Validation of a play package
to facilitate the development of
communication-related skills

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ABSTRACT

TITLE   The validation of a play package for the facilitation of
          communication-related skills

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The needs of the severely disabled, especially in communities where there is a paucity of professional manpower inspired this research aiming at the refinement and validation of a play package consisting of a daily multiple measurement instrument and a package of play activities for the facilitation of communication-related behaviours.

This intervention programme is based on theoretical underpinnings derived from various scientific disciplines' explanations of sensorimotor, cognitive, communication and social-emotional development, as well as the role of play as a facilitator of childhood development. Within this theoretical context a model for the development of communication-related behaviours as adaptive responses is put forward. Through a process of operationalisation of the relevant constructs, observable behavioural indicators are identified and applied to the developmental needs of the intellectually impaired.

Play is described as a tool for the facilitation and measurement of communication-related behaviours and within this framework an authentic daily multiple measurement instrument

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(DMMI) was developed and a package of play activities (previously developed) refined for validation through experimentation.

The main aim of the empirical research was to validate the play package for the facilitation of communication-related skills by the refinement of the play package consisting of specifically selected activities and presentation methods during a pre-experimental phase, as well as experimentation to establish a cause-effect relationship between the activities and changes in single, gradually acquired behaviours of children with intellectual impairments.

In the pre-experimental phase face and content validity were investigated by a group of experts who evaluated the daily multiple measurement instrument and the package of play activities, as well as the audio-visual recordings of the measurement and treatment of intellectually impaired children in two pilot studies.

During the experimental phase construct and convergent validity were investigated. Data were collected from five intellectually impaired participants over an eight week period in which week 1 was used for pre-intervention measurements, weeks 2, 3 and 4 for intervention, week 5 for post-intervention measurements, weeks 6 and 7 for a period of withdrawal and week 8 for post-withdrawal measurements. External raters were involved to assure reliability and three additional authentic measurement instruments were included for the establishment of convergent validity.

Based on the findings of the research face, content, construct and convergent validity of the play package was established, thus proving that the daily multiple measurement instrument measures the behaviour that it claims to measure and the package of play activities facilitates the development of communication-related behaviours that it claims to facilitate.

A valid and reliable play package, catering for the individual needs of the heterogeneous population of disabled children, was thus established. The play package is structured in such a way that it can be applied by any member of a transdisciplinary team, and even (with some prior training) by non-professional caregivers and parents, thus alleviating the

burden on a handful of professional therapists who cannot cope with the needs of the large population of severely disabled children.

Key words   Play, early childhood intervention, validation, measurements, adaptive response, adaptive behaviour, intellectual impairment, communication-related skills, developmental domains, play package, assessment.

OPSOMMING

TITEL   Die validering van 'n spelpakket vir die fasilitering van kommunikasie-verwante vaardighede

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Die behoeftes van erg gestremdes, veral in gemeenskappe met 'n tekort aan professionele mannekrag, het gelei tot hierdie navorsing, wat gerig is op die verfyning en validering van 'n spelpakket bestaande uit 'n daaglikse veelvuldige metingsinstrument en 'n pakket van spelaktiwiteite.

Hierdie intervensieprogram is gegrond op 'n teoretiese onderbou wat verkry is uit verskeie wetenskaplike dissiplines se verduidelikings van sensories-motoriese, kognitiewe, kommunikasie en sosiaal-emosionele ontwikkeling, sowel as die rol van spel as fasiliteerder van kinderontwikkeling. Binne hierdie teoretiese konteks is 'n model vir die ontwikkeling van kommunikasie-verwante gedrag as aanpassingsresponse daargestel. Deur 'n proses van operasionalisering van die relevante konstrukte is waarneembare gedragsaanduiders geïdentifiseer en toegepas op die ontwikkelingsbehoeftes van van die intellektueel-belemmerde.

Spel word beskryf as 'n medium vir die fasilitering en meting van kommunikasie-verwante gedrag en binne hierdie raamwerk is 'n outentieke veelvuldige metingsinstrument (DMMI)

ontwikkel en 'n pakket van spelaktiwiteite, wat voorheen ontwikkel is verfyn vir validering deur eksperimentering.

Die hoofdoel van die empiriese navorsing was juis om die spelpakket vir die fasilitering van kommunikasie-verwante vaardighede te valideer deur die verfyning van die spelpakket bestaande uit spesifieke geselekteerde aktiwiteite en aanbiedingsmetodes. Gedurende 'n pre-eksperimentele fase, sowel as eksperimentering is 'n oorsaak-gevolg verhouding tussen die aktiwiteite en veranderinge in enkel, geleidelik verworwe gedrag van kinders met intellektuele belemmerings vasgestel.

In die pre-eksperimentele fase is gesigs- en inhoudsgeldigheid ondersoek deur 'n groep deskundiges wat die daaglikse veelvuldige metingsinstrument en die pakket van spelaktiwiteite, sowel as die oudio-visuele opnames van meting en behandeling van intellektueel-belemmerde kinders in twee loodsstudies geëvalueer het.

Gedurende die eksperimentele fase is konstruk- en konvergensiegeldigheid ondersoek. Data van vyf intellektueel-belemmerde deelnemers is oor 'n periode van agt weke versamel, waar week 1 benut is vir pre-intervensie meting, weke 2, 3 en 4 vir intervensie, week 5 vir post-intervensie meting, weke 6 en 7 vir onttrekking en week 8 vir post-onttrekking meting. Eksterne gradeerders is betrek om betroubaarheid te verseker en drie outentieke metingsinstrumente is ingesluit vir die vasstelling van konvergensiegeldigheid.

Gegrond op die resultate van die navorsing is die gesigs-, inhouds-, konstruk- en konvergensiegeldigheid van die spelpakket vasgestel. Daar is dus bewys dat die daaglikse veelvuldige metingsinstrument wel die gedrag wat dit veronderstel is om te meet, meet en dat die pakket van spelaktiwiteite wel die kommunikasie-verwante vaardighede fasiliteer wat dit veronderstel is om te fasiliteer.

'n Betroubare en geldige spelpakket, wat voorsiening maak vir die behoeftes van die heterogene populasie van gestremde kinders is dus daargestel. Die spelpakket is op so 'n wyse gestruktureer dat dit deur enige lid van 'n transdissiplinêre span, insluitende nie-professionele versorgers en ouers (na vooraf opleiding) toegepas kan word om sodoende die las van die handjievol professionele persone, wat nie aan die behoeftes van die groot populasie van erg gestremde kinders kan voldoen nie, te verlig.

Sleutelwoorde Spel, vroeë intervensie by kinders, validering, metings, aanpassingsrespons, aanpassingsgedrag, intellektuele belemmering, kommunikasie-verwante vaardighede, ontwikkelingsdomeine, spelpakket, bepaling.

CHAPTER I

PERSPECTIVES AND ORIENTATION

1.1 PROBLEM STATEMENT AND RATIONALE

The "gap between needs and services has major implications for the development of disabled children, their quality of life, and the roles they will be able to play in society" (Alant & Emmett, 1995: unnumbered). The gravity of this statement is enhanced by the fact that the risk for disabilities, or double the risk for those already displaying risk conditions (Escalona, 1987), is increased for children living in disadvantaged conditions (Patel, 1993). Mainly because of ignorance and attitudinal barriers, historically the main focus was often exclusively on the nurturing and caring for these children (Peck & Furman, 1992). As expected, research found that children with limited or no functional speech, such as the intellectually impaired, communicate at a low rate (Rowland & Schweigert, 1993), some of the reasons being that they have few opportunities for meaningful interaction and that their communication partners (parents, caregivers, teachers) expect little or nothing of them. These conditions still exist, despite the well-known fact that "the actual occurrence of behavior depends on appropriate experience" (Shonkhoff & Meisels, 2000:11).

Over the years many health professionals have tried to address the above-mentioned issues, but due to a number of factors their efforts were not very successful. Conditions in South Africa created a situation where most health and rehabilitation services are centred in urban areas, while the highest prevalence of disability is found in the rural areas (Alant & Emmett, 1995). In two studies carried out by Matas, Mathy-Laikko, Beukelman and Legresly (1985) in the United States of America, they also established that the prevalence of children with communication disorders seems to be higher in rural than in urban areas. A lack of understanding of the multilingual and multicultural nature of our population further complicated the delivery of appropriate and effective services. The strict adherence to the medical model of service delivery prevented collaboration and active involvement by communities. Furthermore, the professionals' jealous guarding of the boundaries of

their disciplines limited the scope of, and a holistic approach to service delivery. In 1994 Blackstone stated, "we are moving away from the traditional models of service delivery to more community based, collaborative approaches to intervention" (1994:1), but this was not enough. The multifaceted nature of disability also had to be addressed by a handful of therapists, each specialising in his particular discipline. Although it has many implications, such as training, it is within the community-based service model that the introduction of transdisciplinary intervention was heralded with enthusiasm. It has become evident that research is needed to establish valid intervention programmes for the facilitation of communication-related behaviours that can be applied successfully by any member of a transdisciplinary team including non-professional members such as caregivers and parents.

An area that has not been addressed extensively enough is the nature and quality of intervention. Shonkoff (2000) observed "that the great empirical task of the future would be to identify what processes mediate the long-term effects of early intervention for economically disadvantaged children … to identifying factors that contribute to program efficacy" (Shonkoff & Meisels, 2000:xii; Lipsey & Wilson, 1993). Clinicians have applied foreign models and translated programmes on the basis of limited information, but these efforts have been criticised, as generalisation of cultural, geographic, social and linguistic norms is not possible (Lahey, 1988).

The lack of research relating to the validation of evaluation and intervention material relevant to the South African context have received much attention in the literature over the past decade. In fact, in the white paper of the Integrated National Disability Strategy (1997), it was emphasised that without proper validation formal intervention procedures used for children with disabilities, can be harmful. The dire needs of the disabled in South Africa, as well as the need to establish a valid and effective, transdiciplinary intervention programme for the holistic treatment of the intellectually impaired, inspired this research.

It is against this background that a play package developed by Uys (1997) was refined and validated in this research. A number of underlying assumptions and guidelines underpinned the orientation, planning and course of the project.

According to Shonkoff and Meisels (2000) childhood intervention is based on three assumptions. Firstly, all organisms are designed to adapt to their environment. Their developmental potential and behaviour are not predetermined by genetic factors or limited to a critical period beyond which change is not possible. Secondly, childhood development can only be understood within context, namely the interaction between the child and his environment. Thirdly, the range of services and supports needed by children must of necessity be diverse as children are confronted by a wide variety of opportunities and challenges. The implications of these assumptions are that development is an adaptive response and that children's potential for development should never be underestimated. Furthermore, intervention should always take place in a natural environment, meaningful to the child. As children's natural and main occupation is play (See Chapter 2), it is through play that all intervention should take place. Lastly, as the child's developmental needs are varied, different professional disciplines should be involved in intervention. Because of the paucity of manpower in the health and rehabilitation professions in South Africa, the need for a transdisciplinary approach to intervention is indicated. This play package was constructed in such a way that any team member and even non-professionals who are available in communities, can apply it successfully.

In the United States of America federal law creates a framework for programmatic decisions about developmental delay (Shonkoff & Meisels, 2000), which is just as applicable to conditions in South Africa. Diagnosis and treatment are required to cover five areas of performance, namely cognitive, physical, language and speech (communication), self-help, and psychosocial development. Intervention (measurement and treatment) programmes should thus cover the sensorimotor, cognitive, communication and social-emotional domains of development.

The play package for the facilitation of communication-related skills was developed and evaluated in previous research (Uys, 1997). However, the validity of the play package had to be determined and in this case the "validity of correspondence" (Brinberg & Kidder, 1982:12) in domains, namely the conceptual, the methodological and the substantive domains.

During the pre-study phase the research activities involved the selection of relevant concepts, and the determination of patterns among these concepts. Correspondence

between the selected, relevant concepts led to the development of a model for the development of adaptive communication behaviour and the identification of constructs and their corresponding observable behavioural indicators. This process served as a precondition for the development and use of specific measurement and treatment tools.

Strategies or methods for observing behaviours, for manipulating and controlling research conditions, were carried out in the methodological domain. Based on information derived from the conceptual framework a specific measurement tool, the Daily Multiple Measurement Instrument (DMMI), was developed and the play package activities refined.

The data according to which, through analysis and interpretation, correspondence could be determined between the intervention and the outcomes involved the substantive domain. Because of the cyclical nature of research a further step was taken in that the conceptual elements and relations were brought to bear on the data in order to explain and interpret them. Correspondence between the findings and the preconceived theory is an important aspect of external validity (Brinberg & Kidder, 1982).

It is only after this exposition on the research problem, the rationale for the research and the description of the concept of validity that the research question can be formulated. As this research aims at the validation of the play package, which includes the measurement instrument (DMMI) and the treatment activities, the following research question is put:

Does the DMMI measure the communication-related behaviours that it claims to measure and does the package of treatment activities facilitate the development of the communication-related behaviours that it claims to facilitate?

1.2   TERMINOLOGY

VALIDATION

Validation is the process by which something is ratified or confirmed. Validity is defined in many different ways. According to Leedy (1993) validity determines whether a type of measurement actually measures what it is presumed to measure. Validity also determines the effectiveness of procedures.

According to Brinberg and Kidder (1982:12) "validity and validity-like terms share several underlying meanings", one being the validity of correspondence "whether they be two sets of constructs, a set of concepts and a set of observations, two sets of measures". An important central idea of validity is dependability – that which is really true. This view refers to validity as value.

In the conceptual domain validity refers to the search for concepts and relations worthy of study. In the process of conceptualisation connotations should be unambiguous and clearly delineated and denotations should be accurate indicators of the connotations. Theoretical validity is based upon clarity, scope and systematisation. (Mouton & Marais, 1985). Methodological validity depends upon methods and procedures that are valuable for research purposes, while substantive validity explores events and observations that are real, true and important.

The different types of validity are explained in Chapter 4.

PLAY PACKAGE

A play package can be defined as "a specifically selected, coherent set of play activities, aiming at pleasurable and successful learning and training of skills (Uys, 1997). In this case the play package aims at the development of skills related to communication, namely sensorimotor, cognitive, social-emotional and communication skills.

1.3   ORGANISATION OF THE DISSERTATION

CHAPTER 1

In this chapter some introductory remarks on the needs of the disabled and previous attempts by the health and rehabilitation professions to address these needs, are presented. It is against this background that the problem and the rationale for this research are stated. The researcher's orientation is described in relation to a number of assumptions and guidelines for research and service delivery. The research question was then formulated.

Definitions of the salient terms, as well as an outline of the organisation of the dissertation are included.

CHAPTER 2

This chapter deals with the concept of the adaptive response. Theories on adaptation, as well as on communication development underpin the model for the development of communication-related behaviours as adaptive responses is put forward. The sensorimotor, cognitive, communication and social-emotional domains are identified and the integration between them is described. Through a process of operationalisation of the relevant constructs, observable behavioural indicators are identified and applied to the developmental needs of the intellectually impaired child. This chapter serves as the conceptual orientation for the empirical research.

CHAPTER 3

Play, as a tool for the facilitation and measurement of communication-related behaviours, constitutes the theme of this chapter. Based on the theoretical orientation that the communication-related behaviours are adaptive responses, play is regarded as a vehicle for the development of these behavioural responses. The use of play as an intervention tool and the need for the development, refinement and validation of a play package is discussed.

CHAPTER 4

The methodology implemented in the empirical research is described and defended in this chapter. As the research involves different phases, the aims and designs are presented for the pre-experimental and experimental phases. Procedures for the refinement and face validation are described, including the prior testing of the research methods in a pilot study. The description of the experimental phase includes the aims, the participants, material and equipment, as well as the data collection, recording and analysis procedures. The information is provided in such a way that the study may be replicated.

CHAPTER 5

The results are presented in this chapter, together with a description, discussion and interpretation. As validation of the play package involved much more than the results of the experimental phase alone, a logical structuring of the chapter necessitated the presentation of results according to the validation process, rather than according to the sub-aims of the experimental phase alone. As reliability is a prerequisite for validation, intra- and inter-rater reliability findings are presented first. Validation of the play package according to the outcomes of the group and the individual participants on the different measurement instruments is then addressed, based on the findings during the different phases of the research. Specific attention is paid to construct and convergent validity, followed by conclusions about the validation of the play package.

CHAPTER 6

The conclusions are presented in terms of findings about all the different types of validity. This is followed by a discussion of the implications of the findings for further research and service delivery.

APPENDICES

The appendices supply important information for the understanding of the data collection and analysis procedures, and thus the replication of the research.

1.4   SUMMARY

This chapter deals with the needs of the disabled and the need for further research in the field of validation of intervention programmes in order to improve service delivery. Based on these conditions and requirements a problem statement and rationale for the research is formulated. The researcher's orientation is discussed in terms of accepted assumptions and guidelines from the literature, from which follows the formulation of the research question. Definitions of the salient terms and, finally, an outline of the chapters in the dissertation are presented.

CHAPTER 2

THE ADAPTIVE RESPONSE: DEVELOPMENT OF A FRAMEWORK FOR THE DESCRIPTION OF COMMUNICATION-RELATED BEHAVIOURS

2.1   INTRODUCTION

Over decades the occupational therapy profession has been involved in the development of theoretical constructs related to adaptive behaviour. The concept 'adaptive behaviour', although used in psychology (e.g. Piaget, 1978) has, however, not been used in relation to the development of communication skills. As the concept of adaptive communication behaviour could enhance understanding of the integration and intricacies involved in communication development, this chapter aims to define the concept of adaptive behaviour by referring to four different models of adaptive behaviour. From these theories, general principles will be identified and applied to a different model that will form the basis of the theoretical constructs used in this study.

Many authors have stressed the bio-psycho-social foundations of speech and/or language, depending on their particular fields of interest (Lenneberg, 1967). Jocíc (in Waterson & Snow, 1978) admits the adaptive capacity of speech, dependent upon emotional relations, cognitive and experiential capacities and the need to succeed in communication. Speech and language are, however, vehicles for communication and a more encompassing study of communication behaviour (verbal and non-verbal) also indicates a dependence upon underlying bio-psycho-social maturation. In a "reciprocal and multi-channelled approach to communication" (Lloyd, 1976:xi) the bio-psycho-social underpinnings of communication (involving sensorimotor, cognitive and social-emotional factors (Fewell & Vadasy, 1983), are acknowledged.

It is clear that communication is complex in nature and for the purpose of this research communication will be viewed as an adaptive response. The reasons for this assumption will

be discussed, identifying the underlying components involved in communication and its development.

This chapter aims at the development of a model for communication behaviour as an adaptive response in normal children, and will indicate the interrupted adaptive response in the child with mental disabilities. Support for this thesis is found in theories on communication development, as well as the domains and processes underlying this development.

2.2   LEARNING OF AN ADAPTIVE RESPONSE

Communication is not commonly viewed as an adaptive response. Sylvester-Bradley and Trevarthen, (1978:89) refer to the changes occurring during interaction as adaptation. During the following discussions the researcher will explore different avenues in order to conclude eventually why communication can be viewed as an adaptive response as it is underpinned by the developmental processes. In the field of occupational therapy the term adaptive response is well known. However, in a clinical and/or research situation the behaviour of the child, reflecting the response is observed and measured.

The adaptive response refers "to adjustments made by the individual that primarily enhance personal rather than species survival, and secondarily contribute to actualisation of personal potential" (King, 1978:431). These adjustments are made in the ongoing process of interaction with the environment in a continuum from conscious to unconscious behaviour. Environmental events and experiences have both spatial and temporal dimensions that influence function and require adaptations from the individual (Gilfoyle *et al.*, 1990). There is a constant change in the relationship between an individual and his environment and these changes motivate a person to enter into a transactional relationship with the environment which requires the individual to adapt in order to survive (Gilfoyle & Grady, 1983:549; Kielhofner, 1992; Mosey, 1986:8; Nelson, 1988; Sanders, 1976:3; Schkade & Schultz, 1992). Through this adaptation, or change in behaviour to the environmental demands, a person exerts control over the environment, which facilitates the development of further skills. When an infant matures and he begins to move around and experience his environment, he gains more sensory capabilities. These sensory capabilities enable him to gain more sensory

information from the environment. This demands more of the sensory system, which necessitates adaptive behaviour, resulting in further neurological and motor maturation. Thus, the child, by virtue of his own growth and development is instrumental in increasing the demands he experiences for increasingly complex adaptive behaviours, which leads to engagement in goal-directed purposeful experiences (Gilfoyle & Grady, 1983:549; King, 1978; Lenneberg, 1967:178).

2.2.1 Theories on the adaptation process

The occupational therapy profession has postulated some theories on the adaptation process and it is therefore not uncommon for them to link adaptation to the term occupation. Through the following discussions it will also become clear that in a therapeutic intervention situation adaptation should be closely related to activities or occupations, for an individual's performance to change. Four theories that have similarity with the two constructs of adaptation and occupation will be reviewed so that a model can be proposed from a combination of their data. These theories are the theory of spatiotemporal adaptation (Gilfoyle, Grady & Moore, 1981; Gilfoyle *et al.,* 1990); a model of adaptation through occupation (Reed, 1984); the Model of Human Occupation (Kielhofner & Burke, 1980); and the occupational adaptation framework (Schkade & Schultz, 1992).

2.2.1.1 The spatiotemporal adaptation model

Gilfoyle *et al.* (1981, 1990) focus on sensorimotor adaptations essential for functional skills. There is a direct link between sensorimotor development and communication development (Uys, 1997) and it is therefore important to review this model. They view the environment as primary stimulus for developing skills necessary for performing within a specific context. Spatiotemporal adaptation is a process by which the child discovers and absorbs information from the environment and it has a developmental sequence and matures with the alteration or modification of performance. The spatiotemporal adaptation is, therefore, a process of continual interactions among growth, maturation, development and environmental transactions. This theory is underpinned by four components, namely assimilation and accommodation (similar to Piaget's cognitive development), association and differentiation.

Association is seen as the organised process of relating the sensory information with the motor act and of relating present and past experiences with each other. Differentiation is the process of discriminating between the essential elements of a specific behaviour that are pertinent to a given situation, and distinguishing those that are not pertinent, thereby modifying or altering the behaviour in some way. Association and differentiation form an integral part of sensory feedback that occurs in time and space of the environment. Adaptation is presented in a spiral-like developmental phenomenon progressing from primitive to mature neurological responses. Three principles are specified by the spiralling continuum, namely a) adaptation to new experiences is dependent upon past acquired functions; b) during the integration of past functions with the actions of new experiences, past functions are modified in some way, resulting in higher level, more mature functions; c) the integration of higher level functions influences and increases the maturity of lower level functions. Thus spiralling implies that a child does not acquire totally new functions, but rather functions that are modifications of older lower level responses

2.2.1.2 The model of adaptation through occupation

Reed (1984) described her model as adaptation through the occupational process in a social setting for work and play. Through the use of purposeful activity or occupation a person can positively influence the achievement of adaptive responses and so minimise their loss. Purposeful activity is defined as goal-directed behaviours of tasks that the individual considers meaningful (American Occupational Therapy Association, 1997). Reed stated that adaptation occurs when the sensorimotor system integrates with the cognitive, psychological, and social systems and when the activity is successful in meeting the demands of the physical, bio-psychological or socio-cultural environment. Individuals need skills in each of the performance areas, namely motor, sensory, cognitive, intra- and interpersonal, for adaptation to occur. She sees the environment as either facilitatory or a hindrance to adaptation. A facilitatory environment is the social institutions in which people work, play and interact towards common goals of the individual. When the environment is a hindrance it becomes a non-optimal learning situation for occupational adaptation and separates people from a community. Occupational adaptation requires that the total person is involved in the planning, implementation and feedback to the maximum degree in which he is able to participate. Her

model is based on the assumption that a person adapts through the use of various occupations and it can be said that a person may adapt to the environment or adapt the environment to the person. Reed (1984) specified that adaptation could occur internally, as well as externally and the response (behaviour) can be adaptive, maladaptive or nonadaptive.

