental group significantly improved on the IRP measure. There is also a significant difference between the groups in the pre-test condition ($p<.01$) with the control group having a significant higher score and in the post-test condition ($p<.01$) with the experimental group having a significant higher score. This analysis is summarised in figure 3.2.

Figure 3.2 Study 1: Instrumental Rhythm Production (IRP)
summary

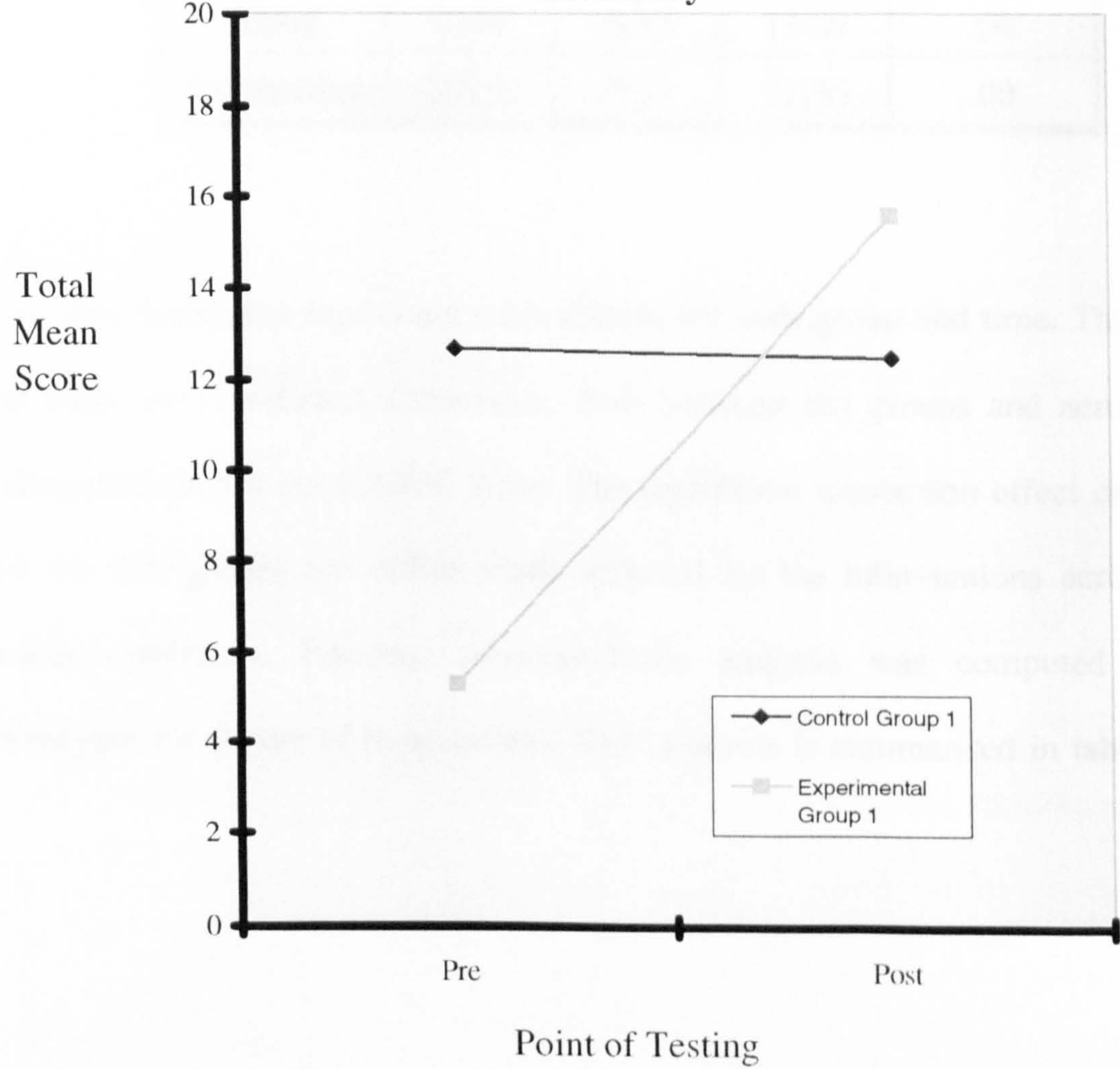


Table 3.8 Study 1: Anova CASP2 summary

Effect	MS Effect	MS Error	F(1,29)	p-level
Group	540.90	48.50	11.15	.00
Time	73.95	5.33	13.89	.00
Interaction	116.92	5.33	21.96	.00

This table highlights significant main effects for both group and time. This indicated that there are significant differences, both between the groups and across the two testing periods, for the CASP2 score. The significant interaction effect demonstrates that the two groups are differentially effected by the interventions across the two testing conditions. Post-hoc Neuman-Keuls analysis was computed to further investigate the nature of these effects. This analysis is summarised in table 3.9

Table 3.9 Study 1: Neuman-Keuls CASP2 summary

				Comparison P Value			
Group	Time	Mean	Label	{1}	{2}	{3}	{4}
Experimental	1	16.47	{1}		>.01	>.01	>.01
Experimental	2	21.40	{2}	>.01		>.01	>.01
Control	1	25.13	{3}	>.01	>.01		.49
Control	2	24.56	{4}	>.01	>.01	.49	

There is no significant difference between the pre-test and post-test scores for the control group ($p=.49$). This result suggests that communication, as measured by CASP2, did not change in the control group. However, a improvement in communication for the experimental group is highlighted by the significant difference between the pre-test and the post-test score ($p<.01$). The control group display significantly higher scores than the experimental group both in the pre-test condition ($p<.01$) and in the post test condition ($p<.01$). This analysis is summarised in figure 3.3.

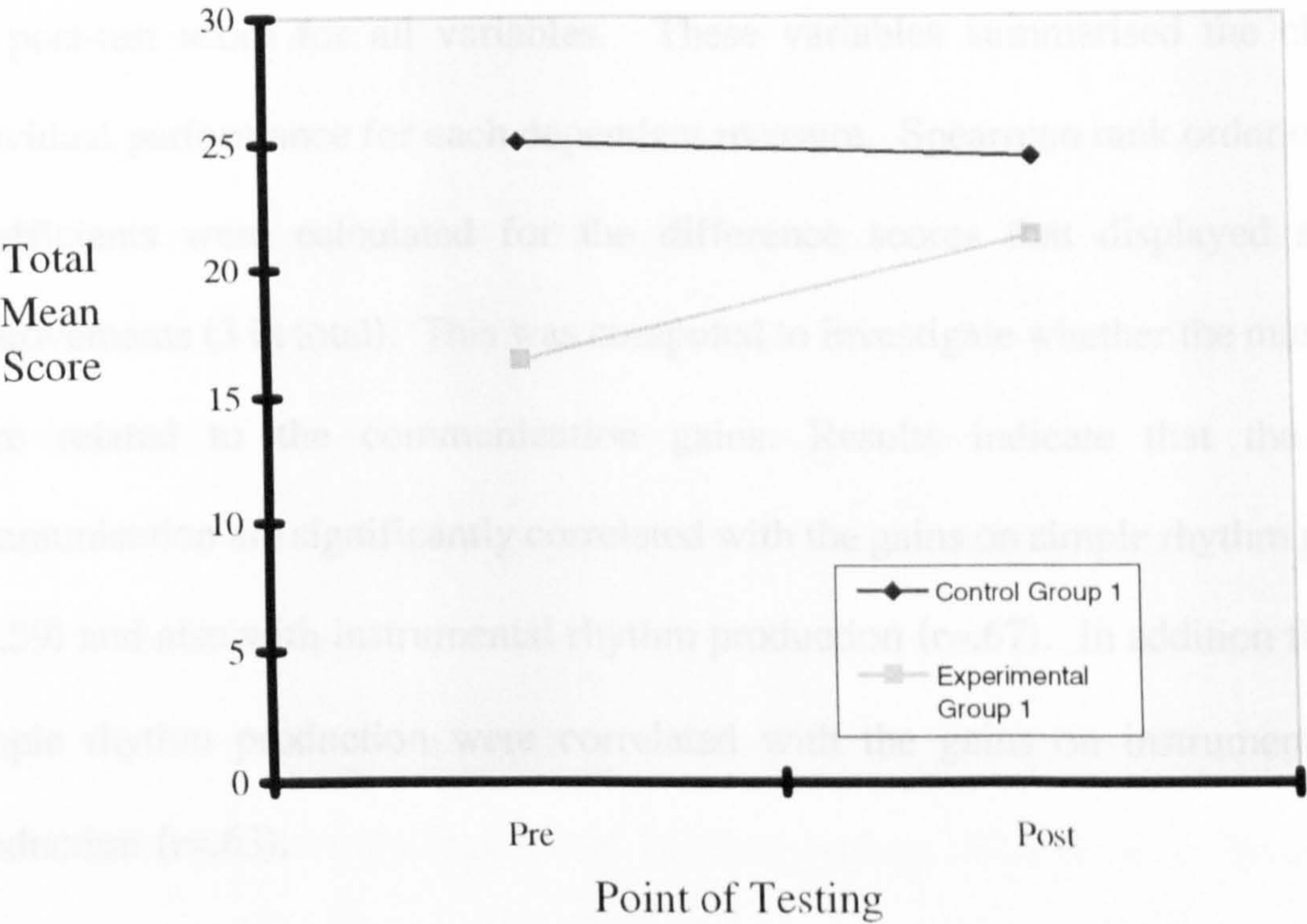
3.3.1 Significant Results

There were no significant results obtained for the dependent variables Pich, CASP2 or CASP3. This suggests that the participants did not change in their ability to perceive pitch or in communication as measured by CASP2 and CASP3. In addition, it suggests that there were no differences between the groups for these variables.

Figure 3.3 Study 1: CASP2 summary

3.3.2 Conclusions

New variables were created by calculating the difference between the pre-test score and the post-test score for all variables. These variables summarised the change in individual participants for each dependent measure. Separate rank order correlation coefficients were calculated for the difference scores. A significant difference was found between the groups for the difference score for CASP2 ($r = 0.59$). This was expected to investigate whether the musical gains were related to the communicative gains. Results indicate that the gain in communication ability is significantly correlated with the gain in simple rhythmic production ($r = 0.59$) and also with instrumental rhythmic production ($r = 0.73$). In addition, the gain in simple rhythmic production was correlated with the gain in instrumental rhythmic production ($r = 0.73$).



3.5.4 Insignificant Results

There were no significant results obtained for the dependent variables Pitch, CASP1 or CASP3. This suggests that the participants did not change in their ability to perceive pitch or in communication as measured by CASP1 and CASP3. In addition it suggests that there were no differences between the groups for these variables.

3.5.5 Correlations.

New variables were created by calculating the difference between the pre-test score and the post-test score for all variables. These variables summarised the changes in individual performance for each dependent measure. Spearman rank order correlation co-efficients were calculated for the difference scores that displayed significant improvements (3 in total). This was computed to investigate whether the musical gains were related to the communication gains. Results indicate that the gains in communication are significantly correlated with the gains on simple rhythm production ($r=.59$) and also with instrumental rhythm production ($r=.67$). In addition the gains in simple rhythm production were correlated with the gains on instrumental rhythm production ($r=.63$).

3.6 Discussion

The purpose of this study was to investigate whether there were any effects attributable to the music intervention across a range of measures. The intervention produced significant improvements in instrumental rhythm production (IRP), simple rhythm production (SRP) and on part 2 section 3 of CASP (CASP2). On measures of pitch perception, self-esteem, disruptive behaviour and the remaining two CASP measurements there were no significant results attributable to the intervention.

3.6.1 Pre-Test Differences

There were significant differences between the control and experimental group on several pre-test measurements. The control group had significantly higher scores on the measurement of IRP, SRP and CASP2. This significant difference can be explained by the sampling procedures since more subjects in the experimental group came from the occupational therapy department in Lennox Castle hospital as opposed to the Adult Training Centre. The Adult Training Centre is a community based day centre and individuals attending the centre may be of a higher intellectual functioning than individuals from the residential hospital setting. The Greater Glasgow Health Board directly financed the ten week workshop period and consequently requested that a majority of the participants came from Lennox Castle Hospital. However, the significant improvements, all more than one standard deviation, exhibited by the experimental group, and the relative stability of the control group results between the pre and post-test conditions, highlight the impact of the workshop environment. This

suggests that the intervention is responsible for the observed gains.

3.6.2 Aspects of the Musical Environment

Communication developments were significantly correlated with the musical gains. Subjects who achieved the greatest musical gains also achieved the greatest improvement in communication. This offers evidence that the music intervention is primarily involved in the gains. The characteristic features of the workshop environment are critical areas for future study. This issue will be further investigated in proceeding chapters .

3.6.3 Disruptive Behaviour

There were no changes in the experimental groups score on The Psychosocial Behaviour Scale. The pre-test and post-test means for the experimental group (0.67 and 0.61 respectively) and control group (0.27 and 0.41 respectively) suggest a floor effect. Participants in the experimental group were either individuals attending the Occupational Therapy department at Lennox Castle Hospital or individuals attending ATC's. Had these individuals been exhibiting disruptive behaviour they would not have been in these two settings. This explains the floor effect obtained in the results and summarised in tables 3.1. and 3.2.

3.6.4 The Experimenter Effect

Although the experimenter was not a facilitator in the workshop environment he was present at all workshops. The experience of forming a developing relationship with the experimenter (who not only tested the subjects but also attended all the workshops) may have helped produce improvements on the measurement scales. The influence of the experimenter on results will be further investigated in the next wave of analysis presented in chapter 4.

3.6.5 The Self-Esteem Issue

There are two possible explanations of the ceiling effect obtained in the measurement of self-esteem. One is that the measurement instrument did not effectively measure subject's level of self-esteem. A second explanation suggests that given these individuals were relatively high functioning individuals drawn from the sample they may have high levels of self-esteem.

3.6.6 Control Group Issues

Other factors may be influential in yielding the effects demonstrated in the study presented here. For example, the experience of communicating in a group situation could be a primary factor. To investigate this issue chapter five examines the communicative developments and self-perception changes in a group of twenty individuals participating in an activity involving similar communication to that found in the Gamelan workshops but without any musical intervention. These activities involve the development of communal cooking and art classes.

3.6.7 Insignificant Results for Pitch Perception

There were no developments in pitch perception as measured by the assessment instrument. This is explained by the fact that the workshops had a rhythmic focus. The Gamelan is essentially a set of pre-tuned percussion instruments and consequently developing playing skills requires a development in rhythmic awareness as opposed to a development in pitch perception.

3.6.8 Insignificant Communication Developments

Although there were developments in one measure of communication two sections of CASP showed no improvements. These sections were completed by the carers and keyworkers of participants. Where as CASP2 focuses on a very specific communication task (the identification of individual items) the other two sections focused more on these carers' views of the participants pragmatic communication in general terms. The

intervention did not produce broad based communicative developments for the participants that could be observed by the carers. However, the participants did develop a more specific communicative task.

3.6.9 Limitations

Although the experimental design overcame certain experimental limitations of previous research, certain trends in the results suggest empirical limitations in this design. It is possible that the Khalid semantic differential technique did not effectively measure the self-esteem of the participants. Although it was easy to understand and administer it was designed for children and therefore not applicable to the present population. A similar argument may also explain the results obtained on the psychosocial behaviour scale in that this scale was developed for individuals with a learning disability who also suffer from epileptic seizures.

3.6.10 Future Research

The results of this study raise certain important research questions to be addressed in the following studies contained within this thesis. (1) Are the results sustainable when the experimenter is unknown to the participants? (2) What are the key features in the workshop environment that produce the observed gains in communication? (3) By what mechanism are the developments operating? (4) Do these musical and communication developments sustain over time?

3.7 Conclusion and Summary

In response to various authors' criticisms of current research investigating therapeutic applications of music this study investigated this issue within rigorous empirical research framework. Results indicate selected improvements of measures of communication and musical ability which were significantly correlated with each other. However the results, in combination with the research limitations, produce directions for further research that motivate the proceeding empirical chapters.

CHAPTER FOUR

AN INVESTIGATION INTO SALIENT FEATURES OF THE WORKSHOP ENVIRONMENT

Motivated by the results presented in chapter three this study employs a similar design to that of the preceding chapter with three modifications in the outcome measures. An experimenter, unknown to the participants, was utilised in post-test situation. This modification removed the possibility of a developing relationship between experimenter and participant acting as a confounding variable during the study. Secondly, short term memory was measured to investigate the possibility of a cognitive mechanism influencing the developments. Finally, the measure of self-esteem was replaced with a measure of participants' self-perception of Gamelan ability.

The IRP and SRP measures of musical ability were used in this study with the CASP2 measurement of communication also being employed. Control group 1 scores, obtained in chapter three were used as a comparison group for the experimental group in this chapter. A new control group (control group two) was created for a comparison group in the measurement of short term memory and self-perception. For reasons of clarity the experimental group in this chapter will be referred to as experimental group 2.

4.1 Enhanced Cognitive Capacities

The significant improvements in communication and musical ability observed in the first study provided evidence supporting the efficacy of the intervention. This study investigates one possible explanation for these gains. Specifically, the observed gains may be mediated by a cognitive mechanism. The musical and communication tasks performed by the participants during the assessment periods require cognitive abilities such as short term memory function. For example, the Simple Rhythm Production (SRP) section of the Elmes Test requires participants to remember and repeat a sequence of notes played by the experimenter. The study contained within this chapter investigates whether or not the gains obtained in chapter 3 can be explained by an increase in general cognitive capacity. The following sub-sections provide an overview of relevant cognitive issues.

4.1.1 Short Term Memory

This study uses a test of short-term memory as a measure of cognitive functioning. Hulme and Mackenzie (1992) provide an overview of the different theoretical conceptualisations of short term memory. During the 1960s and 1970s there were numerous attempts to produce a model of the human memory system resulting in the formation of at least ten different models of human memory (Norman, 1970). Many of these models conceived memory as consisting of a number of stores distinguished by the time for which they held information. This became known as the Modal Model (Hulme and Mackenzie, 1992). These multistore models of

memory consider that different forms of analysis and storage take place in different parts of the memory system. The most influential of these models is that of Atkinson and Shiffrin (1968), based on Broadbent (1958). This approach divides memory into three major types of store: a sensory store; a short-term store and a long-term store. Although other researchers have developed on these ideas, in particular Baddeley (1986) and Hitch (1978), there is broad agreement that short term memory is a separate memory store which holds information for a limited period measured in seconds (Hulme and Mackenzie, 1992).

A memory span test (using sequences of digits of increasing length) was included in the first test of mental development devised by Binet and Simon. Also, a digit span test is still part of modern I.Q. and mental ability tests such as the Wechsler Intelligence Scale for Children (WISC), the British Ability Scale (BAS) and Illinois Test of Psycholinguistic Abilities (ITPA). There is a significant body of evidence which suggests that short-term memory is directly related to overall cognitive functioning as measured by I.Q. tests for individuals with a learning difficulty as well as non-intellectually impaired individuals (Hulme and Mackenzie, 1992). Marinossion (1974) investigated the correlation between short term memory and I.Q. in a group of individuals with mild to severe learning difficulties. Using The Illinois Test of Psycholinguistic Abilities (ITPA) the two sub-tests pertaining to short-term memory correlated significantly with the overall measure of I.Q. In addition, Marinossion (1974) also highlights the fact that individuals with a learning

difficulty appear to have impaired short term memory capacity. This suggestion is supported by various other researchers (Dodd, 1975; McDade and Adler 1980).

Bachelder and Denny (1977) reviewed a number of studies which investigated the correlation between general I.Q. and short term memory for individuals with a learning difficulty. These authors note that the reported correlations between digit span and overall I.Q. was in the 0.6 to 0.8 range suggesting a degree of association between these two hypothesised constructs.

4.1.2 The Measurement of Short-Term Memory

Memory span is the most commonly used measure of short-term memory and refers to the number of words or digits an individual can recall immediately after hearing them (Hulme and Mackenzie, 1992). Administration of such tests is relatively straightforward with the tester speaking a list of words or numbers and the subjects being asked to repeat the list immediately. A test of short term memory was devised for use in this study (appendix G). To control for environmental factors such as speed of presentation the test was recorded onto a cassette tape.

Participants were asked to recall a sequence of numbers played from a tape recorder. The test contained a total of 8 items. The items gradually became more complex with the initial sequence containing one number and the final sequence eight. Performance was rated as follows: 2 points - sequence correctly recalled; 1 point - sequence correctly recalled but in the wrong order; 0 points - sequence incorrectly recalled. Higher total scores reflected greater S.T.M. recall and

consequently more efficient cognitive functioning, while lower scores reflected poor S.T.M. recall and lower cognitive functioning.

4.1.3 Music and I.Q.

The use of music to produce increased cognitive functioning has been investigated by Rauscher, Shaw and Ky (1993). This study investigated the effects of music listening on I.Q. performance. Thirty six college students participated in this study. All subjects were given three sets of standard I.Q. tests after listening to either: 1. Mozart's sonata for two pianos in D Major K488, 2. a relaxation tape or 3. Silence. Immediately following each listening condition, the subjects' spatial reasoning skills were tested using the Stanford-Binet Intelligence scale (Thorndike, Hagen and Sattler, 1986). Results yielded a significant difference for subjects on I.Q. score after listening to Mozart music. The enhancing effect of the music condition was temporary and did not extend beyond 15 minutes. However, the author does speculate about the neuro-physiological priming effects of the music. The debate about the I.Q. enhancing effect of music is unresolved and other authors have reported no difference between experimental conditions in similarly designed studies (Cowan, 1995; Kenealy and Monsef, 1994; Stough, Kerkin, Bates and Mangnan 1994). Although these studies investigate the effects of listening to music and not musical performance, they do illustrate a debate about the influence of music on cognitive functioning which is currently topical.

4.2 Self-Esteem

The observed ceiling effect in the measurement of self-esteem obtained in the first study is also investigated in further detail within this chapter. This experiment modifies the outcome measure employed in chapter 3. Rather than obtaining a global self-esteem measure this study investigates the self-perception of subjects' own Gamelan performance. Although using self-perception of a specific ability prevents generalisation to other life situations this measurement is related to self-esteem. Self-esteem is operationally defined in chapter three as stable personal judgements of worthiness composed of all evaluations an individual makes about the self and therefore relates explicitly to perceptions of self (Pervin, 1986). This assessment is used to investigate if subjects' self-perception of Gamelan ability is related to actual improvements as measured by the musical attainment test.

Self-perception of musical ability was measured using a visual analog question (appendix H). The distance between subjects perception of their own ability to play the Gamelan and that of the workshop facilitator was recorded as the measure of self perceived Gamelan ability.

4.3 The Experimenter Effect

Although the experimenter effect in terms of the researcher/therapist dichotomy was controlled for in the previous study it still remains an issue. The experimenter did attend and participate in all sessions. Consequently, the observed gains could be attributed to artifacts of a developing relationship between the experimenter and subject. In an attempt to investigate the results of the first study in more detail, this second study tries to control for the experimenter effect more stringently by involving a second experimenter in the post-test condition. This second experimenter is unknown to the subjects therefore eliminating the possibility of a developing social relationship influencing the results.

4.4 Experimental Hypothesis

It is suggested that the music intervention group should demonstrate significant improvements in musical ability, self perception, short term memory and communication skills. Secondly it is proposed that these gains will be correlated with each emphasising the influence of the workshop environment on the improvements. This hypothesis will test if the effect of a developing relationship between the experimenter and participants influenced the developments obtained in chapter 3. In addition, it also investigates the development of cognitive functioning as a result of the music intervention (see table 2.2, p.58 for experimental overview).

4.5 Method

4.5.1 Design

This study employed a three group design incorporating pre- and post-test assessment techniques. The experimental group (experimental group 2) received the music intervention while the two control groups (control group 1 and control group 2) received no intervention. Experimental group two is a new experimental group created for the purposes of this chapter's experiment. Control group 1 is the same control group that was utilised in chapter three. This group is a comparison group for the measures of musical ability and communication. Control group 2 is a new control group utilised for comparisons on measures of self-perception and short-term memory.

4.5.2 Participants

The 16 participants utilised in the first study as a control were used as a comparison group in the measure of communication and musical ability and are hereafter referred to as control group one. It is important to note that control group one is only used as a comparison group for these three dependent measures.

Twenty additional participants were randomly selected from the occupational therapy department at Lennox Castle hospital to act as a control group on the short term memory and self-perception measures, and are hereafter referred to as control group two. Due to illness only 19 subjects were post-tested. The chronological

age ranged from 22 to 41 with a mean of 30.45 (S.D.=5.87). The group consisted of 10 males and 9 females. This sampling procedure was employed in order to avoid the significant difference between the control and experimental groups in the pre-test condition observed in the first study.

The experimental group contained twenty subjects in the pre-test condition. Due to illness only 19 individuals (13 males and 6 females) were post-tested and included in the analysis. The chronological age of subjects ranged from 17 to 58 years with a mean age of 40.4 years (S.D=8.41). This group is hereafter referred to as experimental group two.

4.5.3 Assessment Instruments

The following assessment instruments were used to assess the effects of the workshop environment.

- (1) The Elmes test of musical ability: Simple Rhythm Production and Instrumental Rhythm Production Sections.
- (2) The Communication Assessment Profile for Adults with a Mental Handicap, part 2 section 3 (CASP2).
- (3) A visual analog self-perception of musical ability question (appendix H).
- (4) Short term memory test (appendix G).

The pitch perception sub-section of the Elmes test of musical attainment and parts 1 (CASP1) and part 2 section 7 (CASP3) of CASP were not utilised in this study as there were no observed changes in these measures in study one.

4.5.4 Procedure

All subjects were pre-tested on the assessment instruments prior to the workshop period. After the pre-test individuals in the experimental group attended 20 twice weekly workshops. These workshops lasted approximately an hour and were conducted in a similar manner to those in the first study. After the ten weeks of workshops all individuals were post-tested.

4.6 Results

4.6.1 Descriptive Statistics

Table 4.1 displays the descriptive statistics for control group 1 on SRP, IRP and CASP2 measures. This is the same control group utilised in the first experiment.