2.2.1.3 The model of human occupation

Kielhofner and Burke (1980) describe adaptation as a global construct with two subcategories, namely occupational function and dysfunction. They emphasise that adaptation is dependent upon personal satisfaction and satisfaction on the demand put forward by the environment, which is divided into objects, tasks (e.g. play), social groups and culture.

The model of human occupation seeks to explain the occupational functioning of persons. It focuses on the person's characteristics, as well as the environment as factors that influence his choices and behaviour (Kielhofner, 1992). Kielhofner and Burke (1980) proposed that occupational performance is the outcome of the interaction between a person and his unique environment. The model stresses that a person is motivated to master, to be in control and to be effective. The concept is incorporated that a person's knowledge of himself and his experiences influences his decisions. The human system is composed of three hierarchical subsystems, namely volition, habituation and performance. Volition is responsible for decisions to engage in occupations and include personal causation (beliefs about one's effectiveness), interests (disposition to find pleasure or satisfaction in occupation) and values (internal ideas about right and wrong). Habituation is responsible for maintaining patterns and routines of behaviour and includes roles (images of what positions they occupy in different social groups) and habits (images that trigger routine performances in everyday life). Performance is responsible for the direct production of behaviour and includes perceptual motor skills to select and interpret sensory information and effect co-ordinated purposeful movement, process skills such as problem-solving and lastly communication/interaction skills.

2.2.1.4 The occupational adaptation framework

This framework proposed by Schkade and Schultz (1992) gives equal importance to three

occupational adaptation elements, namely the environment, the person, and the interaction between them. The person has a desire for mastery, which results in a challenge to his skills. The environment is the demand for mastery from the person and the interaction between these two elements results in press or drive for mastery. This notion of press for mastery is included in the developmental literature, particularly that of Piaget (Flavell, 1977) and the therapist emerges as an essential facilitator between the person and the environment. Occupations are viewed as activities (e.g. play), which provide active participation, are meaningful to a person, provide a product and are an interaction for the person and the environment. Adaptation is a change in the person's functional state (including the sensorimotor, cognitive, and psycho-social systems) as a result of movement toward relative mastery over challenges put forward. The person uses three subsystems to generate, evaluate, and integrate the responses to these challenges. This framework is normative, process-based, non-hierarchical, and non-stage specific. This is an open loop where the feedback following an event influences the subsequent input.

From the above description of theories and models on adaptation and the adaptive response, it is evident that there is agreement about the importance of adaptive behaviour. Different approaches in the field do, however, lead to expansion and enhancement, ultimately presenting a broader view of factors influencing the development of adaptive behaviour. All the main features of these adaptation models should thus be integrated in a model for the description and explanation of communication behaviour as an adaptive response.

The important issues derived from these occupational therapy models of adaptation, which are applicable to the adaptation process that takes place in the development of communication-related behaviours, are the following:

- Interaction takes place between a person and the environment through the use of purposeful activities or occupations.
- Adaptation is a change observed in the person's performance, dependent on an integrated modification in all developmental domains.
- Feedback plays an important role in the adaptation process.
- Adaptation is also a process of relating present and past experiences to each other

and presents as a spiral-like developmental phenomenon where the integration of higher level functions influences the maturation of lower level functions – causing modification or change.

- An individual develops in a social context where people interact within certain cultural beliefs and norms.

- The assumption is made that people want to master, control and be effective in their environment (Kielhofner & Burke, 1980).

- The influence of distress on the adaptation process can give rise to maladaptation or disadaptation (Kielhofner, 1992:159; Reed & Sanderson, 1992:54).

2.2.2 A model for the development of adaptive behaviour with regard to communication- related skills

The above-mentioned models all stem from an occupational therapy perspective, but there are no similar structures to describe adaptation in relation to communication skills development. A model is proposed to indicate the critical areas in the development of an adaptive response with regard to communication-related behaviours.

According to various authors (Bruner, 1983; Kielhofner & Burke, 1980; Csikszentmihalyi, 1990), a person is motivated to be the master in control of his environment. It is thus important for the interventionist to analyse how to achieve mastery during intervention. Three fundamental elements are thus considered in the proposed model, namely 1) the person, 2) the external environment, and 3) the interaction that occurs between the previously mentioned two elements. The interventionist has specific challenges to meet in order to ensure that a child obtains mastery over the environment. For successful activity participation the demands or challenges inherent in the activity should meet the abilities of the child. These demands should not be too high, as this causes anxiety, and subsequently, withdrawal. The therapist should, however, press or push for mastery, ensuring that development will occur, thus being the facilitator of interaction between the external environment and the child. This is particularly true in the case of communication-related behaviours.

The following schematical model is proposed as a model of adaptation for communication-related skills.

Internal environment (the individual)	Interaction	External environment
Desire for mastery	Press for mastery	Demands for mastery
Personal abilities: Developmental domains (Fig. 2.2) • Sensorimotor • Cognitive • Social-emotional • Communication	Challenges and expectations	Meaningful, purposeful activity
	Optimal arousal Internal motivation Active participation	Goal-directed

Normal development — Normal occupational function — Effective adaptation

Impairment Disability Handicap — Occupational dysfunction — Maladaptation Non-adaptation

Repetition and integration

Experiences of success

Facilitatory — Active participation within a social-cultural group

Hindrance — Unsuccessful participation leading to anxiety, inhibition and withdrawal

Internal adaptation

ADAPTIVE RESPONSE

External adaptation

Internal feedback

External feedback

Mastery

Figure 2.1   Model for the development of adaptive communication behaviour

In Figure 2.1 it is obvious that this model is an open-loop system, not hierarchical, and is based on the process and the interaction between the person and the environment. It is based on a feedback-feedforward system. Like Schkade and Schultz (1992), equal importance is given to the person, the environment and the interaction between them, thereby implying the importance of the therapist as the facilitator of the adaptation process in the child with disability. People fundamentally exist in social groups and these groups create opportunities for action and interaction (Uys, 1999). In the discussion of this model, the three fundamental elements will be concentrated on, namely the person, then the external environment, and lastly the interaction between the two. This model explains the normal developmental process, but as the aim of this research is the validation of a play package for the facilitation of communication-related behaviours (thus intervention founded on the premise that communication behaviours are an adaptive response), attention will be paid to the elimination of non-adaptation and maladaptation and the facilitation of an adaptive response.

2.2.2.1 The influence of the individual's abilities on the adaptation response

The function of internal systems influences a person's desire for mastery and consequently his internal adaptation and occupational performance (See Fig. 2.1). These systems are related to the child's developmental domains, namely sensorimotor, cognitive, social-emotional and communication. The child's developmental capabilities have an integral influence on the demands of the activity and the environment and it is therefore important to have equal weighting on the external as well as the internal adaptation process. Personal capabilities include the internal skills of sensorimotor, cognitive, socio-emotional, and communication. The child brings his own strengths, weaknesses, goals and interests to a therapeutic situation. Because play is the child's occupation (Gunn, 1975:222), his main goal would be enjoyment from a therapeutic session and his desire for mastery would occur during play.

Kielhofner (1992) stated that a child with central nervous system damage experiences distress in relation to environmental challenges. Distress interferes with all aspects of adaptation including assimilation, accommodation and association. These children are unable to use or adapt learnt behavioural responses toward sensory information and environmental demands. They are unable to initiate new responses to environmental demands, thus negating the

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process of differentiation and integration. Children without developmental delays are able to modify their behaviour, thereby expanding their repertoire of problem-solving skills. Developmentally delayed children are not able to modify their behaviour, therefore they are unable to move to higher-level functions. They persistently use primitive functions and these non-adaptive strategies interfere with the adaptation process. It manifests in distortion or absence of sensorimotor and play behaviours. Reed and Sanderson (1992) stated that disadaptation occurs when there is failure to organise and respond due to confusion or disorientation, which fail to bring the person into harmony with the social or physical environment. Maladaptation occurs when there is incorrectly organised information to a response that does not meet the demands of the situation and its behaviours. It is also the inability of the individual to develop patterns of behaviour which make for success in the environment. She proposed that disadaptation and maladaptation are due to reduced or missing sensory input.

Changes (adaptation) occur as a continuum from conscious learning and doing, through non-conscious action, to adoption of unconscious habit as mastery develops – therefore adaptation occurs through active participation. In her development of a psychosocial theory, Mosey (1986) postulated that adaptation occurs in each skill area (e.g. perceptual motor, cognitive, and group interaction) in a developmental sequence and that these are dependent on and related to each other. It could therefore be postulated that through the process of adaptation, a person actively participates in activities, organising and integrating incoming stimuli from the environment, repeating the activity due to the success he experiences and therefore the ultimate objective is reached – mastery or the experience of an adaptive response. When illness or disability compromises these skills, adaptation is threatened and maladaptive function follows.

With regard to communication as an adaptive response, it is evident that an interrelated process of various developmental domains should occur to facilitate competency in communication. A deficit in one area will influence this development. Figure 2.2 provides a schematic presentation of how different developmental domains should be able to adapt to internal and external demands to ensure the development of communication as an adaptive response.

Sensory component
- Auditory
- Visual
- Tactile
- Proprioceptive
- Gustatory
- Olfactory
- Vestibular

Motor component
- Neuromuscular components
- Coordination
- Motor control
- Praxis
- Oral motor control
- Visual motor integration

Cognitive component
- Perceptual processing
- Level of arousal
- Attention
- Memory
- Initiation of activities
- Termination of activities
- Sequencing and categorising
- Problem-solving
- Decision-making

Social-emotional understanding of the situation

Verbal comprehension

Integration

Concept formation

Symbolic understanding

Directive-integrative function of **communication and language**

Language internalised for thought

Social-emotional expression through jargon

Expressive language

Pre-language   Language

0m   6m   9m   18m   3½ y   4 ½ y

Figure 2.2   Integration of the sensory, motor, cognitive and social-emotional domains in the development of communication.
(Adapted from Cooper, Moodley, & Reynell, 1978)

In Figure 2.2 the interrelatedness of developmental domains is evident. Sensory, motor, cognitive and social-emotional domains have to perform as a unit to facilitate intra- and interpersonal adaptation. A child has to integrate information from all the domains to perform effectively in a social context. A deficit in one domain has a direct influence on the other domains with subsequent impact and the ultimate occurrence of developmental delays.

2.2.2.2 The influence of the external environment on the adaptive response

External adaptation involves the demands for mastery (See Fig. 2.1). There should be a close relationship between the challenges inherent in the activity and the person's skills. It is therefore clear that the environment should be structured to meet the abilities of the person for him to experience success. If the challenges are too high or too low the child will withdraw as anxiety is experienced (Csikszentmihalyi, 1990). Structuring of activities include the physical accessibility of toys as well as the accessibility of the way in which the activity is presented to the child – especially the child with special needs. He should be able to actively participate through purposeful and meaningful activities with people, tasks (play), in social settings, which are specific to his culture. These activities should be goal-directed from an intervention point of view to make it purposeful for the therapist as well, as her goal would be to enhance development. If there is a hindrance in the environment where activities are not modified to ensure access for the child, he will experience anxiety and therefore the challenge cannot be met, resulting in the external adaptation process being delayed or interrupted. This could also lead to maladaptation or disadaptation. When the environment is facilitative the impact the environment has on the person contributes to an adaptive response.

2.2.2.3 The influence of the interaction between the internal and external environments on the adaptive response

Interaction between the person and the environment implies the press for mastery – ideally to create a match between the desire for mastery and the demand for mastery. Interaction through actively doing or participating in activities is the pivotal point for adaptation to occur. The responsibility of the therapist is to ensure effective interaction. The therapist plans intervention by expecting specific outcomes from the child. In other words, the therapist

expects the child to participate successfully during intervention, therefore the expectations should not be too high or too low. She challenges the child's abilities and presses for the improvement of behaviours indicative of development. When the child responds to stimuli from the external environment (e.g. a play activity), he has to use his internal abilities (systems) to interpret, integrate and organise the stimuli, to give meaning to it and to respond accordingly. When his response is effective, an adaptation response has occurred and he receives positive feedback from the external environment either through the activity itself or through interaction with the therapist, as well as from his own internal experiences. This internal experience creates satisfaction, which increases self-esteem (Csikszentmihalyi, 1990). When the child experiences an effective adaptive response, he experiences mastery. Mastery, according to Schultz and Schkade (1992:921), could be described as a sense of satisfaction, effectiveness and efficiency. Satisfaction occurs when there is a challenge from a clear structured activity, which facilitates attention from the child and where the child experiences a feeling of choice in a supportive environment. Mastery is preceded by the child's experience of enjoyment from an activity, which motivates him to ensure active participation. Through active participation in a purposeful and enjoyable activity the child repeats the actions and learning of new skills occurs.

From the above description and explanation of the model (See Fig. 2.1), it is clear that the adaptive response develops when there is a match between the child's desire for mastery (depending on his personal abilities) and the environmental demands for mastery (the external challenges), through interaction (the press for mastery). The development of this adaptive response thus leads to further emergence of skills.

This process, and especially the characteristics of the adaptive response, supports King's (1978) research on the components of the adaptive response, which can be integrated into the adaptation continuum of development as proposed by Kleinman and Bulckley (1982).

2.2.3 The adaptation continuum

The adaptation continuum has to be reviewed in order to see where the adaptive response fits

in. For the purpose of this research specific attention will be paid to the adaptive response phase, as this phase requires exploration leading to mastery of adaptive skills. To explain where the adaptive response fits into the continuum of development, the model of Kleinman and Bulkley (1982) is reviewed. They postulated an adaptation continuum that places the adaptive response in a sequential and interdependent relationship to human responses that serve an adaptive function. These authors also acknowledge the human being as developing to gain maturity in adulthood. The adaptation continuum, as a conceptual tool for analysis, is illustrated in Figure 2.3.

Capacity to perform ⟶	Performance ⟶	Constellation of performance over time

Homeostatic reactions ⟶	Adaptive responses ⟶	Adaptive skills ⟶	Adaptive patterns
(e.g.) Reflexes Breathing Crying	(e.g.) Controlling head Standing upright Pursuing visual stimuli Catching a ball Vocalisation ⟶ •Active participation •Goal-directed •Subconscious integration •Self-reinforcing	(e.g.) Personal management Reading Verbalisation	(e.g.) Holding a job Raising a child Engaging in conversation Writing a column for a newspaper Presenting a paper

(Adapted from Kleinman & Bulkley, 1982)

Figure 2.3   Adaptation continuum

Figure 2.3 suggests a spiralling continuum of development, where an infant does not have the full range of responses immediately, but gathers information into adulthood. Kleinman and Bulkley (1982) included four categories in the adaptation continuum, namely: homeostatic reactions, adaptive responses, adaptive skills and adaptive patterns. The concept *homeostatic reactions* are derived from the work of Dubos (1978), who defined these reactions as externally evoked and involuntary. Mechanical and physiological responses of the body, such as reflexes and autonomic nervous system responses are indicative of homeostatic reactions. Trombly (1995:962) refers to these reactions as developed capacities, which are gained through maturation, and learning of biologically-based capacities. *Adaptive responses* are

explained in terms of four features according to King (1978).

i)   Firstly that a person should actively participate in or toward the environment, which demands a positive role of him. In doing this "he is acting and, not being acted upon" (King, 1978:432). This concept is clearly illustrated in Figure 2.1 where the interaction between the child and the external environment enhances active participation.

ii)   Secondly, an adaptive response is goal-directed and is called forth by the demands of the environment. This includes the structuring of the environment and materials in such a way as to call forth a specific adaptive response. Therapists use goal-oriented activities during intervention in specially structured environments to facilitate an adaptive response from a person. Again, this forms part of the interaction element of the development of an adaptive response (See Figure 2.1).

iii) Thirdly the response is "most efficiently organized subcortically… (when)…attention to a task or an object permits the subconscious centers to integrate and organize a response" (King, 1978:432). The therapist should select purposeful activities which demand or pose certain challenges to the child. When a child focuses all his attention on a task, he does not focus on the organisation and integration of the different skill areas in order to accomplish the task, but rather the organisation of the sensory input and motor output is handled on a subcortical level.

iv)   The fourth characteristic of the adaptive response is that of self-reinforcement. As the saying goes "nothing succeeds like success". This is also important in order to motivate a child to prolong interaction in activity participation, which brings repetition of certain skills and therefore mastery of environmental demands. The importance of the correct selection of activities is evident; otherwise no effective interaction will occur to facilitate an adaptive response.

Adaptive skills are defined, as those abilities required through combination and repetition of adaptive responses. Adaptive responses and adaptive skills constitute the performance area, which is similar to function. When therapists use the term function, they refer to the occupational performance of persons who lack the ability to perform an action or activity considered necessary for their daily lives (American Occupational Therapy Association, 1995: 1019). Finally, *adaptive patterns* are more complex than the previous categories and include

constellations such as engaging in conversation. The model in Figure 2.3 assumes that performance depends on capacity to perform, that adaptive skills stem from adaptive responses, and that constellations of performance are made up of adaptive skills. This underpins the concept of the spatiotemporal adaptation model of Gilfoyle and Grady (1983:552), who regarded adaptation as the foundation of more complex behaviour, developing as a spiralling continuum.

During the homeostatic reaction as well as the adaptive response phase, the child interacts with his environment due to curiosity and exploration in order to gain mastery, which enables him to achieve goals in society during the adaptive skill and adaptive pattern phases. Missiuna and Pollock (1991:883) stated that through exploration a child learns about the characteristics of objects, how to make decisions, understand cause-effect relationships, consequences and social skills. As these are all requisites for the development of communication, the importance of the homeostatic as well as the adaptive response phase in the developmental process of a child should not be underestimated.

Piaget's (1978) theory of intellectual development is regarded as one of the cornerstones in the field of childhood development. According to him (Berko Gleason, 1993:48) sensorimotor intellectual development, or pre-linguistic development, culminates in the development of thought. Piaget (1951) identified the first stage of development as the sensorimotor stage. He stated that during this stage, thought, in the shape of sensorimotor intelligence, begins its development. Through participation in activities with communicatively mature persons, the child acquires sensory feedback, constantly building a vocabulary of experiences. Thus, there is an integral relationship between these two developmental modalities. During the sensorimotor phase the child actively engages with the environment, constantly building a vocabulary of sense experiences. The communication development progresses from the use of signals to the use of signs (Morehead & Morehead, 1974). Firstly, the child learns to respond to an indicator or a signal, which elicits a reaction. Then he learns to assimilate certain motor actions in certain situations, acting upon them in a particular way each time. This development constitutes an early form of pre-representation. True representational skills develop at a later stage when the child begins to use single words to represent an object or its use. Finally, he uses signs, which denote thought about an entity

or event. This description correlates with the adaptation process proposed earlier. It is therefore not difficult to understand why Sanders postulated that communication is also adaptive behaviour (Sanders, 1976:17). He continues to state that adaptive communication behaviour is motoric, as various forms of communication involve the motor system.

From this discussion it seems clear that communication does not stand alone in its development. It is a multimodal process where all modalities are involved in order to ensure efficacy. Research done by Uys (1997) led her to conclude that sensorimotor and cognitive skills are more basic than those of communication, which is a higher-level function as communication skills are the most difficult ones for the child to develop.

Whereas communication is regarded as an adaptive response in the normal child, the thesis is put forward that in the child with severe disabilities communication is seen as either an interrupted, delayed or maladaptive response and thus it is necessary to study the communication process, especially in the child with developmental disabilities.

2.3   COMMUNICATION AS AN INTEGRATED ADAPTIVE RESPONSE

"Communication is the essence of human life" (Light, 1997:61). This statement forces us to investigate what communication is, how communication develops and which internal and external factors could influence communication. Communication is the transmission of messages from one individual to another, via gestural, signed, spoken, and/or written means. Although communication is a complex phenomenon not yet fully understood (Fuller & Lloyd, 1997), there are various theories that could assist us in understanding the acquisition of language.

2.3.1   Theories on communication development

In the field of language acquisition a number of theories have been put forward. It is, however, evident that these theories include a variety of factors applicable to communication development. This is because language is a symbol system used as a vehicle for communication. Communication includes, among other things writing, speech, gestures,

facial expressions, body language, and physical contact (Orelove & Sobsey, 1992: 299). In this case these theories will be discussed as theories of communication development. In an attempt to discover the process that occurs when children learn language, numerous theories regarding language acquisition have evolved over time and in synchrony with popular notions regarding child development and adult/caregiver interaction. The most influential theoretical explanations regarding communication acquisition and development will be reviewed. These include the nativist, behavioural, cognitive and interactive theories.

2.3.1.1 Nativist theory

The nativist theory asserts that a biological basis for development exists as revealed by the notion that neonatal responses to human stimuli are inborn and function as a mechanism for survival. According to this theory infants are born with an innate and unusually advanced responsiveness to humans. The task of the caregiver lies in ensuring that development occurs by being an active agent in the developmental process. This can be achieved by modelling correct sentences so that the child can develop hypotheses about the rules that govern language. The role of the adult is, however, viewed as secondary to the biological mechanism within the infant. Learning of language is viewed as an inherent process and therefore this theory is relatively pessimistic about the contribution that can be made by social agents in the developmental process (Price & Bochner, 1991). Justification for this theory of language acquisition lies in the fact that most children master the essentials of language, which is a complex task, before the age of four or five. In addition, the universal development of early language patterns also provides added ground for the credibility of this theory.

2.3.1.2 Behaviourist theory

In contrast to the relatively passive role attributed to caregivers by nativist theorists, behaviourists assume a more positive view of the contribution made by adults to the developmental process.

One of the most cited behavioural theorists, namely Skinner (1957), explained language development in terms of the operant model of learning. According to this view, infants learn

to talk by being rewarded or reinforced by mothers or caregivers for vocalisations that often appear to be produced spontaneously.

In contrast to the nativist viewpoint previously described, the behaviourists see the contribution of environmental influences and the role of mother-child interaction as important factors in child learning. This role is viewed both in relation to the pairing of responses and rewards to reinforce desirable behaviour and in relation to modelling and shaping behaviours by appropriate stimulus reinforcement. This critical role attributed to the caregiver as a reinforcing agent has important implications for early communication intervention (Price & Bochner, 1991).

2.3.1.3 Cognitive theory

The cognitive theory proposes the notion that developmental change occurs when the infant's knowledge about an entity or event is challenged or when he encounters something that is inconsistent with his previous experience and knowledge. This situation is termed "disequilibrium" by Piaget (1978). Children are viewed as having the ability to modify or adapt the concept that they hold so that they can "accommodate" this new knowledge into the relevant concept. A cognitive process occurs which involves taking in new information and integrating it into existing knowledge so that cognitive development takes place.

Language, according to Piaget (1978), provides a symbolic system by which children can represent what they know at times when actual objects or events are absent. So, according to this view of early development, children's knowledge of the world emanates from their experiences and language provides a means of representing what is known. According to the cognitive theory acquisition and absorption of new information into previously acquired knowledge are processes which children have to experience for themselves. Piaget's stages of cognitive development also highlight the simultaneous acquisition of communication skills. Adults can, however, play a facilitative role, by encouraging children to attend to relevant aspects of an event. The contribution by adults can make to the infant's cognitive development is seen as essentially limited (Piaget, 1978).

2.3.1.4 Interactive theory

Whereas the behaviourists are primarily concerned with the provision of rewards for language production, the interactive theorists place value on the contribution of caregivers to the early development of cognition and language (Bruner, 1983; McLean & Snyder-McLean, 1978; Sameroff, 1975; Vygotsky, 1962).

The contribution of social experiences, especially between adults and children, to the process of developmental change was of primary interest to Vygotsky (1962) who stated that developmental change occurs as a result of "tutoring" or "scaffolding" by a more experienced or knowledgeable person. Significant members of a child's family can have as much influence upon the developmental process as factors internal to the child (Sameroff, 1975). This idea of a mutually interactive process underlying development is also evident in McLean and Snyders-McLean's (1978) "transactional" model of language development. This model suggests that infants must enter into a language-learning partnership with mature language users. They provide support and guidance for the language-learning process. Various programmes have been developed on the principles of the interactive model. These programmes include the Ecological Communication Organization Program (MacDonald & Carroll, 1992), the Transactional Intervention Program (Mahoney & Powell, 1986) and the Hanen Early Language Parent Program (Girolametto, 1988). The principles included in these programmes are universal in that they support young beginning communicators. The principles of the interactive model are summarised by Beukelman and Mirenda (1998) as follows:

- *Be child orientated*: Respond to the child's focus of attention, follow his lead, match his style and abilities, organise the environment to promote communication, and maintain face-to-face interaction with a positive affect.
- *Promote interaction*: Take one turn at a time, wait with anticipation, signal for turns, and decrease directiveness.
- *Model language*: Comment on the ongoing activity; use contingent labelling; use repetition and short simple utterances; and expand or extend the child's turn. Caregivers are encouraged to facilitate communication during natural routines and activities.

In summary, each of the above theories has contributed to the understanding of the factors that underlie the development of communication. The theories vary in the type of processes identified as significant for the acquisition of new skills. The nativist theory asserts that learning of language is an inherent process, while the behaviourist theory believes that language is learnt due to the rewards and reinforcements by mothers or caregivers. The cognitive theory proposes that a child can adapt incoming information into existing knowledge, thereby enhancing cognitive development as well as communication development. The interactive theory acknowledges and sees socialisation as playing an inherent role in language acquisition. Interaction is therefore accepted as pivotal in the language acquisition process.

Communication interaction is seen as a multidimensional, multichannel phenomenon, implying that communication interaction depends on the convergence of cognitive, affective and linguistic processes rather than being a skill that emerges independently (Bricker & Carlson, 1981:477; Miller, Chapman, Branston, & Reichle, 1980).

Communication is influenced by various factors. The study of childhood development incorporates knowledge of the systems inherent in the developmental aspects. It is important to view the child holistically, as an evolving human being. None of the developmental skills develop in isolation, but rather in an integrative and interdependent manner. Apart from inherent factors, external environmental factors, such as people, materials and equipment available to the child, also have a crucial influence on development.

It is from this review of the theories on communication development that parallels can be drawn between communication and adaptive behaviour as described in the Model for the development of adaptive communication behaviours (See Fig. 2.1). In both instances the inherent abilities of the person, the challenges of the environment and the interaction between the two reflect the "adjustments made by the individual…that contribute to actualisation of personal potential" (King, 1978:431), namely the adaptive response. Another link between the adaptive response and communication behaviour is found in their dependence on the balanced interaction between the person's desire for mastery and the environmental demands for mastery. Furthermore, indications of corresponding developmental domains influencing

communication-related behaviours emerge, namely the sensorimotor, cognitive, social-emotional and communication domains.

Figure 2.4 illustrates the interrelatedness of the developmental domains with and in communication development.
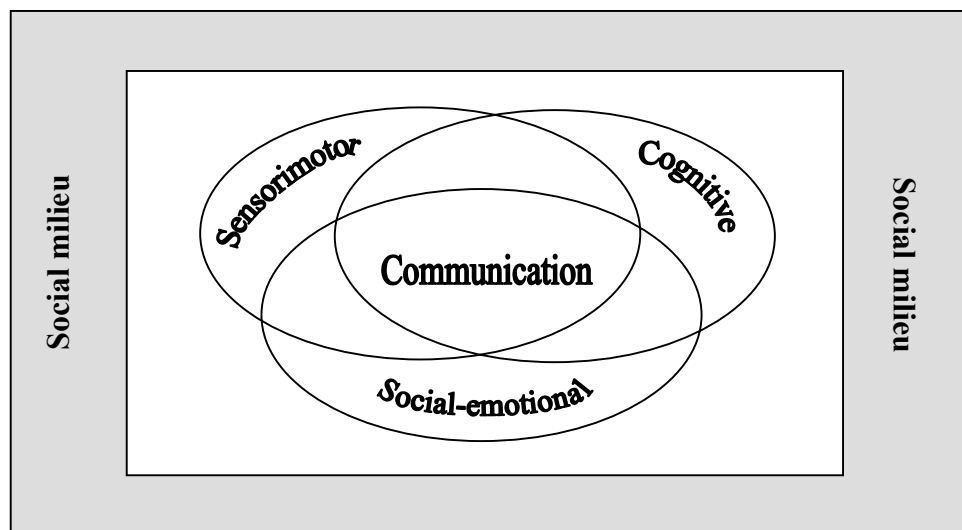
Figure 2.4   Interrelatedness of developmental domains

This figure underlines the bio-psycho-social (Mosey, 1974) involvement of communicative competency. Each of the developmental areas is of equal importance, namely sensorimotor, cognitive and social-emotional and all these skills develop in a social context where activities, tasks, social groups and cultures are involved. To be competent in communication, the skills of each area are needed, but as competency does not indicate total mastery, each area could be involved to a greater or lesser degree. It is, however, important to investigate constructs (Guralnick & Neville, 1997; Linder, 1993; Lloyd, Fuller, & Arvidson, 1997) involved in the areas of communication (See Table 2.1), in order to be able to facilitate an adaptive response

and to be able to evaluate it effectively.

Table 2.1   Constructs of communication development

Construct	Elements related to the construct
Receptive skills	- Understanding instructions: single words, short sentences or complex sentences - Understanding linguistic codes: pictures or gestures
Expressive skills (Modes)	- Common gestures - Pointing - Head-shaking - Imitation - Eye-blinking - Vocalisation - Verbalisation: words or short sentences
Expressive skills (Functions)	- Requesting interaction - Requesting action - Requesting objects - Protesting - Commenting
Discourse skills	- Initiating by drawing attention to self, introducing a new topic, requesting, and terminating interactions - Maintaining interaction by showing an interest in the topic and maintaining attention in the topic - Turn-taking by volunteering new information, requesting, joint attention, awareness
Interaction skills	- Indicating needs and wants by indicating a preference or requesting - Social closeness: eye contact, enjoyment, attention, active participation, greet partners, show of sensitivity for partners - Information transfer
Specific communication skills	- Requesting: objects, information, people, and social routine - Choice-making - Protesting - Self-expression

From Table 2.1 it is evident that the development of communication is subjected to specific internal and external factors. In the following section sensorimotor, cognitive, and psychosocial skills will be reviewed more closely. Although these factors are discussed as single constructs for the sake of comprehensiveness it is unnatural, as a developing child integrates all these constructs simultaneously to gain mastery.

If a child has been diagnosed with severe disability it implies, per definition, that his problems are multiple, including dysfunctions on a cognitive, communicative, and physical level (Wallace, Biehl, Taft & Oglesby, 1987), meaning that all of the above-mentioned factors, which also influence communication, will be affected to a greater or lesser extent.

2.3.2 Developmental domains in communication-related behaviours

2.3.2.1 Sensorimotor skills

Communication is generally considered to be intentional and involves social interaction (Blischak, Lloyd, & Fuller, 1997). For competency or mastery in communication the simultaneous development of different modalities are required. These include sensorimotor, cognitive, as well as psychosocial development. It could be said that communication is the end-product or end-result of a continuing developmental process of more basic skills (Uys, 1997) and therefore it is important to review internal and external factors influencing communication.

Communication forms an integral part of the development of basic skills and it is therefore important to evaluate the influence of the different skills on the development of communication. Sanders (1976) states that maturation of both the physical system and the nervous system is extremely important to the development of communication. The term physical system could also be described as the sensory and motor systems, which are intimately linked within the nervous system. Many refer to these systems as the sensorimotor system (Moore, 1980; Weeks & Ewer-Jones, 1983). These two systems form a definitive network through which an individual experiences and acts on the environment. Various authors acknowledge these systems as the foundation of developmental experiences (Rogers & D'Eugenio, 1981).

The sensory system forms an integral link between the individual and the environment, where all incoming stimuli are received and interpreted, creating maps of oneself and of the environment. The motor system uses these maps to plan, organise and execute movements in

response to environmental demands (Dunn, 1991). Sensory experiences are acquired through incoming information from internal conditions as well as the environment. These include touch, movement, body awareness, sound, vision and even the pull of gravity (Klecken-Aker, Brueggeman Green, & Flahive, 1995). The child uses all these sensorimotor experiences in an exploratory fashion in order to learn a variety of different schemes for interacting with objects and persons in the environment. Firstly, exploration expands the child's repertoire of motor behaviour, secondly, it enables him to develop concepts about cause and effect after a motor action has been executed and lastly, to develop motor representations of objects that result in symbolic representation, cognitive thought and language (Uys, 1997:9). Sensorimotor experience thus provides the underlying information, which facilitates the development of perceptual, cognitive, motor, and language relationships (Dunn, 1992:45). Although Dunn mentioned language as a developmental outcome of the sensorimotor experience, the researcher feels that this term should be replaced with the more encompassing term, communication, as all basic developmental modalities contribute to communication as function, be it verbal or non-verbal – language being the vehicle for communication. The underpinnings of the nativist (Price & Bochner, 1991) and interactive theories (McLean & Snyder-McLean, 1978) of language acquisition share this opinion. It is, however, important to investigate major constructs involved in the area of sensorimotor development (See Table 2.2), in order to be able to train and evaluate it effectively.

Table 2.2 Constructs for sensorimotor development

Construct	Elements related to the construct
Sensory skills	- Awareness - Processing - Perceptual processing
Neuro-musculoskeletal skills	- Muscle strength - Muscle tone - Range of motion
Motor skills	- Visual scanning and tracking - Co-ordination: gross and eye-hand - Bilateral integration - Hand function and manipulation - Visual-motor integration - Motor control - Oral-motor control

(The American Occupational Therapy Association, 1999; Linder 1993)

2.3.2.2 Cognitive skills

A child's cognitive activity consists of assimilating external data to internal cognitive-structure units. Through the utilisation of sensorimotor abilities internal and external data are simultaneously accommodated. According to Piaget (Flavell, 1977) this is adapted intelligence.

Flavell (1977:16) states that there are three forms of cognitive functioning, namely adapted intelligence, imitation, and play. He suggests that cognitive functioning shifts between imitation (the child's modelling or copying of other people's behaviour through adaptation and accommodation), and play or self-expressive behaviour (assimilating the outcome).

As the study of the relationship between cognition and language progresses, it becomes clear that the relationship between cognitive and linguistic milestones is an important issue that must be addressed (Waterson & Snow, 1978). Once again, researchers refer back to Piaget's (1951) stages of intellectual development, highlighting the simultaneous acquisition of communication skills. In Table 2.3, Hallet and Proctor (1996:4) provide information on the way the development of communication compares with cognitive development according to Piaget.

Table 2.3   A comparison of age, communication and cognitive development

Age	Communication/speech/ language milestones	Piagetian cognitive stages
Birth	Pre-intentional communication stage, adults interpret reflexes as communication, reflexive crying, vegetative sounds, vowel sounds	Sensorimotor: reflex substage, non-intentional, primary reactions, movement leads to interesting results which the child reproduces by trial and error
3 months	Pre-intentional communication stage, reduced crying and increased cooing, laughter, proto-conversation, differential response to sounds, self-imitation of vocalisations, single syllable CV sound segments, vowels predominate	Sensorimotor: secondary circular reactions, co-ordinates two types of sensory information, connections between actions and results are perceived and the actions are repeated, content dependent memory

Age	Communication/speech/ language milestones	Piagetian cognitive stages
6 months	Pre-intentional communication stage, gives clear signals of communicative interaction, increasingly lingering CV sound segments, vocalisations directed at people, self-imitations of vocalisations, intonational contours	Sensorimotor: co-ordination of secondary circular reactions, simple means-end behaviour, rates of simple associative learning stabilise
9 months	Pre-intentional/intentional communication stage, responds to own name, increases variety of non-reduplicated babbling sounds, CV or CVC syllables, varied intonational contours, coughs, hisses, clicks, intonated jargon	Sensorimotor: object permanence begins to develop (symbolic capacity)
12 months	Conventional communication stage, successive syllables, variety of CV/CVC "sentences", variety of babbling, simple directions understood best when accompanied by gestures, sentence-like intonations, first words	Sensorimotor: further developments in object permanence, intentional means-end behaviour and understanding of causality, experimentation occurs
18 months	Conventional communication stage, variety of consonants, expressive jargon, articulation intelligible 25% of the time, recognises objects by name, identifies some body parts, 50-word vocabulary, early naming, emergence of 2-word combinations.	Sensorimotor: object permanence (symbolic representation), uses images, words or actions to represent objects
24 months	Conventional communication stage, emotionally toned speech, sounds learned: 90% of all vowels and diphthongs, articulation intelligible 60% of the time, 2- to 3-word combinations	Sensorimotor: object permanence (symbolic representation)
3-4 years	Conventional communication stage, sounds learned: p, b. m, phrases and short sentences	Pre-operational: concrete concepts
5-6 years	Sounds learned: n, ng, y, t, d, k, g, f, v, r, th, s, z, ch, j, sh, articulation intelligible 90% of the time, 5 to 6-word sentences	Pre-operational: concrete concepts

Adapted from Hallet and Proctor (1996:4)

The information given in Table 2.3 provides a synopsis of the sequence of normal development. It shows clearly the simultaneous acquisition of communication development and intellectual developmental stages (Piaget, 1951). According to Piaget (Berko Gleason, 1993:48) sensorimotor intellectual development, or pre-linguistic development culminates in the development of thought. Thus the interrelatedness between sensorimotor, cognition and communication development is recognised.

Intrinsic Motivation

Another factor that influences a child's desire to communicate is intrinsic motivation. Intrinsic motivation (the desire for mastery) is strongly associated with effective and efficient learning, and this intrinsic motivation is largely a learned disposition that is, at least in part, shaped by past experiences (Bailey & Wolery, 1994). This motivation drives a child to satisfy deficient needs, e.g. the need to communicate with other people. In the Model of Human Occupation, Kielhofner, Burke and Igi (1980) posed that motivation is an innate, global urge to explore and master the world. A child's behaviour fluctuates between exploration of the environment, to become competent in practised skills, which will ensure achievement. This sequence is repeated often as the child develops.

But before children can be motivated by the urge to explore, they need to have had experiences that allowed them to discover the laws of cause and effect (Arnsten, 1990:463). In his explanation of cognitive motivation, Flavell (1977:19) poses that "a great deal of human mentation, at all developmental levels, is intrinsically rather than extrinsically motivated".

It is, once again, important to investigate constructs involved in the area of cognitive development (See Table 2.4), in order to be able to train and evaluate it effectively.

Table 2.4   Constructs of cognitive development

Construct	Elements related to the construct
Cognitive skills	- Attention and concentration - Cause and effect - Ability to make a choice - Object permanence - Problem-solving - Concept formation - Perceptual skills: identifying objects, shapes, colours and numbers on a two- and three dimensional level - Memory

(The American Occupational Therapy Association, 1999; Linder 1993)

2.3.2.3 Social-emotional skills

Social competence, according to Guralnick and Neville (1997:579), is a dynamic and higher order construct in which other domains such as cognitive, communication, affective, and motor development are integrated. There is considerable evidence to support the idea that the characteristics of the social interaction between a child and a caregiver are related to the child's cognitive development. Clarke-Steward's (1973) research findings suggest that an interactive style characterised by warmth, responsiveness, and social stimulation was related to children's later performance on the Bayley Scale of Mental Development and other indexes of intellectual and social competence. She also found a positive correlation between adult verbal stimulation and the child's ability to comprehend and express language. Another correlation was between the time the caregiver spent with the child, playing with materials and the child's level of cognitive development and complexity of play with objects. These studies indicate that regular and nourishing interaction with other people is vital for a child's social and emotional development.

Physical contact is an important factor in the infant's social development and during therapeutic intervention physical contact could assist the therapist to form an attachment with the child. This form of attachment leads to a trusting relationship. When a young child experiences mistrust it can lead to self-defeating behaviour, a reduced sense of self-esteem, and an inability to deal positively with others (Ambron, 1978:120). Various studies have shown dysfunctional social interaction patterns between that parents and infants with developmental disabilities (Barnard, Bee & Hammond, 1984; Crawford, 1982; Field, 1977; Field, 1979). Factors such as a negative set of expectations, difficulty in understanding communication, and feelings of incompetence, lead to poor caregiver-child interaction (Mitchell, 1987).

Socialisation is the learning process that guides the growth of our social personalities. It is by means of socialisation that we become reasonably acceptable and effective members of our society. Through socialisation children acquire discipline, a sense of responsibility, and the skills and knowledge that allow them to participate in the life of the family and later in the larger group around them, namely pre-school and school. The child has to learn to take into account the demands of others in his social environment. According to Ambron (1978:280)

social relations become richer as play develops.

Understanding the incompetencies, impairments, and even delays in the development of the child with a disability one must always base knowledge on the normal. The above discussions are viewed from the development of persons without any kind of disability. However, the question arises, how these developmental domains influence the child with developmental disabilities and specifically communication-related skills. It is thus important to investigate constructs involved in the area of social-emotional development (See Table 2.5), in order to be able to train and evaluate them effectively.

Table 2.5   Constructs of social-emotional development

Construct	Elements related to the construct
Social-emotional	- Social closeness: eye contact, enjoyment, active participation, greets partners and understands humour - Shows sensitivity for partners - Separation anxiety

(Ambron, 1978; Linder, 1993)

From the previous discussions it is evident that the development of communication is an interrelated process of various developmental domains to become competent in communication and language. The identification of constructs in each developmental domain is necessary in planning an intervention programme with appropriate goals. A deficit in one domain will influence the process of development.

2.4   CHILDREN WITH DEVELOPMENTAL DISABILITIES

A developmental disability results from any condition, trauma, deprivation or disease that interrupts or delays the sequence and rate of normal growth, development, and maturation (Gilfoyle & Grady, 1983:565). The resulting interference in sensorimotor processing further compromises the individual's ability to adapt and therefore to develop. As seen from previous discussions, there is a relationship between the sensorimotor system, the nervous system, environmental stimuli and adaptive responses. When these systems are deprived of

environmental stimuli, or when they cannot respond appropriately to environmental stimuli, effective maturation and development cannot occur. The nervous system, according to Harris (1971:392), consists of a series of interacting functional units that are involved in a continual interplay at different structural levels. Therefore, if one unit works ineffectively, the other units are affected in some way. Maturation and the resulting developmental behaviours become disorganised in proportion to the degree of involvement or impairment (Gilfoyle & Grady, 1983:565). Sensorimotor processing can be affected if the child has difficulty in interpreting the incoming information. Whenever sensory assimilation is inadequate, motor accommodation is limited and sensory feedback is diminished, further limiting the sensory assimilation (Gilfoyle *et al.,* 1981:178), resulting in spatiotemporal maladaptation and the consequent development of disabilities. The child thus misses the cognitive opportunities that facilitate growth in problem-solving skills (Dunn, 1992:76).

2.4.1 Children with intellectual impairments

Many different terms (e.g. mental retardation, intellectual disabilities, intellectual impairment) are used in the literature to describe children with mental retardation. The correct term currently is intellectual impairment and this is the population focused on in this research. Pretorius (1997:203) stated that mental handicap is a complex condition, and although mainly an intellectual impairment, it has wide ramifications that reflect on virtually all aspects of life. The American Association on Mental Retardation (2001) provides the following definition of mental retardation: "Mental retardation refers to substantial limitations in present functioning. It is characterised by: significantly sub-average intellectual functioning, existing concurrently with; related limitations in two or more of the following applicable adaptive skill areas: communication, home living, community use, health and safety, leisure and self-care, social skills, self-direction, functional academics and work." The AAMR apply four assumptions to the definition, namely

- Valid assessment considers cultural and linguistic diversity as well as differences in communication and behavioural factors;
- The existence of limitations in adaptive skills occurs within the context of community environments typical of the individual's age peers and is indexed to the person's individualised needs for support.

- Specific adaptive limitations often co-exist with strengths in other adaptive skills or other personal capabilities.

- With appropriate supports over a sustained period, the functioning of the person with mental retardation will generally improve (American Association on Mental Retardation, 2001). Inability to adapt stems from the widespread problems that these children experience in the sensorimotor and perceptual areas of development (Pretorius, 1997:204-205). Furthermore, this maladaptation leads to disorders of higher functioning such as communication.

The distribution of mental retardation is uneven in the different age groups as only the severe forms of this disorder are recognised when children begin pre-school or school. Most cases of intellectual impairment are only identified at school age. In the United States of America, the overwhelming majority (87%) of mental retardation falls into the mild category, and 13% belong to the moderate, severe, and profound groups (Kaplan & Sadock, 1982: 853). In an attempt to classify developmental characteristics of the mentally retarded pre-school child, the U.S Department of Health, Education, and Welfare (1963) suggested the following:

Table 2.6   Developmental characteristics of the child with mental disabilities*

Degree of mental retardation	Pre-school age 0-5 maturation and development
Profound	Gross retardation; minimal capacity for functioning in sensorimotor areas; needs nursing care
Severe	Poor motor development; speech minimal; generally unable to profit from training in self-help; little or no communication skills
Moderate	Can talk or learn to communicate; poor social awareness; fair motor development; profits from training in self-help; can be managed with moderate supervision
Mild	Can develop social and communication skills; minimal retardation in sensorimotor areas; often not distinguished from normal until later age

*Adapted from Mental Retardation Activities of the U.S. Department of Health (1963)

It is clear from this table that the sensorimotor system as well as the communication function is involved at all the different levels of mental retardation, thus emphasising the fact that professionals should include these developmental modalities when planning intervention.

Due to the interrelatedness of all developmental modalities the child with mental retardation will experience various problems in different areas of development. It is important to consider the development of all these modalities and their reciprocal influences as these behaviours could be indicators for inclusion in intervention.

2.4.2 Problems of children with intellectual disabilities

Although the definition of mental retardation indicates problems in adaptive skills, a delineation of specific areas comprising the adaptive skills is presented in Table 2.7.