Table 4.1 Study 2: Descriptive statistics for control group 1 on SRP,IRP and CASP2 measures

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
SRP	9.50	4.70	9.06	7.72
IRP	12.69	6.99	12.50	7.74
CASP2	25.12	3.70	24.56	4.84

SRP - total score on simple rhythm production test
 IRP - total score on instrumental rhythm production
 CASP2 - total score on part one section three CASP

Table 4.2 presents descriptive statistics for control group 2 on short term memory and self-perception measure. As stated in section 4.2 the self perception result was obtained by measuring the difference between the participants' perception of their own Gamelan ability and their perceptions of the workshop facilitator's Gamelan ability. This distance is entered for analysis in millimetres (appendix H). Lower scores on this scale represent a higher self-perception of Gamelan ability while the higher scores represent lower self-perception of Gamelan ability.

Table 4.2 Study 2: Descriptive statistics for control group 2 on short term memory and self-perception measures

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
STM	6.25	2.27	6.315	1.96
SELF PER	104.19	35.30	100.56	31.91

STM - total score on short term memory test
SELF PER - mean difference on visual analogue scale

Table 4.3 Study 2: Descriptive statistics for experimental group two

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
SRP	9.21	4.96	13.84	7.49
IRP	13.15	5.71	20.68	8.63
CASP2	19.57	5.56	24.79	4.25
STM	5.68	51.74	5.92	3.04
SELF PER	92.00	51.74	32.57	34.43

SRP - total score on simple rhythm production test
IRP - total score on instrumental rhythm production
CASP2 - total score on part one section three CASP
STM - total score on short term memory test
SELF PER - mean difference on visual analogue scale

4.6.2 ANOVAs

Five 2x2 ANOVAs were computed with group (experimental/control) as the first independent variable, and point of testing (pre/post) as the second independent variable. The dependent measures were the following: CASP2, SRP, IRP, Short term memory and self perception of musical ability. Significant results are summarised in tables 4.4 - 4.8.

Table 4.4 Study 2: ANOVA SRP summary

EFFECT	MS EFFECT	MS ERROR	F(1,33)	P
Group	87.56	61.04	1.43	.24
SRP	76.39	7.94	9.62	.00
Interaction	111.59	7.94	14.05	.00

The significant interaction effect highlights improvement on musical ability for experimental group two, as measured the SRP sub-section. This improvement is highlighted by experimental group two having a pre-test mean of 9.21 (S.D.=4.69) and a post-test mean of 13.84 (S.D.=7.49) while the control group means remain stable with a mean of 9.50 (4.70) in the pre-test condition and 9.06 (S.D.=7.72) in the post-test condition. The results supports the experimental hypothesis in relation to this measure. Post hoc analysis is presented in table 4.9.

Table 4.5 Study 2: ANOVA IRP summary

EFFECT	MS EFFECT	MS ERROR	F(1,33)	P
Group	325.29	100.08	3.25	.08
IRP	233.90	7.81	29.96	.00
Interaction	258.41	7.81	33.10	.00

The significant interaction effect obtained demonstrates a significant improvement for experimental group two in relation to the IRP sub-section of musical ability. Experimental group two displays a pre-test mean of 13.15 (S.D.=5.71) and a post test mean of 20.68 (S.D.=8.63). The control group exhibits no change in IRP ability highlighted by a pre-test mean of 12.69 (S.D.=6.99) and a post-test mean of 12.50 (S.D.=7.74). This result supports the experimental hypothesis in relation to this measure. Post hoc analysis is presented in table 4.10.

Table 4.6 Study 2: ANOVA CASP2 summary

EFFECT	MS EFFECT	MS ERROR	F(1,30)	P
Group	122.87	38.18	3.21	.082
CASP	93.82	5.44	17.24	.000
Interaction	144.73	5.44	26.60	.000

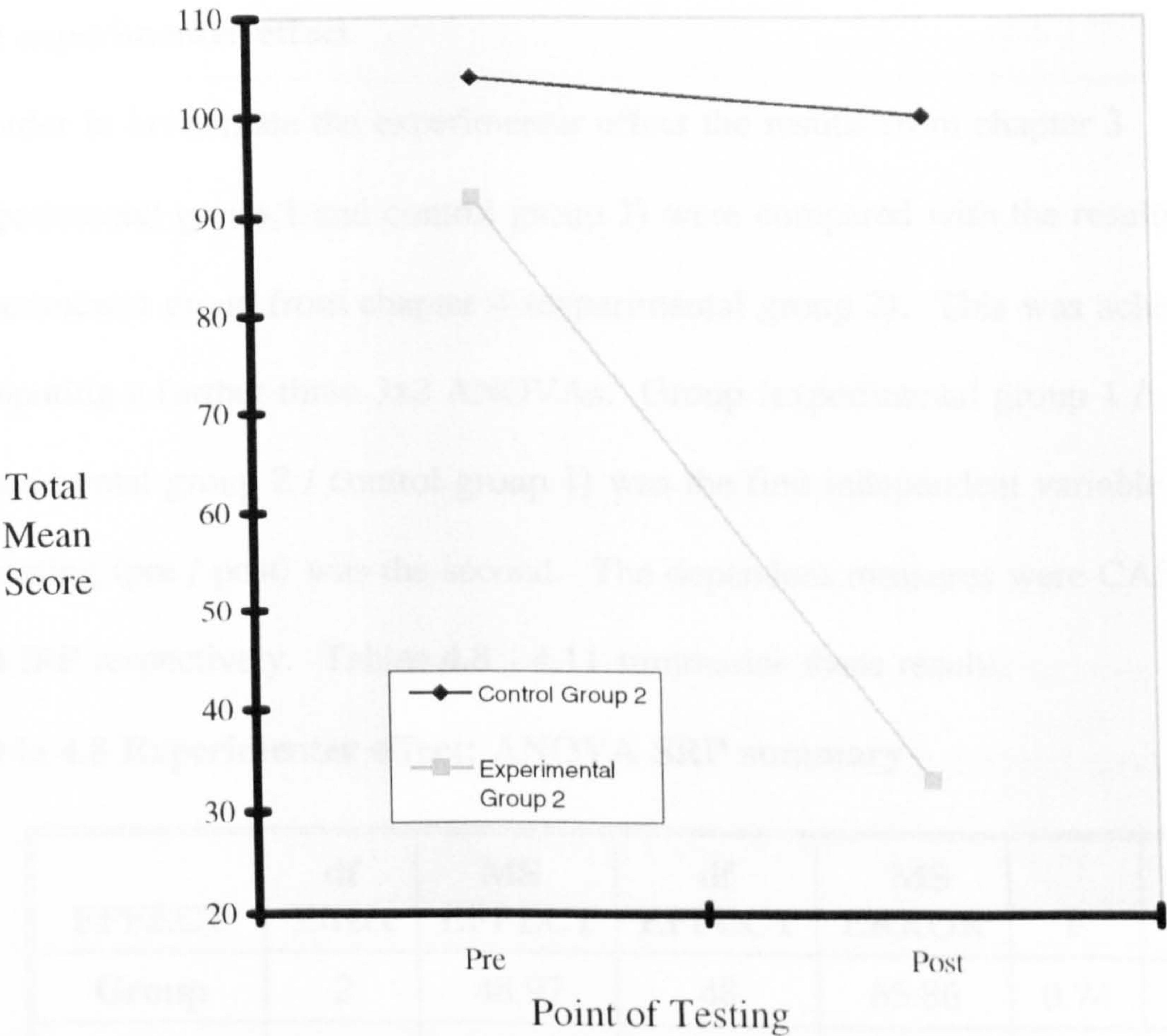
The significant interaction effect obtained on this measure highlights significant improvements on communication for the experimental group while the control group exhibit no change in communication as measured by CASP2. The experimental group displays a pre-test mean of 19.57 (S.D.=5.56) and the post-test mean of 24.79 (S.D.=24.79) while the control group displays a pre-test mean of 25.12 (S.D.=3.70) and a post-test mean of 24.56 (S.D.=4.84). This result supports the experimental hypothesis. Post hoc-analysis is presented in table 4.11.

Table 4.7 Study 2: ANOVA Self-Perception summary

EFFECT	MS EFFECT	MS ERROR	F(1,33)	P
Group	27913.27	2290.48	12.19	.00
SELF PER	17262.01	846.28	20.40	.00
Interaction	13520.18	846.28	15.98	.00

The significant interaction effect highlights that participants' self-perception of Gamelan ability significantly improved after the workshop period while the control group showed no change in Gamelan self-perception. The experimental group displays a pre-test mean of 92.00 (S.D.=51.71) and a post-test mean of 32.57 (S.D.=34.43). The control group displays a pre-test mean of 104.19 (S.D.=35.30) and a post-test mean of 100.56 (S.D.=31.91). A post-hoc Neuman-Keuls analysis revealed significant differences between the means in the post-test condition ($p<.01$). In addition there is a significant difference between the post-test mean of experimental group 2 and the pre-test mean for both experimental group 2 ($p<.01$) and control group 2 ($p<.01$). There were no significant differences between the means at time one. This result supports the experimental hypothesis. This analysis is summarised in figure 4.1

Figure 4.1 Study 2: Self-Perception summary



Short term memory

There were no significant effects on the short term memory measure indicating that both the experimental and control groups showed no change in short term memory after the workshop period. This result does not support the experimental hypothesis.

The experimenter effect

In order to investigate the experimenter effect the results from chapter 3 (experimental group 1 and control group 1) were compared with the results for the experimental group from chapter 4 (experimental group 2). This was achieved by computing a further three 3x2 ANOVAs. Group (experimental group 1 / experimental group 2 / control group 1) was the first independent variable and point of testing (pre / post) was the second. The dependent measures were CASP2, SRP and IRP respectively. Tables 4.8 - 4.11 summarise these results.

Table 4.8 Experimenter effect: ANOVA SRP summary

EFFECT	df Effect	MS EFFECT	df EFFECT	MS ERROR	F	P
Group	2	48.97	48	65.86	0.74	.48
SRP	1	401.56	48	8.49	47.28	.00
Interaction	2	136.91	48	8.49	16.11	.00

To further investigate the nature of the interaction effect Neuman-Keuls post-hoc analysis was computed. These results are summarised in table 4.9.

Table 4.9 Experimenter effect: Neuman-Keuls SRP summary

				Comparison P Value					
Group	Time	Mean	Label	{1}	{2}	{3}	{4}	{5}	{6}
Exp 1	1	5.94	{1}		>.01	>.01	>.01	>.01	>.01
Exp 1	2	13.69	{2}	>.01		>.01	>.01	>.01	.88
CG	1	9.50	{3}	>.01	>.01		.91	.77	>.01
CG	2	9.06	{4}	>0.1	>.01	.91		.88	>.01
Exp 2	1	9.21	{5}	>0.1	>.01	.77	.88		>.01
Exp 2	2	13.84	{6}	>0.1	.88	>01	>.01	>.01	

This table highlights that there are no significant differences between the means of experimental group one (mean=13.69) and experimental group two (mean=13.84) in the post-test condition (p=.88). With an experimenter unknown to the participants in experimental group two, this results suggests that the gains made by experimental group one in chapter 3 can be attributed to the intervention and not the experimenter effect. In addition, there are significant pre-test differences between the means of experimental group one (mean=5.94) and experimental group two (mean=13.84). This results highlights that experimental group two have a significantly higher pre-test score for the SRP measure. In comparison with the control group, both experimental group one and experimental group two display significantly higher scores in the post-test condition (p<.01). Figure 4.2 summarises these trends

Figure 4.2 Experimenter effect SRP summary

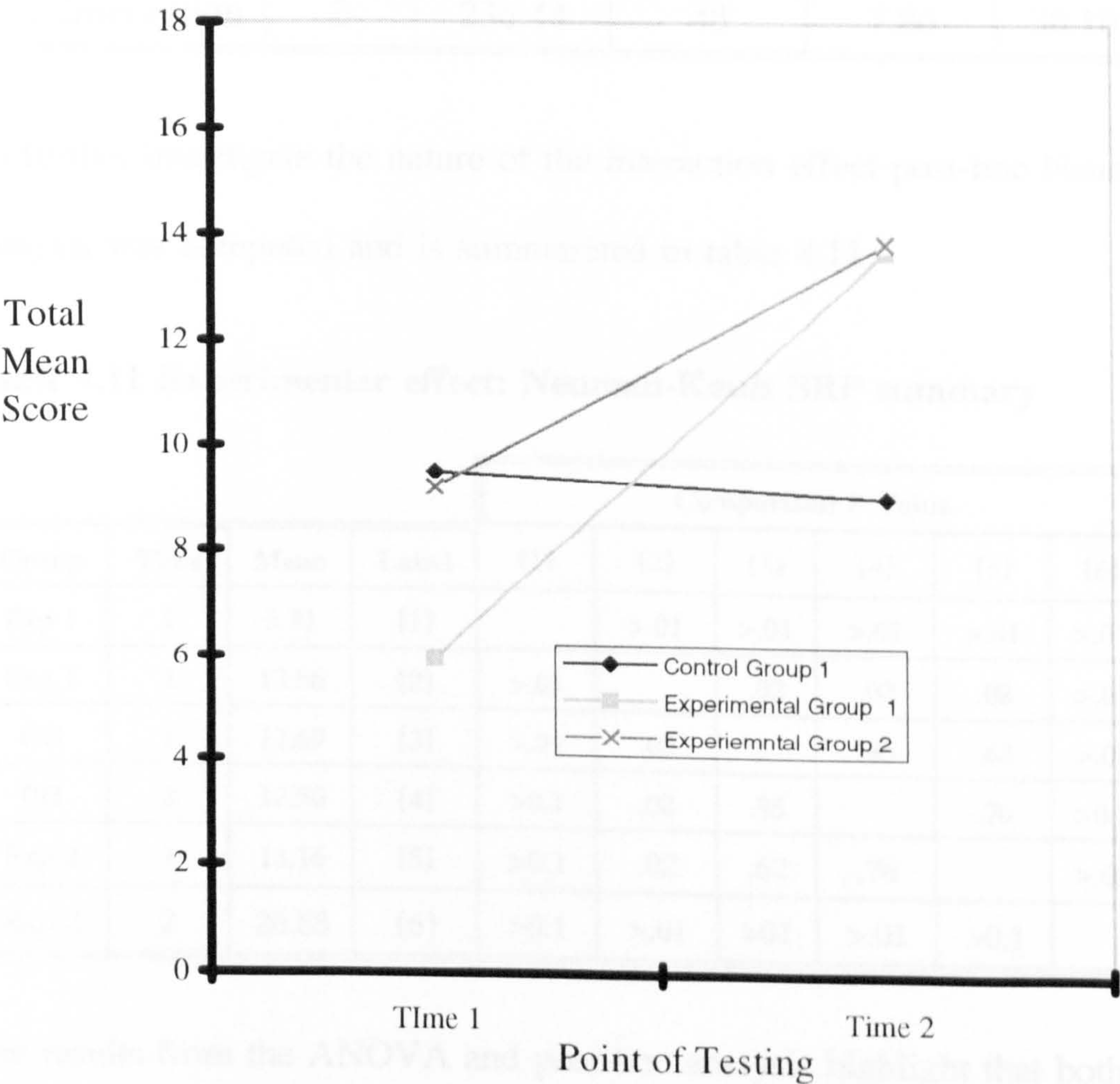


Table 4.10 Experimenter effect: ANOVA IRP summary

EFFECT	df Effect	MS EFFECT	df EFFECT	MS ERROR	F	P
Group	2	385.53	48	78.72	4.90	.001
IRP	1	870.81	48	7.86	110.85	.000
Interaction	2	236.44	48	7.86	30.10	.000

To further investigate the nature of the interaction effect post-hoc Neuman-Keuls analysis was computed and is summarised in table 4.11.

Table 4.11 Experimenter effect: Neuman-Keuls SRP summary

				Comparison P Value					
Group	Time	Mean	Label	{1}	{2}	{3}	{4}	{5}	{6}
Exp 1	1	5.31	{1}		>.01	>.01	>.01	>.01	>.01
Exp 1	2	13.56	{2}	>.01		.02	.02	.02	>.01
CG	1	12.69	{3}	>.01	.02		.85	.62	>.01
CG	2	12.50	{4}	>0.1	.02	.85		.76	>0.1
Exp 2	1	13.16	{5}	>0.1	.02	.62	.76		>.01
Exp 2	2	20.68	{6}	>0.1	>.01	>01	>.01	>0.1	

The results from the ANOVA and post-hoc analysis highlight that both experimental groups 1 and 2 made significant improvements on the SRP measure over the workshop period. With reference to the experimenter effect, there is a significant difference between the means of experimental group 1 (mean=13.56) and experimental group 2 (mean=20.68) in the post-test condition ($p<.01$). There is also a significant difference between the means of experimental group 1 (m=5.31) and

experimental group 2 ($m=13.16$) in the pre-test condition ($p<.01$). This results suggests that although experimental group 2 had significantly higher scores in the pre-test condition, both experimental groups produced gains of similar magnitude in the post-test condition offering evidence that the intervention is primarily responsible for the observed developments. This analysis is summarised in figure 4.3.

Figure 4.3 Experimenter effect IRP summary

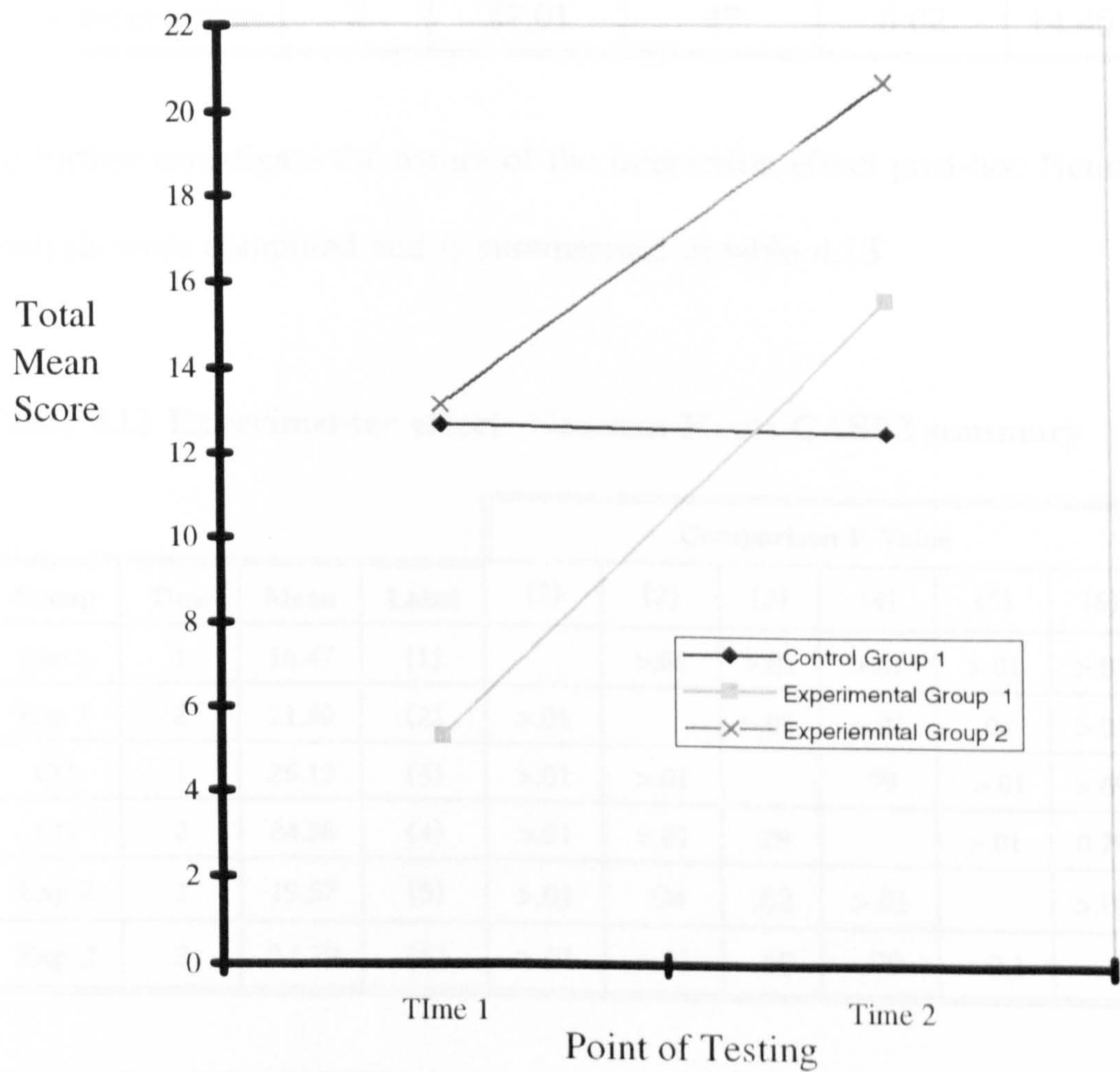


Table 4.12 Experimenter effect: ANOVA CASP2 summary

EFFECT	df Effect	MS EFFECT	df EFFECT	MS ERROR	F	p
Group	2	270.92	47	45.95	5.90	.00
CASP2	1	252.18	47	6.02	41.93	.00
Interaction	2	87.01	47	6.02	14.45	.00

To further investigate the nature of the interaction effect post-hoc Neuman Keuls analysis were computed and is summarised in table 4.13

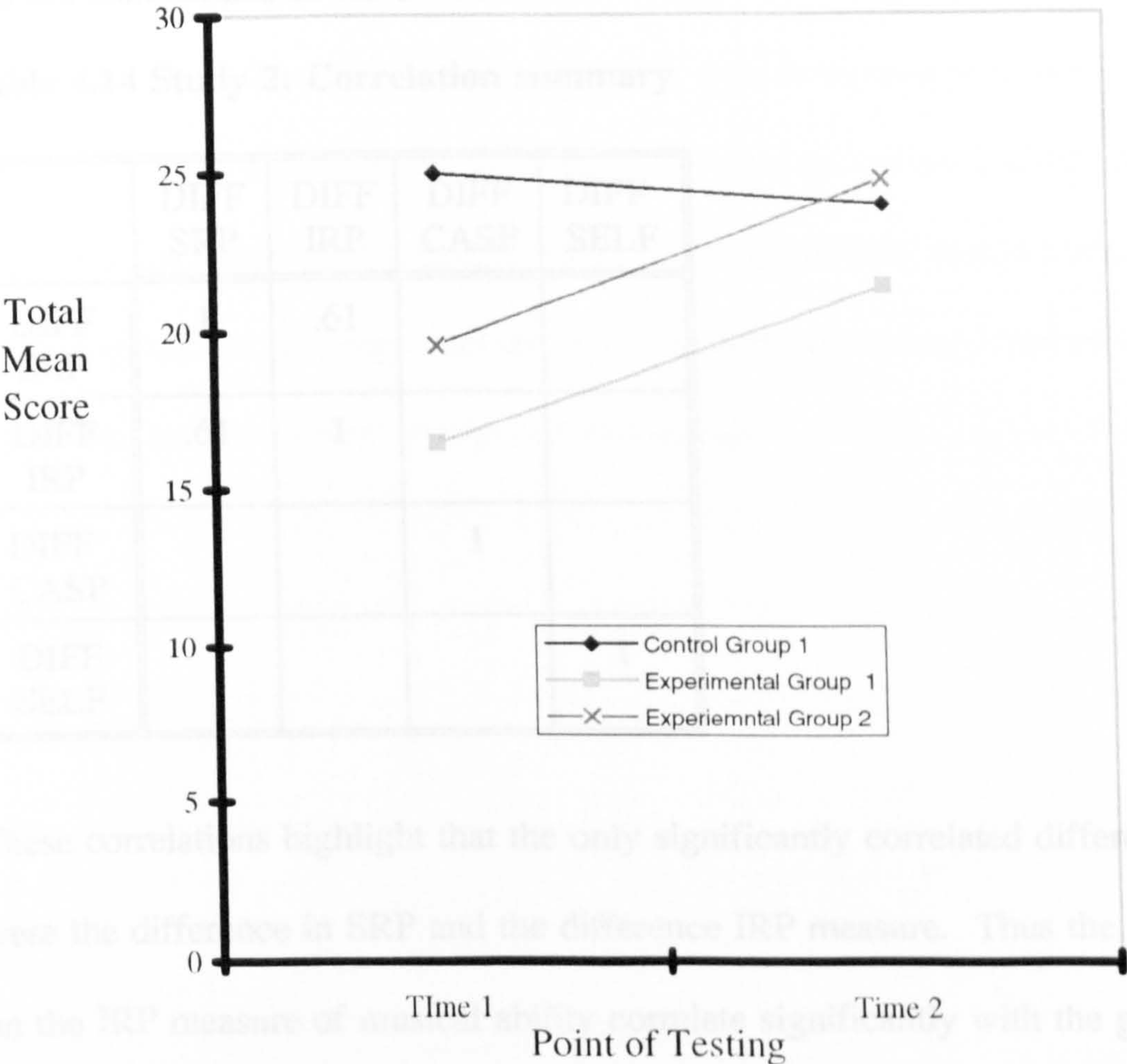
Table 4.13 Experimenter effect: Neuman-Keuls CASP2 summary

				Comparison P Value					
Group	Time	Mean	Label	{1}	{2}	{3}	{4}	{5}	{6}
Exp 1	1	16.47	{1}		>.01	>.01	>.01	>.01	>.01
Exp 1	2	21.40	{2}	>.01		>.01	>.01	.04	>.01
CG	1	25.12	{3}	>.01	>.01		.79	>.01	>.69
CG	2	24.56	{4}	>.01	>.01	.79		>.01	0.79
Exp 2	1	19.57	{5}	>.01	.04	.62	>.01		>.01
Exp 2	2	24.79	{6}	>.01	>.01	.69	.79	>0.1	

The results of the ANOVA and post-hoc analysis reveal that both experimental groups 1 and 2 made significant improvements on the CASP2 communication measure. In addition, the control group display no significant differences between the pre- and post-test means. Similar to the SRP measure, there were significant differences between experimental groups 1 and 2 at pre-test ($p<.01$) but not at post-

test. With experimental group 1 having a pre-test mean of 16.47 and a post-test mean of 21.40 and experimental group two having a pre-test mean of 19.57 and a post-test mean of 24.79 the gains made appear larger for experimental group 1. This results is further investigated in section 4.6.4. This analysis is summarised in figure 4.4.