Table 2.7 Problem areas identified in the child with intellectual impairments

Skills	Motivation
Ability to learn	These children tend to learn new skills and acquire new information slower than the average child. Their intellectual functioning usually keeps pace with physical growth as learning and experience go hand in hand (Steenkamp & Steenkamp, 1992:4). General development is therefore slow and limited.
Motivation	They lack inner vitality, meaning that their activity participation level is lower than the average. They lack spontaneity and their creative participation is impaired (Pretorius, 1997).
Cognition	The ability to acquire knowledge through perception, grouping, analysis, synthesis and memorising is severely impaired in the mentally retarded child, who develops at a quarter to a half the tempo of the normal child (Steenkamp & Steenkamp, 1992:3). His perceptions are limited, vague and often distorted, and this forms a poor foundation for concept formation and results in impoverished conceptualisation. It explains why this child will tend to rely on others for solving problems. Problems are observed in all areas of perceptual development i.e. basic perceptual skills, spatial orientation, figure ground, and form constancy.
Language and Communication	The child thinks in terms of action and images rather than in terms of language or symbols (Piaget's preconceptual phase of cognitive development). This implies that the child cannot use language in his thinking to replace concrete thought (Du Toit, 1981). Receptive language is impaired as he has difficulty in understanding complex verbal language. He does not readily use language for thinking or as a mental tool (Du Toit, 1980). He tends to talk later than children without disabilities, has a very limited and concrete vocabulary, and uses simple sentence construction. Poor articulation and voice disorders are common.
Concentration	This is one of the biggest problems in clinical settings as the child has problems in screening unnecessary or irrelevant detail, has a short attention span and low resistance to distraction and therefore imposes strain on the learning process (Pretorius, 1997).

Skills	Motivation
Memory	Research done by Du Toit (1981) indicates that the lower the child's IQ, the poorer his short-term memory. This might be due to impaired sensory integration of incoming information.
Development of affect	Emotional responses are of short duration and change readily with poor execution of control. Mentally retarded children experience far more anxiety than normal children and this is usually manifested as lack of interest or diminished attention (Du Toit, 1980).
Self-esteem	During the learning process the normal child experiences the pleasure of mastery, which creates a desire to learn more. This process is severely hampered in the mentally retarded child since he expects failure due to past experiences and therefore has a low self-esteem (Pretorius, 1997).
Motor development	Problems in this area are widespread and include poor fine and gross co-ordination, hyperactivity or hypo-activity, self-abusive behaviour, psychomotor retardation, poor balance, disturbances of body image and body scheme, and a tendency to tire easily. The clinical picture portrays a clumsy child (Steenkamp & Steenkamp, 1992).
Sensory defects	A substantial number of mentally retarded children has impaired vision and hearing, which results in an even greater diminution of incoming information. Zubek, Bayer & Shepherd's (1969) research on the effects of sensory deprivation leads to the conclusion that the mentally retarded child, who has an abnormal threshold of sensory perception, decreased curiosity and who reacts less readily to external stimuli, suffers sensory deprivation. This affects the process of learning through the sensorimotor modality (Kaplan & Sadock 1982).
Additional physical handicaps	To compound the above difficulties even further, one third of these children has an additional physical handicap, while one fifth also has a psychiatric disability (Kaplan, & Sadock, 1982).
Social behaviour	Mentally retarded children have many problems with social interaction, including poor conversational skills, egocentricity, poor social judgement, inappropriate behaviour, emotional instability, and poor decision-making skills. They have poor personal habits and their appearance has a detrimental effect on their social interaction (Kaplan & Sadock, 1982).
Self-care skills	Due to his level of motivation as well as his sensorimotor limitations, this child tends to stay dependent in all self-care activities longer than the norm. He will be excluded from many social experiences and exposed to health hazards if he is unable to perform basic self-care tasks (Pretorius, 1997).
Play	All of the above-mentioned problems are manifest during play and influence the play pattern severely. They lack initiative and spontaneity and are often destructive during play. Due to limited motivation, exploration is affected which results in impaired learning (Pretorius, 1997).

It becomes clear that the child with mental disabilities has multiple problems, which will affect his functioning in all activities of daily living. Because of these internal problems, we can conclude that there will be an interference with the adaptation process and disadaptation will occur, influencing occupational performance (including communication). Due to the child's lack of intrinsic motivation he has a diminished desire for mastery, which influences his ability to interact with the environment. For this reason he cannot meet the challenges put forward to him by the environment and thus experiences unsuccessful participation in activities. The internal and external feedback he receives is negative and that causes him to withdraw even more from participation. The child with mental disabilities does therefore not

experience an effective adaptive response, but rather maladaptation.

Although it is now evident that children with mental disabilities have problems with the adaptation process, the current research will focus on the consequences this has on the development of communication competence.

2.5   CONCLUSION

The thesis was put forward that communication behaviour can and should be regarded as an adaptive response as this concept would enhance understanding of the integration involved in communication development. Furthermore, such an orientation would have a direct impact on intervention approaches aiming at facilitating the development of communication-related behaviours.

Based on a review of the theories on the adaptation process, the development and characteristics of the adaptive response were identified and described. From this background a model for the development of adaptive communication behaviour was developed and defended. The model explains how the adaptive response is learned when the child's desire for mastery (depending on the sensorimotor, cognitive, social-emotional, and communication abilities) and the environmental demands for mastery are brought into interaction (press for mastery).

Although indications that communication-related behaviours can be regarded as adaptive responses, it was only through a study of the theories of communication development that the thesis could be verified. It became clear that

-       communication development can be regarded as "adjustments made by the individual…that contribute to the actualisation of personal potential" (King, 1978) – the adaptive response;

-       the identical developmental domains (sensorimotor, cognitive, social-emotional, and communication) underlie the emergence of adaptive responses and communication

behaviour;

- the adaptive response, as well as the development of communication, is dependent upon the person's desire for mastery, the environmental demands for mastery and the press for mastery through interaction between the person and the environment.

Based on the premise that communication-related behaviours could be regarded as adaptive responses, a further study of the field of developmental disabilities verified that non-adaptation, or maladaptation, does present in these children. However, from the knowledge gained from the study of the normal development of communication behaviours as adaptive responses, definite principles for intervention could be established. These principles, forming the cornerstones of the intervention programme, or play package, will be integrated in Chapter 3.

It is therefore on the basis on this theoretical evidence that the further development and empirical research will be conducted.

2.6   SUMMARY

In this chapter the assumption is put forward that communication is an adaptive response and this is underpinned by various theories on the adaptive response. A model for adaptation is derived from these theories. Theories on communication development were reviewed and it was concluded that an eclectic approach derived from all of them is necessary in intervention. Developmental modalities (sensorimotor, cognitive, social-emotional, and intrinsic motivation) influencing communication development were investigated and the interrelatedness of these modalities during the development process was highlighted. For the purpose of this research the child with mental retardation will be incorporated, but in order to understand disability it must be based on knowledge of the normal. The development of communication competence is a way to view communication abilities and inabilities of a child with developmental delays, as it is more important to strive for communication competence rather than perfect communication skills.

CHAPTER 3

PLAY AS A TOOL FOR THE FACILITATION AND MEASUREMENT OF COMMUNICATION-RELATED BEHAVIOURS

3.1 INTRODUCTION

There is growing empirical evidence that infants and young children who are environmentally, biologically or medically at risk, developmentally delayed and/or handicapped benefit from early intervention. Various studies from diverse fields have strongly supported the efficacy of an early intervention model for children with disabilities (Guralnick & Bricker, 1986; Ottenbacher & Peterson, 1985; Rossetti, 1986:147; Schaaf & Mulrooney, 1989; Trohanis, 1989). Studies regarding specific outcomes of occupational therapy have also demonstrated benefits in the areas of fine, gross, sensory, visual, motor and self-help skills (Hourcade & Parette, 1986; Oelwein, Fewell & Pruess, 1985; Ottenbacher, Muller, Brandt & Heintzelman, 1987).

In the process of designing an early childhood intervention programme, the therapist should consider how to achieve adaptive responses in a child with a disability, thereby discouraging maladaptive responses. It is proposed that an intervention programme is a process of adapting the environment to suit the child's needs and abilities. Gilfoyle *et al.* (1981) stated that the desired outcome of therapy is when the infant or young child has the ability to master the environment, to function independently according to developmental age, or to cope with daily life. Inherent in this statement is the ability of the child to meet environmental demands, in other words, the ability to adapt.

As discussed in Chapter 2 the child's main occupation is play so it is through play that all intervention should take place. Before intervention (assessment and treatment), the therapist should have an in-depth knowledge of the theories and value of play in the normal development of the adaptive response. This means that the therapist should know how to eliminate maladaptive behaviour and facilitate adaptive behaviour through the use

of play. For this reason play as a vehicle for the development of an adaptive response serves as a basis for planning intervention and is presented as point of departure before the presentation of the role of play in intervention.

3.2 PLAY AS A VEHICLE FOR THE DEVELOPMENT OF AN ADAPTIVE RESPONSE

Play is not an easy concept to define, but Rubin, Fein and Vandenberg (1983) provide six characteristics of play that separate it from other occupations. The six characteristics are intrinsic motivation, attention to means rather than ends, organism rather than stimulus dominated, nonliteral, simulative behaviour, freedom from externally imposed rules and requiring the active participation of the player. Definitions of play endow it with fun and enjoyment. Three theories on play motivation support the value of using play therapeutically. Table 3.1 provides a summary of these theories.

Table 3.1   Theories of play motivation

Theory	Explanation
Optimal arousal	Play is viewed as a strategy to maintain a pleasurable emotional state. Arousal is a measure of alertness. Play is seen as an arousal-seeking activity. Play increases stimulation when children use objects and actions in new and unusual ways. Elements resulting in arousal include novelty, complexity, incongruity, and surprise (Berlyne, 1960; Ellis, 1973).
Flow theory	For a person to experience flow the following elements should be present: a match between the skills of the person and the challenges of the activity, total concentration on the activity at hand, a loss of self-consciousness, control over actions and the environment, and unambiguous feedback from the environment (Csikszentmihalyi, 1990). This flow state is easily observed in the object play of young children.
Competency and mastery	Mastery motivation is rooted in the belief that humans naturally possess a motive to control the environment, to master skills, and to be effective. It follows a developmental hierarchy: exploration, means-ends tasks, preference of challenging tasks, and self-initiated mastery. There is a strong relationship between mastery motivation and cognitive skills (Hrncir, Speller, & West, 1985). Reilly (1974) also used a developmental hierarchy when she described three stages of play behaviour: exploration, competency, and achievement of mastery.

When using play as an intervention medium with the aim of stimulating development, it is difficult to comply with all of the above. Bundy (1991:59) proposed a working definition of play for therapists:

> Play is a transaction between an individual and the environment that is intrinsically motivated, internally controlled and free of many of the constraints of objective reality.

This definition puts play in the realm of a bio-psychosocial approach (Mosey, 1986), as it comprises both action and attitude.

3.2.1 The role of play in the development of children with disabilities

Play and development are related and intertwining concepts (Parham & Fazio, 1997). Rast (1986:30) describes how play provides a natural arena within which therapy goals can be achieved. She states: "Play offers a practical vehicle to enlist a child's attention, to practice specific motor and functional skills, and to promote sensory processing, perceptual abilities, and cognitive development. It also serves to support social, emotional, and language development. In the therapeutic setting, play often becomes a tool used to work towards a goal". It is widely documented that the use of play as a therapeutic medium contributes to the development of children (Case-Smith, 1993; Heiniger & Randolph, 1981; Hughes, 1991; Johnson *et al.*, 1999).

Before considering the value and implementation of play as a therapeutic medium, it is necessary to take cognisance of some theories that highlight the importance of play in childhood development. Relevant aspects of these theories are presented in Table 3.2.

Table 3.2   Modern* theories on play and early childhood development

Theories	Discussion
1. Psychodynamic theory	Freud (1961) claims that play has a cathartic effect. The child rids himself of negative feelings and during repetitive play, he deals with unpleasant events.
2. Cognitive theories	
a) Piaget's theory (1978)	The type of play reflects the child's level of cognitive development and it contributes to cognitive development. For learning to occur there must be a balance between assimilation and accommodation, which he calls adaptation. During play a child practises and consolidates acquired skills.
b) Vygotsky's theory (1976)	He saw a direct link between play and cognitive development. Play has a crucial role in social, emotional and cognitive development, which points to

Theories	Discussion
	their interrelatedness.
c) Bruner's theory (1983)	Play promotes creativity, flexibility and exploration. He emphasises that the process (play) is more important than the end-product. He also acknowledged the adaptive usefulness of play. Play is linked to the narrative modes of thinking namely dealing with meaning, reconstruction of experiences and the imagination.
d) Sutton-Smith's Theory (1967)	Three concepts shape his thinking. *Symbolic transformation*, which enhances mental flexibility that later could be used for adaptive purposes; *Adaptive potentiation* allows the child to consider various options or alternatives to manage the challenges of the environment; and *Adaptive variability* embraces play as key to human development just as physiological and behavioural variables are the key to evolution. The adaptive potential of developing children requires not exact and precise adaptations, but greater flexibility to use specific abilities demanded by specific situations.
e) Singer's theory (1973)	Play offers a way for the child to modulate the rate of incoming stimulation, from both the external and internal worlds. Through play the child can optimise the flow of internal and external stimulation, thereby experiencing pleasurable emotions. The emphasis is on cognitive and emotional development.

*Classical theories were developed before World War I and the modern theories have their roots in the early theories (Johnson *et al.*, 1999).

From the above the following valuable theoretical underpinnings are provided for the implementation of play as a therapeutic medium in the elimination of maladaptive responses and the facilitation of adaptive responses in children with disabilities:

– Freud postulates that children can experience *catharsis through play*. This is important for children with disabilities as they often have feelings of frustration due to their inability to accomplish certain tasks; therefore they do not experience success. Children with intellectual impairments experience far more anxiety than children without disabilities (Du Toit, 1980). This can manifest in undesirable behaviours such as head-banging or rocking (Wehman, 1977). Giving the child the opportunity to control the environment reduces anxiety.

– Due to their impairments, children with disabilities do not experience a *sense of control* over the environment due to their impairments. It is the responsibility of interventionists to address this issue during therapy by adapting the environment to suit the needs and abilities of each individual child.

– All the cognitive theories emphasise the *interrelatedness between the different developmental domains* (cognitive, social and emotional). In Chapter 2 the

interrelatedness of all the developmental domains, including the sensorimotor domain, were discussed and also how maladaptive responses occur when there is a deficit in any of the domains.

–   These theories also focus on the adaptive process as part of learning that occurs during play. Sutton-Smith (1967) stipulated that a child needs to be *flexible* in his approach to problem-solving – a skill acquired through exposure to different play situations.

–   Singer (1973) addresses the internal system of *motivation as a drive* to increase opportunities for stimulation. This contributes to physical and emotional stimulation. Children with intellectual disabilities do not have a high inner drive or motivation (Pretorius, 1997). To contribute to the development of the child, play opportunities must be selected and planned carefully so that they are appropriate and challenging on the appropriate level for these children (Johnson *et al.*, 1999).

–   Studies on children with intellectual disabilities, autistic and language impaired children, referred to by Westby (Casby & Ruder, 1983; Hill & McCune-Nicolich, 1981; Terrel, Schwartz, Prelock & Messeick, 1984; Anderson, Hinojosa & Strauch, 1987), indicate that children with disabilities exhibit the same *developmental play sequence* as children without disabilities, but with some qualitative and quantitative differences.   The developmental sequence is, however, always delayed.   In intervention consideration should be given to the selection of activities appropriate for mental, as well as chronological age.

–   Children with intellectual impairments are less creative and imaginative than their peers without disabilities and they are often destructive during play (Steenkamp & Steenkamp, 1992). They are less likely to engage in constructive play but rather use non-specific touching of toys.   Intellectual impairments do not prevent symbolic play, but it is observed only at a later chronological age. In intervention a child should be given opportunities for *more constructive and symbolic play situations* and less emphasis should be placed on destructive activities.

3.2.2   Value of play in the management of communication-related behaviours

From the above it is apparent that the play experiences of children with disabilities are influenced by their impairments. Wehman (1979) stated that adequate, independent interactions with play material might reduce the need for institutionalisation of severely handicapped children as they learn new skills, which could be carried over to other performance areas such as activities of daily living. It is not only the disability in itself that renders a child's play deficient. An environment that reflects the deprivation of play can also contribute to further handicap the child with any form of disability (McConkey, 1985; Law, 1991; Takata, 1974). When selecting toys and play materials for children with special needs, consideration should thus be given to the needs of the child, the inherent factors of the toys, the environment in which the activity will take place and the child's functional level of development. Furthermore, the selection of toys is also dependent on the therapeutic goals aimed at the facilitation of adaptive responses.

In Table 3.3 a summary is given of factors influencing toy and play material selection to encourage optimum intervention for children with disabilities.

Table 3.3   Factors influencing toy and play material selection for children with disabilities

Factors	Motivation	References
Internal environmental factors of the child affecting play	• Internal factors include performance components of all developmental domains, namely sensorimotor, cognitve, communication, and social-emotional. Each domain consists of specific behaviours that could be stimulated and measured to observe improvement. • The experience of playfulness facilitates problem-solving and adaptation by the child. • Children should explore with their own capabilities to: – Foster creativity; make decisions; understand cause-effect; understand congruence; learn to cope with anxiety, frustration, failure; facilitate optimal state of arousal	Bundy (1991) Missiuna & Pollock (1991); Reilly (1974)

Factors	Motivation	References
External environmental factors influencing play	• Environmental factors include: – adequate and safe play spaces – structure in daily routines – arranging the social environment to include competent play partners and responsive adults – adopting a naturalistic or milieu teaching strategies – reduction of distracting environmental stimuli	Bailey and Wolery (1992); Florey (1981); Musselwhite (1986)
	• Adults as part of the play experience: – children are influenced by the way in which adults present toys and materials to them. – children with developmental delays exhibit higher levels of positive emotion when adults encourage child-centred play with toys as opposed to a directive approach • Providing the "just right challenge" between the demands of the activity and the ability of the child to execute the activity so that he experiences a sense of mastery and competence. • Facilitation of confidence and self-esteem. • Essential skills for a therapeutic relationship are understanding, empathy and caring. • Establishment of rapport	Rubin and Howe (1985) Hupp, Boat and Alpert (1992) Csikszentmihalyi (1990) Ginott (1961); Howe and Swartzberg (1995)
Inherent factors of toys	• Guidelines for selecting toys and play materials for children with special needs. Toys should – be responsive – be age-appropriate – be adapted to increase engagement and learning – be natural objects familiar to the child – promote learning of important skills. • Novelty of toys stimulate exploration (simple manipulation) • Toys preferred by children with intellectual impairments: – structured toys (they spend more time playing with these toys) – social toys, which enhances social interaction (e.g. turn-taking, physical assistance, dramatic play) – reactive toys such as jack-in-the-box, battery-operated toys.	Bailey and Wolery (1992) Case-Smith (1993); Dempsey and Frost (1993) Ichinose and Clark (1990)

Factors	Motivation	References
Play stages: Sensorimotor stage	- Body-orientated activities - Use of basic materials and concepts - Opportunities for object permanence - Kinaesthetic learning should be included - Opportunities of repetition - Inclusion of all the senses - Activities with incidental elements and cause-effect - Opportunities for variety in tool use - Activities that allow for exploration and/or destructive actions	Adapted from Uys (1997)
Play stages: Symbolic and simple constructive stage	- Representational skills on 2- and 3-dimensional levels - Opportunities for construction - Opportunities for imitation of verbal and non-verbal actions - Problem-solving as part of abstract thinking behaviour - Stimulation of imagination	Adapted from Takata (1974)

During intervention there should be equal emphasis on the internal factors of the child affecting play and on the external environmental factors influencing play. Internal factors include performance components of developmental domains, such as coordination, attention, and turn-taking. Under internal factors, Bundy (1991) also includes aspects of playfulness, which facilitate problem-solving and adaptation by the child. These components form part of the interventionist's goalsetting for each therapy session and should be measured before and during intervention. External environmental factors are equally important to consider as Bailey and Wolery (1992) showed in specific guidelines, as presented in Table 3.3. In an activity-based intervention programme, the establishment of goals or objectives are directly linked to the selection of the activities. Activities should be selected to provide the child with the opportunity to develop and practise target behaviours (Bricker & Cripe, 1995).

When toys are selected only to suit the child's internal environment and the goals that should be met, success cannot necessarily be guaranteed. A crucial ingredient in the intervention process is the interventionist or therapist, whose role is to obtain interaction between the external environment and the child (See Figure 2.1). The therapist utilises three essential skills to establish a therapeutic relationship namely understanding, empathy and a caring approach. The therapist should be conscious of the use of self, the non-verbal, as well as the verbal communication being portrayed and which are relevant to the

situation. Therapeutic authenticity is a necessary requirement for establishing rapport. Rapport is experienced when the child feels the therapist's respect and regard, as well as appreciation of his own uniqueness and qualities. Participation in such a relationship facilitates the child's growth and change (Briggs, Duncombe, Howe, & Swartzberg, 1979). As this research focuses on children functioning on the sensorimotor and symbolic and simple constructive developmental stages, specific attention is paid to these two play stages.

3.2.3 Theoretical models that influence early childhood intervention

Various models have a bearing on early childhood intervention. The most pertinent of those have been investigated in order to present an overview and perspective.

Each of the models addresses some critical issues pertaining to this study. The *medical model* emphasises the importance of recognising the diagnosis of the population included in the study, as it influences the characteristics of the child with intellectual impairment's performance in unique ways, thereby assisting the therapist with appropriate and realistic goal-setting.

The *child developmental model* presents a theoretical foundation for the assessment procedures used in this study. Children with intellectual impairment follow the same sequential developmental route, although at a slower pace, than their peers without any kind of disability (Gowen, Johnson-Martin, Goldman & Hussey, 1992). Developmental norms should thus be considered in the assessment procedures used, in order to detect change in behaviour.

The *cognitive model* incorporates Piaget's (1951) principles of assimilation and accommodation of new and learned behaviours. Together these two processes account for intellectual adaptation and the development of intellectual structures, an important topic in this study. A further expansion of this model incorporates types of encouragement used in intervention (Hanson & Lynch, 1989). Criticism against this model is that the prevention of failure is not encouraged. Children with disabilities experience excessive negative feedback, which could influence their intrinsic and extrinsic motivation. It is the responsibility of the interventionist to provide positive feedback.

The *behavioural model* utilises motivational factors as part of intervention strategies. There is great emphasis on the development and use of instructional methods and intervention techniques. This interactive model is concerned with the relationship between the child's behaviour and the stimuli from the environment. This relationship is the key around which this study revolves and should form an integral part in the planning and execution of the assessment and treatment phases (Shonkhoff & Meisels, 2000).

The *ecological model* feels strongly about the match between the child and the environment for change in behaviour to occur (Dunst, 1985). Again, for this study the adaptation of these two components is vital in the planning phase. The environment should be adapted specifically to ensure access on a physical and mental level for the population in consideration (Thurman, 1997; Csikszentmihalyi, 1990).

3.3 THE ROLE OF PLAY AS AN INTERVENTION TOOL FOR THE DEVELOPMENT OF ADAPTIVE COMMUNICATION BEHAVIOURS

Intervention refers to the assessment and treatment plan to provide for the needs of children with special needs. Assessment and treatment are interrelated and authentic assessment procedures should lead to authentic curriculum goals and authentic interventions (Bagnato *et al.*, 1997). The primary role of assessment is to guide treatment, implying that one is dependent on the other and cannot be separated.

3.3.1 Play in assessment

3.3.1.1 Disadvantages of traditional assessment tools

Traditional assessments are not functionally orientated and are biased against children with developmental delays and disabilities (Brookes-Gunn & Lewis, 1981; Garwood, 1982). Children with disabilities are seen as "untestable" due to the influence of their impairments on their performance and therefore outcomes from the use of a traditional method of assessment do not reflect the child's actual abilities or progress. The progress made by children with disabilities is gradual and slow and the increments used in norm-based

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assessments do not reflect small changes in observable behaviours (Bricker & Cripe, 1995). If a child has a language deficit he may seem to have a cognitive deficit when assessed by traditional measures, because a perceived deficit in one developmental domain may mask abilities in another area. This may lead to misinterpretation of results and ultimately inappropriate planning of the intervention programmes. Addressing these issues, various authors have developed alternative methods of assessment of children with disabilities that focus on their strengths, as well as their inabilities (Linder, 1993). The trend is to use assessment methods where people who are familiar with the child observe functional skills and comprehensively record performance on all developmental domains namely sensorimotor, cognition, self-care, social-emotional and communication-language.

If play is vital for development, and forms part of intervention programmes for young children, it should also form the basis of performance evaluation. Play is a functional activity and the performance during play is the window through which professionals should view the child's optimal developmental level (Westby, 1988; Fewell & Glick, 1993). This research project uses play as intervention medium, but it becomes evident that play should also be used for assessment of the child's performance before, during and after intervention.

3.3.1.2 Criteria for play-based assessment tools

There are certain criteria that an assessment instrument should meet in order to monitor programme-related performance of children with disabilities. Bricker *et al.* (1978) and DuBose (1981) suggested the following criteria. An assessment instrument should:

–   be used by people who deal with the child on a regular basis in familiar settings;
–   reflect curricular content of the intervention programme;
–   provide a logical developmental sequence of items that can be used as training guidelines;
–   accommodate a range of disabilities;
–   specify performance criteria that indicate a skill as a functional part of the child's daily repertoire; and
–   be a reliable and valid measure.

These six criteria refer to the authenticity, reliability, and validity of assessment tools.

i) Criteria for authenticity of play assessment tools

Bagnato *et al.* (1997) developed the LINK standards that are a set of six guidelines that addresses the missions, content, methods, and applications for linking authentic curriculum-based assessment and early intervention. These six standards according to which assessment instruments could be measured are presented in Table 3.4 and the model for the development of adaptive communication behaviours (See Fig. 2.1) incorporates these standards.

Table 3.4   The six operational LINK standards characterising early childhood assessments incorporated in the model for the development of adaptive communication behaviours

Standard	LINK dimension	Comparison with the model for the development of adaptive communication behaviours
Authenticity	- Bases assessments on sequential authentic goals contained in the curriculum or task analysis - Relies on child's actual performance - Requires appropriate and familiar toys or adaptive toys - Promotes natural circumstances for assessment - Uses qualitative and quantitative information	- Clear goal-setting with a challenge that could successfully be met - Active participation is facilitated by the correct selection of activities matching the person's occupation - Works towards interaction between the external environment and the internal environment
Convergence	- Uses multiple sources to collect data - Assessment in natural contexts - Relies on play-style simulations - Promotes transdisciplinary modes of teamwork - Is family-centred	- Play activities incorporate the occupation of the child - Theories on play and communication development should be integrated to elicit an adaptive response
Collaboration	- Relies on family as primary source of child's performance data - Supports consensus decision-making between parents and professionals	- When a child actively participates it is easier for professionals to conclude with an appropriate intervention programme specifically developed for a child with his own strong and weak areas
Equity	- Adapts the task to accommodate the child's functional limitations - Emphasises competencies demonstrated by the child	- Activities should be adapted in such a manner as to eliminate hindrance in the external environment and rather facilitate

Standard	LINK dimension	Comparison with the model for the development of adaptive communication behaviours
	- Uses natural test-teach-test framework that blends testing and teaching - Seeks to foster the child's learning-to-learn skills	an adaptive response and eliminate maladaptation - The opportunity for repetition should be created in a test-teach-test framework - The challenge presented to the child should not be too high or too low in order to decrease anxiety and inhibition
Sensitivity	- Uses graduated metrics to monitor small increments of progress - Links authentic assessment tasks to authentic curriculum goals and authentic intervention - Underscores activity-based intervention in natural settings, using natural activities	- Use play activities to teach and to test the child's abilities - Play activities appropriate for the child's social-cultural group should be used - Activity-based intervention provides the opportunity for internal and external feedback - As a child's developmental domains are all observed during play, authentic assessment is possible
Congruence	- Accomplishes missions of early childhood intervention(s) - Uses developmentally appropriate styles of assessment that emphasise play and natural observations - Allows flexible accommodations for children with disabilities - Encompasses social and treatment validities to support the suitability for children with disabilities	- Observations of the child's actual potential could be made when there is a match between the child's abilities and the demands from the external environment - This match could be obtained by adjusting the external environment - Treatment is guided by the performance of the child and the therapist should be flexible enough to change challenges expected from the child - The aim is to facilitate an adaptive response thereby facilitating mastery of the environment

Evaluating the criteria set by Bricker *et al.* (1978) and DuBose (1981), as well as the LINK standards of Bagnato *et al.* (1997), it is apparent that assessment of children's performance is multifaceted. According to these six standards the child should be observed in a natural setting, engaging in familiar play activities to obtain optimal performance. In this sense, they endorse a transdisciplinary approach to assessment. Social validity is a key to incorporate families and carers in the intervention process and they should also be used as a source to collect data. They encourage individualised assessments to make provision for the impairments of children with disabilities. Another key concept is the sensitivity of instruments with the ability to indicate slow progress and change in behaviour.

ii)   Criteria for reliability of play assessment tools

Reliability refers to the extent to which one can rely on the results obtained from an instrument. It is the degree of consistency with which an instrument measures a variable or the ability of an instrument to produce similar scores on repeated testing occasions that occur under similar conditions (DePoy & Gitlin, 1994).   The definitions of items used in an instrument should be clear and unambiguous, as this would reduce the likelihood of misinterpretation. The longer the measurement instrument measuring a specific construct, the more information is collected to represent the underlying concept, thus increasing reliability. Lynn (1986) argues that for content validity of a measurement instrument it should include just enough items to assess each construct reliably, thereby excluding duplication of items in a measuring instrument, but establishing a reliable instrument.   Reliability is expressed as a form of a correlation coefficient that ranges from a low of zero to a high of 1.00. There are three methods of measuring reliability: stability, internal consistency, and equivalence. Table 3. 5 summarises these elements of reliability.

Table 3.5   Reliability measures

Reliability measures	Methods
1. Stability (Intra-rater reliability)	Stability refers to the extent to which the same results are obtained when the instrument is administered twice to the same sample by the same rater. It is concerned with the consistency of repeated measures (test-retest).
2. Equivalence (Inter-rater reliability)	This is the comparison of two observers measuring the same event. Eighty percent or more is considered an indication of a reliable instrument.
3. Internal consistency	This refers to the extent to which all of the items on an instrument measure the same characteristic.

A reliable assessment tool is needed for an accurate and consistent measurement of play and the skills involved to master the activity.

iii)   Criteria for validity through data collection using play assessment tools

Assessment is a form of data collection. Validity addresses the critical relationship between a concept and how it is measured. It asks whether what is being measured is a reflection of the underlying concept or construct. The closer an instrument comes to representing the true definition of the concept, the more valid the instrument.

Table 3.6   Measures of validity

Types of validity	Description
Face validity	Experts in the field essentially base face validity on an intuitive judgement. This procedure is useful in the instrument development process in relation to determining readability and clarity of content. It means that the instrument measures what it is supposed to measure (Brink, 1999).
Content validity	This type of validity is sometimes referred to as *face validity*. In other words, it is the accuracy with which an instrument measures the factors or content that is studied (Leedy, 1985:25). Steps to obtain content validity include: - specification of the full domain of a concept through a thorough literature search - adequate representation of domains through the construction of specific items. One way of making certain of content validity is to use external raters to review constructed items or drafts of scales used (DePoy & Gitlin, 1994:208). The steps to obtain content validity include: 1) specification of the full domain of a concept through a thorough literature review and, 2) adequate representation of domains through the construction of specific items (DePoy & Gitlin, 1994). Each item on the instrument should be evaluated by experts in the field with regard to the degree to which the variable to be tested is represented. The overall appropriateness for its use should also be evaluated (Brink, 1999).
Treatment validity	The primary role of assessment is to guide treatment. Treatment validity is concerned with the degree to which assessment contributes to useful outcomes (Hayes, Nelson, & Jarrett, 1987). Assessment can contribute in three ways: 1) identifying goals to be reached, 2) determining methods and material to help reach the goals, and 3) detecting progress or change related to intervention. When assessment performs one or more of these functions, it has treatment validity.
Construct validity	A construct is any concept, such as sensorimotor, which cannot be directly isolated or measured (Leedy, 1985:25). Construct validity is concerned with the degree in which the construct is measured and how it differs from other constructs (e.g. cognition and social-emotional). Because constructs are abstract theoretical concepts, each construct should be clearly defined to eliminate inaccuracies and operationalised in order to be measured. Construct validity addresses which constructs the measurement instrument actually measures (DePoy & Gitlin, 1994; Brink, 1999). It establishes the relationship between the results provided by the instrument to the underlying

Types of validity	Description
	theoretical concepts of the instrument. The multitrait-multimethod approach is regarded as the preferred method to establish construct validity. This approach is based on the premise that different measures of the same constructs should produce similar results (Polit & Hungler, 1983; Waltz, Strickland & Lenz, 1991).
Convergent validity	The results of a new instrument should be compared to the data of a criterion measure (a known instrument), at the same time (Brink, 1999). Assessment validity refers to the quality of information provided to guide decision-making. Validity, therefore does not reside within the instrument, but depends on the instrument's use and contribution to the goodness of decisions made. This validity concerns how well assessment instruments help us make informed, useful, and worthwhile decisions for children and their families (Bagnato *et al.*, 1997).
Social validity	An assessment tool may be useful for specifying certain objectives, but those objectives may not be judged as worth pursuing. Social validity has three functions: 1) generating worthwhile goals, 2) using assessment instruments that are considered acceptable, and 3) producing findings with social validity recognising the importance of partnerships with families and carers of the children.

Convergent, treatment and social validity focus on the function or treatment utility of assessments (Hayes *et al*., 1987) whereas construct, content, and face validity focus on the structure of the assessment instrument.

3.3.1.3 Selected play assessment tools

Play is a universal human activity that blends cognitive, social, emotional, linguistic, and motor components. Although there are numerous assessment methods, only a few of the most relevant that use play as primary medium for assessment, are included in this discussion. Table 3.7 identifies the most commonly known play assessments used in the intervention (Sturgess, 1997).

Table 3.7   Selected play assessments used in intervention

Name of assessment	Clinical organisation	Age range
The Assessment, Evaluation, and Programming System for Infants and Children (AEPS) (Bricker, 1993)	Links assessment and intervention, and evaluation components. Six developmental domains are covered: fine motor, gross motor, self-care, cognitive, social-communication, and social. Data are collected through observations, direct test, and reporting from caregivers/parents.	One month to 3 years

Name of assessment	Clinical organisation	Age range
The Knox Preschool Play Scale (Knox, 1974; Bledsoe & Shepherd, 1982)	It is an observational assessment in a naturalistic setting. It requires observations on four dimensions – space management, material management, imitation and participation. Observations should be over a range of different settings. A disadvantage is that the measurement is in yearly increments which poses a problem when looking for progress.	0-6 years.
The Play Skill Inventory (Hurff, 1980)	It is a collection of 20 possible play situations and activities. Through the use of these play situations a child could be assessed for competency in sensations, motor ability, perception and intellect. It is a criterion-referenced performance-based test.	Eight to ten years
The Transdisciplinary Play-Based Assessment (TPBA) (Linder, 1993)	Focuses on assessment and individual programme development. In this way a child's performance can be monitored. It is a functional assessment tool, sensitive to the needs of children with disabilities. The TPBA is a natural, functional approach and assesses the four developmental domains of sensorimotor, cognitive, language and communication and social-emotional. The TPBA involves the child in a play situation with a facilitating adult and peers. The TPBA obtains a high score on overall quality according to the LINK standards. However, in the process of evaluating children's performance on a daily basis, the assessment instrument should be sensitive enough to indicate small and gradual changes over a short period.	Six months to six years
The Symbolic Play Scale (Westby, 1980; 1988)	Evolved from a Piagetian base language programme for severely intellectually impaired children. Westby emphasises the development of play itself and related language abilities. Five groups of toys are used during the assessment where a child-centred approach is followed. The assessment has two components namely play performance and language performance.	Nine months to five years
The Play Checklist (Heidemann & Hewitt, 1992)	Involves observation of 10 play skills. It was designed for use in preschool educational and care settings to analyse a child's current play skill level, with the aim of designing goals for play development.	Not specified

Numerous play assessments are available, some more recent than others with a variance in reliability and validity. Most tests also measure only one specific aspect or context of play and do not look at a developing child holistically. When selecting appropriate play assessments, the criteria given by Bricker *et al.* (1978) and DuBose (1981) and Bagnato *et al.* (1997) should be taken into consideration. Therapists are frustrated by the lack of reliable assessments available that seem fair to children with disabilities and are not too time-consuming to administer. Another reason for frustration is the lack of progress some of the assessment tools can demonstrate. For this purpose systematic observation should be incorporated. This refers to structured procedures for collecting objective and quantifiable data on developing or changing behaviours (Bagnato *et al.*, 1997) through a

method of observation in real-life situations, thereby increasing the authenticity of the assessment.

3.3.2 Play in treatment

Intervention is the process of adapting the environment, the use of purposeful play activities presented according to therapeutic principles, and the correctly selected therapeutic approach to facilitate the development of the child. The aim of the treatment is to create a better match between the child and the environment by changing the demands on the child to fit his capabilities, by enhancing his developmental skills and coping resources, and by changing the environment's response to him (Gorga, 1989).   The programme should be planned in such a way as to provide a graduated challenge to the child, which will assist him to develop adaptive responses.

3.3.2.1 Early intervention: An occupational therapy perspective

The American Occupational Therapy Association (1986) has defined occupational therapy in early intervention in the following manner.

> "Occupational therapy personnel use purposeful activity in the development or restoration of function to help the child and family develop resources to meet personal needs and the demands of the environment. The child's occupations of movement, play, eating, interacting with others, dressing, bathing and the like are the purposeful activities used in early childhood intervention to promote normal development and adaptive coping behaviors.   Treatment stems from a scientifically-based neurophysiological framework. Services are provided to help parents in their roles as providers and primary caregivers. Treatment may be provided in collaboration with other disciplines and professionals…Occupational therapy in early intervention promotes independent function and adaptive interaction with the environment through the use of age appropriate, purposeful activity."

The Education of the Handicapped Act Amendments of 1986 (Public Law 99-457) marks a shift in the focus and priorities for a comprehensive system of services for young children and their families. Included in this law is a definition of occupational therapy in early

intervention: "Occupational therapy includes services to address the functional needs of a child related to the performance of self-help skills, adaptive behavior and play, and sensory, motor, and postural development. These services are designed to improve the child's functional ability to perform tasks in home, school, and community setting, and include:-

i)   Identification, assessment, and intervention;

ii)   Adaptation of the environment, and selection, design and fabrication of assistive and orthotic devices to facilitate development and promote the acquisition of functional skills;

iii)   Prevention or minimization of the impact of initial or future impairment, delay in development, or loss of functional ability".

The occupational therapist, as a member of a transdisciplinary or interdisciplinary team of parents, caregivers, health and education professionals, facilitates the independence in young children by enhancing motor control, sensory modulation, adaptive coping, sensorimotor development, social-emotional development, daily living skills and play. *Motor control* gives the child a means of mobility, of exploring the environment, and of communicating before speech develops (Gorga, 1989). Because of its influence on the development of other systems (social-emotional, cognitive), motor control is often at the root of many interventions. Neuro-developmental and sensory integration approaches are commonly used to address motor control. *Sensory modulation* is the ability to regulate the sensory processes needed to maintain a state of equilibrium. There is a correlation between dysfunction in sensory processing and learning behaviour in young children (Ayers, 1972). Sensory registration is the initial awareness of a change in the environment. This change results in arousal. The child focuses his attention on the stimulus in the environment, which enhances the possibility for learning to occur. Sensory modulation is essential for well-developed functioning in other areas (namely motor control, social interaction, and cognitive performance). *Adaptive coping* is the process of responding effectively to the demands of the environment. The match between the demands of the environment and the abilities of the child is of the essence for successful intervention. *Sensorimotor development* utilises principles of the learning theory and Piaget's cognitive theory (1951) to stimulate concept formation, memory, and problem-solving by incorporating environmental influences and demands in intervention.

3.3.2.2   Early intervention: A communication perspective

Early communication intervention can be defined as assessment and treatment provided to families and their young children who demonstrate or are at risk for demonstrating either a disability or delay involving communication, language, speech or pre-requisite oral-motor behaviour (American Speech and Hearing Association, 1989).   The concept of early communication intervention for infants, young children and their families is increasingly recognised as an essential component of a modern society's special educational services (Mitchell, 1991).

When adults recognise that a disparity exists between their communicative competence and that of children with whom they interact, they adjust their communicative style. This changing of a communication style by adults to match those of children is known as communicative accommodation (Crago, 1992).   According to Nelson (1996) the accommodations of an individual's own resources to the requirements of the task are one of the major types of adaptation. It could therefore be postulated that the adults adapt their behaviour to suit the abilities of the child. Adults can be communicatively accommodating towards children by means of the nature of their communicative interaction and its focus.

Adults can alter or adapt the nature of their discourse during interaction and one way in which communicative interaction is altered in an attempt to reduce the competence gap, is the simplification of the adult's speech to better match the lesser verbal competence of the child (Conti-Ramsden, 1985; Crago, 1992; Van Kleeck, 1992). This is characterised by shorter sentence structures, simpler lexicon and acoustically distinct higher pitch than normal.

The focus of the communication interaction refers to the adaptation that adults make for children regarding the topic of conversation and on whom or on what the conversation is focused. The situation-centred approach is characterised by the expectation that children should adapt to activities and persons in the situation at hand (Anderson & Battle, 1993; Schieffelin & Ochs, 1986). In a child-centred approach adult interactions are characterised by child-centred topics and a desire to engage the child frequently as a conversational partner (Schieffelin & Ochs, 1986). Both these approaches are important to incorporate in a communication intervention programme for young children.

3.4 THE DEVELOPMENT OF AN INTERVENTION PROGRAMME FOR COMMUNICATION-RELATED BEHAVIOURS

In the development of an intervention programme for communication-related behaviours, the following six areas are relevant:

3.4.1 Inclusion of developmental domains

Developmental domain categories, according to developmental theories, were identified as sensorimotor, cognitive, communication and social-emotional (Gilfoyle & Grady, 1983; Piaget, 1951; Robinson Ambron, 1978) (See Figure 2.2). All intervention programmes should therefore incorporate these domains.

3.4.2 Strategies and principles

The principles and strategies to facilitate communication-related behaviours were identified (Beukelman & Mirenda, 1998; Lloyd *et al.*, 1997; Musselwhite, 1986). These principles are presented in Table 3.8.

Table 3.8   Principles and strategies to facilitate communication-related behaviours

Behaviour	Strategies and principles
General strategies to facilitate communication (Constable, 1983; Olswang, Kriegsmann, & Mastergeorge, 1982)	• Requesting • Commenting on objects • Commenting on actions • Denying and protesting • Obstacle presentation • Mand-model • Time-delay • Nurturance • Sensitivity • Sequence experiences • Fading • Shaping
Prompting (Lloyd *et al.*, 1997)	• Verbal / gestural / physical / visual • Partial / full • Natural prompt – "What do you want." • Minimum prompt – "You need to tell me what you want."

Behaviour	Strategies and principles
	• Medium prompt – " You need to tell me what you want. You want_____." • Maximum prompt – "What do you want. You need to tell me. Say _____." Used with gestures, physical and visual cues.
Visual tracking and scanning (Musselwhite & St Louis, 1982)	• Stimulus: Size, colour, complexity of activity • Location: Distance – near to far • Range: Grade to 180° visual range • Cues: Verbal, vocal, gestural • Speed: Slow, medium, fast • Path: Horizontal, vertical, diagonal, circular, random
Choice-making (Porter, Carter, Goolsby, Martin, Reed, Stowers, Wurth, 1985)	• Child should have a preference before initiating choice-making • Child should have a mode of communication • Increase the opportunities • Child should learn natural consequence of making a choice
Joint activity (MacDonald & Gillette, 1984)	• Adult first follows the child's lead • Structure for give-and-take situation - Optimal eye contact - Sustain interaction - Routine back and forth action and then break the routine • Animation • Imitate behaviour • Initiating • Receive requests • Maintain eye contact • Touch
Activation (Musselwhite, 1986)	• Different planes • Different speed • Tone of voice • Give-and-take situation • Animation • Surprise element
Object interaction (Musselwite, 1986)	• Exploratory - accessibility of toys - increase duration of play - increase opportunities for manipulation • Conventional - non-threatening area - appropriate toys - allow self-directed play - functional object use
Learning (Bandura, 1977)	• Repetition / practise • Associations, assimilation and accommodation • Trial and error • Reinforcement • Motivation • Imitation • Insight • Multi-sensory experience • Methodical instructions

Behaviour	Strategies and principles
Social learning (Bandura, 1977)	• Observation and modelling • Continuous reciprocal interaction between the environment • Reinforcement, self-reinforcement • Rapport between the therapist and child
Adaptive response (King, 1978)	• Ensures active participation • Opportunity for goal-directed participation • Sub-conscious integration • Self-reinforcement through experience of success
Level of activity (Kramer & Hinojosa, 1993)	Grade level of activity according to: • Kinaesthetic • Three dimensional • Two dimensional

Strategies and principles are the cornerstones which make therapy a scientific practice. The strategies and principles could be used across all the developmental domains of sensorimotor, cognition, social-emotional and communication. It is the responsibility of the therapist to use these strategies and principles in planning the intervention programme. Without the use of specific strategies no change in behaviours will occur and the therapist will only maintain the functional level of the child. Treatment programmes are also graded according to the strategies and principles used during a session.

3.4.3   Selection of activities for inclusion in a play package

Many childhood intervention programmes implement play as a therapeutic medium. There are, however, no researched play packages except for one developed and researched in 1997 (Uys, 1997). Various authors have recognised play as an effective intervention medium for children (Fewell & Vadasy, 1983; Lear, 1996; Linder, 1983; Parham & Fazio, 1997; Uys, 1998). Play is regarded as a natural way through which a child learns, through which he acquires and practises the skills necessary for daily living and participation in human society (Uys, 1997:19). These primary occupations are viewed as activities that both reflect and facilitate the development of a child's competence in interaction with the world (Ayres, 1972; Mack, Lindquist & Parham, 1982; Reilly, 1974; Takata, 1969). Toys and other play materials are "tools" used during activity participation and are linked ultimately to the child's intellectual development and learning (Bradley, 1985). Play can give us insight into the child's volition (values, needs and interests), habituation (the child's and family's organisation of behaviours into patterns and routines), performance

(the child's skills and abilities), and environmental strengths and weaknesses (Kielhofner, 1985; Schaaf & Mulrooney, 1989).