Figure 4.4 Experimenter effect CASP2 summary



4.6.3 Correlations

New variables, summarising the change in scores between the pre- and post-test condition, were created by subtracting the pre test score from the post test score for all variables. Spearman rank order correlations were calculated for these variables and are summarised in table 4.13.

Table 4.14 Study 2: Correlation summary

	DIFF SRP	DIFF IRP	DIFF CASP	DIFF SELF
DIFF SRP	1	.61		
DIFF IRP	.61	1		
DIFF CASP			1	
DIFF SELF				1

These correlations highlight that the only significantly correlated difference scores were the difference in SRP and the difference IRP measure. Thus the gains made on the IRP measure of musical ability correlate significantly with the gains made on the SRP measure. In addition, the gains in communication do not correlate with the gains made in musical ability. This result does not support the experimental hypothesis.

4.6.4 *t*-tests

In order to investigate the experimenter effect in more detail the difference score for each variable was compared between experimental groups 1 and 2 using three independent *t*-tests. The gains scores on IRP for experimental group 1 were compared with the gains scores on IRP for experimental group 2. Likewise the gain scores on IRP for experimental group 1 were compared with the gains scores on IRP for experimental group 2. Finally, the gain scores on CASP2 were compared for experimental groups 1 and 2. No significant results were obtained indicating that the developments made by experimental group 1 are similar in magnitude to those made by experimental group 2.

4.7 Discussion.

The purpose of this study was to investigate the effects of the music workshop environment across musical, communication, short term memory and self-perception measures. The experimental design removed the possibility of an experimenter effect by utilising an experimenter who was unknown to the subjects in the post-test condition.

4.7.1 *Significant Improvements*

Similar to experimental group one from chapter three, the intervention produced significant improvements in musical ability and communication skills in experimental group 2. Furthermore the intervention also produced significant improvements in self-perception of Gamelan ability. These improvements offer evidence supporting the efficacy of the intervention.

Although the results follow a similar trend to those obtained in the first experiment there were some differences. In particular there were significant differences between experimental group 1 and experimental group 2 on several pre-test and post-test measures. Specifically, experimental group 2 had significantly higher scores on SRP ($p < .01$) indicating that this group were able to reproduce the rhythm clapped by the experimenter to a higher standard than experimental group 1. There were also significant differences between experimental group 1 and 2 on the IRP measure both in the pre-test condition ($p < 0.1$) and the post-test condition ($p < 0.1$)

indicating that experimental group 2 were able to reproduce the rhythms played by the experimenter on the Saron (part of the Gamelan) to a higher standard at both time one and time two. A similar trend was observed with the CASP2 measure. Experimental group two displayed significantly higher scores at time 1 ($p<.01$) and at time 2 ($p<.01$) on this measure indicating that experimental group two were significantly better at communicating as measured by CASP2.

Thus, there appears a general trend in the results, with experimental group 2 displaying significantly higher scores on the outcome measures in comparison to experimental group 1. One explanation for this difference may lie in the sampling technique. There are over 200 individuals attending the occupational therapy department at Lennox Castle hospital (where the participants were sampled from). With approximately 20 individuals in each of the experimental and control groups significant differences in baseline scores might be expected. However, although significant differences exist between all the groups on baseline measures only the participants in the music intervention groups display improvements on the outcome measures. This trend offers evidence that the intervention is primarily responsible for these developments.

4.7.2 The Experimenter Effect

A main focus of this second study was to investigate the possible confounding influences of the experimenter effect. Experimental group two displayed significant improvements in the outcome measures even though the experimenter in the post-test condition was unknown to the subjects. This offers evidence that the developing relationship between participants and researcher was not influential in producing the observed developments. There was, however, a small difference between the two groups with experimental group 1 displaying greater but insignificant improvements across the outcome measures in comparison to experimental group 2. One explanation of this may be that a component of the gains was influenced by the experimenter effect. However, given that this difference is insignificant, it can be concluded that the most influential components of the gains are certain aspects of the workshop environment. For example, the experience of participating in group activities which offer opportunities for co-operation and enjoyment may be an influencing factor. Alternatively there may be some feature of music participation which facilitates these developments. This issue is further developed in chapter 5 where the group aspects of the experience are isolated from the musical features.

4.7.4 Self-Perception

There were significant improvements in participants, self-perception of their Gamelan ability. This result suggests that following the music workshops the participants believed that they had improved in their ability to play the Gamelan. However, there was no significant correlation between their self-perception of Gamelan ability and any of the other observed developments. For example, gains made on the IRP measure (measure of Gamelan ability) did not correlate with participants' self-perception of Gamelan ability. One explanation of this result is that the self-perception measure is not an objective measure of Gamelan ability but rather an indication of an individual's subjective impression of their ability. The subjective nature of this measure can explain the insignificant correlations with the other gains scores in that the subjective perception of improvement may not be related to the object measure of improvement.

4.7.4 Insignificant Correlations.

The only gains scores that are significantly correlated are the gains in SRP and IRP ($r=.61$), suggesting that developments in being able to clap a rhythm as played by the experimenter are associated to developments in being able to reproduce a rhythm on the saron as played by the experimenter. This result is not surprising given the similarity between the two tasks. However, neither of the two musical gain scores correlate with the gains in communication as measured by CASP2.

This is in contrast to the results obtained in chapter 3 for experimental group 1

where SRP and CASP2 were correlated ($r=.59$) and IRP and CASP2 were correlated ($r=.67$).

4.7.5 Short Term Memory

There were no significant changes in short term memory for both the control and the experimental groups. This result offers evidence that cognitive developments leading to an improvement in short term memory are not taking place as a result of the intervention. However, other researchers have provided evidence for an improvement in cognitive functioning as a result of a music intervention (Rauscher et al, 1994). The present study supports arguments presented by Cowan, (1995) Kenealy and Monsef (1994) and Stough et al (1994) who reported no improved cognitive functioning as a consequence of a music intervention. There still remains a possibility that a cognitive mechanism other than that involved in short term memory is influential in these gains.

4.8 Conclusions

In conclusion, the results of this study support the efficacy of the intervention. However, there were no developments in short term memory suggesting that the gains are not mediated by a cognitive mechanism influencing short term memory. The influential features of the workshop environment are important directions for future research, and this issue is investigated in more detail in chapter 5.

CHAPTER FIVE

AN INTERVENTION CONTROL GROUP INVESTIGATION

This chapter presents the third study of this thesis and investigates influential components of the music intervention. This is achieved by separating the musical aspects of the workshop environment from the social aspects. A group of individuals with mild or moderate learning difficulties participated in group activities that did not involve music. These activities were group cooking or art classes. The subjects' self-perception and communication skills were assessed using the same techniques as for the participants in the music workshops in previous chapters.

5.1 Investigating the Music Intervention Process.

Results from previous chapters have suggested that the music intervention is primarily involved in the reported improvements in communication and musical ability. A crucial research issue must now investigate what aspects of the workshop environment are influential in producing these developments. There are two possible explanations. One is that the group and inter-personal dynamics involved in the workshops help facilitate these gains. A second suggests that something explicitly musical is facilitating these developments.

This research question has similarities with issues raised by Bunt and Hoskyns (1987). Chapter two outlines that these authors believe an important function of research within this field is to investigate the process of music therapy: specifically, to identify features of a music intervention which produce benefits for individuals involved. Radhakishnan (1991) asserts that this issue has not been investigated from an empirical perspective. Bunt and Hoskyns (1987) are in agreement with this opinion stating that previous literature (Alvin, 1971; Nordoff and Robins, 1971) focuses on the expressive and emotional aspects of musical experience without offering any evidence that these features are influential in producing the suggested benefits for individuals participating in music therapy. In an attempt to respond to these criticisms of existing research this chapter empirically investigates the process involved in music interventions.

The music intervention process contains two broad sets of variables that may be influential in producing the observed developments. The first set of variables are interpersonal or group variables. Aspects of the workshop environment such as mutual co-operation and goal directed group communication are possible explanations for the observed developments. The music workshop activities focus on every member of the workshop group participating musically to produce cohesive music in both sound and structure. This set of variables has been largely ignored by previous authors

The second set of variables that may be influencing the efficacy of the workshop is explicitly musical. That is, the workshop environment allows for musical experiences such as self-expression, musical creativity and aesthetic awareness which prove rewarding for the participants. These rewarding experiences may act as a catalyst in the observed developments. It is these musical aspects of the experience that previous authors (Alvin 1978, Nordoff and Robins; 1971) have suggested as the influential factors in music interventions.

5.2 Isolating Two Sets of Variables.

Given that two discrete sets of influencing variables have been suggested this study isolates these variables by utilising activities that have similar group dynamics to the music intervention without any musical experience. The cooking and art classes involved in this study were focused on group co-operation and goal directed behaviour in terms of cooking a meal or producing a completed piece of artwork. Thus the group aspects of the music workshops have been retained while the musical variables have been removed.

5.3 Experimental hypothesis.

There is no predicted trend for the results within this chapter. However based upon the results from chapters three and four this study investigates a specific research question: What are the influencing factors in the workshop environment?

5.4 Method

5.4.1 Design

This study utilised a three group design employing pre- and post-testing assessment techniques. One group participated in art classes (control group 3a) and a second participated in cooking classes (control group 3b). The results from the experimental group in chapter 4 (experimental group two), were used as comparison results for control groups 3a and 3b (see table 2.2, p.58 for experimental overview).

5.4.2 Participants

24 Subjects were randomly selected from the Occupational Therapy department at Lennox Castle hospital. Twelve subjects were allocated to the cooking classes and twelve subjects were allocated to the art classes. The chronological age range for the cooking group was 25-42 with a mean age of 37.6 (S.D.= 6.12). The chronological age range for the art group was 29-43 with a mean age of 36.1 (S.D.= 7.01).

5.4.3 Apparatus

The following assessment instruments were used to assess the self perception and communication skills of individuals in both control groups.

(a) Visual analog self-perception scale. The question related specifically to the tasks involved in the classes, i.e. the cooking class were asked about their cooking skills (appendix I) while the art class were asked about their art skills (appendix J).

(b) Part two section three (CASP2) from The Communication Assessment Profile for Adults with a Mental Handicap.

5.4.4 Procedure

All subjects were tested on communication skills and self-perception before the ten weeks of workshop.

(i) Art group

This group met once a week for approximately one hour. There were two groups of six individuals with one occupational therapist being present in each group.

Each group worked together on a separate piece of work. This was a large painting (10m X 5m) which would be worked on over the ten weeks.

(ii) Cooking group

This group also met once a week for ten weeks with two sub groups containing six individuals. The cooking class lasted approximately two hours with one occupational therapist being present for each group. Each week the groups would prepare and eat a meal together.

After the ten week period all individuals were re-tested on the assessment instruments. Results from the experimental group in the previous chapter were incorporated into the analysis to provide a comparison group.

5.5 Results

5.5.1 Descriptive Statistics

Tables 5.1 and 5.2 presents the means and standard deviations for art and cooking classes (control groups 3a and 3b).

Table 5.1 Cooking class: Descriptive statistics

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
CASP2	15.38	1.78	15.46	7.01
SELF PER	74.08	17.10	47.85	17.27

CASP2 - total score on part one section three CASP
SELF PER - mean difference on visual analog scale

Table 5.2 Art class: Descriptive statistics

	PRE-TEST		PRE-TEST	
	MEAN	S.D.	MEAN	S.D.
CASP2	15.17	2.82	15.50	2.50
SELFPER	88.75	28.84	42.91	18.64

CASP2 - total score on part one section three CASP
SELF PER - mean difference on visual analog scale

Table 5.3 presents relevant descriptive statistic from experimental group 2.

Table 5.3 Experimental group two: Descriptive statistics

	PRE-TEST		POST-TEST	
	MEAN	S.D.	MEAN	S.D.
CASP2	19.57	5.56	24.79	4.25
SELF PER	92.00	51.74	32.57	34.43

CASP2 - total score on part one section three CASP

SELF PER - mean difference on visual analogue scale

5.5.2 ANOVAs

A 2x2 ANOVA was calculated with Group (cooking/art) as the first independent variable and point of testing (pre/post) as the second independent variable. The dependant variables were pre- and post-test scores on CASP2. No significant differences were found between the groups or over the two testing times. A second ANOVA with self perception as the dependent variable produced similar non-significant results. With both these groups showing no significant differences they were combined and entered together in further analysis.

Two 2x2 ANOVAs were computed with group (experimental2/cookingart) the first independent variable and point of testing (pre/post) the second independent variable. The dependant measures were CASP score and self perception. Results are summarised in tables 5.4 - 5.7

Table 5.4 Experimental group 2 and cooking/art group: ANOVA Self-perception summary

Effect	MS Effect	MS Error	F(1,42)	p
Group	22.05	1198.94	.018	.89
TIME	39422.80	744.38	52.96	.00
Interaction	6014.66	744.38	8.01	.01

This table displays a significant main effect for time in addition to a significant interaction effect. The significant interaction effects suggests that the self-perception of the two groups are differentially affected between the pre- and post-test conditions. Post-hoc Neuman-Keuls analysis further investigated the nature of the interaction effect. These results are summarised in table 5.5

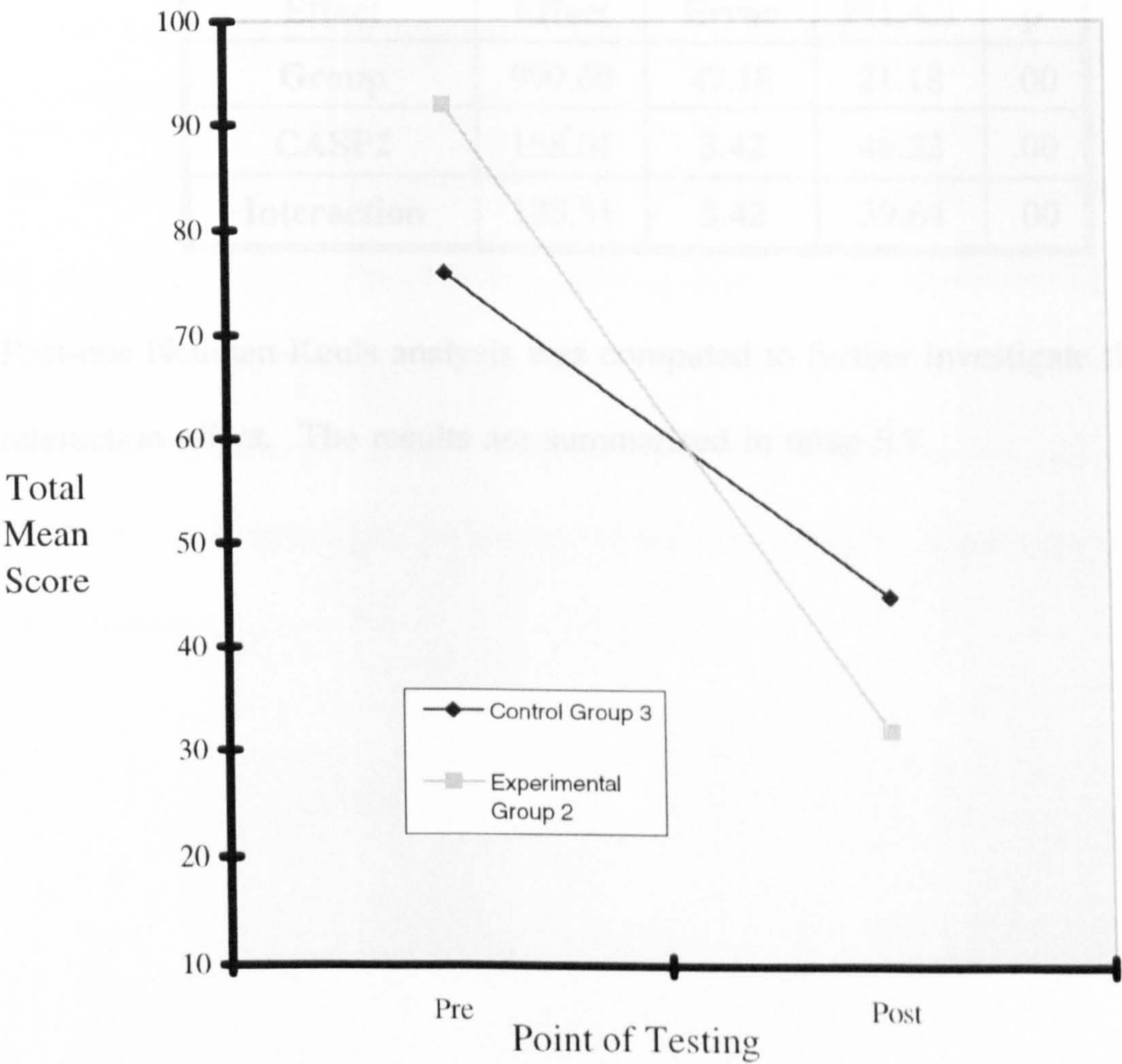
Table 5.5 Experimental group 2 and cooking/art group: Neuman-Keuls

Self-perception summary

				Comparison P Value			
Group	Time	Mean	Label	{1}	{2}	{3}	{4}
Exp 2	1	92.00	{1}		>.01	.07	>.01
Exp 2	2	32.57	{2}	>.01		>.01	.04
Cooking/Art	1	76.32	{3}	.07	>.01		>.01
Cooking/Art	2	45.28	{4}	>.01	.04	>.01	

This table highlights that there is no significant difference between the means in the pre-test condition. Significant group effect highlights that both experimental group two and the cooking/art group display significant improvements in self-perception after the ten week period. However the non-significant group effects demonstrate that there was no difference between the groups in their self-perception. The Neuman-Keuls analysis reveals that the interaction effect is obtained due to experimental group 2 displaying a greater improvement in self-perception than the cooking/art control group. Figure 5.1 summarised this analysis.

Figure 5.1 Experimental group 2 and cooking/art group: Self-Perception summary



**Table 5.6 Experimental group 2 and cooking/art group: ANOVA CASP2
summary**

Effect	MS Effect	MS Error	F(1,42)	p
Group	999.60	47.18	21.18	.00
CASP2	158.01	3.42	46.22	.00
Interaction	135.51	3.42	39.64	.00

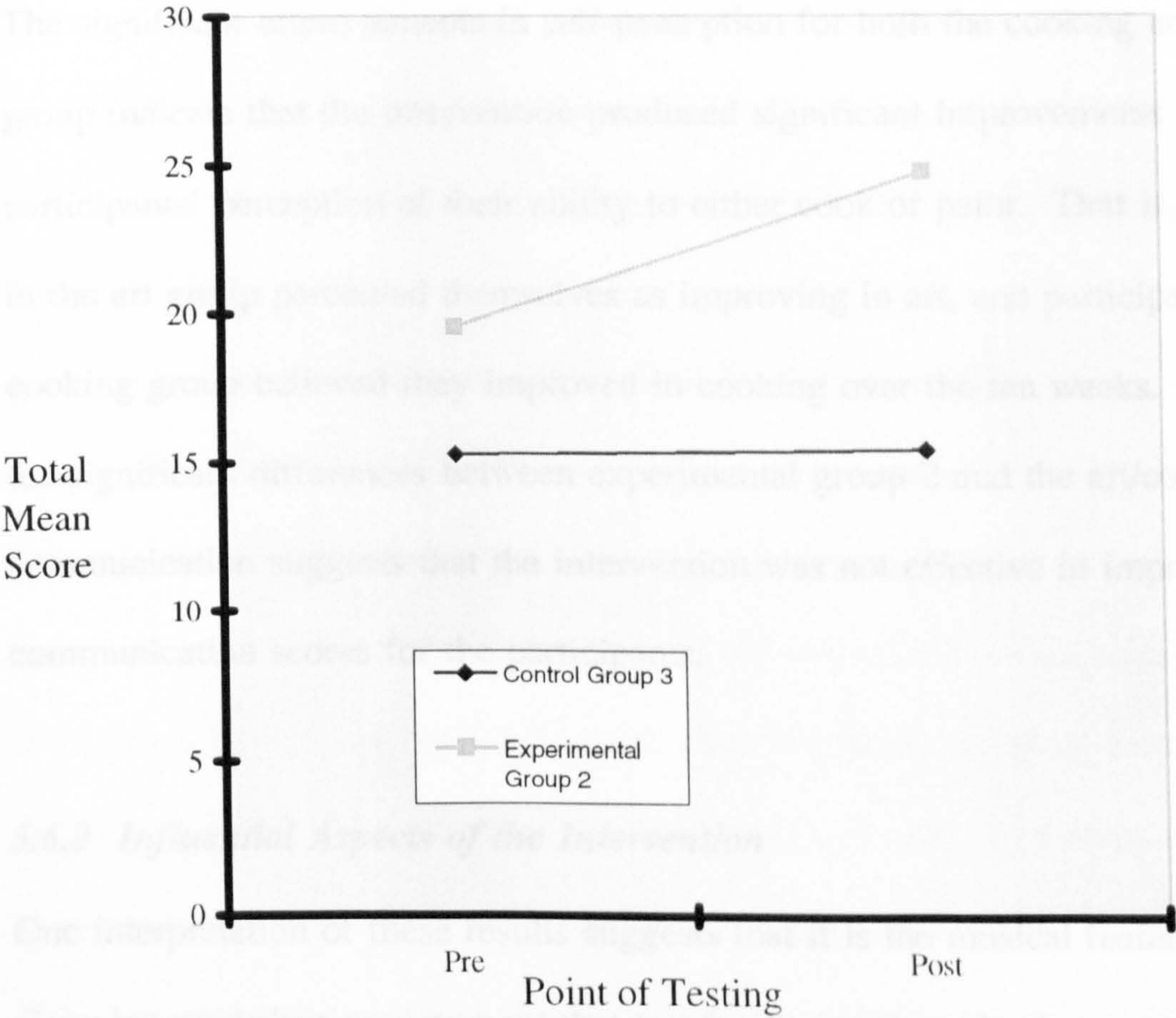
Post-hoc Neuman-Keuls analysis was computed to further investigate the interaction effect. The results are summarised in table 5.7

Table 5.7 Experimental group 2 and cooking/art group: Neuman-Keuls
CASP2 summary

				Comparison P Value			
Group	Time	Mean	Label	{1}	{2}	{3}	{4}
Exp 2	1	19.58	{1}		>.01	.07	>.01
Exp 2	2	24.79	{2}	>.01		>.01	.04
Cooking/Art	1	15.28	{3}	>.01	>.01		.70
Cooking/Art	2	15.48	{4}	>.01	>.01	.70	

The results reveal main effects for both group and CASP2 score combined with an interaction effect. The post-hoc analysis demonstrates that experimental group two had significantly higher communication scores at the pre-test level. In addition, experimental group 2 display a significant increase in CASP2 scores while the cooking/art group show no significant change. These results are summarised in figure 5.2

**Figure 5.2 Experimental group2 and cooking/art group:
CASP2 summary**



5.6 Discussion

5.6.1 *Initial trends*

The purpose of this study was to further investigate the variables that influence the efficacy of the music workshop intervention by isolating the group and interpersonal variables from the musical influences.

The significant improvements in self-perception for both the cooking and the art group indicate that the intervention produced significant improvements in the participants' perception of their ability to either cook or paint. That is, subjects in the art group perceived themselves as improving in art, and participants in the cooking group believed they improved in cooking over the ten weeks. However, the significant differences between experimental group 2 and the art/cooking on communication suggests that the intervention was not effective in improving communication scores for the participants.

5.6.2 *Influential Aspects of the Intervention*

One interpretation of these results suggests that it is the musical features of the Gamelan workshop environment that has facilitated the gains in communication since these communication development are not evident in individuals who participated in the cooking/art groups. This interpretation would suggest that authors such as Alvin (1971) and Nordoff and Robbins (1971) are correct in their assertions concerning the nature of the music therapy process, in that the

experience of musical participation allows for freedom of expression and emotional creativity that facilitate certain communication developments. Thus the experience of performing music contains certain features that are not found in the other activities.

5.6.3 Confounding Variables

This interpretation of the results is not free from error due to certain experimental limitations of this study. Although the inter-personal and group dynamics were similar for the cooking/art groups and the music groups they were not identical. The music workshops and were facilitated by a professional musician trained to work musically with this client group. The group also left the hospital where they were living to attend the workshops. The workshops were a continual focus of attention for the participants with carers and key workers commenting on the importance of the workshops for participants. In comparison the cooking/art classes took place in the occupational therapy department in the hospital and facilitated by the occupational therapists who were in contact with many of the clients on a daily basis. Thus the experience of the cooking/art classes was not as excitingly different for the participants as the music group activities.

5.6.3 Directions for Future Research

In order to overcome these limitations future research should seek to investigate activities similar to music participation that provide an environment closer to those found in music workshops. For example, an individual specialising in art therapy could organise group art classes taking place outside the hospital environment.

Another possible avenue for future research investigating the process of music therapy would be to isolate the group activities from the musical variables. For example, do music classes that are one-to-one confer the same communicative developments as group music activities?

5.7 Conclusions

In response to criticisms of existing research literature by Bunt and Hoskyns (1987) and Radhakishnan (1993) this study investigated the specific features of a music intervention which influence the outcome. Although the results suggest that the experience of music participation offer opportunities for communication developments not found in other activities, various design limitations must be taken into account. Future research investigating these issues must control environmental variables more stringently.

CHAPTER SIX

A LONGITUDINAL INVESTIGATION

6.1 Overview

An important issue for researchers investigating the efficacy of music interventions is to identify whether any gains made during and immediately after an intervention remain following an extended period of time (Radhakishnan, 1991). This study investigates whether the developments made by experimental group 1 in chapter three remained six months following the completion of workshops. In the intervening period the individuals had received no music intervention.