Previous research (Uys, 1997) was aimed at the development of activities to be used by CSD. The play package was developed by ensuring that severely disabled children had access to play with specifically selected activities. Activities were modified or adapted to ensure participation on a physical, as well as a mental level. Four children from a developing community were included in the study and the activities were applied to them to make sure that they related to the activities. Although gains were obvious, it was indicated that of the ten activities selected, some targeted similar skills and in order to streamline the package, some activities could be excluded, while developing a more useful grading system of fewer activities. The activities, included in the play package, with their most prominent skills involved are presented in Table 3.9.

Table 3.9   Activities in a play package and their most prominent skills facilitated

ACTIVITIES	SKILLS MOSTLY PRESENT		
	Sensorimotor	Cognitive	Communication
1. Battery-operated toys	X		
2. Skittles	X		
3. Finger-painting	X		
4. Sensory box	X		
5. Music	X		
6. Concept board		X	
7. Pop-up toys		X	
8. Sand play		X	
9. Water play		X	
10. Storytelling			X

Uys (1997:71)

Although application of the package brought about significant differences in the children's behaviour, it became clear that before this package can be reproduced for wider application in South Africa, more in-depth research is needed to validate the play package in terms of changes in the behaviours of children with disabilities.

3.4.4 The content of the adapted play package

Taking the theoretical underpinnings, as discussed in Chapter 2 and 3, into consideration, it is evident that the adapted play package should meet the following requirements:

– *All developmental domains* should be included namely sensorimotor, cognitive, social-emotional, and communication. The therapist should have a thorough knowledge of theories of play motivation and the ability to incorporate the knowledge to facilitate an adaptive response.

– Crucial factors *from early intervention theories* should be taken into account namely the medical, child developmental, cognitive, behavioural, and ecological models.

– The activities should be planned in such a way that it is *flexible* for children with different levels of functioning to participate in the same activity. In other words, it should provide a match between the child's abilities and the demands of the activity. The therapist should be able to apply the knowledge of child development in the presentation of the activity.

– The *theories of play, development, including communication*, should be incorporated in the planning of the activities.

– Play activities should be *appropriate* in terms of the children's chronological and mental age, novelty, familiarity, social toys, reactive toys, and toys that would promote learning.

– Play activities should be selected *to facilitate the progression to the following stages of play* for young children.

– The therapist must be meticulous in the proposed *goals* that must be reached and the selection of appropriate *strategies and principles* that should bring about change in behaviours. In the treatment, a "just right challenge" for each child should be set which would make *successful participation* possible for him.

– There should be a *link between the treatment goals and the assessment* of changes in behaviours.

– Consideration should be given to *treatment and social validity*.

– Theories on the *facilitation of the adaptive response* should be included (See Fig. 2.1). These include

  • Adjustments should be made to ensure active participation

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- The external environment is the primary stimulus for developing the skills necessary to perform tasks within a specific context, therefore activities should be adapted to facilitate physical and mental participation

- Unambiguous feedback from the external environment (the therapist and the activity) forms an integral part of the adaptive process

- The child should experience success as well as intrinsic reward

- The environment should be adapted to the child's abilities and the child should learn to adapt to demands from the environment

- Activities should be motivational to maintain optimal arousal levels and total concentration

- Activities should be easier in the beginning, rigidly structured and presented in a supportive environment, to decrease anxiety

3.4.5   Rationale for change

The play package should be refined in order to eliminate duplication of activities that train the same skills. A manual with treatment principles and their application should be developed to make the package accessible for community health workers to use successfully. The play package should be tested on a more homogeneous group of children with disabilities to establish specific related problems.

When designing a play package for children with intellectual impairments, attention has to be paid to learning strategies that will enable these children to benefit maximally from their experiences. McCormick and Schiefelbusch (1984:186) proposed recommendations for increasing the use of learning strategies with the intellectually disabled child:

a)   Vary training stimuli on critical dimensions only.

b)   Emphasise critical linguistic stimuli

c)   Reduce the distracting potential of irrelevant stimuli

d)   Take advantage of attentional predispositions

e)   Consider the status of social and cognitive skills

f)   Use group-related stimuli to facilitate categorisation

g)   Arrange for referent and reference to be experienced simultaneously

h)   Teach how and when to apply mnemonic strategies

i)   Use within-stimulus prompts

j)   Consider spatial as opposed to temporal arrangement of stimuli

As the adaptation of the play package forms part of the validation process, it will be described in Chapter 4.

3.5 CONCLUSION

There is evidence that children with developmental delays or disabilities benefit from early intervention (Shonkoff & Meisels, 2000). The aim of the interventionist is to facilitate an adaptive response from the child to ensure that learning occurs. Play is widely recognised as a powerful tool to be used in intervention with young children as this is seen as their primary occupation. The motivational aspect of play is supported by three theories on play motivation. Their strategies form a crucial part in the effectiveness of the treatment programme presented to young children.

Although play development in children with disabilities is delayed, the sequence of the play stages stays the same as for children without disabilities (Linder, 1993). It is therefore important to consider theories on play and early childhood development before planning a play package to facilitate development in children with disabilities.

For the purpose of this thesis the emphasis is on the facilitation of communication-related behaviours. This concept was clearly defined to identify the underlying elements of this complex construct. Elements in the internal environment (the child's developmental domains) and the external environment were identified. These elements are interwoven in the intervention process of assessment and treatment.

To enhance the validity of a play package to facilitate communication-related behaviours, there should be a distinctive link between the goals of treatment and the assessment instruments used. Specific criteria in the development and selection of assessment instruments are provided by Bricker *et al.* (1978), DuBose (1981), and Bagnato *et al.*, (1997).

If play is the intervention medium, the assessment should also be play orientated; it should be sensitive enough to depict small changes in behaviour of children with disabilities, as

their progress is slower than that of children without disabilities. This puts the emphasis on the treatment and social validity where parents or caregivers could be part of the process and able to see the benefits of the intervention. In developing an assessment instrument, reliability and validity measures should be followed meticulously in order to declare the intervention process valid.

The planning of a play package to facilitate communication-related behaviours should be based on the theories of early childhood development, play development, and the selection of appropriate play activities. The scientific base of treatment rests on the strategies and principles incorporated in the presentation of the play activities. These strategies and principles are derived from a transdisciplinary approach to intervention.

Previous research on the use of a play package to facilitate development in children with severe disabilities was used as a point of departure. This package was refined by selecting the most appropriate activities, by eliminating duplication of activities training the same skills and by changing the method of presentation to fit the population of children with intellectual impairments.

With this background it is evident that further empirical research is necessary to validate the play package and assessment instruments in the realm of a transdisciplinary approach.

3.6 SUMMARY

In this chapter the use of play to facilitate an adaptive response was investigated. This was related to children with disabilities and the influence play has on the different developmental domains. Various theories pertaining to early childhood development, play motivation and play development were investigated.

It is evident that there should be a link between assessment methods and treatment in the intervention process. Criteria with which assessment instruments should comply were discussed regarding authenticity, reliability and validity during the data collection procedures.

The importance of the selection of appropriate play materials and toys were discussed with special reference to children with intellectual impairments. Strategies and principles used during the presentation of these activities were investigated.

The chapter concludes with the refinement of a play package used in previous research to meet the needs of this research project.

CHAPTER 4

METHODOLOGY

4.1   INTRODUCTION

The research question was formulated in Chapter 1, namely: *"Does the measurement instrument measure the communication-related behaviours that it claims to measure and does the package of play activities facilitate the development of communication-related behaviours that it claims to facilitate?"* This question refers to validation. The methodology implemented to answer the research question is described in this chapter.

The methodology is a description of the process by which the play package (the measurement instrument and package of play activities) was validated and it included a description of the research carried out in three domains. In the conceptual domain concepts and relations were considered in abstract form while in the methodological domain instruments and techniques for obtaining observations and for relating and comparing sets of observations were included. In the substantive domain "states and processes in the real world (events) and sets of relations among events (phenomena)" were included (Brinberg & Kidder, 1982: 6). In this chapter a description of the method employed in the pre-experimental and experimental phases reflects the conceptual and methodological domains. The description of the data analysis procedures is indicative of the way in which validation will be carried our in the substantive domain.

Based on knowledge of the normal development of communication and communication-related skills, severe communicative disability, and scientific investigative methods, specific aims for the investigation into the validity of the proposed play package, were formulated.

4.2   MAIN AIM

The aim of this research is to validate a play package for the facilitation of communication-related skills by:

a)   the development of a play package consisting of specifically selected activities and presentation methods based on existing theories on childhood development and facilitation principles and procedures; and

b)   experimentation to establish a cause-effect relationship between the activities and the changes in single gradually acquired behaviours of children with intellectual impairments.

As this aim represents a complex problem incorporating a variety of facets to be investigated in different phases, it was necessary to formulate a number of sub-aims through which each main aim could be realised before, during and after the application of the play package.

It is evident that there are two distinctive phases in this research, and they will be discussed separately in a pre-experimental as well as an experimental phase.

4.3   SUB-AIMS

4.3.1   Pre-experimental phase

4.3.1.1 To develop the play package:
-   by evaluating each activity of the play package used in previous research (Uys, 1997) in terms of its value in facilitating communication-related behaviours. This refinement is necessary in order to limit the number of activities, while covering all the necessary underlying behaviours;

-   by establishing presentation methods for each activity, which will ensure the facilitation of communication-related behaviours in children with intellectual impairments, incorporating theories on childhood development and facilitation principles and procedures.

4.3.1.2 To select and develop assessment tools for the identification of behaviours related to play activities:
-   by selecting appropriate pre- and post-intervention assessment tools;
-   by identifying behavioural indicators, which will be facilitated and measured during each play session with the child; and

- by establishing face, and content validity of the daily multiple measurement instrument (DMMI) to be used daily, involving the evaluation by experts in the field.

4.3.2 Experimental phase

4.3.2.1 To establish the reliability of the daily multiple measurement instrument by determining intra-rater and inter-rater reliability

4.3.2.2 To establish outcome validity of the play package by determining and comparing the levels of performance of the participants on the sensorimotor, cognitive, communication, and social-emotional activities during the pre-intervention phase, intervention phase, post-intervention phase and post-withdrawal phase, using four authentic assessment tools.

4.3.2.3 To establish construct validity of the play package by determining the changes in behavioural indicators reflecting the sensorimotor, cognitive, social –emotional and communication constructs.

4.3.2.4 To establish convergent validity of the daily multiple measurement instrument by comparing the performance of the participants on this instrument with their performance as measured by three other authentic measurement instruments, using two as comparable assessment tools and one as a countermeasure.

4.4   RESEACH DESIGN

A small group pretest-posttest design was selected to meet the aims of this research. A quasi-experimental design was used, as a comparison (control) group was omitted (Brink, 1999; Campbell & Stanley, 1966). The research was carried out over an eight-week period.

4.4.1 Schematic presentation of the research design

```
┌─────────────────────┐
│ *A₁ (week 1)        │
│ Measure pre-        │
│ intervention using  │
│ multiple assessment │
│ tools               │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐          ┌─────────────────────┐
│ *B                  │          │ A₂                  │
│ Three-week          │    ─────▶│ Daily measurements  │
│ intervention to     │          │ during week 2       │
│ facilitate          │          └─────────────────────┘
│ communication-      │─────▶    ┌─────────────────────┐    Compare   Compare
│ related             │          │ A₃                  │
│ behaviours          │          │ Daily measurements  │
└─────────────────────┘          │ during week 3       │
           │          ─────▶     └─────────────────────┘
           ▼                     ┌─────────────────────┐
┌─────────────────────┐          │ A₄                  │
│ A₅ (week 5)         │          │ Daily measurements  │
│ Measure post-       │          │ during week 4       │
│ intervention using  │          └─────────────────────┘
│ multiple assessment │
│ tools               │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Two-week            │
│ withdrawal          │         *A = Dependent variable, behaviours during
└─────────────────────┘               different phases
           │                    *B = Independent variable, the intervention
           ▼
┌─────────────────────┐
│ A₆ (week 8)         │
│ Measure post-       │
│ withdrawal using    │
│ multiple assessment │
│ tools               │
└─────────────────────┘
```

Figure 4.1   One-group pretest-posttest design

This design was used to determine how the independent variable affects the dependent variables namely behaviours of the selected group. When a decision is made about the effectiveness of intervention the rule of a quasi-experimental design is that it is necessary to consider the context in which the research took place and the particular pattern of results obtained (Robson, 1994). By measuring on a daily basis during intervention, a trend towards a particular pattern can be obtained as the interpretation process is enhanced. Change in behaviour from the pre-intervention phase, through the intervention phase, to the post-intervention phase of each subject on multiple measurements, is obtained and can be compared. This method allows for inter-method cross validation where the more formal testing in the pre- and post-intervention phases is correlated with the daily evaluations made

during intervention (Mouton & Marais, 1985; Waltz *et al.*, 1991), thus improving the reliability of the testing procedure implemented in the research.

Although this is, by necessity (because of the heterogeneity of the population) a quasi-experimental design, certain measures of validity and reliability are required by this design.

4.4.2   Validity measures

Specific measures of estimating validity had to be introduced prior to the determination of the validity of the play package – the aim of this study. Full detail of this process is discussed under 4.5.1. Incorporated in the initial establishment of validity is the determination of the validity of the DMMI (See 4.5.2.2 (d)). The final validity of the play package, however, can only be accepted or rejected once the findings have been analysed, evaluated, and interpreted.

Internal validity is an important part of validity measures. It has to do with the ways in which the research design ensures that the introduction of the independent variable (play package) can be identified as the sole cause of change in the dependent variable (behaviours) (Williams *et al.*, 1995). Certain measures were taken to ensure internal validity in this study.

a)   Maturation
Since the subjects used in this study are young, the design could not be stretched over a long period as normal development or maturation could influence the results.

b)   Testing
When selecting pre- and post-intervention tests or assessments, a criterion should be that performance on the post-test should not be influenced by memory traces of the pre-test.

c)   Instrument error
In the selection and development of measuring instruments it should be noted that the instruments are valid and reliable. The administration of the tests should also be valid and reliable in order to limit misinterpretation by external observers. For the administration of the tests see 4.6.3.

4.4.3   Reliability measures

During the quantitative evaluation phase of the development of the DMMI certain reliability measures were introduced (See 4.5.2.2 (c)).

4.5   PRE-EXPERIMENTAL PHASE OF THE RESEARCH

This research consisted of two phases namely pre-experimental phase and experimental phase. Each phase will be discussed separately after the schematic presentation of the two phases in Figure 4.2.

The pre-experimental phase aim was threefold. Firstly, to develop intervention material and procedures to be utilised in the experimental phase. Secondly, to select and develop appropriate measurement instruments to be used during the experimental phase. Lastly, the developed play package and assessment instruments were submitted to a pilot study.

```
                          ┌─────────────┐
                          │  MAIN AIM   │
                          └─────────────┘
                                 ▲
        ┌──────────────────────┐   ┌──────────────────────┐
        │ Pre-experimental     │◄─►│ Experimental phase   │
        │ phase                │   │                      │
        └──────────────────────┘   └──────────────────────┘
```

Figure 4.2 is a flow chart labelled "Procedural sequence" with boxes: MAIN AIM; Pre-experimental phase; Experimental phase; One-group pre-test-post-test design; Sub-aims; Development of the play package; Selection and development of assessment tools; Refinement of the play package; Development of presentation; Selection of pre- and post-tests; Development of daily measurement; Establish validity of instrument; Pilot studies; Participants (Selection criteria, Description); Material (Play package, Data collection materials); Procedure (Data collection, Data recording, Data analysis).

Figure 4.2   Procedural sequence

Each of the stages in the pre-experimental phase will be discussed in the following section.

4.5.1   Initial validation of the play package

Validation allows the evaluation of four specific aspects of the intervention process namely

a)   the goals selected for the intervention

b)   the procedures to be used in intervention

c)   the effects of the intervention

d)   the outcomes of the intervention (Kazdin, 1977; Kazdin, 1982; Wolf, 1978)

The goals for the intervention should be stated precisely. This is done through investigation of theoretical underpinnings of aspects included in the intervention programme. A process of operationalisation (Brink, 1999; Groenewald, 1988) identifies the intervention programme's constructs to be facilitated and measured. Procedural validation includes the type (strategies) and form (presentation methods) of intervention (Kazdin, 1980). The effects of intervention could only be established after data were collected and analysed. Ultimate effects refer to the link between the intervention and the specific changes observed in individuals after measuring the goals of the intervention programme (Schlosser & Braun, 1994). Outcome validation refers to the assessment of perceived changes as a result of intervention (Wolf, 1978). It is divided into proximal-, intermediate-, and distal outcomes.

The first two matters, namely the goals of intervention and the process of intervention were dealt with in the pre-experimental phase, and the effects and outcomes of the intervention will be discussed in the experimental phase of this research, as it is only after the application of scientific research methodology that the theoretical explanations and descriptions can be validated (Groenewald, 1988).

A previously developed play package (Uys, 1997) was used to facilitate communication-related behaviours in children with severe disabilities. However, before the play package could be implemented it had to be refined, graded, and appropriate presentation methods developed.

4.5.1.1 Refinement of the play package

It was decided to refine the play package in order to eliminate duplication of activities with the same characteristics but ensuring that all the relevant communication-related behaviours would still be elicited.

In the previous research (Uys, 1997) ten activities were used. The activities of the play package were validated by a group of experts who rated the activities in terms of the skills they facilitated. Activities were rated according to their strength in terms of three different constructs, namely sensorimotor, cognitive and communication. The determination of elements represented in the activities by experts in the field, is a form of validity by definition

(Lynn, 1986). In Figure 4.3 the results of these ratings are portrayed. Some activities scored higher in certain domains than others, but all the activities stimulated not less than 50% on each domain area.
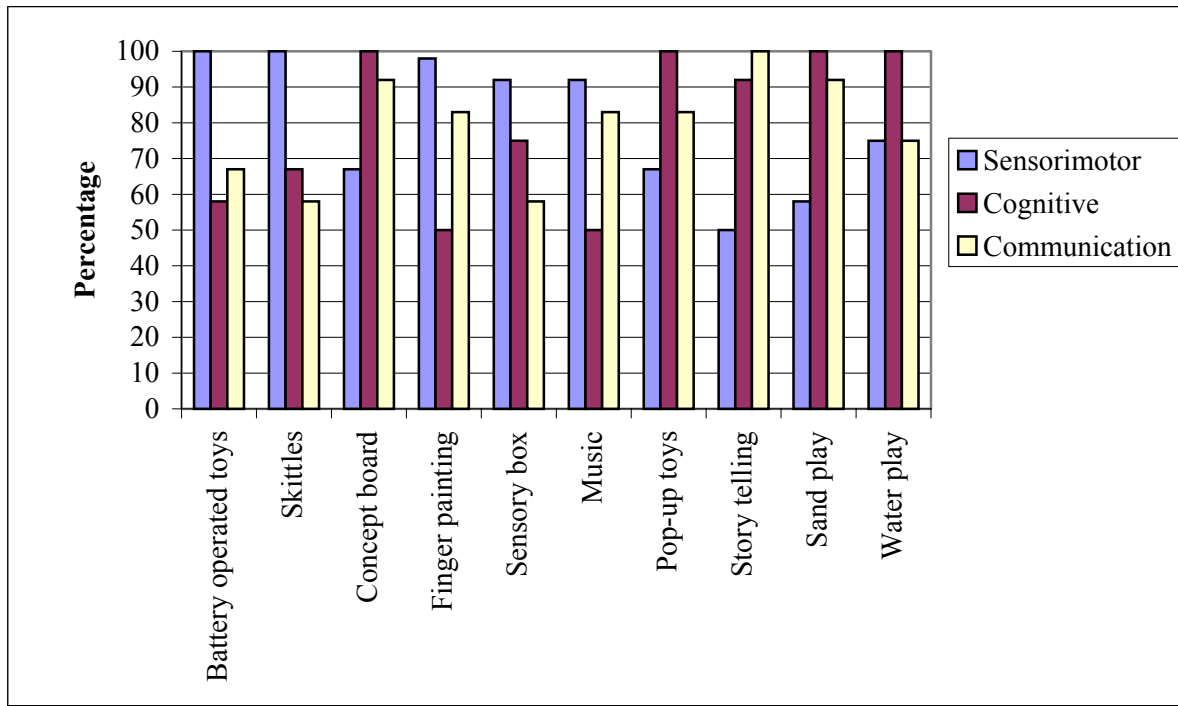
Figure 4.3   Rating of activities in terms of sensorimotor, cognitive and communication behaviours

The activities were ranked after an intervention period according to the gains in performance of children with severe disabilities on three different constructs, or developmental domain areas. The ranking was as follows: 1 being the most gain and 10 being the least gain. The results are shown in Table 4.1.

Table 4.1   Ranking of activities

Activities	Rank
Sensorimotor	
Battery-operated toys	3
Skittles	4
Finger-painting	2
Sensory box	6
Music	10
Cognitive	
Concept board	9
Pop-up toys	1
Sand play	7
Water play	8
Communication	
Storytelling	5

These findings indicated that some activities yielded better results than others in different domains or constructs. By selecting the two highest-ranking activities from each construct, except for communication, inclusion into the refined play package was determined.

In Table 4.2 the refined play package is described and a photograph of each activity is provided.

Table 4.2   Activities in the play package

Activity	Description	
Battery-operated toys	Brightly coloured battery-operated toys were selected. This included an elephant, a car, a worm, and jumping fishes. These toys were operated by different switches, namely joystick, large and small pressure switches, and a pinch switch. Corresponding 2D pictures were used.	
Finger-painting	A mirror was set up and shaving foam was used as a paint medium. Three different paint colours were introduced in the session. Imitation of certain movements was required.	
Pop-up toys	Three different pop-up toys were used, namely jumping jack, a "piano" keyboard with hidden animals popping up after pressing a key, and a multimethod pop-up toy where different actions released different hidden animals. Corresponding 2D pictures were used.	
Sand play	The following objects were used: a sandpit of approximately $1m^2$, different tools (spade, cups, bucket, rake, sieves, wooden blocks), a sand wheel, and plastic animals. Hide and seek games were played as well as operating the sand wheel. Construction play was introduced with the wooden blocks.	
Storytelling	A story was told, using the different objects functionally in the process. The objects included a train, a car, an aeroplane, a doll, and a telephone. Corresponding 2D pictures were used at the end of the story.	

4.5.1.2 Grading of activities

To establish a valid procedure of presentation, the activities had to be graded according to a learning phase and an intervention phase. The learning phase (5 minutes) gave the child the opportunity to explore with the materials and objects (Reilly, 1974) and to learn the basic rules of the activity before the intervention phase commenced.

Pre-set criteria for the learning phase were written and a child was expected to reach a 100% performance before continuing with the intervention phase. The criteria were

- understanding basic instructions (verbal and non-verbal) how to execute the activity;
- doing basic movements to indicate active participation; and
- visually focusing on the activity for at least 50% of the time.