6.2 Hypothesis

It is suggested that the developments in musical ability and communication obtained in study one will still be in evidence six months after completion of workshops.

6.3 Method

6.3.1 Design

This longitudinal investigation contained one group who were tested at three different time intervals. This group was experimental group one, the experimental group from chapter three (see table 2.2, p.58 for experimental overview).

6.3.2 Participants

Twelve of the original 16 individuals in experimental group 1 were re-tested on musical ability and communication 6 months after completion of study one. In the intervening period no music interventions had been undertaken by any individuals in the group. The remaining four individuals were not contactable during this phase of the study and therefore only data for the 12 subjects were entered for analysis. The group contained 7 males and 5 females with a chronological age range from 23 to 58 years, with a mean age of 41.67 (S.D.=11.60).

6.3.3 Apparatus

The following assessment instruments were used to assess participants' musical ability and communication skills.

(i) IRP and SRP tests of musical ability

(ii) The Communication Assessment Profile for Adults with a Mental Handicap

section 1 part 3 (CASP2)

6.3.4 Procedure

Six months after completion of workshops 12 individuals from experimental group were re-tested on musical ability and communication skills.

6.4 Results

6.4.1 Descriptive Statistics

Descriptive statistics for the 12 individuals in experimental group one who were re- tested over the three experimental testing periods are presented in table 6.1

Table 6.1 Longitudinal study: Descriptive statistics

	POINT OF TESTING					
	TIME 1		TIME 2		TIME 3	
	MEAN	S.D	MEAN	S.D	MEAN	S.D
SRP	4.33	2.13	12.08	6.45	12.50	4.01
IRP	4.83	2.01	14.92	4.87	13.17	5.12
CASP2	15.18	4.91	19.91	6.12	18.36	4.05

- SRP - total score on simple rhythm production test
- IRP - total score on instrumental rhythm production
- CASP2 - total score on part one section three CASP

6.4.2 ANOVAs

3 one way repeated measures ANOVAs with respective dependant variables (SRP,IRP,CASP2), all with three levels (time1 time2 time3), were computed.

Results are summarised in table 6.2

Table 6.2 Longitudinal study: ANOVA SRP summary

Effect	MS Effect	MS Error	F(2,22)	p
TIME	253.86	10.80	23.50	<.01

This table highlights a significant main effect for time suggesting that experimental group one displays significantly different SRP scores over the three assessment times. A post-hoc Neuman-Keuls test was computed to further investigate the main effect for time and is summarised in table 6.3.

Table 6.3 Longitudinal study: Neuman-Keuls SRP summary

			Comparison P Value		
Time	Mean	Label	{1}	{2}	{3}
1	4.33	{1}		>.01	>.01
2	12.08	{2}	>.01		.76
1	12.50	{3}	>.01	.76	

The ANOVA displays a significant main effect for time over the three test periods. However the post-hoc analysis highlights that this main effect is explained by significant differences between time 1 (mean=4.33) and time 2 (mean=12.08, $p<.01$) on the SRP measure. There are no significant differences between time 2 and 3 ($p=.76$). This result suggests that the developments in simple rhythm production observed at time 2 remain at time 3. This analysis is summarised in Figure 6.1

Figure 6.1 Longitudinal study: SRP summary

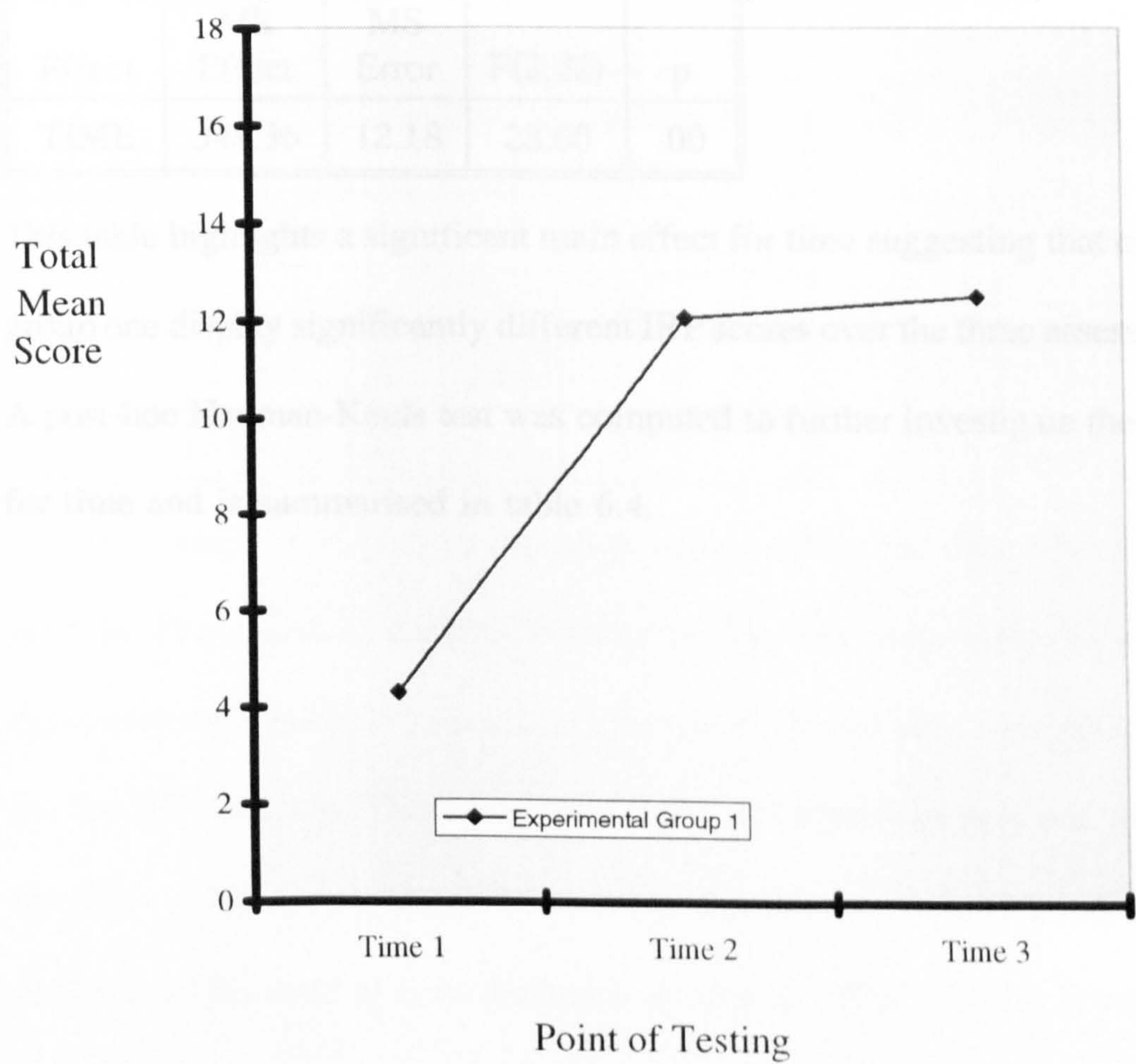


Table 6.4 Longitudinal study: ANOVA IRP summary

Effect	MS Effect	MS Error	F(2,22)	p
TIME	348.36	12.18	28.60	.00

This table highlights a significant main effect for time suggesting that experimental group one display significantly different IRP scores over the three assessment times. A post-hoc Neuman-Keuls test was computed to further investigate the main effect for time and is summarised in table 6.4.

Table 6.5 Longitudinal study: Neuman Keuls IRP summary

			Comparison P Value		
Time	Mean	Label	{1}	{2}	{3}
1	4.83	{1}		>.01	>.01
2	14.92	{2}	>.01		.23
1	13.17	{3}	>.01	.23	

The IRP ANOVA displays a significant main effect for time over the three test periods. The post-hoc analysis highlights that this main effect is explained by significant differences between time 1 (mean=4.83) and time 2 (mean=14.92, $p<.01$) for the IRP measure. There are no significant differences between times 2 and 3 ($p=.23$). This result suggests that the developments in instrumental rhythm production observed at time 2 remain at time 3. This analysis is summarised in Figure 6.2.

Figure 6.2 Longitudinal study: IRP summary

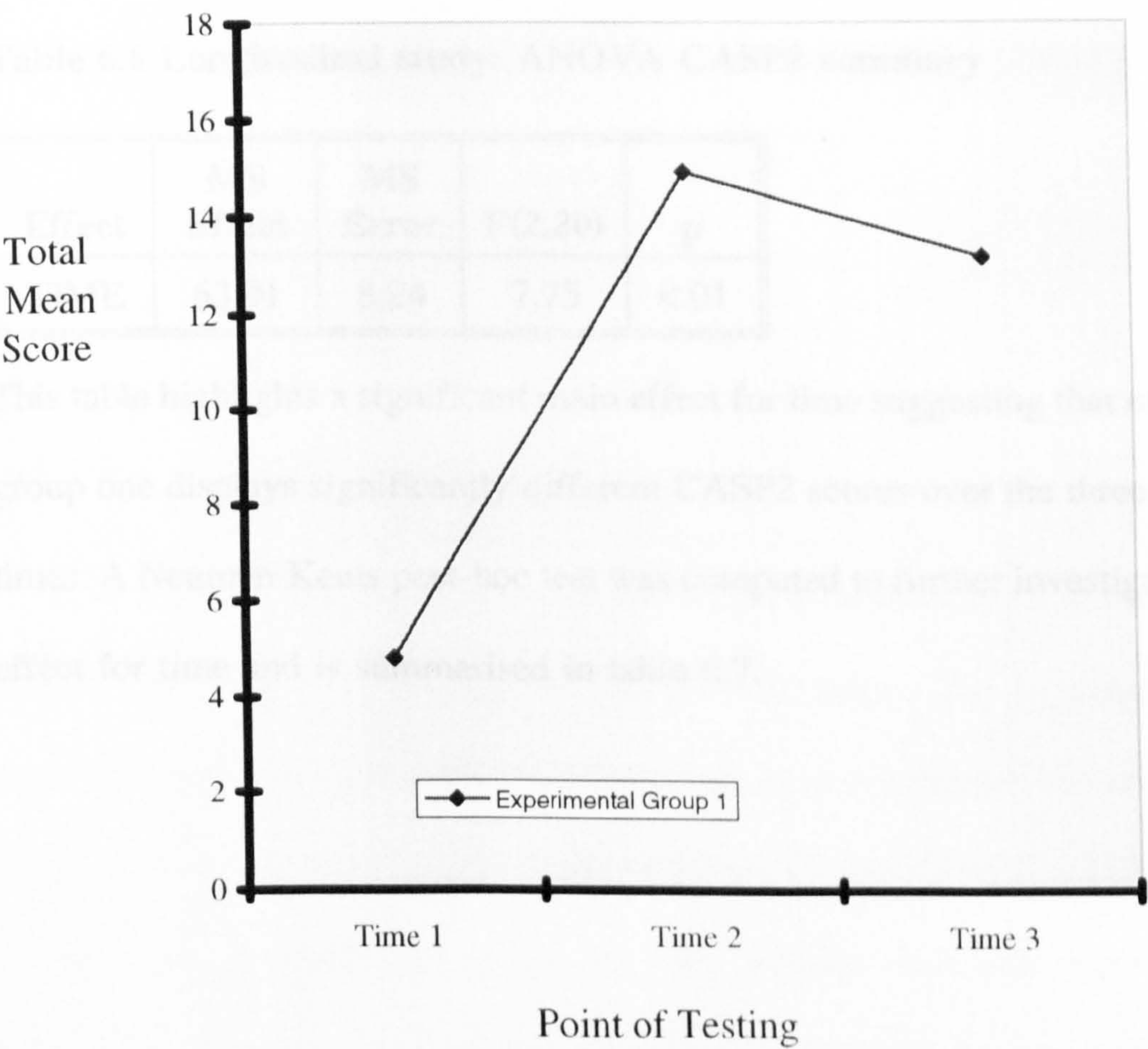


Table 6.6 Longitudinal study: ANOVA CASP2 summary

Effect	MS Effect	MS Error	F(2,20)	p
TIME	63.91	8.24	7.75	<.01

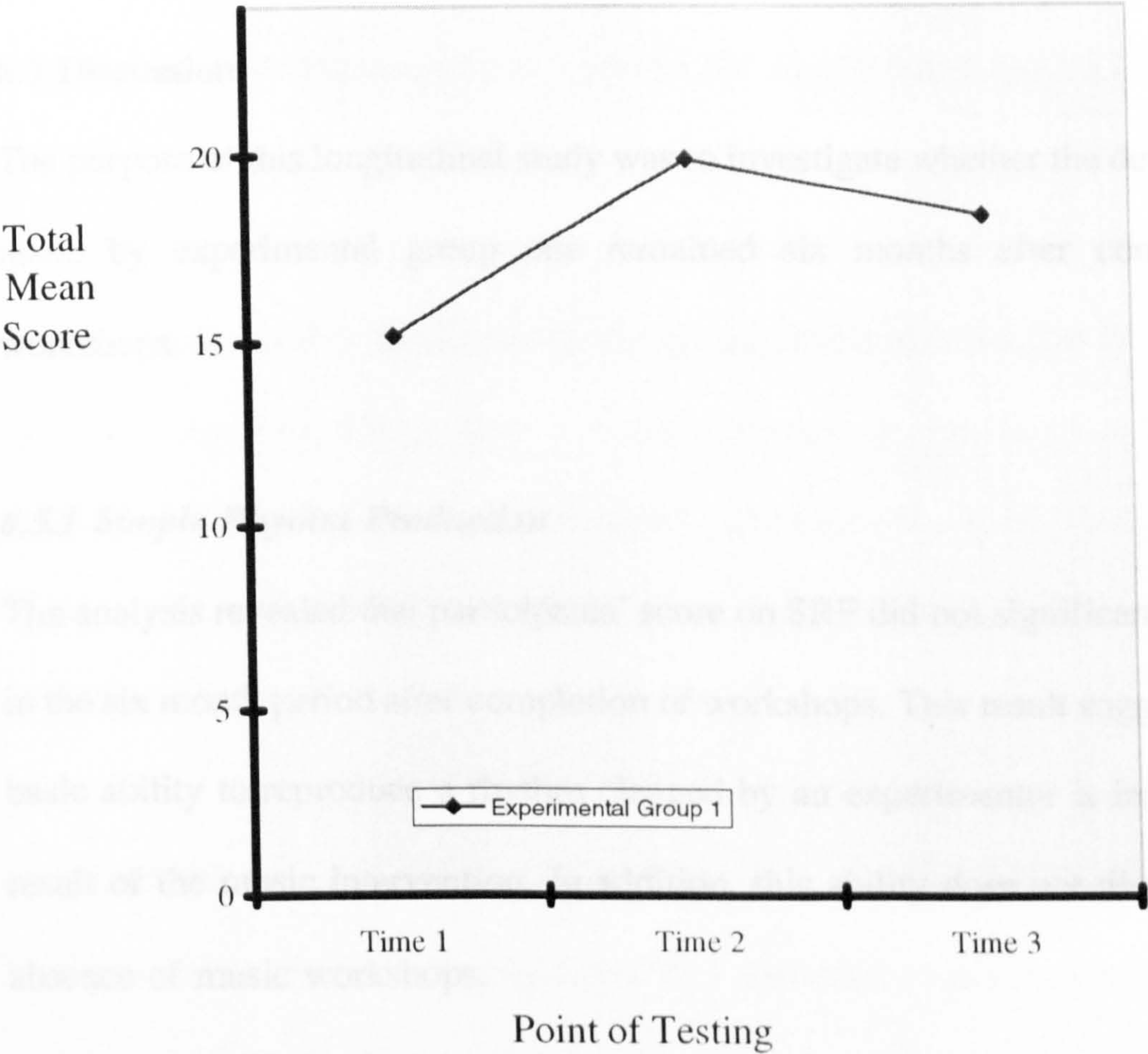
This table highlights a significant main effect for time suggesting that experimental group one displays significantly different CASP2 scores over the three assessment times. A Neuman-Keuls post-hoc test was computed to further investigate the main effect for time and is summarised in table 6.7.

Table 6.7 Longitudinal study: Neuman-Keuls CASP2 summary.

			Comparison P Value		
Time	Mean	Label	{1}	{2}	{3}
1	15.18	{1}		>.01	.02
2	19.91	{2}	>.01		.22
3	18.36	{3}	.02	.22	

The trend of the results obtained for the CASP2 measure differs from the results obtained for the two measures of musical attainment. The significant effect for time over the 3 testing periods is explained by a significant increase in CASP2 scores between time 1 (mean=15.18) and time 2 (mean=19.91, $p<.01$). There is a slight, but insignificant drop in the results between time 2 and 3 (mean=18.36, $p=.22$). In addition, the difference between the results for time 1 and time 3 approaches significance at the .01 level ($p=.02$). This suggests that there is a maintenance effect for CASP2 despite a drop in the results. This analysis is summarised in figure 6.3

Figure 6.3 Longitudinal study: CASP2 summary



6.4.3 Individual Subject Analysis

In order to investigate the nature of the maintenance effects in more detail the scores for each subject on the three dependant variables over the three testing times are presented in appendices K - V.

6.5 Discussion

The purpose of this longitudinal study was to investigate whether the developments made by experimental group one remained six months after completion of workshops.

6.5.1 Simple Rhythm Production

The analysis revealed that participants' score on SRP did not significantly decrease in the six month period after completion of workshops. This result suggests that the basic ability to reproduce a rhythm clapped by an experimenter is improved as a result of the music intervention. In addition, this ability does not diminish in the absence of music workshops.

6.5.2 Instrumental Rhythm Production

A similar trend to the SRP measure was obtained for IRP, suggesting that the maintenance exists for this measure in addition to the SRP measure. Specifically, the ability to reproduce a rhythm played by an experimenter on a Saron develops during the music workshops and remains in the absence of continuing workshops.

6.5.3 CASP2

There were no significant differences between time 2 ($M=19.91$) and time 3 ($M=18.36$) for the CASP2 measurement suggesting that the developments in communication do sustain over time. However, the maintenance effect was slightly less for CASP2 in comparison with the musical measures. The drop in the mean produced a comparison with time 1 ($m=15.18$) significant at the .05 level ($p=.02$).

One explanation of this trend is that communication is not specifically a focus of the intervention and its development was not explicitly reinforced at the workshops. However, musical ability was a specific target of the intervention and its development was continually encouraged. Therefore the gains made in musical ability are more likely to sustain over time whereas the communication developments may diminish.

6.6 Conclusion

The general trend of results highlights that a maintenance effect exists for the 3 variables under investigation. Specifically, the gains observed in musical ability and communication after the first study are still in evidence six months after the completion of workshops. However, the communication developments are not sustained to the same extent as the musical developments. This trend in results offers further evidence supporting the efficacy of the intervention.

CHAPTER SEVEN

TIME LAPSE VIDEO ANALYSIS OF PARTICIPANTS

This fourth experimental chapter investigates whether developments in communication recorded by the CASP2 measurement in chapters 3 and 4 generalise to other communication developments. All pre- and post-test assessment sessions in chapter 3 and 4 were video taped. These video tapes are the experimental focus of this chapter. Independent raters observed 20 second clips of the tapes. These clips contained examples of control group and experimental group participants communicating in both pre-test and post-test situations. The raters were asked to assess the non-verbal communication skills of the music intervention and control group participants.

7.1 Generalisability of observed developments

One of the major limitations of the current music therapy research literature is the absence of studies that investigate the ability of music interventions to produce developments that generalise to situations outside of the intervention environment (Radhakishnan, 1991). This chapter investigates whether the communication gains recorded by CASP in chapters 3 and 4 are observable to independent raters assessing the communication abilities of the participants.

7.2 Non-verbal communication

Human communication is a complex and multi-faceted phenomenon (Argyle, 1988). Non-verbal communication is one of the many influential aspects of general communication and plays an integral role in conveying meaning effectively (Argyle, 1988; Ekman 1982; Lewis, 1991; Paulsell and Goldman, 1984). Although there are differences of opinion as to exactly what extent non-verbal communication influences meaning in communication, there is broad agreement among researchers that between 55% and 70% of all communication is non-verbal. In addition, the correct use of non-verbal communication is an essential part of social skills competence in general (Argyle, 1988). For these reasons non-verbal communication (NVC) is an important area of investigation when trying to assess effective communication skills.

Various authors have identified the different components of NVC (Argyle, 1988; Edelman and Hampson, 1979; Trower, 1980). Argyle (1988) divides NVC into several different sub-categories: facial expression, gaze and pupil dilation, gestures, posture, bodily contact, spatial behaviour, non-verbal vocalisations, smell and clothes. There appears to be agreement that these features are the main non-verbal cues influencing communication (Lewis, 1991).

7.3 NVC in Individuals with a Learning Difficulty

Individuals with a learning difficulty are less competent in using NVC than individuals with no learning difficulty. Eye gaze, facial expressions, body posture, use of gestures and spatial behaviour are deficient for individuals with a learning difficulty (Wolfolk, Fucci, Friedenberg and Conlen, 1991). These authors note that education programmes targeting improvements in NVC would enhance the general communication level of individuals with a mental handicap. The following sub-sections outline the major features of NVC investigated in the present study. In addition, these issues are discussed in relation to individuals with a learning difficulty.

7.3.1. Eye Contact

Gaze is of central importance in social behaviour. A high level of gaze shows interest and the wish to initiate interaction (Argyle, 1988). Individuals with a learning difficulty do not use eye contact effectively during social interactions

Trower (1980). In particular individuals with a learning difficulty do not follow cultural norms in eye contact during conversation, they tend to either make no eye contact or inappropriately use too much eye contact (Trower, 1990).

7.3.2. Facial Expression

The face is recognised as the most important non-verbal channel (Ekman and Oster, 1979). In addition, Ekman (1982) asserts that there are six basic emotions that are expressed cross culturally through facial expression: happiness, surprise, fear, sadness, anger and disgust. Mehrabian (1972) asserts that friendliness is signalled primarily by smiling and also acts as a rewarding stimulus. Wilczenoki (1991), relates these ideas to individuals with a learning difficulty and observes that these individuals have difficulty in recognising and communicating facial expressions effectively.

7.3.3. Posture

A socially confident person will occupy more space in their environment and show interest in their communicative partner by leaning towards them. In contrast, poor communicators, lacking in confidence, tend to take up less space and adopt a defensive posture (Argyle, 1988). Wolfolk et al (1991) note that body posture appears inappropriate in individuals with a learning difficulty.

7.3.4. Tone of Voice

Effective communicators display variations in tone of voice that aid comprehension. Individuals with a learning difficulty display less variety in tone of voice and will frequently have problems in being understood due to lack of clarity in voice (Trower, 1980).

7.3.5. Gestures

The gestures utilised during social interaction enhance effective communication (Scherer, 1986). Less effective communication is associated with more self-touching e.g. hair grooming movements, neck massaging or pulling of ear lobe. In general, the gestures employed in communication by such individuals will be inhibited and sometimes unnecessary. Trower (1980) notes that individuals with a learning difficulty have inappropriate use of gestures.

7.4 The Measurement of Non-verbal Communication.

Argyle (1988) and Lewis (1991) state that while there are many different methods for assessing NVC encoding and decoding techniques are the two broad approaches utilised by the majority of researchers.

7.4.1 Encoding Techniques

The first approach to assessing NVC relates to the NVC encoding. The purpose here is to investigate how individuals use NVC to express emotions, attitudes to other people or situations are encoded in NVC. The earliest method was simply to ask subjects to pose the facial expressions which they would have, for example, when happy, sad etc. Photographs would then be taken of the subjects and these photographs would then be analyzed. Both Ekman (1982) and Mehrabian (1972) employed this method when investigating the encoding of NVC.

The main objection to this method is that posed expressions are not the same as spontaneous ones. Specifically, posed expressions are stronger and less symmetrical than spontaneous expressions. For example the superiority of women over men at decoding is greater for posed signals (Buck 1984). Allen and Atkinson (1981) video taped posed and spontaneous expressions of understanding and non-understanding on the part of ten year old children.

Observers could easily distinguish which group contained posed expressions and which group contained spontaneous expressions. Further analysis revealed that the children nodded thirty times as often in the posed condition in comparison with the spontaneous condition. Despite this limitation it has been argued that posed expressions are useful in tests of decoding accuracy (Argyle, 1988).

Another method of investigation focuses on creating a more natural or spontaneous communication environment. With this approach subjects are asked to spend several minutes thinking about a specific event. They then talk about the event and the NVC is recorded. Although this approach is more naturalistic it still does not investigate communication in a natural setting as subjects.

There are a variety of approaches that have endeavoured to create a truly natural environment for investigating the influence of NVC on communication:

- (1) Subjects watch films chosen to arouse disgust, sadness, excitement or other emotions. They talk to the experimenter about each film; while this is happening their facial expression is video taped and physiological measures are taken as well as subjective and questionnaire reports (Buck, 1984). (2)

Subjects meet different individuals who behave in a friendly or disagreeable manner. The NVC communication of the subjects is recorded while these interactions are taking place (Exline and Winters, 1966).

- (3) NVC of participants is observed and filmed in real life settings and subsequently coded (Kraut and Johnson, 1979).

7.4.2 Decoding Techniques

Here the purpose is to study how subjects perceive, interpret, or react to communication signals from a non-verbal perspective. Similar to the encoding technique these signals can be posed or genuine, studied in a laboratory or in a field setting and the response of subjects is recorded in a number of ways e.g. video analysis, physiological responses etc.

Buck (1984) videotaped subjects as they watched and talked about emotionally arousing slides or films. These videotapes were then used as stimuli, representing the portrayal of known emotions. A second group of subjects were then asked to label the emotions. Trimboli (1984) used photographs from newspapers and stills from television programmes to produce and examine NVC of subjects in a laboratory setting. Decoding studies have also been carried out in field settings (Mahl, 1968; Van Hoof 1982). The major issue here is to examine the non-verbal communication of individuals responding in natural situations.

Argyle (1988) describes a common method for investigating the NVC of subjects communicating in natural environments. This approach uses a semantic differential questionnaire which independent raters complete while watching either real life situations or video tapes of communication taking place. The questionnaire contains the features of communication under investigation.

Typically the questionnaire contains the basic components of NVC previously discussed. This approach has been utilised by Buck (1984), Mahl, (1968), Van Hoof (1982) and Trimboli (1984). Argyle (1988) argues that this method is useful when assessing a large number of subjects over different testing environments.

7.5 The Assessment of Non-verbal Communication in the present study

Independent raters were asked to assess the NVC of the participants in the present study. This approach has similarities with the encoding techniques previously discussed. Raters were asked to assess the non-verbal cues of the participants who were communicating in a real life situation. A questionnaire was constructed for this purpose (appendix W). This questionnaire contained items outlined by Argyle (1988) and Lewis (1991) as being the major components of non-verbal communication. In addition to these five items, attention and tension were added to the questionnaire. The addition of these items was motivated by the review of literature presented in chapter two suggesting that music interventions have the capacity to increase attention and reduce anxiety (Aldridge, 1991; Nordoff and Robbins, 1976; Tyson 1981). Details piloting procedures and reliability measurement in relation to developing this questionnaire are described in the method section of this chapter.

7.6 Experimental Hypothesis

It is suggested that participants in experimental groups one and two (chapters 3 and 4) will display significant improvements in non-verbal communication skills as assessed by independent raters in comparison with control group 1 (chapter 3) who will show no change in NVC. This improvement will offer further evidence supporting the efficacy of the music intervention in that the communication developments obtained by the CASP2 measurement in chapter 3 and 4 will be supported by general improvements in NVC.

7.7 Method

7.7.1 Design

This study utilised a between groups design. The video tape data for the study was obtained during the pre- and post-test assessment periods in chapters 3 and 4. There were two experimental groups and one control group. Experimental group one and control group one (from chapter three) were utilised. In addition, data from experimental group 2 (chapter four) was used. See table 2.2, p.58 for experimental overview.

7.7.2 Participants

Thirty two participants were involved in this study. All video sessions were informally assessed for picture quality and those subjects whose pre- and post-test sessions were recorded to a suitable standard were selected for analysis in

this study. Thirteen subjects from experimental group one (chapter three) were selected. This group contained 10 males and 11 females with a chronological age range from 17 to 58 and a mean age of 29.7 years (S.D.=7.02). Ten subjects (6 males and 4 females) from experimental group two (chapter four) were selected. This group had a chronological age range from 25 to 46 years with a mean age of 29.5 years (S.D.=6.79). Nine individuals from the control group were selected. This group contained 4 females and five males with a chronological age range from 21 to 37 and a mean age of 28.9 (S.D.=5.14).

7.7.3 Raters

Sixteen undergraduate psychology students in their senior honours year at Glasgow University were randomly sampled to act as raters. The group contained 5 males and 11 females.

7.7.4 Materials

(1) Experimental tapes

The video taped pre- and post-test assessment sessions from chapters 3 and 4 were edited for use in this study. Twenty second clips from subjects communicating during the SRP measurement of musical ability were edited on to the experimental tapes. Two clips from the pre-test condition and two clips from the post-test condition were selected. Each clip was separated by a ten second break to give the raters adequate time to complete the accompanying

questionnaire. The length of clip and break were decided after asking two pilot raters to complete questionnaires while watching the video tapes. There were 128 clips in total which were edited on to two video tapes. These tapes lasted approximately 45 minutes each. Inter-rater reliability and test retest reliability are both reported in appendix Z.

(2) Orientation Tape

This tape was made for the purposes of giving the raters some insight into the level of handicap of the subjects. It consisted of six clips, all around 40-60 seconds in length. The videotapes were run on a VHS recorder and shown on a large TV monitor.

(3) Rating scale

The 7 components of NVC being assessed in this study were compiled into a 7 question semantic differential questionnaire (appendix W). 128 questionnaires (one for each clip) were compiled into booklets. A cover sheet was included giving brief instructions to the raters, (appendix X).

7.7.8 Procedure

All raters were contacted individually during the two weeks prior to the experiment. They were contacted the night before the experiment to ensure attendance. Both sessions were run in a quiet room where the raters sat around

a table. The experimenter gave a brief presentation to the raters. This covered the instruction to the raters and the orientation tape. Raters were given the opportunity to familiarise themselves with the questionnaire and ask any relevant questions. The raters were not trained in terms of showing them clips of subjects and directing them towards the relevant features of NVC. This avoided expectancy effects of the type outlined by Argyle (1988). The experimenter observed performance at all times and found that the tape often needed to be paused between clips to give everyone an opportunity to complete each questionnaire. The number of the clip was also frequently called out to ensure no errors were being made.

On completion of the first tape which lasted approximately one hour, the raters were given a 15 minute break. The second tape was then run, following the same procedure as the first. At the end of the experiment payment forms were completed and £5 given to each rater for participation. The experiment lasted approximately 2 hours 30 minutes.

7.8 Results

7.8.1 Descriptive statistics

The pre- and post-test means and standard deviations for the two experimental groups and control group are displayed in tables 7.1 - 7.3.

Table 7.1 NVC study: Descriptive statistics for control group 1

	POINT OF TESTING			
	PRE		POST	
	MEAN	S.D.	MEAN	S.D
Q.1	3.09	.79	2.92	.58
Q.2	2.81	.67	2.50	.64
Q.3	2.99	.53	2.84	.50
Q.4	2.95	.59	3.02	.46
Q.5	3.44	.69	3.52	.29
Q.6	3.10	.47	3.08	.35
Q.7	3.82	.60	3.79	.41
TOTAL	3.19	.48	3.10	.32

- Q.1 Appropriate eye contact
- Q.2 Facial expression
- Q.3 Posture
- Q.4 Tension
- Q.5 Gesture
- Q.6 Tone of voice
- Q.7 Attention

Each item has a maximum score of 5 representing effective use of non verbal item and a minimum score of 1 representing poor use of non verbal item.

Table 7.2 NVC study: Descriptive statistics for experimental group one

	POINT OF TESTING			
	PRE		POST	
	MEAN	S.D.	MEAN	S.D
Q.1	3.11	.54	2.80	.70
Q.2	2.53	.33	2.49	.57
Q.3	2.66	.61	2.71	.61
Q.4	2.98	.27	2.87	.55
Q.5	3.29	.34	3.22	.36
Q.6	3.04	.50	3.09	.48
Q.7	3.46	.55	3.59	.52
TOTAL	2.96	.33	2.96	.43

- Q.1 Appropriate eye contact
- Q.2 Facial expression
- Q.3 Posture
- Q.4 Tension
- Q.5 Gesture
- Q.6 Tone of voice
- Q.7 Attention

Table 7.3 NVC study: Descriptive statistics for experimental group 2

	POINT OF TESTING			
	PRE		POST	
	MEAN	S.D.	MEAN	S.D
Q.1	2.72	.56	3.05	.86
Q.2	2.38	.55	3.37	.96
Q.3	2.99	.54	3.35	.48
Q.4	2.71	.41	3.45	.52
Q.5	3.45	.35	3.44	.58
Q.6	3.23	.36	3.42	.41
Q.7	3.75	.52	3.92	.32
TOTAL	3.04	.35	3.44	.49

- Q.1 Appropriate eye contact
- Q.2 Facial expression
- Q.3 Posture
- Q.4 Tension
- Q.5 Gesture
- Q.6 Tone of voice
- Q.7 Attention

7.8.2 ANOVAs

Eight 3X2 ANOVAs were computed to investigate the general trends within each group. The first independent variable was group with three levels (control, experimental group 1 and experimental group 2). The second independent variable was point of testing with two levels (pre and post). The dependant variables were mean score for each of the seven questions contained in the questionnaire and also the mean total score obtained in the questionnaire. Results of the ANOVAs and post-hoc analysis are summarised on tables 7.4 - 7.11.

Table 7.4 NVC study: Q.1 ANOVA (eye contact) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.073	29	.69	.10	.90
TIME	1	.038	29	.23	.17	.68
Interaction	2	.62	29	.23	2.69	.08

This table displays no significant effects both between the groups and across the two testing periods. In addition, there is no interaction effect. Post-hoc Neuman-Keuls analysis revealed no significant differences for any of the pair wise means comparisons. This results suggests that there was no observable changes in eye contact both between the groups and across the two testing periods.

Table 7.5 NVC study: ANOVA Q.2 (facial Expression) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.77	29	.59	1.31	.28
TIME	1	.70	29	.21	3.33	.08
Interaction	2	2.31	29	.21	10.98	.00

The main effect for time highlights that there are significant differences across the two time periods in the assessment of facial expression. The significant interaction effect highlights that the three groups are rated as being differentially affected over the 10 week period. Post hoc Neuman-Keuls analysis revealed that the post test score for experimental group two is significantly higher than all other scores ($p < 0.1$ for all comparisons) indicating that these participants were rated as having more animated facial expressions. With experimental group two having a pre-test mean of 2.38 and a post-test mean of 3.37 the results for Q2. suggest that participants in experimental group 2 have significantly more animated facial expressions in the post-test condition. Both the control group and experimental group 1 showed no change in facial expression. This analysis is summarised in figure 7.1.

Figure 7.1 NCV study: Q2. (facial expression) summary

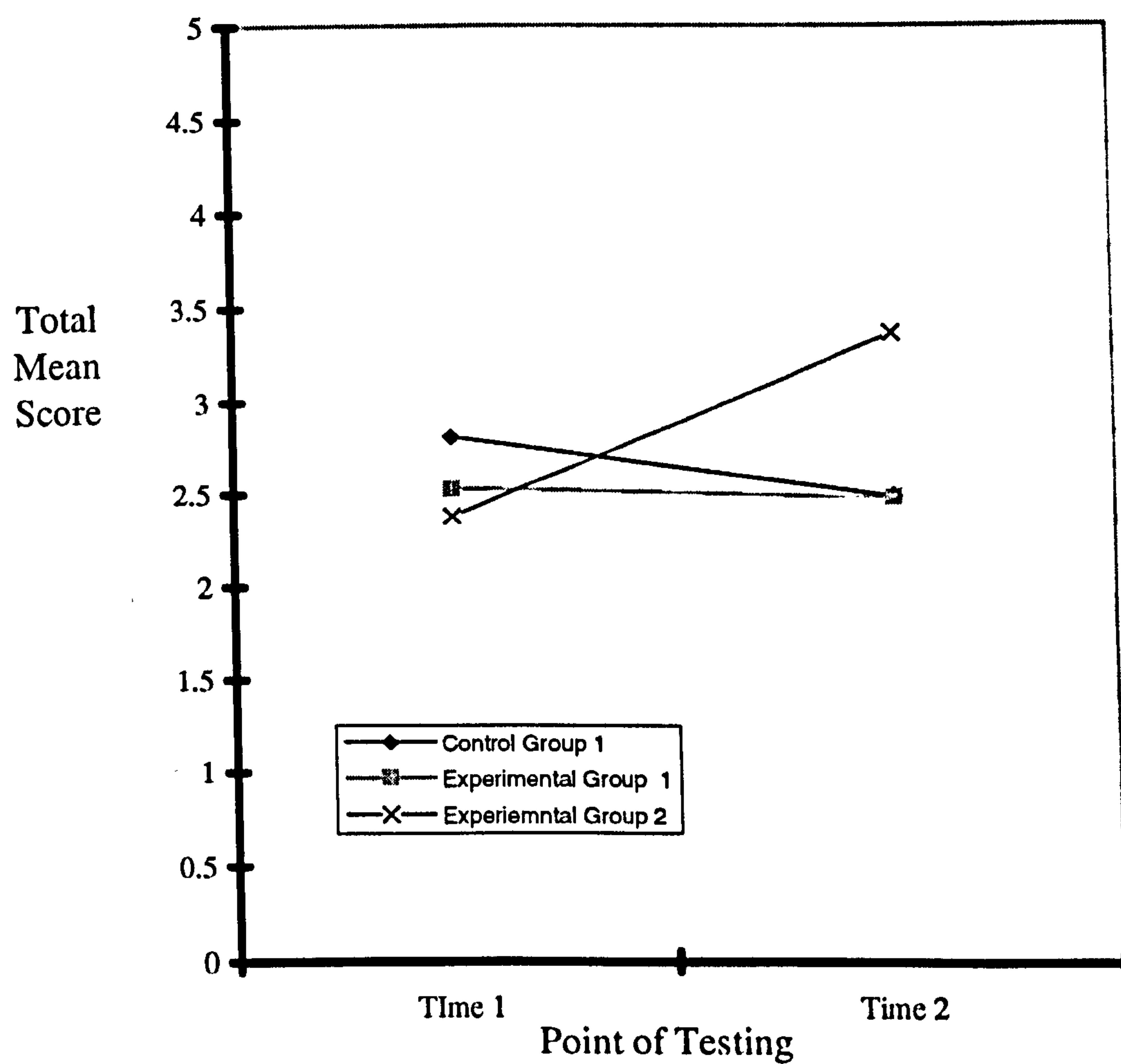


Table 7.6 NVC study: ANOVA Q.3 (posture) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	1.34	29	.51	2.63	.09
TIME	1	.11	29	.11	1.06	.31
Interaction	2	.32	29	.11	3.01	.06

Although this ANOVA displays no significant effects the interaction effect is approaching significance. Post-hoc Neuman-Keuls analysis revealed that experimental group two have significantly higher scores in the post-test condition than other groups ($p < 0.01$ for all comparisons). Experimental group two have a pre-test mean of 2.99 and a post-test mean 3.35. This result suggests that group two were rated as having significantly better posture in the post-test condition. This analysis is summarised in figure 7.2.

**Figure 7.2 NCV study: Q3. (posture)
summary**

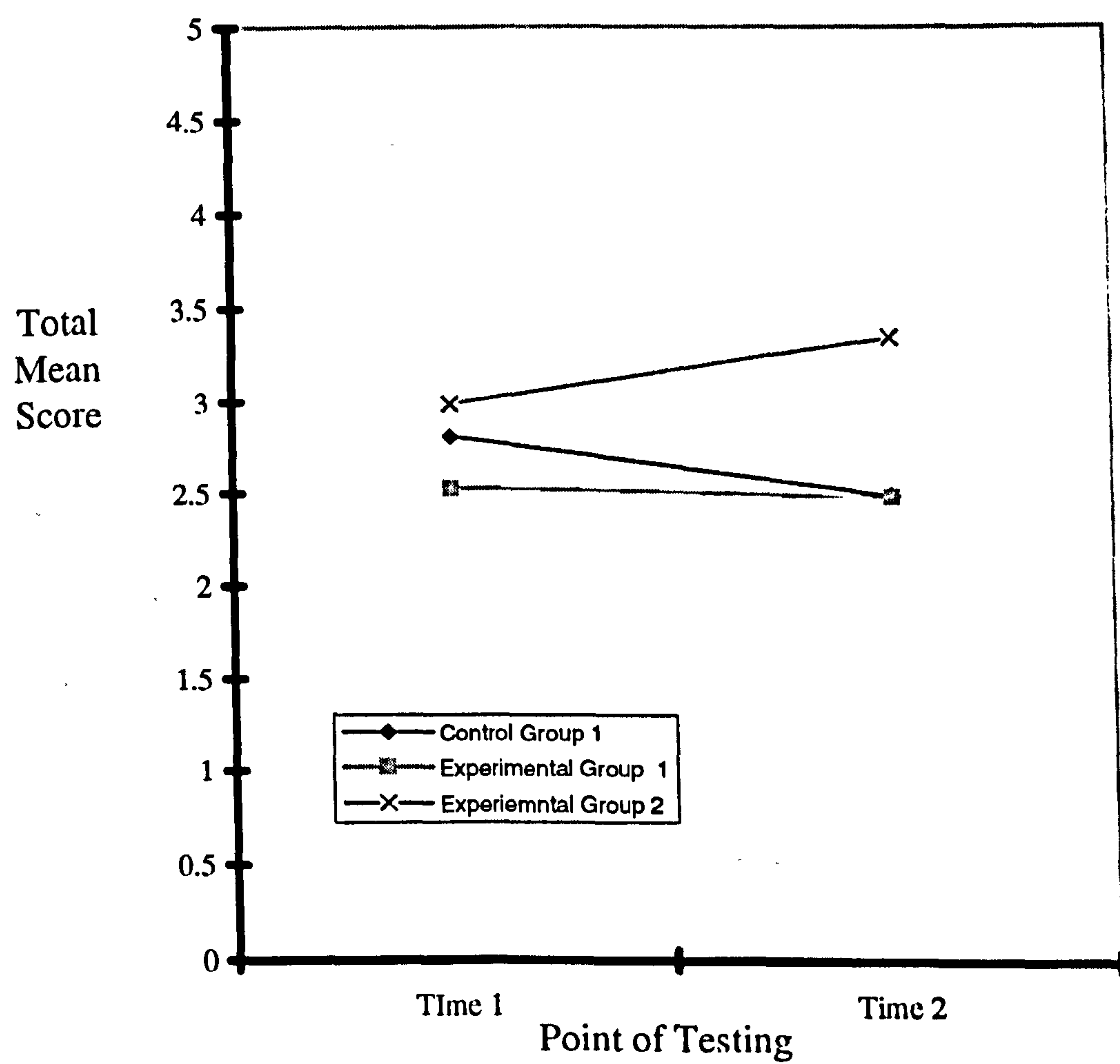


Table 7.7 NVC study: ANOVA Q.4 (tension) summary.

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.13	29	.29	.45	.63
TIME	1	.80	29	.15	5.46	.02
Interaction	2	1.05	29	.15	7.12	.00

This ANOVA displays a significant interaction effect in addition to a main effect for time significant at the .05 level of significance. This suggests that the tension of the participants was differentially affected between the two testing periods and across the three groups. Post-hoc Neuman-Keuls analysis revealed that experimental group 2 had significantly higher scores in the post test situation ($P<.01$ for all comparisons) indicating that individuals in experimental group two appeared more relaxed in the post-test situation. The pre-test mean for this group was 2.71 and the post-test mean was 3.45. This analysis is summarised in figure 7.3

Figure 7.3 NCV study: Q4. (tension)
summary

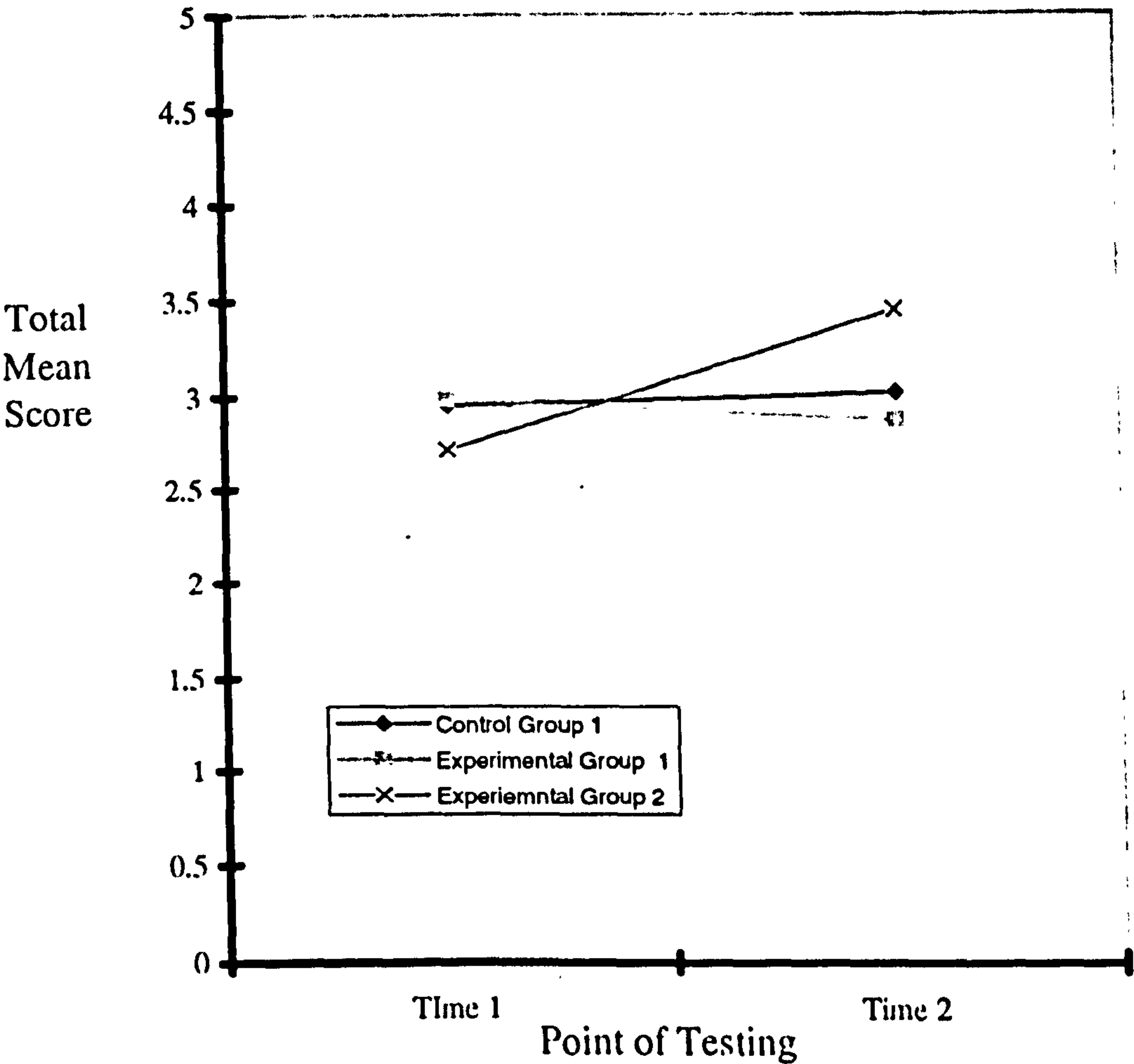


Table 7.8 NVC study: ANOVA Q.5 (gestures) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.35	29	.27	1.27	.29
TIME	1	.00	29	.12	.00	.99
Interaction	2	.03	29	.12	.28	.76

There were no significant differences across the independent variables, suggesting that the participants in all three group were showed no change in their use of gestures.

Table 7.9 NVC study: ANOVA Q.6 (tone of Voice) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.42	29	.28	1.49	.24
TIME	1	.08	29	.10	.81	.37
Interaction	2	.05	29	.10	.53	.59

There were no significant differences across the independent variables, suggesting that the participants in all three groups showed no change in their tone of voice.

Table 7.10 NVC study: ANOVA Q.7 (attention) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.67	29	.41	1.64	.21
TIME	1	.12	29	.08	1.37	.25
Interaction	2	.05	29	.08	.61	.55

There were no significant results highlighted by the ANOVA suggesting that the participants attention had not changed over the workshop period. However, post-hoc Neuman Keuls analysis did produce one significant pair-wise comparison. Experimental group two scored significantly higher in the post-test condition than experimental group one in the pre-test condition ($p < .05$).

However, experimental group two display a pre-test mean of 3.75 and a post-test mean of 3.92. This difference is not significant ($p = .09$). This analysis is summarised in figure 7.4.