4.5.1.3 Establishment of presentation methods

Before principles for facilitation of communication-related behaviours could be selected and applied the different developmental domains had to be identified. This was done in Chapter 2. Strategies and principles to achieve specific goals and objectives as set for the treatment of communication-related behaviours were identified and are presented in Chapter 3.

These principles and strategies were incorporated in planning the presentation of the activities. This presentation was developed in three phases namely:

- How the response from the child would be probed
- Anticipated response from the child
- Principles and strategies implemented to facilitate the response.

The activities had to be presented in a fixed way to each subject to eliminate the influence of external variables. The presentation of each activity was therefore written in a step-by-step manner. The external raters used these forms as a control mechanism for a reliability check. For a complete set of the presentation methods of all the activities see Appendix A.

A time limit of 20 – 30 minutes was set for each activity presented, as short sessions ensure maximum participation (Steenkamp & Steenkamp, 1992).

4.5.2   Selection and development of assessment tools

All experimental research consists of treatment and measurement phases. The independent variable (presentation of the activities) was dealt with in the previous section. The focus was to select and develop specific assessment tools for pre- and post-intervention and to develop a measurement instrument to be used daily during the treatment phase. In this process, the central point was to determine that these evaluation procedures should identify specific behavioural indicators reflecting communication-related behaviours. The thoroughness and appropriateness of assessment tools are critical to the results of the study as it influences the meaningfulness of results. (See 3.3) The following steps were pursued.

4.5.2.1 Selection of pre- and post-intervention assessment tools

Children with disabilities are frequently termed "untestable".   Traditional assessment processes may not give a true or realistic picture of the performance of a child with disabilities, therefore a functional assessment approach was deemed necessary (Linder, 1993).   The benefit of a functional assessment is that it ensures that each test item is potentially an appropriate intervention target. The child can be observed in a familiar, non-threatening situation which assists in maximal performance.   A multitrait-multimethod approach was used in this research to establish validity.   Therefore it was necessary to select more than one assessment tool. Various assessment tools were considered for this study and the following were selected.

(a)   Transdisciplinary Play-Based Assessment (TPBA)

> Functional assessment tools, sensitive to the needs of children with disabilities were identified and after video-conferences with Purdue University and Pennsylvania State University, the TPBA (Linder, 1993) was selected.   The TPBA model is developmental, transdisciplinary, holistic, and dynamic. As this research uses play as medium for intervention, it seemed appropriate to assess the children with disabilities through the use of play activities.   The TPBA is a natural, functional approach to

assessment which could be used for pre-and post-intervention evaluations (Linder, 1993) and it assesses the four domains of communication-related behaviours, namely sensorimotor, cognitive, language and communication, and social-emotional. The TPBA involves a child in a play situation with a facilitating adult, the parents (if possible), and another child. It was designed for children between 6 months and 6 years of age. The TPBA was evaluated against the six operational LINK standards and obtained a high score, proving it to be an authentic assessment tool (Bagnoto, Neisworth & Munson, 1997).

The TPBA is divided into five phases:

Phase I   The play facilitator begins with unstructured facilitation during which the child leads the play and the play facilitator imitates, models and expands the child's play.

Phase II   This phase incorporates aspects of play that the child did not initiate.

Phase III   A peer is introduced to observe child-to-child interaction.

Phase IV   Structured and unstructured motor play is included.

Phase V   To observe oral motor difficulties snack-time is included.

The author suggested incorporating a phase for parent interaction, but this was not done as the intervention occurred during the school day and the parents were not available. The sequence of these phases could be changed to incorporate the child's preference of play situations. After the play session, videotape analysis was done and the summary sheets completed.

Scoring

A summary sheet for data recording which resembles a checklist format is provided. Observers had to complete the form for each item with a [+] if the child exhibited skills within a standard range of development, or with a [−] if the child demonstrated a delay in development or deviation from the normal behaviour patterns (Linder, 1993). These decisions are based on age charts provided.

(b)   **Symbolic Play Scale (SPS)**

The SPS (Westby, 1980) was also selected as it incorporates cognitive and language development, two of the constructs of communication-related behaviours. The SPS

evolved from a Piagetian-based language programme for severely retarded children. Children without developmental disabilities were observed and the normal developmental ages were added to normal play development. The SPS provides a means of assessing a child's representational thought, a major cognitive development during the pre-operational period (Piaget, 1951; Westby, 1980). As the sequence of play stages is the same for children with and without developmental disabilities (Westby, 1980), the SPS could be used for the population targeted for the purpose of this research.

The assessment consists of five groups of toys, arranged in areas within a large room. These include:

- the infant stimulation area with pull toys, windup toys, talking toys, busy boxes, musical toys, rattles and soft stuffed animals.
- the household area with dolls, cooking utensils, dress-up clothes and telephone.
- the store area with play money, miniature food, telephone/ intercom.
- the creative play area with a sandbox, rubber animals, blocks, village with garage and cars.
- the gross motor area with a slide, steps, walking board, riding toys, bowling set, beanbags and balls.

Scoring

Children were brought into the playroom individually and one adult interacted with the child while video-recording the session. The researcher and external raters completed the observation form (See Appendix B) after watching the video recordings. To score the child's performance, the observer had to select a specific developmental stage most suitable in description. There are ten stages categorised from 9 months to 60 months.

(c) Developmental Test of Visual-Motor Integration Test (VMI)

The VMI was selected as these test results correlated with children's mental age. The VMI measures an integrative ability important to adequate functioning beyond visual-motor behaviour. The VMI is a reliable and valid test (Beery, 1989).

The VMI incorporates a developmental sequence of 24 geometric forms to be copied with paper and pencil. The child sits at a table with the test booklet and an pencil without an eraser in front of him. He is instructed to redraw the same forms as given in the booklet. Specific instructions are presented in Beery (1989).

Scoring

Scoring is done as prescribed by the author. A raw score is obtained and then an age equivalent is worked out according to age equivalent tables provided.

4.5.2.2 Development and validation of Daily Multiple Measurement Instrument (DMMI)

Many tests are biased against children who are unable to demonstrate what they know due to physical, emotional, sensory, or other impairments (Bricker, 1989; Brooks-Gunn & Lewis, 1981; Garwood, 1982; Zelazo, 1982). The researcher decided to develop the DMMI to assess children's performance on the different developmental domains during the experimental phase. This could indicate trends in developmental sequences. According to Bricker and Cripe (1995) there should be an active link between the assessment, intervention, and (daily) evaluation components. This linked system allows for "…an efficient and focused approach that maximizes the probability that children… will acquire target skills… that will move them toward independent functioning" (Bricker & Cripe, 1995:89).

Benson and Clark (1982) suggested a process of planning, construction, quantitative evaluation and validation when developing and validating multiple measurement assessment tools to be used on a daily basis, linked to intervention. These suggestions were used in the development of the DMMI.

(a)   Planning the measurement instrument

The purpose of this tool was to measure performance reflecting communication-related behaviours of children with intellectual impairments on a daily basis, using functional activities.

In the development of a valid measurement tool, it was necessary to investigate the theory pertaining to communication- related behaviours. Operationalisation of the theoretical constructs was conducted (Brink, 1999; Groenewald, 1988; Williams *et al.*, 1995). Through a process of naming, defining, categorising, and sorting, the researcher converted the constructs identified (sensorimotor, cognitive, communication and social-emotional) into measurable behavioural indicators. A list of at least twice as many measurable indicators that will be needed for a final measurement tool was the end-result of this process.

Two different teams of experts were asked to observe patterns of behaviour on video-recordings of a child with intellectual impairments engaging in activities of the play package. The experts included six speech-language and hearing therapists, six occupational therapists and one physiotherapist. The aim was for the experts to identify observable, measurable indicators and to document the results. Each expert did this process individually. The researcher then analysed and categorised their observations into the four constructs. The sum of all the experts' identified behavioural indicators was calculated and is represented as percentages. The results of this process are shown in Table 4.3. The values indicate the percentage of all the experts that recorded the measurable indicator.

Table 4.3   Identification of observable, measurable indicators

% of Sensorimotor indicators		% of Cognitive indicators		% of Communication indicators		% of Socio-emotional indicators	
Bilateral hand use, manipulation	92	Cause & effect	58	Expressing likes & dislikes,	33	Enjoyment, expressing emotions	100
Gross co-ordination	58	Attention and concentration	83	Requesting	50	Interaction	100
Fine co-ordination	42	Object permanence	33	Choice-making	50	Initiating	8
Imitation	100	Matching objects & pictures	67	Vocalisation, communication attempts	75	Participation, motivation	67
Exploration	17	Object recognition	67	Verbal imitation	42		
Visual focus, tracing and scanning, eye contact	83	Functional object use	50	Expressive, labelling, verbalisation, commenting	50		
Pointing, reaching	58	Identifying body parts	33	Understanding or following instructions	67		
Averages	**64**		**54**		**52**		**68**

The results indicated that the experts could identify relevant behaviours and that these behaviours proportionally reflected all the constructs to be investigated. These averages indicated that indicators on sensorimotor, cognitive and communication constructs were easier to identify than on social-emotional although all agreed on prominent indicators. These experts were not trained to identify specific behaviours because they were all professionals working in the field of disability. It was therefore interesting to note that the social-emotional construct was not proportionally represented in the identified indicators. Although social-emotional indicators were fewer than the rest, this tendency is also observed in assessment instruments such as the TPBA. There was more agreement between the speech-language and hearing therapists and occupational therapists and physiotherapists on the sensorimotor construct, but less agreement in the cognitive and communication constructs. These results were compared to literature on child development to ensure the reliability and validity of the information (Groenewald, 1988), and were used in drafting the DMMI. As some of these behaviours depend on the same underlying performance

components, one component was selected, representing more than one behavioural indicator.

(b)   Construction of the instrument

To increase the authenticity of the DMMI, the six operational LINK standards as presented by Bagnato *et al.* (1997) were incorporated in the design and construction. These standards were discussed in Chapter 3. A six-point rating scale was selected, as an even number of responses forced the evaluators not to select a neutral or "middle" response (DePoy & Gitlin, 1994). Operational definitions were drafted for all the measurable indicators on the six-point scale, as an operational definition assigns meaning to a variable and describes the activities required to measure it and is directly linked to literature findings (Brink, 1999). This enabled the evaluators to score the child's performance precisely after observations and increased inter-rater reliability, as it is specific.

The refined DMMI was again scrutinised by a group of experts. The aim was to assess the usability of the form in clinical practice and to determine whether the behaviours observed could be scored successfully. In this instance the experts were presented with definitions of grading the observable behavioural indicators. They were required to comment on the clarity of these definitions.

Results and changes to the DMMI

- In general the objective was to change the definitions to emphasise the behaviour observed. Words like "attempt to…" were replaced with "Can… or cannot…".
- *Requesting:* There were two areas where requesting could be scored (non-verbal and verbal). These two were combined.
- *Choice-making:* The first score's wording was misleading and could be interpreted in different ways. This could influence inter-rater reliability. The scores were changed to make it more user-friendlier.
- *Understanding instructions:* The wording was changed to "Following instructions". The grading was also modified to correlate with the presentation methods of the activities.

- *Attention:* A better sequence of time intervals was provided.

Not applicable column: This column was removed as it did not pertain to all the items. Some activities could not be scored on all the items, e.g. sand play does not have the opportunity to match objects with 2D pictures. Therefore only those items, not applicable for each activity were shaded.

(c) Quantitative evaluation of the instrument

The quantitative evaluation included a pilot study, testing the DMMI. The pilot study provided the data from which the initial reliability was estimated. Reliability is the consistency with which a measurement instrument performs (Leedy, 1985). Table 4.4 provides the different reliability measures and explains how and during which phase it was implemented. See Chapter 3 for the motivation of the use of these methods.

Table 4.4   Reliability measures

Reliability measures	Motivation	When implemented
1. Stability (Intra-rater reliability)	Stability refers to the extent to which the same results are obtained when the instrument is administered to the same sample twice by the same rater.	During the pilot study.
2. Equivalence (Inter-rater reliability)	Two raters observe 20% of the recorded sessions executed by the researcher and then score the children's performance on the video-recordings independently on the same measurment instrument as the researcher.	During the experimental phase.
3. Internal consistency	This refers to the extent to which all of the items on an instrument measure the same characteristic.	An item analysis could not be done due to the small sample size.

(d) Validation of the instrument

The validation of a newly developed instrument should be an ongoing process, which is seldom accomplished in one study, or by one researcher (Benson & Clark, 1982). Despite this, validation is essential because validity guarantees that the measurement instrument is accurate in what it measures, given the context in which it is applied. In

Table 4.5 a delineation of the different types of validity is provided, and motivated how and when it was applied in this study.

Table 4.5   Measures of estimating validity

Type of validity	Motivation	Implementation
1. Face validity	Experts in the field essentially base face validity on an intuitive judgement. This procedure is useful in the instrument development process in relation to determining readability and clarity of content. It means that the instrument measures what it is supposed to measure (Brink, 1999).	External raters will evaluate the DMMI to indicate whether the communication-related behaviours were adequately represented. This was done during the planning and construction phases of the instrument.
2. Content validity	The steps to obtain content validity include (1) specification of the full domain of a concept through a thorough literature review and (2) adequate representation of domains through the construction of specific items (DePoy & Gitlin, 1994). Each item on the instrument should be evaluated by experts in the field with regard to the degree to which the variable to be tested is represented. The overall appropriateness for it's use should also be evaluated (Brink, 1999).	During the planning phase, external raters were familiarised with the content of the DMMI. Theoretical training was then presented with regards to the content of the DMMI so that they could determine the appropriateness of the measurement instrument. During the judgement-qualification stage the experts judged the content validity of the instrument by determining the proportion of total items (Lynn, 1986). A content validity index will be established through a process of rating the relevancy of each item.
3. Construct validity	Construct validity addresses which constructs the measurement instrument actually measures (Brink, 1999; DePoy & Gitlin, 1994). It establishes the relationship between the results provided by the instrument to the underlying theoretical concepts of the instrument. The multitrait-multi-method approach is regarded as the preferred method to establish construct validity. This approach is based on the premise that different measures of the same constructs should produce similar results (Polit & Hungler, 1983; Waltz *et al.*, 1991).	In this research, the TPBA, SPS, VMI and DMMI assessed the four identified constructs, namely sensorimotor, cognitive, social-emotional and communication. Both the TPBA and DMMI assess all four constructs. The DMMI's results will be compared with the SPS, as it respectively measures cognitive and language development and the integrative ability of the child. The VMI will be used as a countermeasure as it measures only visual-motor integration. Thus correlation between the measurement instruments could only be conducted in the experimental phase.
4. Convergence	The results of the new instrument (DMMI) were compared to the data of a criterion measure (a known instrument), at the same time (Brink, 1999).	The TPBA's, SPS's and VMI's results will be compared with the newly developed instrument (DMMI). This could only be done after the experimental phase.

Face validity, content validity, construct validity, and convergent validity was addressed in this research. Face validity and content validity were done during the pre-experimental phase and construct validity and convergent validity during the experimental phase.

The pre-experimental phase aimed at developing material and procedures for the experimental phase. Pre- and post-intervention assessments were identified and the DMMI were developed and validated as far as theoretically possible. The intervention material, namely the play package was refined and graded. These materials now had to be subjected to a pilot study.

4.5.3 Pilot Study 1

As a final stage of the pre-experimental phase, the developed and selected play package and measuring instruments were applied in a pilot study.

4.5.3.1 Aims

(a)   The application of the play package

i) To apply the five play activities to children with moderate to severe intellectual impairments, to identify whether any problems exist with the presentation of the activities.

ii) To test the usefulness of the DMMI in terms of presentation and scoring of the activities.

(b)   The application of the measurement instruments

i) To identify any problems with the clarity of definitions given for each score of the multiple measurement instrument to enhance inter-rater reliability during the experimental phase.

ii) To use the DMMI to assess the child's performance and to ascertain problem areas.

4.5.3.2 Participants

(a)   Criteria for selection

   i)   Home language

As the researcher is proficient in English and Afrikaans, the subjects had to be either English- or Afrikaans-speaking. This was decided to ensure that language problems did not influence the effectiveness of the intervention.

   ii)   Sensory abilities

Children with visual and/or hearing impairments were not included. The application of the play package was oriented towards children with intellectual impairments.

   iii)   Communication

All children included in this study had to be communicatively impaired because the use of the play package was developed to facilitate skills related to communication. This included children with little or no functional speech.

   iv)   Diagnoses of intellectual impairment

All the children had to be classified as children with moderate to severe intellectual impairment according to the definition (American Association on Mental Retardation, 2001). That included children with an IQ classification of between 25 and 50 who were accommodated in special schools in South Africa (Steenkamp & Steenkamp, 1992). Children with severe motor impairments were excluded. The school where the study was conducted has specific inclusion criteria (Appendix C) of which the primary criterion is mental retardation. During their initial assessment before inclusion, a multi-disciplinary team evaluated the children and a functional age level was established.

   v)   Chronological and mental age

The children's chronological age had to be between 4:6 and 7:6 years, with a mental age of between 1:6 and 3:6 years (as obtained from school records).

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vi)   Therapy

The children should not have received extra occupational therapy, speech therapy or physiotherapy except those which form part of the school programme.

(c)   Description of the subjects for the pilot study

Three children who met the inclusion criteria were selected for the purpose of the pilot study. The children's profiles are presented in Table 4.6:

Table 4.6   Profiles of participants included in the pilot study

Subject	Diagnosis	Chronological age	Mental age	Gender	Home language
1	Down Syndrome	4:6	2:0	Male	Afrikaans
2	Mental retardation and attention deficit disorder	5:7	1:6	Female	Afrikaans
3	Down Syndrome	6:6	2:0	Female	Afrikaans

4.5.3.3 Material for data collection

-       Transdisciplinary Play-Based Assessment (Linder, 1993)

-       Symbolic Play Scale (Westby, 1980) (See Appendix B)

-       Draft Daily Multiple Measurement Instrument (DMMI) (See Appendix D)

-       Visual Motor Integration Test (VMI) (Beery, 1989)

4.5.3.4 Equipment

a)   Equipment for intervention (SeeTable 4.2)

        Play package (See Appendix A)

b)   Equipment for data recording

        -       Video camera and video cassettes

        -       Tripod

        -       Remote control for the video camera

-       Television monitor
-       Video cassette player

4.5.3.5 Procedures

An overview of the aims, methods, procedure, findings and recommendation are shown in Table 4.7.

Table 4.7   Procedures followed, findings and recommendations of Pilot Study 1

AIM	METHOD	PROCEDURE	FINDINGS	RECOMMENDATIONS
1. To evaluate the clarity of definitions provided for each score.	- Video-recordings of children with intellectual impairments were made while the researcher presented the activities to them according to the examples given in Appendix A. - The researcher as well as two external raters scrutinised the recordings for any problem areas that could still exist.	- The room was set up with the video camera in the corner so that it did not distract the child. - The child was brought into the room - The first activity was put in front of him. - The video camera was switched on with the remote control - The activity was presented for 15 minutes. - The activity was taken away and replaced with the second one. - Only two activities were done each day so that the child could concentrate maximally on each.	- Terminology of some of the scoring was not clear enough and the wording had to be changed to ensure better inter-rater reliability. - The definition for scoring each item included a complexity as well as a frequency level. This influenced the accuracy of the scoring of the children's performance.	- The wording of all the scoring was evaluated again to ensure clarity in the definitions to make it more understandable. - A new form should be developed where each item's scoring was divided into a complexity and a frequency level.
2. To use the DMMI to assess the children's performance and to ascertain problem areas.	Same as above.	The researcher as well as the two external raters watched the video-recordings of the five activities.	The children scored high on the certain items (cause-effect, following instructions). This meant that it would not be able to indicate improvement over time sufficiently. The scoring of those items was not sensitive enough.	The rating was changed of the item indicated not to be sensitive enough.
3. To apply the five activities with children with intellectual impairments, to identify whether any problems exist with the presentation of the activities.	Same as above.	The same procedures were followed as with DMMI.	- Some of the activities did not allow the child to follow more than one-step instructions, making it difficult to score according to the grading on the DMMI. - Only one activity gave the child the opportunity to recognise 2-dimensional (2D) pictures.	- Presentations of the activities were adjusted to allow the child to follow from one step instructions to three step instructions. - The presentation of some of the activities was changed to incorporate so that the children could get more exposure to 2D grading.
4. To test the usefulness of the DMMI.	Same as above.	Same as above.	- Finger-painting and sand play did not include matching of pictures.	- Due to the nature of the activity, it was decided not to change the presentation.

4.5.3.6 Results of Pilot Study 1

The aim of Pilot Study 1 was to implement the materials and procedures to be used during the experimental phase of the research.

- Two external observers felt that some of the wording of the DMMI had to be changed for the sake of clarity and reliability.

- A new daily multiple measurement instrument was developed where each item's scoring was divided into a *complexity* and a *frequency* level. This was in accordance with literature stating that the development of skills occurs in a sequential fashion and that the child then uses the opportunity to practise the new skill to gain mastery (Kielhofner, 1992; King, 1978; Schade & Shultz, 1992). This made the form more user-friendly and increased reliability. In Chapter 2 detailed discussions on this topic are provided. (See Appendix E for the final DMMI).

- The new DMMI was again subjected to the group of experts to establish face and content validity. Table 4.8 shows the results.

Table 4.8   Results of face and content validity testing of the DMMI

1.   Face validity There was a 100% agreement between the experts that all the items on the DMMI adequately represent communication-related behaviours. *2.   Content validity* The judgement qualification stage of the DMMI entailed establishing a content validity index (Lynn, 1986). The group of experts gave a 100% rating for each of the 21 items on the DMMI as well as for the DMMI as a whole. This meant that the DMMI was evaluated as content valid.

4.5.4   Pilot Study 2

A second pilot study was undertaken to scrutinise the changes made to the measurement instruments and to assess the usability of the TPBA, SPS and VMI.

4.5.4.1 Aims

a)   To train the external raters (consisting of an occupational therapist and a speech-language and hearing therapist) in the use of the TPBA so that consensus could be obtained on the scoring.

b)   To use the TPBA and SPS on a child with intellectual impairments so that the external raters could be exposed to the assessment procedure and gain consensus on the scoring.

The results of the second pilot study are presented in Table 4.9.

Table 4.9   Procedures followed, findings and recommendations of Pilot Study 2

AIM	METHOD	PROCEDURE	FINDINGS	RECOMMENDATIONS
To use the TPBA, SPS with children with intellectual impairments so that the external raters could exposed to the assessment procedure and gain consensus on the scoring.	Two external raters were trained to use the TPBA and SPS as an assessment tool as this tool is not commonly known in the RSA.	Video-recordings of the children were observed.	- The TPBA only has a [+] or [−] score meaning that the children scored appropriate for their age level, or below their age level. - It was not possible for the parents or caregivers of the children to be present. The execution of the test was done without them.	- The method of scoring on the TPBA should change as performance could not be accurately assessesed. - The use of the SPS and VMI as other forms of criteria to measure against in the multitrait-mutimethod approach will overcome the limitations of the TPBA. - The SPS was used successfully.

4.5.4.2 Results of Pilot Study 2

-   One of the children could not do the VMI, the formal pen and paper test. This highlighted the problems that exist when using traditional tests with children with disabilities. Although a raw score could not be obtained, Beery (1989) provided more qualitative norms for the younger child, according to which the child could be allocated an age norm.