Figure 7.4 NCV study: Q7. (attention)
summary

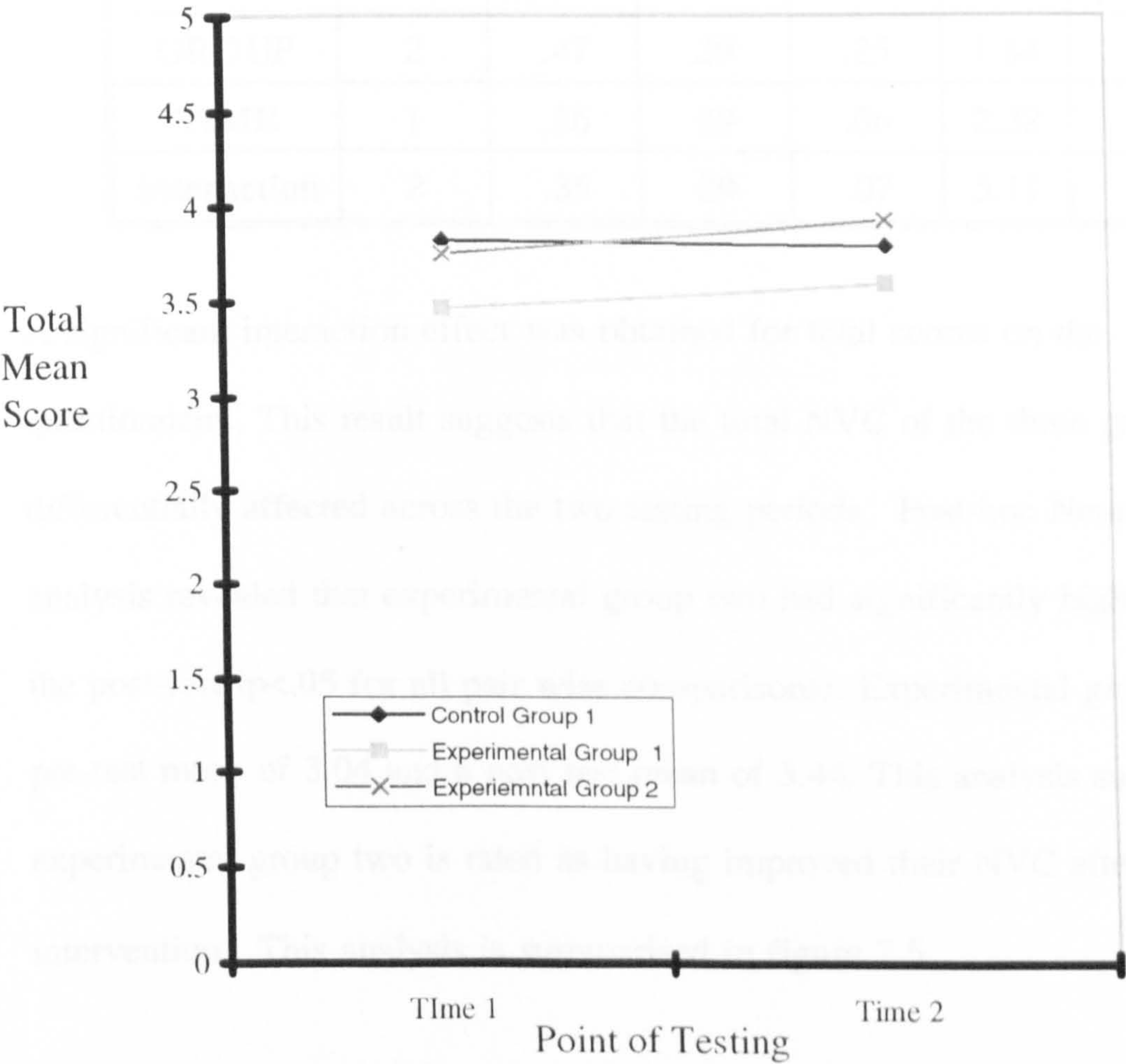
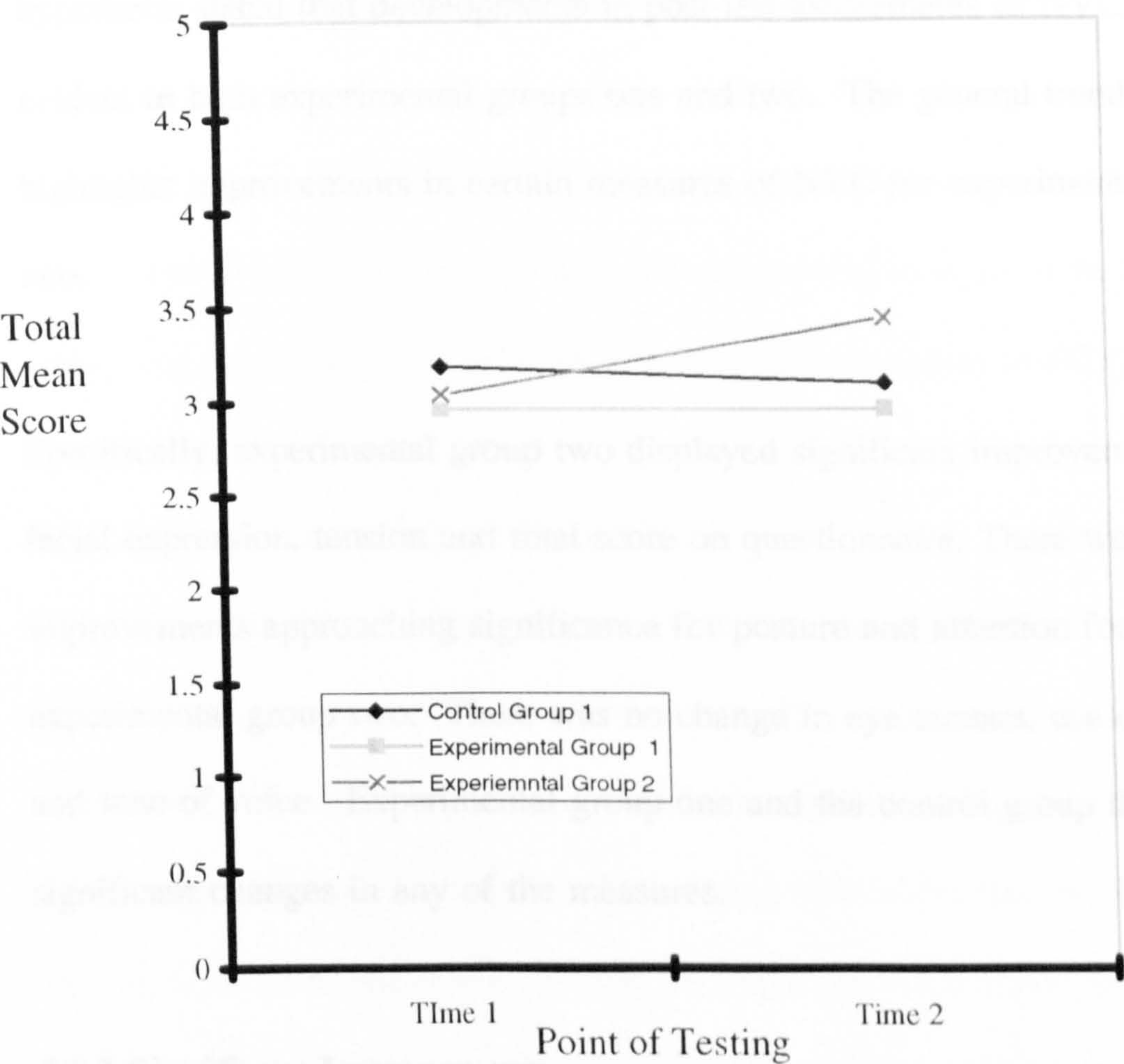


Table 7.11 NVC study: ANOVA Q.8 (total score) summary

Effect	df Effect	MS Effect	df Error	MS Error	F	p-level
GROUP	2	.47	29	.25	1.84	.18
TIME	1	.16	29	.06	2.32	.14
Interaction	2	.35	29	.07	5.11	.01

A significant interaction effect was obtained for total scores on the questionnaire. This result suggests that the total NVC of the three groups is differentially affected across the two testing periods. Post-hoc Neuman-Keuls analysis revealed that experimental group two had significantly higher scores in the post-test ($p < .05$ for all pair wise comparisons). Experimental group 2 have a pre-test mean of 3.04 and a post test mean of 3.44. This analysis suggests that experimental group two is rated as having improved their NVC after the intervention. This analysis is summarised in figure 7.5.

Figure 7.5 NCV study: Total score summary



7.9 Discussion

7.9.1 General Trends

The purpose of this study was to investigate the non-verbal communication of participants in experimental groups one and two and control participants. The hypothesis stated that developments in post-test assessments of NVC should be evident in both experimental groups one and two. The general trend of results highlights improvements in certain measures of NVC for experimental group two.

Specifically, experimental group two displayed significant improvements in facial expression, tension and total score on questionnaire. There were improvements approaching significance for posture and attention for experimental group two. There was no change in eye contact, use of gestures and tone of voice. Experimental group one and the control group displayed no significant changes in any of the measures.

7.9.2 Significant Improvements

An initial interpretation of these trends suggests, that for experimental group two, the gains in communication highlighted by the CASP2 measurement do generalise to gains in communication as measured by independent raters completing a NVC questionnaire. However, experimenter effect issue must be taken into consideration when interpreting these results. As chapter four

outlined, experimental group two utilised two different experimenters, one in the pre-test condition and another who was unknown to the participants in the post-test condition. Thus the observed gains in non-verbal communication may be due to the different communication styles of the two experimenters and not attributable to the music intervention. This explanation is supported by the results for experimental group one. This group showed no improvements in NVC while consisting of subjects with similar communication styles prior to the music workshops commencing. This group also displayed gains in musical ability and communication skills that were similar to experimental group two.

7.9.3 Intra and Inter Subject Variability

If the observed gains in experimental group two can be attributed to artifacts of the experimenter effect then an alternative explanation of the results should be suggested. Although the participants in both experimental groups were sampled from a population of individuals with learning difficulties the variability between individual subjects' general NVC may be important. This assumption is based upon anecdotal observation of participants in real life settings and on video tape. However, with the video tape being composed of a random sample of pre- and post- test clips of all subjects it is possible that the inter-subject variability masked the intra-subject variability. For example, subject no.1 communicating in one post-test situation is presented in clip no. 12. A pre-test clip of subject no.1 is not presented until clip no. 45. Thus, when raters are trying to assess the

NVC they probably make judgements based upon the general level of communication and not in reference to the previous clip of that subject. The task for the raters may have been too difficult given that there were 128 clips to rate. It might have been made easier by presenting each subject communicating in the different testing situations in sequence in order to allow the raters to anchor their perceptions of each subject's communicative style.

A second explanation of the non improvement in NVC suggests that although there were observed gains in communication as measured by CASP there were, in reality, no improvements in general levels of NVC.

7.10 Conclusion

This study investigated the changes in NVC of participants in experimental groups one and two and also in the control group. It was suggested that gains in NVC would be evident in the two experimental groups providing further evidence of the efficacy of the music intervention. Results show that only subjects in experimental group two displayed improvement in NVC and then only on selected measures. A general experimenter effect was suggested as a possible explanation of these gains. The lack of improvement in NVC is explained by the inter-subject variability masking the intra-subject variability. A second possible explanation suggests that there are no resultant improvements in NVC.

CHAPTER EIGHT

GENERAL DISCUSSION AND CONCLUSIONS

This chapter contains a general discussion of the empirical aspects of this thesis. An overview of the results is presented and possible mechanisms, influential in the observed developments, are speculated. In addition, the strengths and limitations of the research are discussed.

8.1 Overview of Results

In response to criticisms of existing research by Aldridge (1991) Bunt (1984), Bunt and Hoskyns (1988) and Rahakishnan (1993), this thesis empirically investigated the effect of a music intervention on musical ability and a range of psychological variables.

In summary, the results from the five empirical chapters demonstrate a significant improvement in musical ability. The results from chapters three and four highlight improvements in communication as measured CASP2. A significant improvement in participants' self-perception of Gamelan ability was also reported (chapter 4). This development in self-perception observed at the

end of the second workshop period suggests that the subjects had some appreciable notion of self development in musical terms over the course of the intervention. Chapter 5 investigated the self-perception and communication changes for a group of individuals who participated in activities that contained similar group dynamics to the music intervention. The results from this chapter indicated significant improvements in self perception but no significant improvements in communication. The longitudinal study (Chapter 6) demonstrated that the reported improvements in musical ability and communication sustain over time. There were no reported improvements in self-esteem, short-term memory or communication as measured by CASP1 or CASP2 (Chapters 3 and 4). In addition there was no improvement in non-verbal communication as measured by video assessment (Chapter 7).

The general trend of the results offers evidence supporting the efficacy of the intervention but only from within specific parameters. The intervention does not produce improvements in communication that enable participants to dramatically improve their psychological adjustment. The improvements seems restricted to specific communication tasks. However, the gains in musical ability are substantial and do impact the participants' ability to perform music highlighted by the significant improvements, all more than one standard deviation.

8.2 Musical Developments

The gains in musical ability support anecdotal observations made by Sanger and Kippen (1987) whose research is outlined in chapter three. Motivated by the observations of these authors, i.e. that the Gamelan is an excellent instrument for music interventions with therapeutic objectives, this research highlights quantifiable developments in musical ability. However, as development in musical ability is not a usual objective for therapeutic music interventions there is no existing research with which to compare these results.

8.3 Developments in Communication

The developments in communication were evident on one specific measure of communication but not on any other measure. It is beyond the scope of this thesis to answer in detail why this result was obtained but the following explanation is one possibility.

The primary focus of the intervention was the development of musical ability. In addition the intervention was only one hour a week for ten weeks. It would be unrealistic to expect dramatic changes in quality of life given the intervention was relatively limited over a short time scale. However, the review of literature in chapter two highlighted that various authors have speculated that music interventions have the potential to improve communication in clients. This idea is proposed due to the specific type of communicative environment found in

music interventions. Thus, an improvement in communication which in effect only impacts certain basic communicative functions such as responding to questions and simple identification of objects may result from the intervention.

It is not suggested here that the subjects did not know what a cup was prior to the intervention and did know what a cup after the intervention was but rather the participants' ability to response to this type of question are improved. In a sense there is a sort of "fine tuning" of commutative ability and not a radical improvement.

8.4 Possible Mechanisms

Given that this research has offered evidence supporting the efficacy of the intervention it is important to suggest one or more mechanisms by which the gains are operating. There are various possible mechanisms which may be responsible for producing the developmental gains observed.

8.4.1 A Behaviourist Paradigm

A behaviourist paradigm can be used in that the workshop environment may offer reinforcers that are conducive to the development of musical ability. These positive reinforcers, such as positive responses from workshop facilitators and participants and the sense of achievement felt while playing the music, may also be important in producing the gains in communication and self perception developments.

Social learning theorists such as Bandura (1986), Kanfer and Martson (1963) and Rotter (1954; 1982) state that most important reinforcers have little connection with physiological needs but rather operate as social reinforcers. Hall, Lund and Jackson (1968) demonstrated the importance of social reinforcers in a study focused on improving childrens' performance in school. After establishing baseline measures for study behaviour, the researchers gave social reinforcement in the form of attention and praise whenever a child engaged in study behaviour. These authors report a significant increase in study behaviour as a result of the intervention with many of the participants studying more than twice as much than in the baseline condition.

The type of attention that the participants receive during the music intervention may act as a social reinforcer in a similar way to that reported by Hall, Lund and Jackson (1968) in that the participants receive attention and positive support

for their musical participation. The resulting sense of achievement and satisfaction may then impact not only their musical ability but also their communication skills.

8.4.2 A Cognitive Paradigm

A cognitive mechanism may explain the observed developments. Chapter four investigated the possibility of a cognitive mechanism being influential in the developments by investigating short term memory improvements after the intervention. Although the results showed no improvements in short-term memory, the possibility of enhanced cognitive functioning as a result of music interventions remains. In other words music may be impacting cognitive functioning in a way that does not enhance short term memory. For example the various authors have speculated that music may have an effect on cognitive abilities by acting as a neuro-psychological primer (Raushcer, Shaw and Ky 1994).

This argument relates to the physiological aspects of music participation and listening. Mountcastle (1978) presented an organisational principle for the structure of cortical neurons consisting of columns of neural networks. Each column is composed of numerous mini-columns known as Trions. Networks of Trions in the cortex undergo inherent, periodic spatial-temporal firing patterns. These patterns develop through small variations in synaptic potentials. Leng and

Shaw (1981) propose that these patterns form a common neural language in higher cortical brain function.

Rauscher, Shaw and Ky (1995) offers a representation of neural activity that distinguishes analytical processing which contains a highly distinctive symmetry of firing patterns from creative processing which contains less symmetrical activity patterns with more fluctuations. This author also suggests that musical participation and listening may directly access these firing patterns and thus improve brain functioning.

The plasticity of the nervous system suggests there is far more potential for recovery and the establishment of new synaptic pathways in the damaged brain than was once thought (Thault, 1993). Also, modern ideas relating to music and brain function suggest that the whole brain is involved in musical processing and not just the right hemisphere as previously suggested (Sergent, 1993). The limbic system is utilised in emotional responses to music (Swallow, 1996). This author also notes that various neuro-peptides formed by the hypothalamus in the limbic system are essential for effective nervous system functioning. It is possible that music, while activating the limbic system also influences the producing of these essential neuro-peptides and consequently influences brain functioning.

8.4.3 Hawthorn/Placebo Effect

The possibility of a Hawthorn or Placebo effect must also be considered. The intervention provided novel experiences for the clients who left the hospital once a week to travel to the music workshop. The workshop facilitators were new people in the client's life and they were also very interested in the clients' behaviour and responses. This novel experience and interest in the participants' behaviour may have produced the beneficial effects and not the musical aspects of the intervention.

8.5 Strengths of the Present Research.

This study added to the existing research investigating therapeutic uses of music in the following ways:

- (1) While the majority of papers discussed in chapter 2 were descriptive and anecdotal in nature, the present research had an empirical focus incorporating a recognised scientific research methodology.
- (2) In addition, this study also utilised control groups to allow comparisons with non-intervention groups and also with groups receiving interventions different to the music workshop (chapter 5).

- (3) The procedure outlined in chapter four also eliminated the possibility of experimenter bias influencing the results, a limitation of previous research noted by Radhakishnan (1991).
- (4) Aldridge (1993) states that the published literature investigating therapeutic uses of music contains an over reliance on single subject design studies. The research contained within this thesis investigated the influence of music interventions incorporating 58 subjects.
- (5) While the operational definition of variables in the existing research literature is somewhat vague, the dependent variables utilised in this research were validated and reliable operational definitions of the relevant concepts.
- (6) This study also investigated the potential for music interventions to produce developments that generalise to other life situations (chapter 7).
- (7) Finally the maintenance of developments over time was investigated in chapter 6 highlighting that the gains in communication and musical attainment maintain after a six month period with no intervention.

8.6 Limitations

The following sub-sections outline the possible weaknesses of the present study.

8.6.1 Dosage Level

The level of intervention was not varied over the separate experiments.

Therefore, an interesting issue not investigated is whether changing the level of the intervention would influence the results. For example: could four hour of music each week produce gains in excess of those observed in the present study? Alternatively: would an intervention of only 30 minutes each week produce developments that were not as large as those observed?

8.6.2 Internal validity

The pragmatic issues concerned with controlling the internal validity of this experiment pose some methodological problems. Anastasi, (1990) suggests that internal validity is concerned with "the elimination of bias which, if present, might invalidate any conclusions drawn concerning the manipulations of the experiment" p.339.

The workshops were held outwith the institution where the subjects were resident. This feature of the workshops was not possible to control. It could be argued that the experience of leaving the hospital every week was, in itself, a variable that contributed to the observed effects. Ideally the control group

would also have left the hospital once a week to engage in an activity that did not involve music. It was not possible however, to organise the control group in this manner. The control cooking and art groups also participated in these activities within the institution not fully controlling for the influencing variables once again.

The communication style of the workshop leader is a very important feature of structured music groups. It would have been advantageous to have the same individual lead all music groups as well as the control cooking and art groups; but once again this was not possible. It was members of the occupational therapy department who led the cooking and art groups while two musicians were employed to run the music groups. The second session of workshops also had a different leader from the first session.

It is suggested that the two most important features of a workshop leader are good communication skills and a knowledgeable grasp of the ideas being conveyed in the workshop (Andsell, 1995). While it may seem reasonable to assume that both the O.T.s and the musicians leading these activity groups possessed both these qualities this feature of the experimental environment was not controlled and may therefore act as a confounding variable.

8.6.3 External Validity

An important issue here is whether the music intervention is representative of all music based interventions. In order to investigate whether music interventions have therapeutic potential it is important to investigate a music intervention which is representative of music interventions in general. This is a complex issue especially since the workshop facilitators were not trained professional music therapists and the intervention itself was not primarily aimed at developing psychological features of the individual. Unlike conventional music therapy, the intervention involved in this study was aimed at developing musical ability. Although musical developments were the primary aim, in addition, it was suggested that the workshop environment would produce psychological developments.

The intervention employed music to allow individuals with a learning difficulty to work together musically in a supportive environment. To this extent the intervention is similar to other group based music interventions (Andsell, 1995). However the fact that the workshop facilitators were not trained music therapists implies that there are certain differences between this intervention and interventions that are conducted by trained music therapists. These factors make the music workshops an idiosyncratic intervention to a certain extent.

8.6.4 Theoretical Model

Although section 8.3 discussed possible mechanisms influential in the observed developments it is important to note that the research contained within this thesis does not test an explicit theory of music therapy. The empirical aspects of the thesis are evaluative in nature. In essence the thesis investigated the question: does music therapy work? While it would have been advantageous to underpin the research with a theoretical model the lack of empirical research in this area made this difficult and perhaps an issue for future research.

8.7 Directions for Future Research

The present study employed recognised quantitative methods of evaluation when investigating the outcomes of the intervention. A recent development in music therapy research is the use of qualitative research methods when investigating both the process and outcomes of music interventions (Andsell, 1996).

Smeijsters (1995) asserts that the traditional scientific rule of objectivity views subjective opinions of clinicians and clients as subjective and therefore biased. Moreover, this author believes that the subjective experiences of participants involved in music interventions can provide valuable knowledge about the process and outcomes of the intervention. Aldridge (1995) states that these new qualitative methods have developed as a result of the post-modern influence on science. Conventional quantitative methods do not allow for the investigation of these subjective experiences whereas recent developments in qualitative research

provide an alternative research methodology that allows subjective feelings to be analyzed.

Andsell (1996) provides one example of qualitative research as applied to music therapy. In this study five individuals listened repeatedly (3 times) to a ten minute recording of a therapy session. During the listening they wrote down interpretations of the musical interaction. The data was analyzed by coding the subjective interpretations and categorising the different themes that emerged.

Andsell (1996) notes that this approach is a also popular methodology for other therapeutic interventions such as art therapy (Henzell, 1995; Mitchel, 1993).

The influence of qualitative research issues is discussed by Davies (1995,1996).

This author asserts that when investigating subjects' attitudes towards and perceptions of a particular issue, the motivation to respond in a given manner must be taken into consideration. Thus, when designing a questionnaire or attitudinal instrument not only should the psychometric properties of validity and reliability be addressed but also issues such as the influence of the experimenter on response style. The effect of the testing environment must also be taken into consideration

While Davies (1995, 1996) relates these ideas to attitudinal issues in drug research there are direct parallels with the research contained within this thesis.

For example, chapters 4 and 5 utilised self-perception questions (appendices H-J) to investigate subjects perceptions of their own ability to perform a given task. The fact that subjects had recently completed a 10 week music course or cooking/art course may have motivated the subjects to respond in a given way. That is, the reported improvement in self-perception may be related to the fact that subjects realised that, given they had just completed a ten week course focused on either music, cooking or art, an improvement in task performance would be expected by the experimenter. Consequently the reported improvements in self-perception may not be related to a belief in task improvement but rather a knowledge that task improvement was expected. It should also be noted that the measures of musical ability and communication are free from this bias given that assessment instruments were not attitudinal but rather contained questions with right or wrong answers.

Although Smeijsters (1995) states that the differing philosophical foundations of qualitative and quantitative research make these two methodologies mutually exclusive to some researchers, it is suggested here that qualitative methods can be combined with quantitative methods to further investigate the therapeutic potential of music. The important issue is not which methodological paradigm is selected but rather that the research methods employed are relevant to the questions being asked. Moreover, a knowledge of the strengths and limitations of a particular method of enquiry should also be demonstrated.

Given that the preceding sections have discussed the strengths and weakness of the present research in addition to relevant issues of research methodology, it is important to suggest specific directions for future research. Future research investigating the process and outcomes of music interventions should make a more intensive study of each individuals' development over the intervention period. Specific objectives could be developed for each participant and these objectives may be assessed using both qualitative and quantitative techniques. For example, the subjective opinions of the professional carers could be taken into consideration. This could be achieved by asking the carers to complete weekly progress reports that give the carers the opportunity to write about how they feel the client is responding to the intervention. These questionnaires would then be coded and general themes relating to the music intervention would emerge. In addition, the measurement of musical ability could be developed to incorporate more advanced music ideas such as melody and harmony. It may even be possible to develop a musical qualification for individuals with special needs. Future research should also address the dosage issue raised in section 8.5.1. by varying the level of the intervention. A multi disciplinary approach may prove beneficial in terms of assessing the communicative ability of participants. For example, a speech therapist could make a more detailed assessment of participants communication skills before, during and after the intervention. This method of enquiry may generate more knowledge about the process and outcomes of music interventions.

8.8 Conclusions

This research was motivated by a need to evaluate the therapeutic potential of music interventions. The results offer evidence suggesting that this intervention can produce developments in musical ability and certain communication functions. The research methodology conformed more stringently to scientific criteria than previous research although certain limitations are noted. Future research should seek to incorporate qualitative and quantitative research methodologies when investigating both the process and outcomes of this modern intervention.

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APPENDIX A

SEMANTIC DIFFERENTIAL SCALE

GOOD	:___:	:___:	:___:	:___:	:___:	BAD
CHEERFUL	:___:	:___:	:___:	:___:	:___:	GLOOMY
FRIENDLY	:___:	:___:	:___:	:___:	:___:	UNFRIENDLY
CLEVER	:___:	:___:	:___:	:___:	:___:	STUPID
POPULAR	:___:	:___:	:___:	:___:	:___:	UNPOPULAR
LOVELY	:___:	:___:	:___:	:___:	:___:	UGLY
NICE	:___:	:___:	:___:	:___:	:___:	HORRIBLE
KIND	:___:	:___:	:___:	:___:	:___:	UNKIND
CLEAN	:___:	:___:	:___:	:___:	:___:	DIRTY
SLIM	:___:	:___:	:___:	:___:	:___:	FAT

APPENDIX B

PITCH PERCEPTION TEST

THIS IS A HIGH NOTE -----7
THIS IS A LOW NOTE -----1

CAN YOU TELL ME WHICH OF THE FOLLOWING NOTES IS THE
HIGHER OR IF YOU FEEL THEY ARE BOTH THE SAME

REPEAT HIGH AND LOW NOTES

No.	NOTES		SCORE
1	7	1	
2	3	3	
3	6	4	
4	2	5	
5	6	6	
6	2	6	
7	5	3	
8	4	7	
9	2	2	
10	3	4	
11	7	5	
12	1	2	
13	6	5	
14	2	7	
15	3	1	
16	5	5	
17	2	4	
18	3	7	
19	5	4	
20	1	1	

APPENDIX C

Simple Rhythm Production

No	Rhythm	Score
1a	1 beat x2	
1b	1 beat x1	
1c	2 beat x2	
1d	3 beat x1	
2a	4 beat x1	
2b	2 beat x4 (small interval)	
2c	3/4 slow x2	
2d	3 beats in 4/4 x2	
3a	4 beat x2 (Stress on 1 and 3)	
3b	4 beat x4 (Stress on 1)	
3c	7 beat x2	
3d	3/4 x4 (fast)	
4a	song clave x3	
4b	1 1 1/2 1/2 1 x2	
4c	1/2 1/2 1 1 1/2 1/2 x2	

APPENDIX D

Instrumental Rhythm Production

No.	Rhythm	Score
1a	5	
1b	6	
1c	4 4	
1d	7 7	
1e	1 2	
2a	5 6	
2b	2 2 2 2 (slow)	
2c	7 7	
2d	1 6	
2e	7 2	
3a	2 5 2 5	
3b	2 2 3 3	
3c	6 5 6 5	
3d	3 3 3 3 5 5 5 5	
3e	1 1 1 4 4 4	
4a	2 2 4 4 7 7	
4b	3 5 3 5 2 1 2 1	
4c	7 6 7 6 7 6 7 6	
4d	7 5 7 5 7 5 7 5 6 3 6 3 6 3 6 3	

THE PSYCHOSOCIAL BEHAVIOUR SCALE (PBS) FOR THE ASSESSMENT OF MENTALLY HANDICAPPED PEOPLE

Please provide a score within the range 0-4, for each item in the scale. The scale should be completed based upon your own knowledge of the individual. Scores should be allocated in accordance with the following guidelines:

0=Behaviour described by item never occurs

1=Behaviour described by item occurs infrequently in a mild/relatively unproblematic form

2=Behaviour described by item occurs infrequently in a stronger/more problematic form

3=Behaviour described by item occurs frequently in a mild/relatively unproblematic form

4=Behaviour described by item occurs frequently in a stronger/more problematic form

<i>Item</i>	<i>Score</i>
1 Medication is given by staff	_____
2 Has paralyzed/partially paralyzed limbs	_____
3 Disrupts the activities of others	_____
4 Laughs very loudly	_____
5 Attempts to run away	_____
6 Uses body in a peculiar way	_____
7 Risks physical self-injury by behaviour	_____
8 Resists taking medication	_____
9 Worries about things	_____
10. Is incontinent	_____
11 Bosses other people	_____
12 Shows a violent temper	_____
13 Annoys other people	_____
14. Takes little spontaneous part in activities	_____
15 Cannot be trusted	_____
16. Claims help is needed when it is not	_____
17 Threatens others verbally	_____
18. Cries	_____
19 Needs support to take part in activities	_____
20. Does inappropriate things when with others	_____
21 Engages in socially inappropriate sexual behaviour	_____
22 Complains of feeling unwell	_____
23 Throws, bangs or damages objects	_____
24. Tends to get drowsy/fall asleep	_____
25 Requires transport assistance	_____
26 Overestimates own abilities	_____
27 Is difficult to settle down to work/to listen	_____
28 Demands excessive attention	_____
29 Does not respond to instructions/rules	_____
30. Suffers from panics/fears	_____
31 Refuses to speak correctly	_____
32. Talks loudly	_____
33 Forgets to take medication	_____
34. Is physically abusive	_____
35 Feels that others are denying his rights	_____
36 Complains about peers	_____

APPENDIX F



Stobhill General Hospital
Glasgow G21 3UW

Telephone: 041-558 0111

RESEARCH AND ETHICAL COMMITTEE.

RLCC/MT
24.4.92

Mr. Raymond A.R. MacDonald,
Research Student,
Department of Psychology,
University of Glasgow.
56 Hillhead Street,
Glasgow. G12

Dear Mr. MacDonald,

Ref: 92/02

Your protocol titled "Music as a catalyst for personal development" was considered at the Research and Ethical Committee Meeting on Monday 13th April, 1992 and was approved without further amendment.

Yours sincerely,

A handwritten signature in cursive script, which appears to read 'Robert L.C.C. Cumming'.

R.L.C.C. Cumming
Consultant in Admin. Charge.
Department of Haematology.

APPENDIX G

SHORT TERM MEMORY TEST

No.	Response	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		

APPENDIX H

SELF PERCEPTION QUESTION

The experimenter plays the Gamelan everyday.

On the following scale how would you rate his ability to play the Gamelan?

How would you rate your own ability to play the Gamelan?

NO
SKILL

VERY
HIGHLY
SKILLED

APPENDIX I

SELF PERCEPTION QUESTION

How would you rate the O.T.'s ability to cook.

How would you rate your own ability to cook.

NO
SKILL

VERY
HIGHLY
SKILLED

APPENDIX J

SELF PERCEPTION QUESTION

How would you rate the O.T.'s ability to draw.

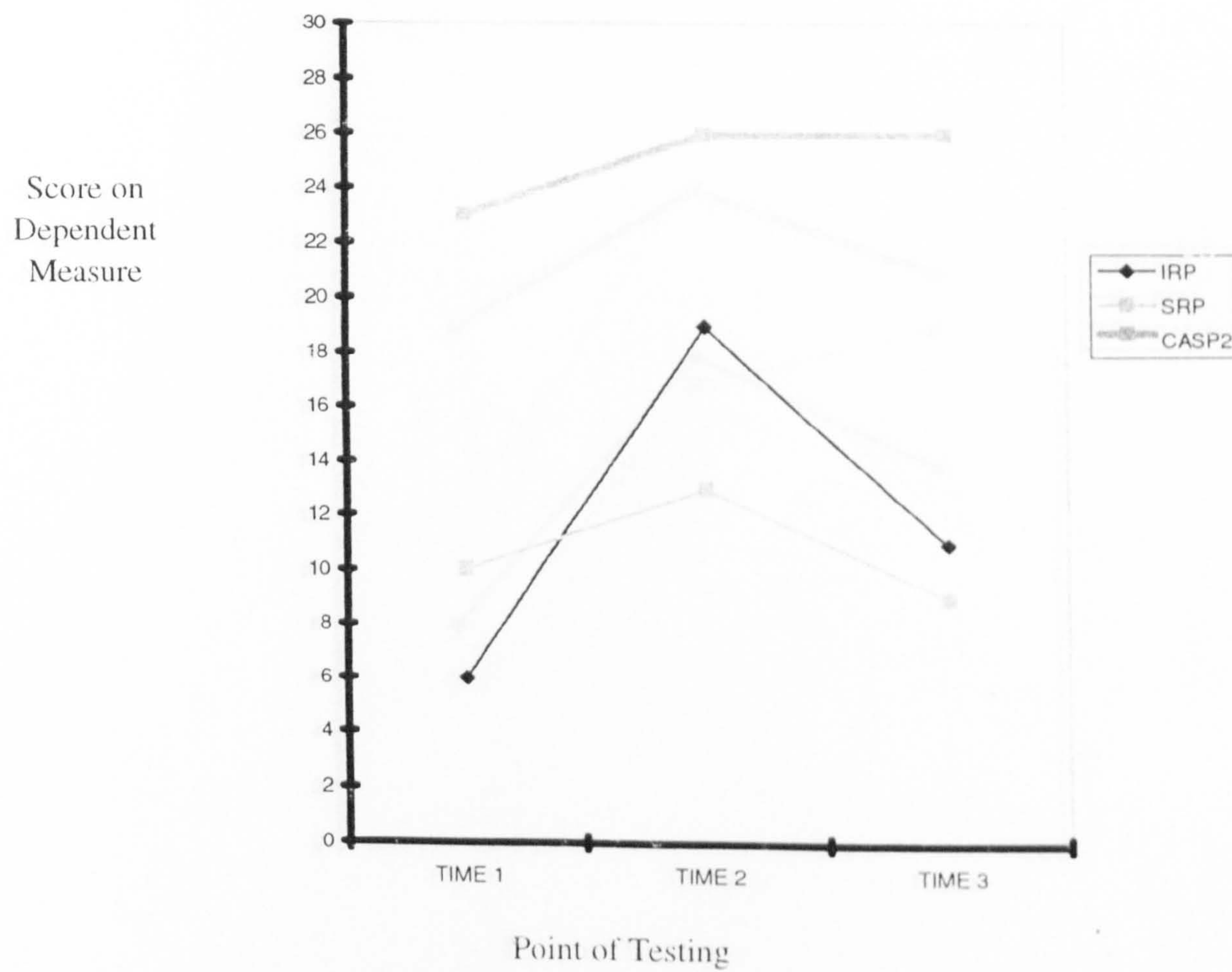
How would you rate your own ability to draw.

NO
SKILL

VERY
HIGHLY
SKILLED

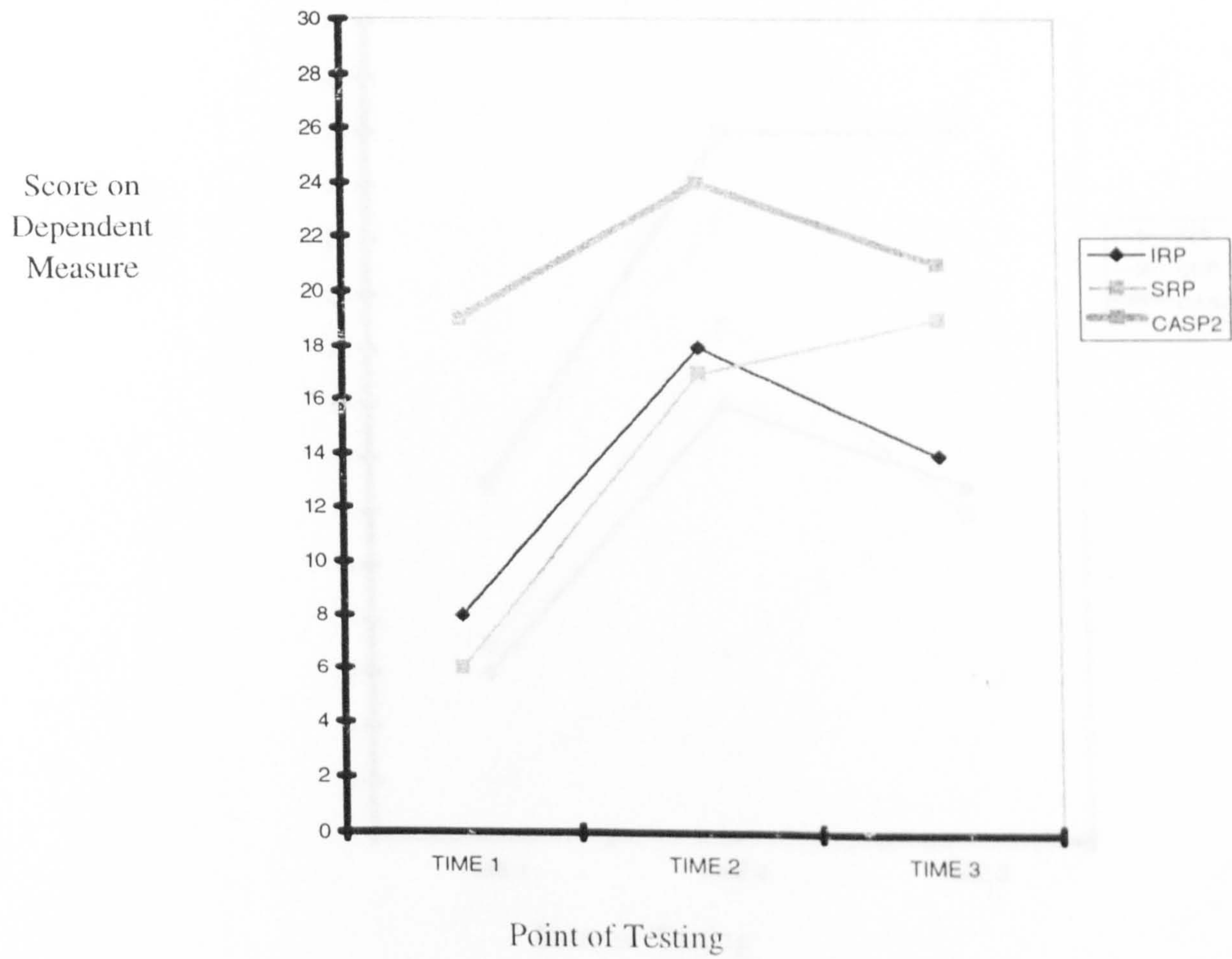
APPENDIX K

Subject No. 1



APPENDIX L

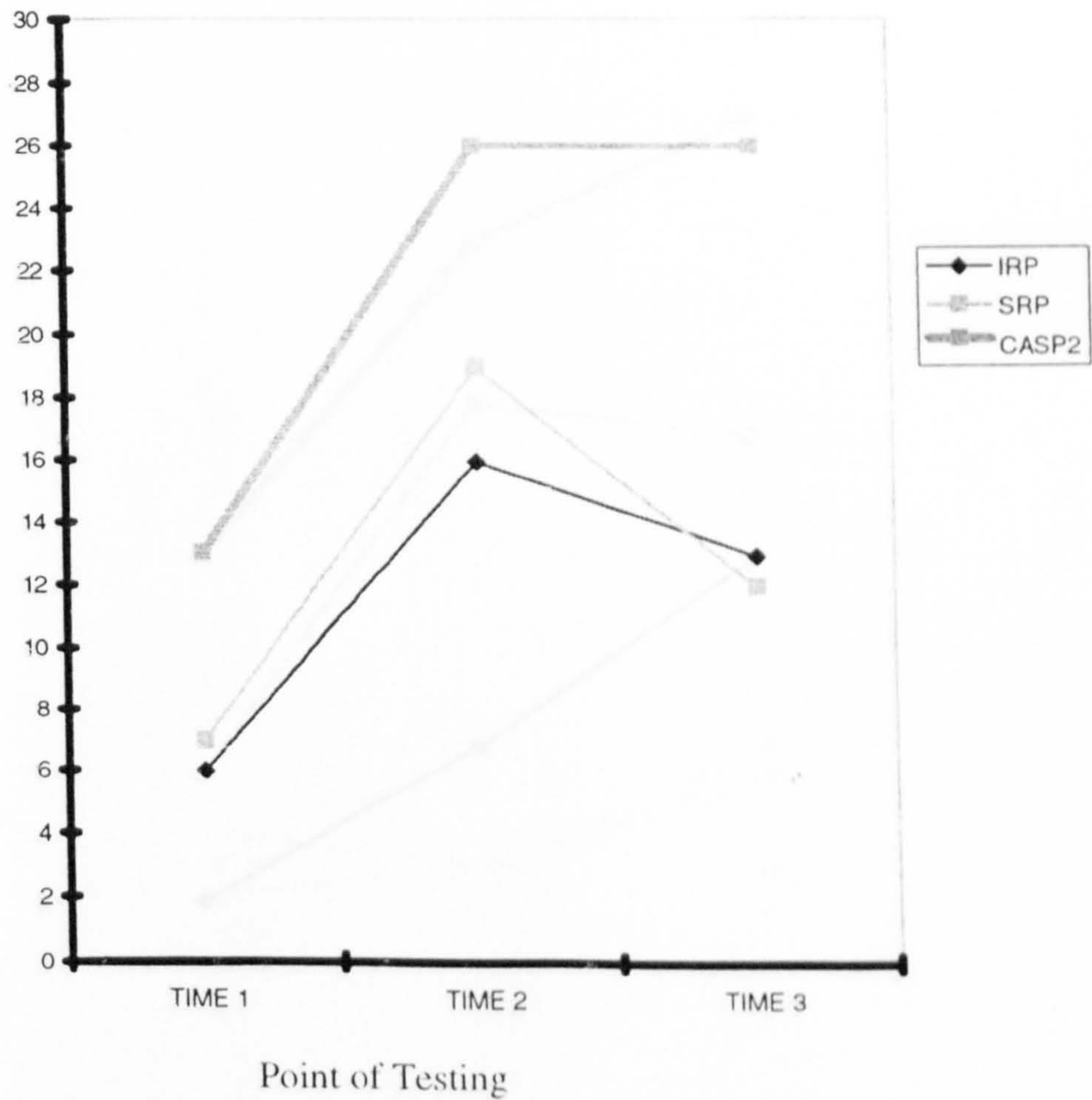
Subject No. 2



APPENDIX M

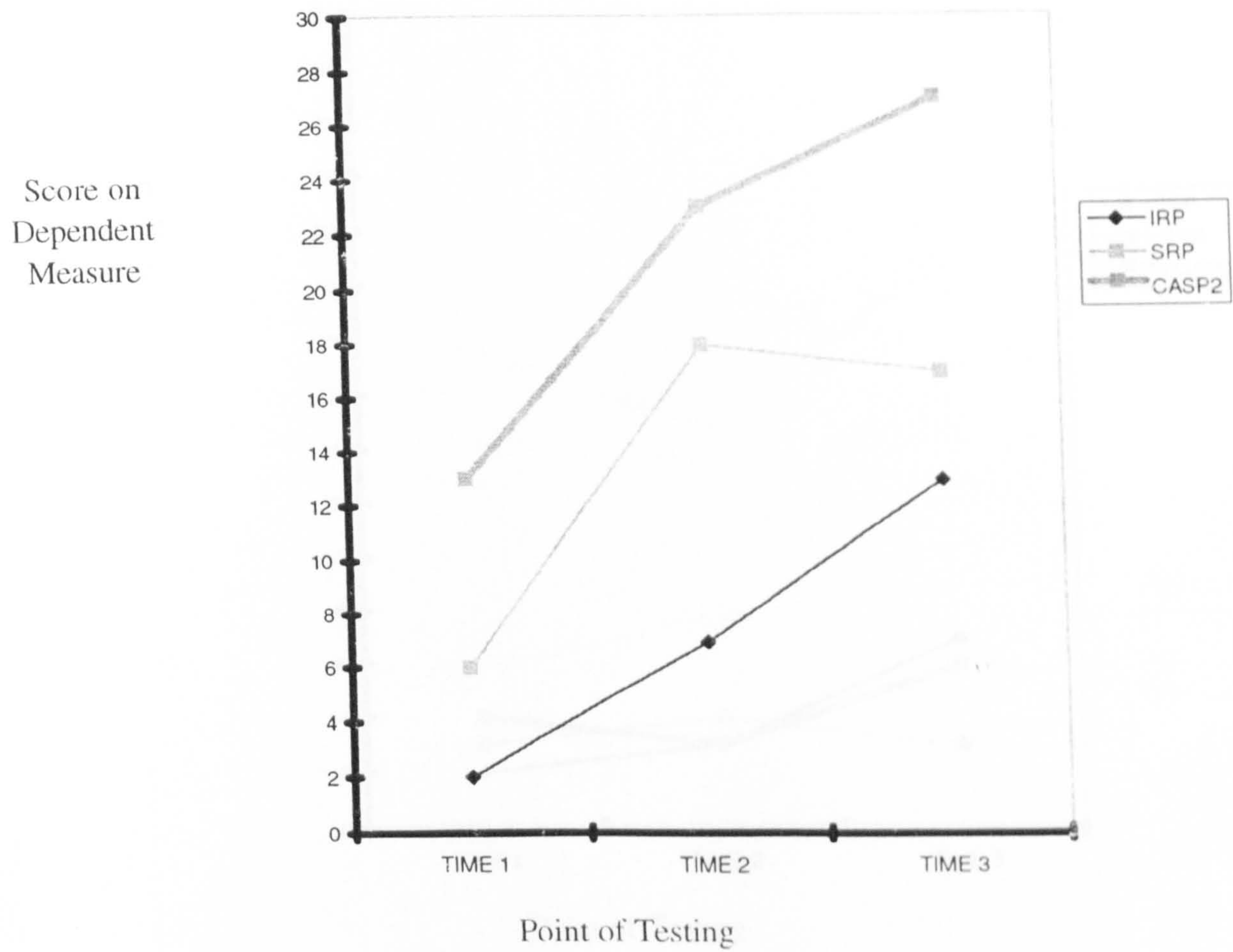
Subject No. 3

Score on
Dependent
Measure



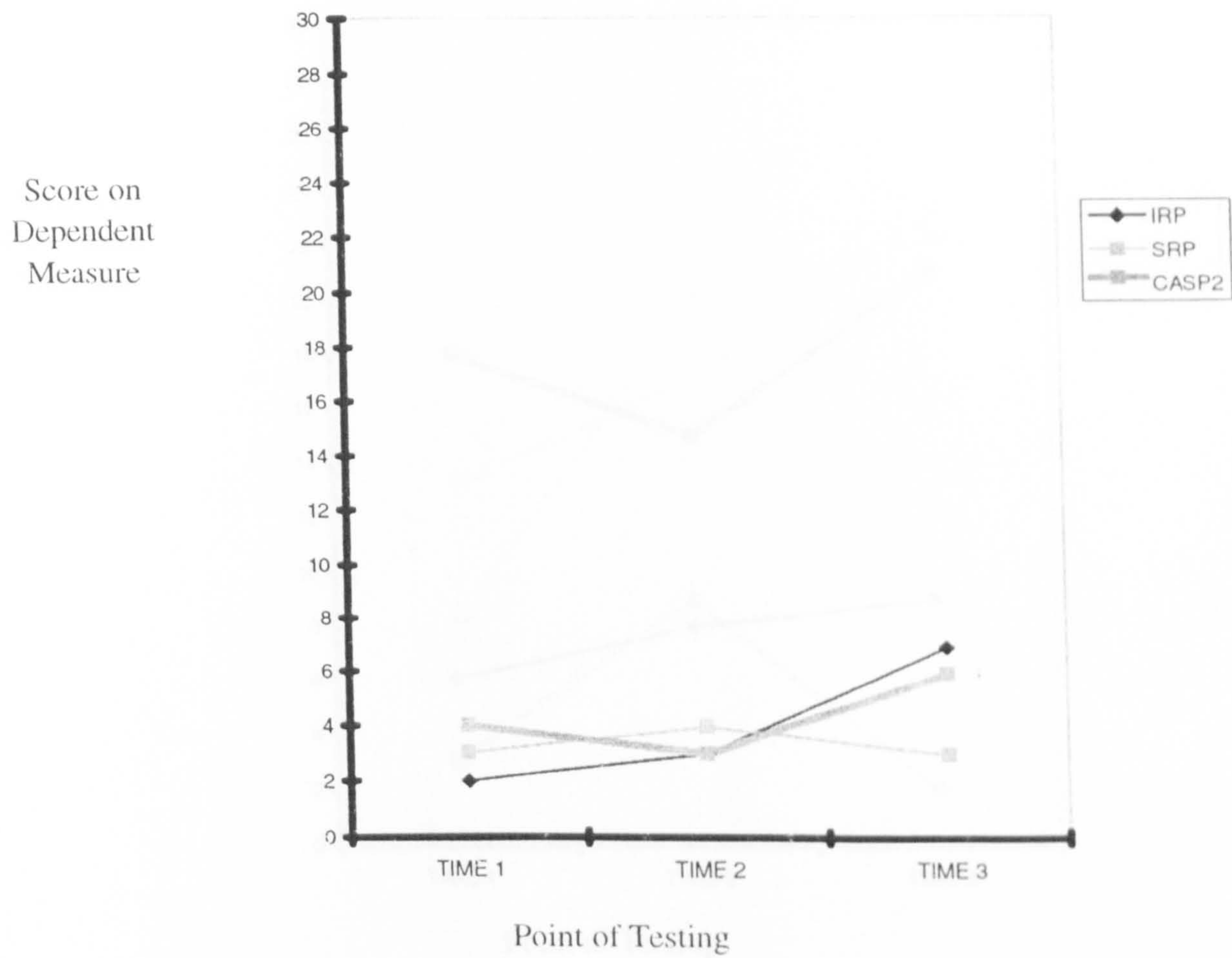
APPENDIX N

Subject No. 4



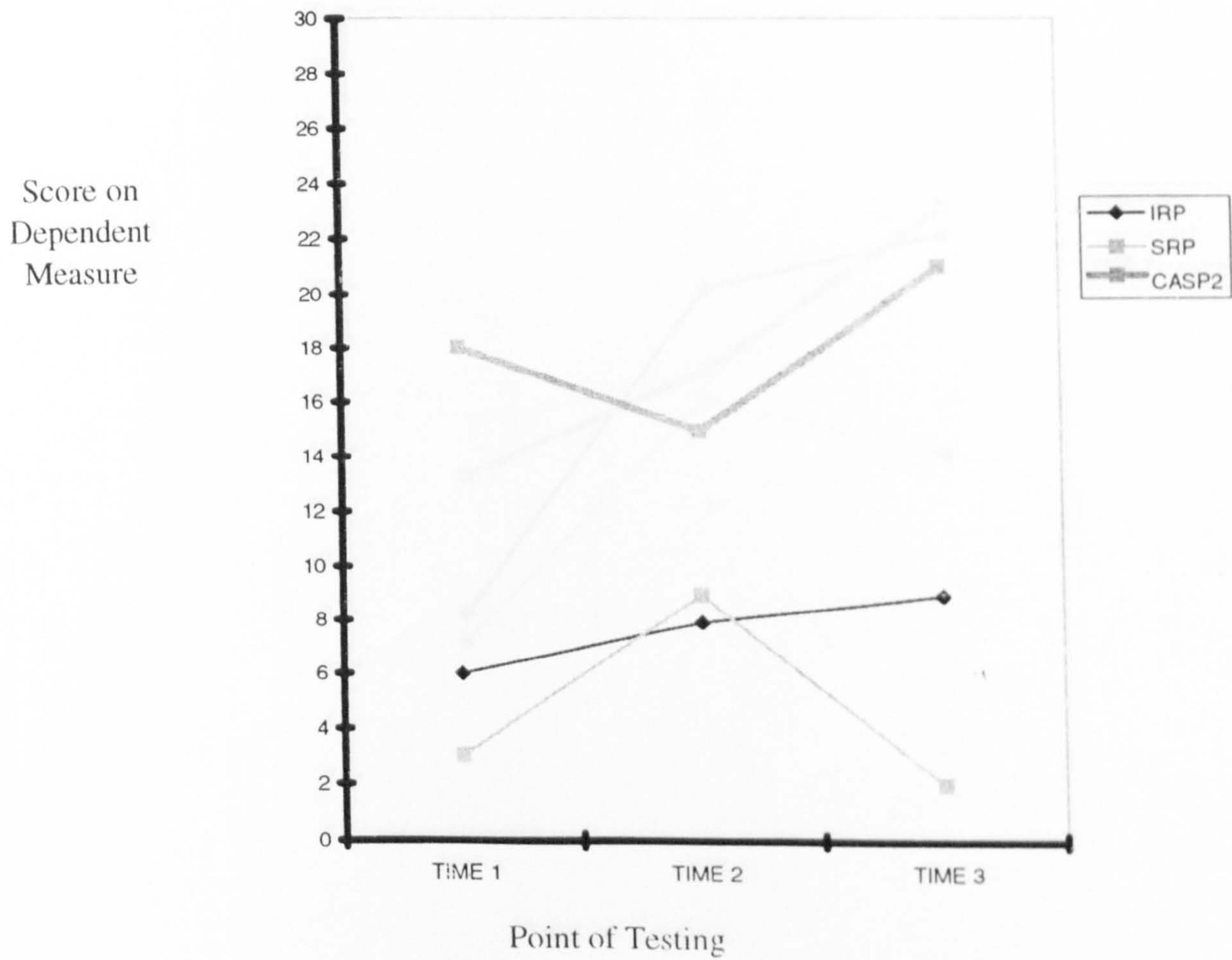
APPENDIX O

Subject No. 5



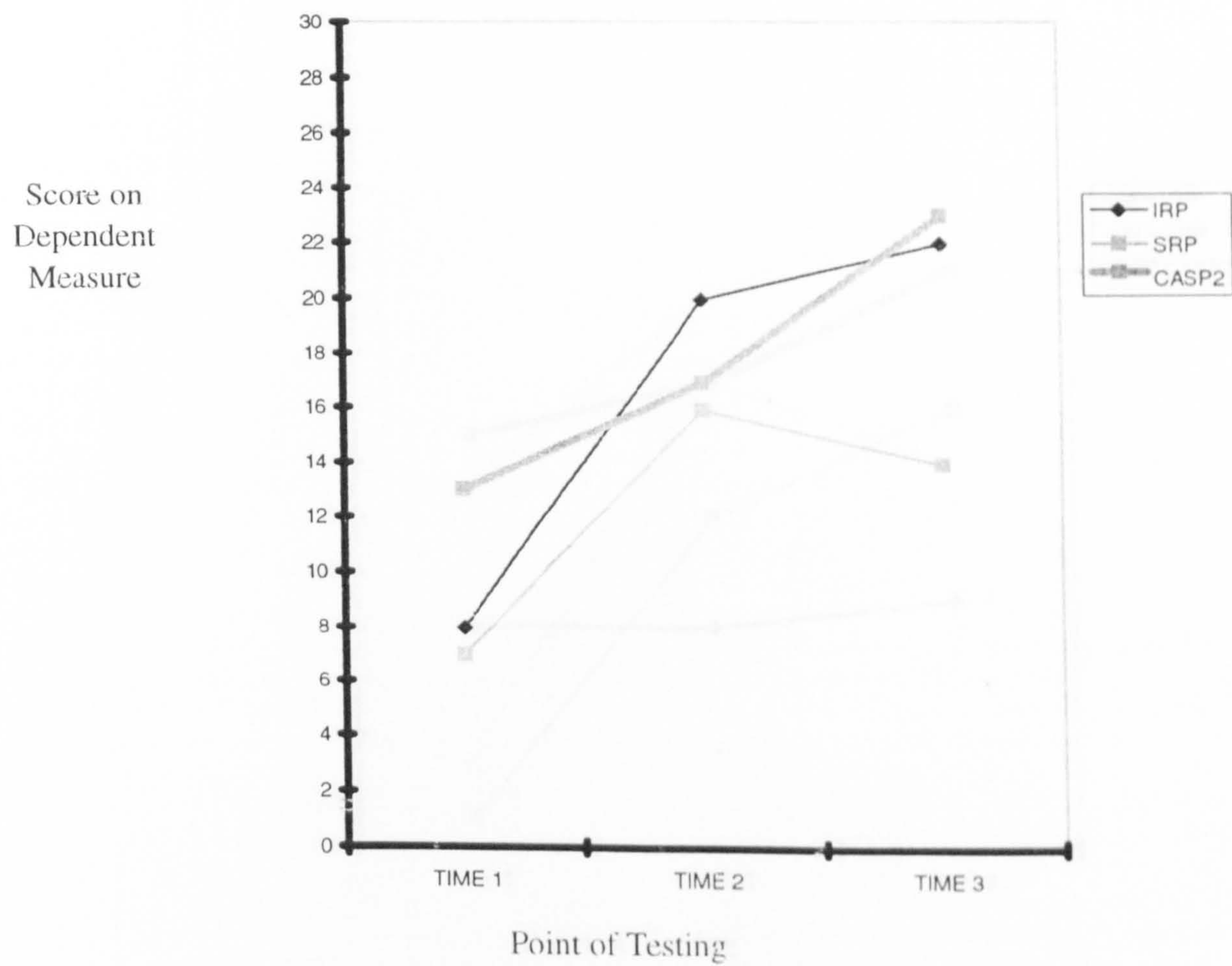
APPENDIX P

Subject No. 6



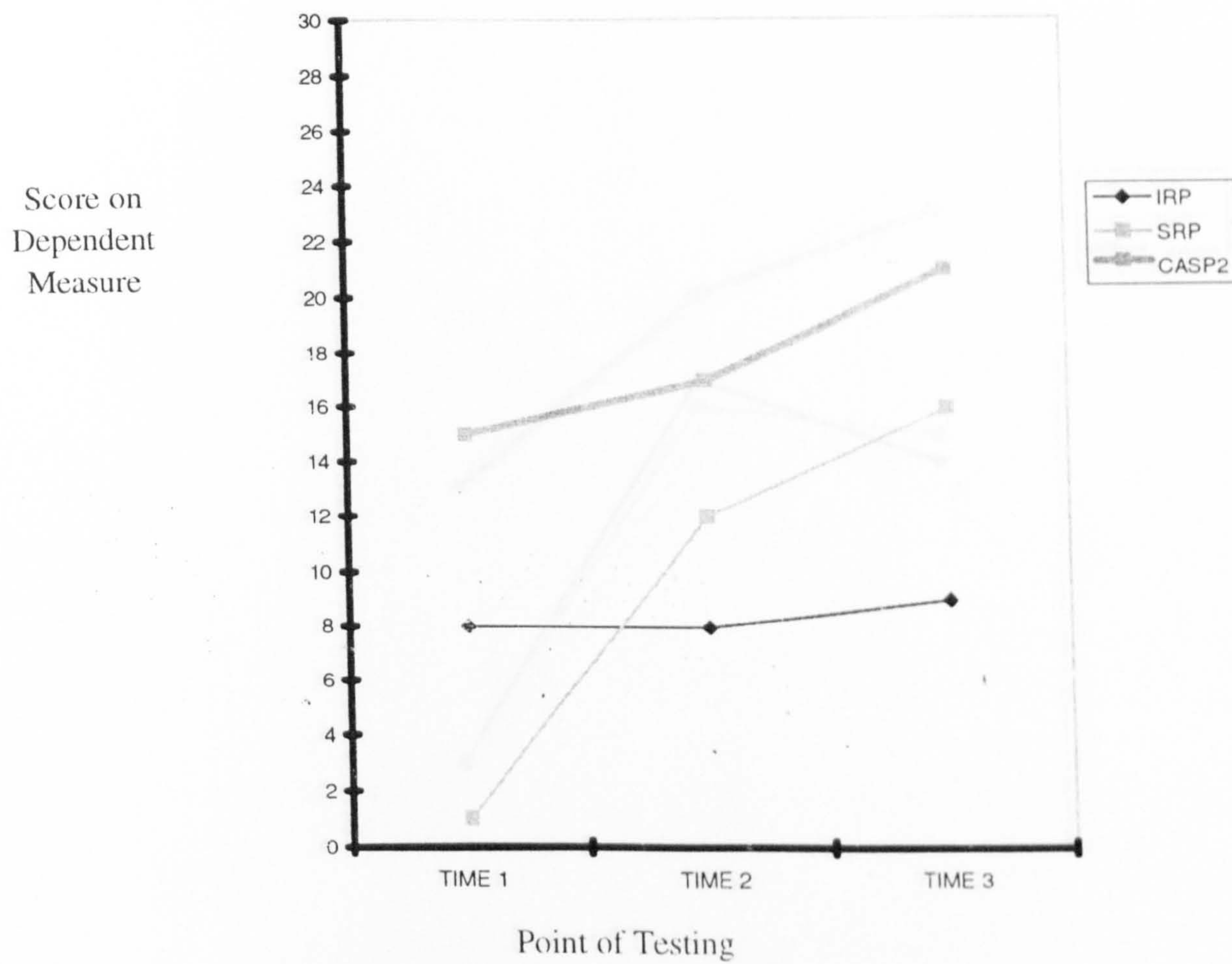
APPENDIX Q

Subject No. 7



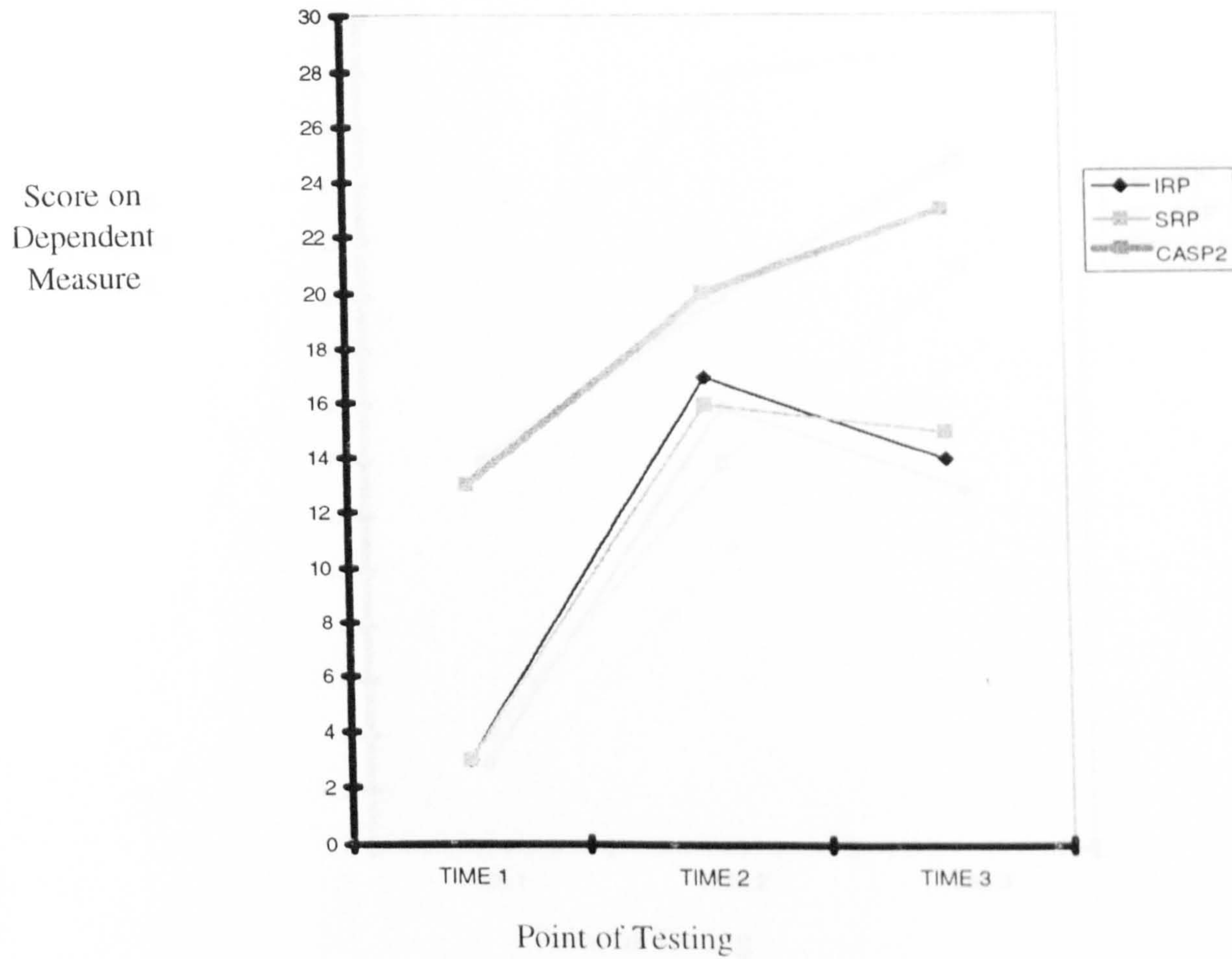
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Subject No. 8



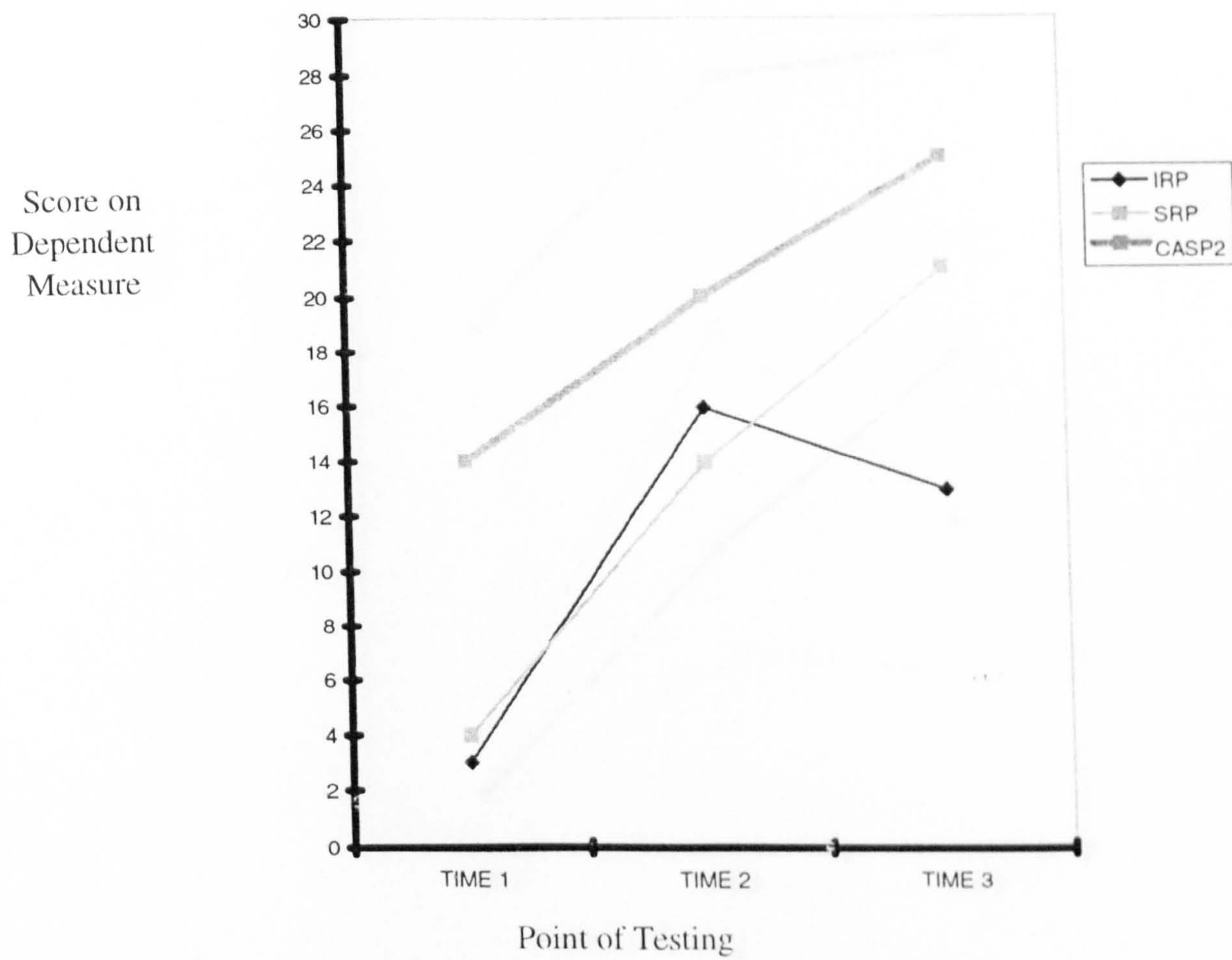
APPENDIX S

Subject No. 9



APPENDIX T

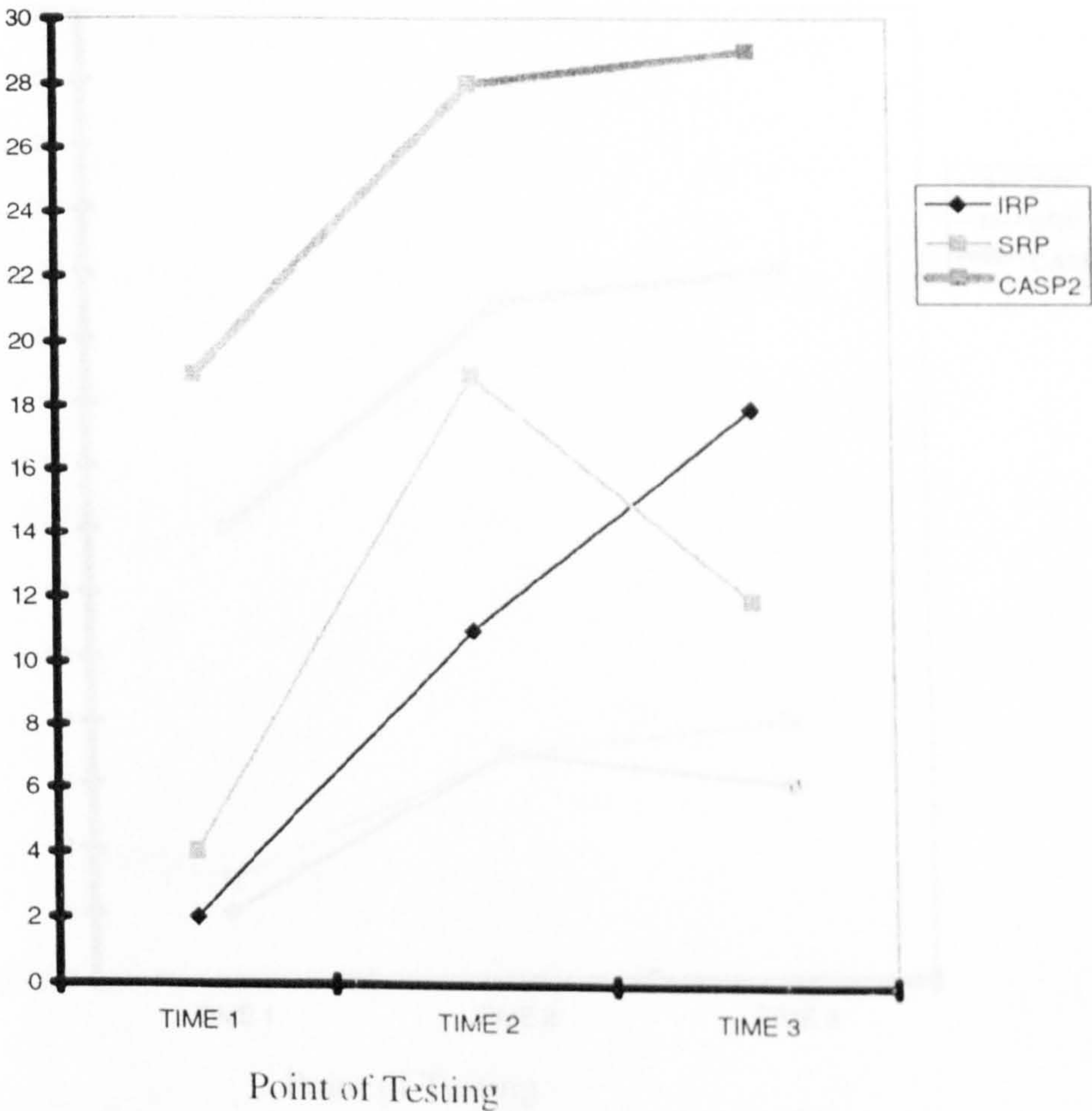
Subject No. 10



APPENDIX U

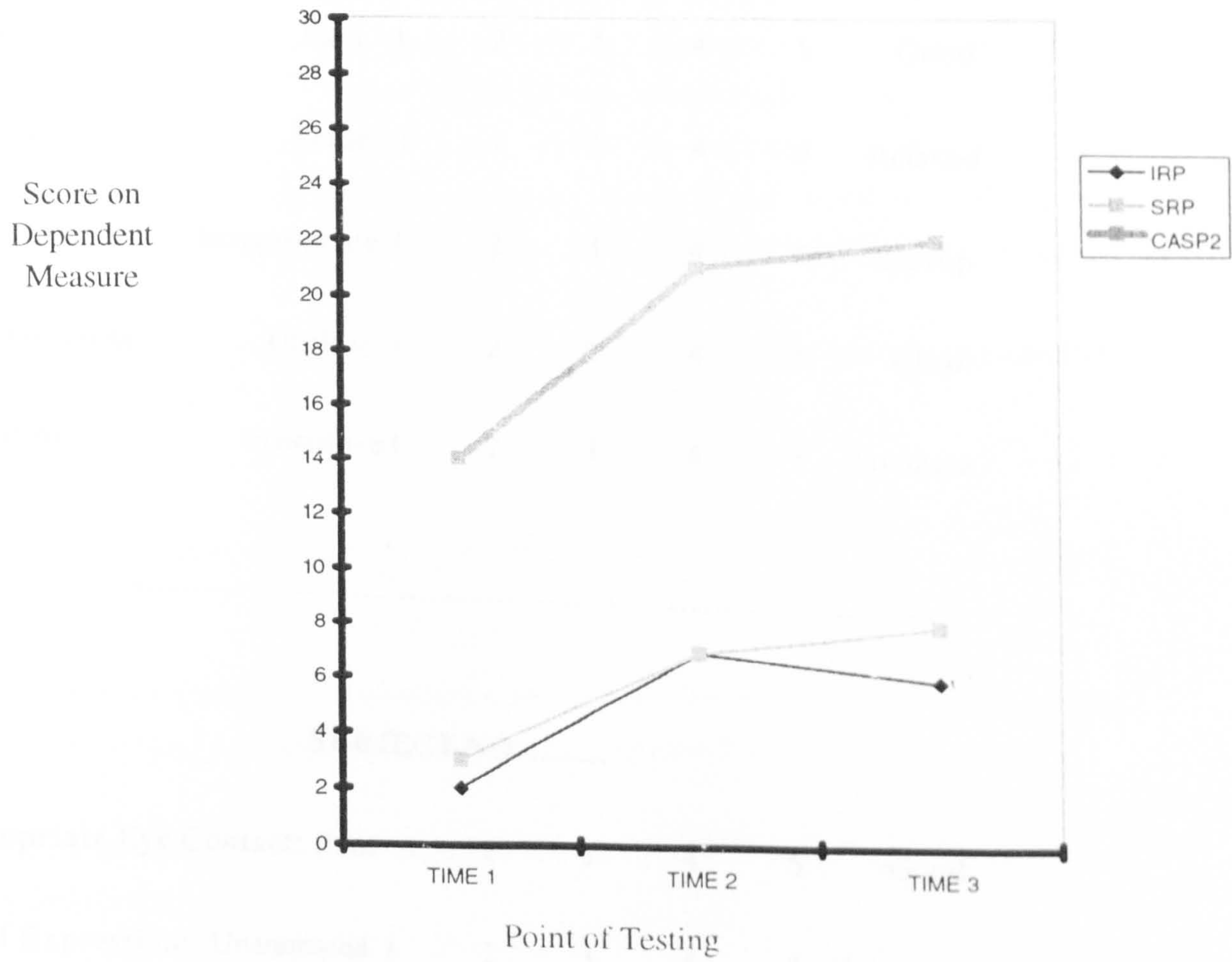
Subject No. 11

Score on
Dependent
Measure



APPENDIX V

Subject No. 12



APPENDIX W

SUBJECT NO.

A. Appropriate Eye Contact:	Poor	1	2	3	4	5	Good
B. Facial Expression:	Unanimated	1	2	3	4	5	Animated
C. Posture:	Poor	1	2	3	4	5	Good
D. Tension:	Tense	1	2	3	4	5	Relaxed
E. Gestures:	Inappropriate	1	2	3	4	5	Approp
F. Tone Of Voice:	Unclear	1	2	3	4	5	Clear
G. Attention:	Inattentive	1	2	3	4	5	Attentive

.....

SUBJECT NO.

A. Appropriate Eye Contact:	Poor	1	2	3	4	5	Good
B. Facial Expression:	Unanimated	1	2	3	4	5	Animated
C. Posture:	Poor	1	2	3	4	5	Good
D. Tension:	Tense	1	2	3	4	5	Relaxed
E. Gestures:	Inappropriate	1	2	3	4	5	Approp
F. Tone Of Voice:	Unclear	1	2	3	4	5	Clear
G. Attention:	Inattentive	1	2	3	4	5	Attentive

APPENDIX X

Age

Sex

Date

You will be presented with a series of clips of subjects who will be either playing a musical instrument called a Gamelan, or completing a communication test. Your task is to rate each subject on their communication ability and social skills by filling in the following questionnaire. Complete each section by circling the number at the point you consider to be most suitable, (where 1 is very poor and 5 is very good).

For example, if you consider a subject to have very ⁱⁿappropriate eye contact circle the number 1.

A. Appropriate Eye Contact: Poor (1) 2 3 4 5 Good

Please use a separate questionnaire for every clip and number it according to which subject you are rating in the space provided.

Try to concentrate and be as accurate as possible as your responses are very important.

Thank you for your help.

APPENDIX Z

1. Inter-rater reliability

The following table reports inter-rater reliability for the NVC questionnaire. Spearman correlation co-efficients were calculated based upon two raters completing the questionnaire while watching the experimental video.

	RATER 1 Q.A	Q.B.	Q.C.	Q.D	Q.E.	Q.F.	Q.G.
RATER 2 Q.A	.80						
Q.B		.79					
Q.C			.84				
Q.D				.84			
Q.E					.77		
Q.F						.81	
Q.G							.84

APPENDIX Z

2. Test retest reliability

The following table reports test-retest reliability for the NVC questionnaire. Spearman correlation co-efficients were calculated based upon one rater completing the questionnaire while watching the experimental video (time one) then completing the same procedure two weeks later (time two).

	TIME 2 Q.A	Q.B.	Q.C.	Q.D	Q.E.	Q.F.	Q.G.
TIME 2 Q.A	.79						
Q.B		.77					
Q.C			.80				
Q.D				.81			
Q.E					.76		
Q.F						.82	
Q.G							.78