- The execution of the TPBA has limitations as the parents or caregivers were not able to attend the assessments due to logistical problems. The test was therefore done without their presence, but the researcher felt that this fact did not diminish the comprehensiveness of the data collected. Similar situations will occur during the experimental phase as the children are brought to school by bus and not by the parents.

- Other limitations were experienced in the scoring method, as the TPBA only has a positive or negative score. Due to the population selected for this study this checklist format was inadequate, as all the children would score [–] on most of the items as a result of their developmental delays. It was decided to rather use the age charts provided for each item to be scored. For consistency these age norms were grouped into 6 developmental levels ranging from 0 months to 60 months.

- Certain items were discarded from the assessment form. The reasons are given in the Table 4.10.

Table 4.10   Excluded items on the TPBA

Items discarded	Reason
Development and mobility in prone, supine, sitting and standing, mobility in hands and knees	Due to the population selected for this study the children were capable of these skills.
Attachment and separation from parents	The children were seen at their school which was a familiar environment, but an objective evaluation could not be obtained.
Development of intentionality, oral-motor skills	The age norms provided for this item only ranged to 12 months and the assessment should allow for up to 60 months.

For the final assessment form for the TPBA see Appendix F.

4.6   EXPERIMENTAL PHASE OF THE RESEARCH

In the pre-experimental phase the play package was refined and specific measurement instruments were developed and selected for validation through experimentation.

4.6.1   Participants

4.6.1.1 Selection criteria for participants

The same selection criteria were used as in the pilot study.

i)   **Home language**

As the researcher is proficient in English and Afrikaans the subjects had to be either English- or Afrikaans-speaking. This was decided in order to make sure that language problems did not influence the effectiveness of the intervention.

ii) **Sensory abilities**

Children with visual and/or hearing impairments were not included. The application of the play package was oriented towards children with intellectual impairments.

iii) **Communication**

All children included in this study had to be communicatively impaired as the use of the play package was developed to facilitate skills related to communication. This included children with little or no functional speech.

iv) **Diagnoses of intellectual impairment**

All the children had to be classified as children with moderate to severe intellectual impairment according to the definition (American Association on Mental Retardation, 2001). That includes children with an IQ classification of between 25 and 50 who are accommodated in special schools in South Africa (Steenkamp & Steenkamp, 1992). Children with severe motor impairments were excluded. The school where the study was conducted has specific inclusion criteria (See Appendix C) of which the primary criterion is mental retardation. During their initial assessment, before inclusion, a multi-disciplinary team evaluated the children and a functional age level was established.

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v) Chronological and Mental age

The children's chronological age had to be between 4:6 and 7:6 years, with a mental age between 1:6 and 3:6 years (as obtained from school records).

vi) Therapy

The children should not have received extra occupational therapy, speech therapy or physiotherapy, except those which formed part of the school programme.

4.6.1.2 Selection procedures

a)   Several schools for children with disabilities were visited.

b)   A school was selected that accommodated children who complied with the selection criteria.

c)   The researcher met with the headmaster and occupational therapists of the school to obtain permission to treat their pupils and to use the facilities.

d)   Informed consent forms (See Appendix G) were sent to parents of nine potential participants.

e)   Six participants who best met the selection criteria were selected with the help of the school's occupational therapist.

4.6.1.3 Sample size

Five children with moderate to severe intellectual impairments were selected.

4.6.1.4 Description of the participants

Table 4.11 describes the subjects included in the study. The children all attended the same school.

Table 4.11   Profiles of participants included in the main study

Subject	Date of birth	Gender	Home language	Chronological age at time of study	Mental age
1	1996-02-17	Female	Afrikaans	5:0	1:6
2	1995-12-07	Female	Afrikaans	5:2	3:0
3	1994-06-29	Female	English	6:8	2:6
4	1993-11-24	Male	Afrikaans	7:3	2:0
5	1993-02-27	Female	Afrikaans	7:0	2:6

4.6.2   Materials and equipment

4.6.2.1 Materials

- Transdisciplinary Play-Based Assessment (Linder, 1993) (See Appendix F)

- Symbolic Play Scale (Westby, 1980) (See Appendix B)

- Daily Multiple Measurement Instrument (DMMI) (See Appendix E)

- Visual Motor Integration Test (VMI) (Beery, 1989)

4.6.2.2 Equipment

a)   Equipment for intervention (See Table 4.2)

Play package (See Appendix A)

b)   Equipment for data recording

- Video camera and video cassettes

- Tripod

- Remote control for the video camera

- Television monitor

- Video cassette player

4.6.3   Procedures

4.6.3.1 Data collection and recording procedures

The data collection was done through structured observations. Objective, valid, reliable and accurate description of behaviours observed in a natural setting is invaluable when measuring performance before, during and after intervention. The research was carried out over an eight week period. Table 4.12 presents the different phases of data collection, which assessment tools were used during which phase. See Figure 4.1 for a schematic presentation of the research design.

Table 4.12   Data collection phases

Weeks	Phases		Assessment procedure
1	Pre-intervention assessment	A_1	TPBA SPS VMI DMMI
2	Intervention	$*A_2$	DMMI
3	Intervention	$*A_3$	DMMI
4	Intervention	$*A_4$	DMMI
5	Post-intervention assessment	A_5	TPBA SPS VMI DMMI
6-7	Withdrawal		
8	Post-withdrawal assessment	A_6	TPBA SPS DMMI

*Daily measurements

A description of the procedures of each phase will be presented for clarity.

(a)   Pre-intervention assessment phase procedures

- A quiet large open room was used. Different toys and play materials were prepared for five areas, as described for the TPBA and SPS (See 5.2.1).
- The video camera was set up in a corner of the room and switched on as the children entered the room.

- The children were brought into the room individually and asked with which toys they wanted to play.
- Procedures as set out by the TPBA and SPS were followed (See 5.2.1).
- Snack-times were observed in the classroom.

(b)   Intervention phase procedures

The five activities were presented in the same set every week, namely battery-operated toys, finger-paint, pop-up toys, sand play and storytelling. Only one activity was presented each day. The sequence of the set was determined by the ranking of the activities (See Table 4.1). It was decided to keep the set stable over the 3-week intervention period, so as to decrease the external variables that could influence the results.

The six children were randomly sequenced for each day's presentation.

Daily data collection procedures

− The same room was used for the intervention as described during the pre-intervention phase.
− The researcher started at 08:00 each morning. The area was prepared by organising the toys selected for each particular day. The video camera was positioned in the corner of the room in order not to draw attention to it. A remote control was used to switch it on when the child was positioned in front of the toys.
− The selected child was fetched from the classroom and brought to the room.
− The child was put at ease by telling him that he was going to play with some toys. The child was then positioned in front of the toys.
− The activity was presented in the two phases as described in 5.1.2 (See Appendix A for detailed presentation methods).
− During the first phase the child was taught how to do the activity until he had complied with specific set criteria.
− The second phase of the activity was introduced, namely the intervention phase. Each activity was presented for 20 - 30 minutes.

- The child was then told that the activity was completed for the day and that another activity would be done the following day.

- The video camera was switched off.

- The child was then taken back to the classroom and the next one brought in.

- The researcher scored the video-recordings afterwards. Each day a new sheet of the DMMI for each participant was used for scoring. This procedure ensured that the researcher was not influenced by previous scorings of the subjects.

- The same method was used for the external raters. The raters watched the video-recordings separately so that they could not influence each other.

(c)   Post-intervention assessment procedures

- The same procedures were followed as during the pre-intervention phase.

- The external raters followed the same procedures as described in the intervention phase.

4.6.3.2 Reliability control measures

Two outside observers or raters, professionally trained as a speech-hearing therapist and an occupational therapist, were included for the specific purpose of recording data together with the researcher. External raters are more objective as they have no vested interest in the events they are observing (Williams *et al.*, 1995). It is difficult to observe, participate and record data simultaneously, therefore every session of each participant was video-recorded. All the scores were made after observing the video-recordings.

The raters had to fill in the assessment forms of the TPBA, SPS and DMMI (See Appendices F, B and E) during all the A-phases of the research. (See Figure 4.1). The researcher scored all the sessions and the two external raters observed 20% of all the sessions. These sessions were randomly selected.

The reason for using external raters was twofold. Firstly, to determine whether the activities were presented consistently across all the participants and secondly, to ascertain inter-rater

reliability of the daily evaluations process (See Table 4.4). For the first aim, the presentation of the activities (See Appendix A) was used as a criterion.

The raters watched the videos after the completion of the eight-week period. They watched the videos together, but no interaction between them was permitted.

4.6.3.3 Data analysis procedures

Small group experimentation requires the application of descriptive and non-parametric statistics for the analysis of data (Barlow & Herson, 1984). In this research an association between the ordinal variables was investigated. In a bivariate situation the data are arranged in a cross-classification table to see how scores on one variable are paired with scores on another (Lutz, 1983). This analysis determines whether there is a pattern to the pairing of the scores and describes the character of any pattern found.

This method of data analysis was applied to establish intra- and inter-rater reliability (sub-aim 4.3.2.1), to establish outcome validity (sub-aim 4.3.2.2), and to establish construct validity (sub-aim 4.3.2.3). The Friedman two-way analysis of variance test was selected to analyse the data. This test is designed for comparing three or more related samples on an ordinal variable. It is approximated by the chi-square distribution. The appropriate degrees of freedom are found by the formula of $(k - 1)$, where k is the number of conditions under which the measurements are taken. This test also converts raw scores to ranks. The ranks are assigned across the rows (for each participant), not across all scores. This test uses a statistic labelled χ_r^2 and is known as "chi-r-square". The "r" stands for the use of ranks in the test. The test statistic is found by the following formula:

$$\chi_r^2 = \frac{12}{Nk(k+1)} \; [\Sigma(\Sigma R_i)^2] - [3N(k+1)]$$
<div style="text-align:right">The Statistics for Friedman Two-Way ANOVA</div>

where: r = the use of ranks in the test
ΣR_i = sum of ranks in each measurement condition
k = number of conditions
N = total number of cases

T..

(r_s) was used. This is a measure of association specifically designed for rank-ordered data.

The Spearman's r_s is based on a comparison of the squared differences in ranks between differences. The test statistic is found by the following formula:

$$r_s = 1 - \left[\frac{6 \, \Sigma \, D^2}{N \, (N^2 - 1)} \right]$$ The Spearman's r_s Formula

where D = difference between X and Y ranks for each case
    $\Sigma \, D^2$ = sum of the individual squared differences
    N = number of pairs of ranks

4.7   SUMMARY

In this chapter a delineation was given of the process on validating the play package when presented to children with intellectual impairments (Kazdin, 1977; Kazdin, 1982; Wolf, 1978). A quasi-experimental design for a small group was selected as a control group was omitted. During the pre-experimental phase the selection of authentic assessment tools were described. The development of a valid daily multiple measurement instrument was then addressed (Benson & Clark, 1982). This instrument allowed the researcher to collect and document scientific evidence on which decisions about the effectiveness of the intervention could be based. The experimental phase was carried out over a period of seven weeks and included, as all experimental research should, multiple assessment and intervention phases. A multitrait-multimethod approach (Brink, 1999; Robson, 1994) was used to collect data and reliability procedures were included to enhance the validity of the results.

CHAPTER 5

RESULTS AND DISCUSSION

5.1   INTRODUCTION

This study aimed at validating a play package on the performance of children with intellectual impairments. Performance in this study was assessed on four developmental domains, namely sensorimotor, cognitive, communication and social-emotional, using four assessment tools.

A daily multiple measurement instrument (DMMI) was used and the TPBA, SPS, and VMI were used as countermeasures to indicate the level of performance, as well as to establish convergent validity. The treatment section of the play package was developed (Uys, 1997) and refined, based on the theory put forward that learning of communication- related behaviours is an adaptation process.

The areas of performance acquisition that were probed by this study were determined by the aims and sub-aims of the experimental phase as set out in Chapter 4. As the validation of the play package includes much more than the results of the experimental phase alone, the logical structuring of this chapter makes it necessary for the results to be presented according to the validation process, rather than according to the sub-aims of the experiment. Figure 5.1 illustrates the structure of the chapter as well as the sections where the specific sub-aims would be addressed.

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┌──────────────────────────────────────────────────────────────┐
│  ┌────────────────┐          ┌─────────────────────────────┐  │
│  │                │          │ • Intra-rater reliability   │  │
│  │  Reliability   │──────────│   Inter-rater reliability   │  │
│  │                │          │                             │  │
│  └────────────────┘          └─────────────────────────────┘  │
│          ⇩                                                     │
│  ┌────────────────┐                                            │
│  │ Validation of  │          ┌─────────────────────────────┐  │
│  │ outcomes of    │          │ • Pre-intervention phase    │  │
│  │ group and      │          │ • Intervention phase        │  │
│  │ individual     │──────────│ • Post-intervention phase   │  │
│  │ participants on│          │ • Post-withdrawal phase     │  │
│  │ the DMMI,      │          │                             │  │
│  │ TPBA, SPS &    │          └─────────────────────────────┘  │
│  │ VMI            │                                            │
│  └────────────────┘                                            │
│          ⇩                                                     │
│  ┌────────────────┐          ┌─────────────────────────────┐  │
│  │                │          │ • Behavioural changes on    │  │
│  │ Construct and  │          │   constructs                │  │
│  │ convergent     │──────────│ • Level of difficulty of    │  │
│  │ validity       │          │   activities                │  │
│  │                │          │ • Cross-validation          │  │
│  └────────────────┘          └─────────────────────────────┘  │
│          ⇩                                                     │
│  ┌────────────────┐          ┌─────────────────────────────┐  │
│  │ Validation of  │          │                             │  │
│  │ the play       │──────────│ • Conclusions               │  │
│  │ package        │          │                             │  │
│  └────────────────┘          └─────────────────────────────┘  │
└──────────────────────────────────────────────────────────────┘
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Figure 5.1   Schematic presentation of results of this study

5.2   RELIABILITY

Before addressing the issue of validity it was necessary to establish that the measurements were carried out reliably. Both intra-rater reliability and inter-rater reliability will be discussed with reference to the measurement phases of the study.

5.2.1 Intra-rater reliability

Intra-rater reliability was addressed during the experimental phase of the study. Video-recordings of all the intervention sessions were made. The researcher watched 20% of all the video-recordings made during the intervention phase. This was done 2 weeks after the initial scoring. The "complexity-score" of the DMMI were used for statistical analysis (See Appendix E).

The hypothesis was put forward, namely that

H_0 :   there would be a difference in the scoring of the DMMI by the researcher.

H_1 :   There would be no difference in the scoring of the DMMI by the researcher.

The "complexity-score" of the DMMI were used for statistical analysis (See Appendix E) and the following frequencies and percentages were calculated.

Table 5.1   Two-way frequency table to compare intra-rater reliability on the DMMI

		Score 1	Score 2	Score 3	Score 4
First scoring	Frequency	19	28	69	109
	Percentages	8.44	12.44	30.67	48.44
Second scoring	Frequency	20	28	68	110
	Percentages	8.85	12.39	30.09	48.67

The data of the 2 separate scorings compares favourably. The chi-square test was used to establish whether there was a difference between the researcher's scores or not. No significant difference between the first and the second scoring done by the researcher (p-value = 0.9983) was determined. The H_0 is rejected as stability in the researcher's scoring was established.

5.2.2   Inter-rater reliability

The external raters used the same assessment tools as the researcher to assess inter-rater reliability. Two external raters independently observed the same 20% of all the video-

recordings made during the intervention phase as well as 20% of the pre-intervention, post-intervention and post-withdrawal recordings. This exceeds Hensilwood and Ogilvy's (1999) view that only 15% of all observations are necessary to establish inter-rater reliability.

The hypothesis was put forward that

H_0 : there would be a difference in the scoring of the pre-intervention, intervention, post-intervention and post-withdrawal phases between the researcher and the external raters.

H_1 : there would be no difference in the scoring of the pre-intervention, intervention, post-intervention and post-withdrawal phases between the researcher and the external raters.

The scores of the two external raters were compared with those of the researcher. The "complexity-score" of the DMMI were used for statistical analysis (See Appendix E).

Table 5.2 **Two-way frequency table to compare inter-rater reliability on the DMMI**

		Score 1	**Score 2**	**Score 3**	**Score 4**
Researcher	Frequency	21	48	119	121
	Percentages	6.8	15.53	38.51	39.16
External rater 1	Frequency	16	50	110	133
	Percentages	5.18	16.18	35.60	43.04
External rater 2	Frequency	30	53	101	125
	Percentages	9.71	17.15	32.69	40.45

The chi-square test was used with the data from this table and it was established that there was a difference between the data of the researcher and the two external raters. There was no significant difference between raters' and the researcher's observations (p-value = 0.3375) therefore it could be stated that inter-rater reliability was established. The H_0 was therefore rejected.

A quantitative description was used to establish whether there was a reliable correlation between the presentation method used by the researcher and what the external raters found. The external raters watched the same video-recordings as mentioned above. There was a 95% correlation between the presentation methods used by the researcher and what the external raters observed (See Appendix A).

5.3   VALIDATION OF OUTCOMES

The sequence as presented in Figure 5.1 will be followed. Firstly, the outcomes as measured by the DMMI for the group and individual participants will be delineated. Secondly, the outcomes of the other measurement tools will be presented before the validation of the play package is addressed. Each section will start with a description of the results, followed by a detailed discussion.

Outcome validation refers to the assessment of perceived changes as a result of intervention (Wolf, 1978). The outcomes of the group will be presented across the whole research period i.e. the pre-intervention–, intervention–, post-intervention–, and post-withdrawal phase. A summary of the different assessment tools used during the different phases of the study for data collection is presented in Table 5.3.

Table 5.3   Assessment tools used during the different research phases

Pre-intervention phase Week 1	Intervention phase Week 2, 3, 4	Post-intervention phase Week 5	Post-withdrawal phase Week 8
DMMI TPBA SPS VMI	DMMI	DMMI TPBA SPS VMI	DMMI TPBA SPS

The DMMI was the constant measuring instrument used during all the phases. The TPBA, SPS and VMI were used to investigate construct and convergent validity. The VMI could not

be used during the post-withdrawal phase as this test should not be administered over short intervals (Beery, 1989).

In Chapter 4 the sub-aims were formulated with a view to establishing the behaviour of the participants during the pre-intervention and post-intervention phases, as well as to cross-validate measurements and establish convergent and construct validity. Although it seems as if primary attention is paid to the assessment of behaviours, the play package as a whole can only be validated through this assessment of changes in behaviour. Answers to the sub-aims will thus become evident by presenting the results in terms of outcomes. In this section sub-aims 4.3.2.2, 4.3.2.3, and 4.3.2.3.1 will be addressed.

5.3.1 Outcomes according to the DMMI

The outcomes of the group as a whole will be presented, as well as those of the individual participants. While the group's results will be based on quantitative analysis of the data, the analysis of the individual participant's results will be done quantitatively as well as qualitatively to augment the interpretation.

Figure 5.2 shows the performance of the group on the DMMI over the eight-week research period.
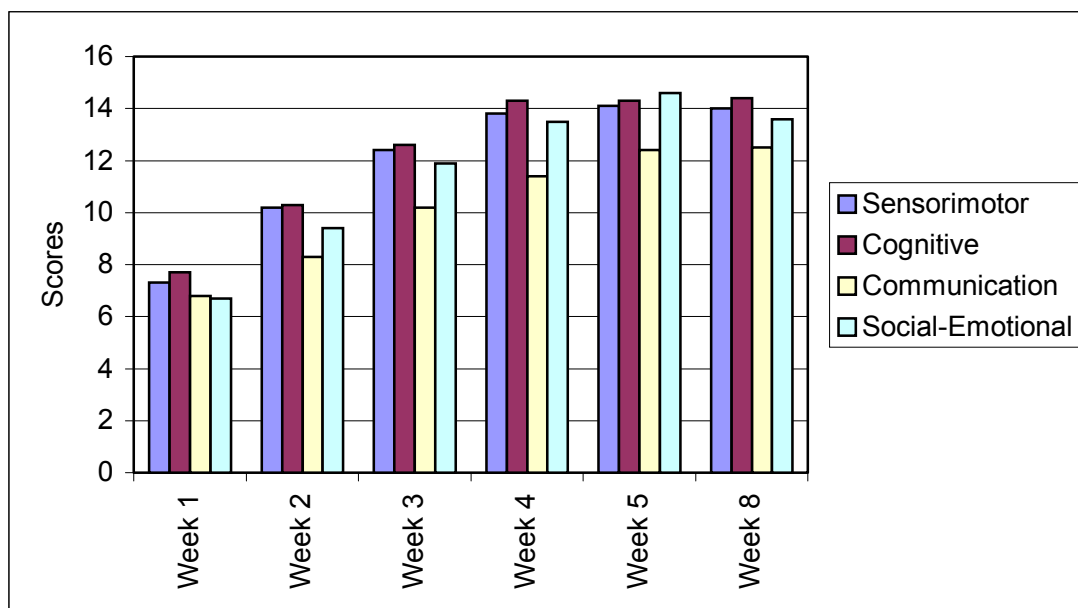
Figure 5.2   **Mean performance of the group on the DMMI**

In this figure the group's performance on the DMMI is presented on a weekly basis and it clearly shows the increase in performance on the four different developmental domains (constructs). Distinctive patterns occurred, such as that communication trails all other constructs, that there was little or no difference between the other 3 constructs across the 8 weeks, and that a definite pattern of gradual acquisition of behaviours occurred from week 1 to week 4. A plateau was reached from week 4 to week 8. The statistical analysis is described below.

Table 5.4 presents the mean, median and standard deviation scores as obtained from the Friedman two-way analysis of variance test for nonparametric statistics (Steyn, Smit & Du Toit, 1987). This test is designed for comparing three or more related (dependent) samples on an ordinal variable. It converts the raw scores to ranks.

Table 5.4 Friedman test of scores obtained with the DMMI across the whole research period

		Pre-inter-vention	Intervention phase			Post-intervention phase	
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
Sensorimotor	mean	7.2857	10.2	12.3543	13.7886	14.0857	14.0000
	median	6.5714	9.8571	12.1429	13.8571	14.1429	13.8571
	sd	1.5253	2.0291	1.5585	0.9158	1.0527	0.6624
Cognitive	mean	7.7333	10.327	12.597	14.2800	14.3333	14.4000
	median	7.6667	10.667	12.5000	14.667	14.6667	14.6667
	sd	1.5882	2.1475	1.6363	1.0846	1.4530	0.3651
Communication	mean	6.7750	8.2850	10.1700	11.4350	12.4250	12.5000
	median	6.2500	9.0000	10.6250	11.6250	12.7500	13.0000
	sd	2.4002	2.1144	2.5698	2.2836	2.8140	2.3335
Social-Emotional	mean	6.7000	9.4000	11.9200	13.5000	14.6000	13.6000
	median	6.5000	9.5000	12.5000	14.5000	16.0000	15.0000
	sd	1.0368	2.2867	2.3527	2.0916	2.8592	2.7704

The hypothesis was put forward that

H_0 :   there would be no positive change in behaviours after the intervention phase (week 2 – week 4).

H_1 :   there would be a positive change in behaviours after the intervention phase (week 2 – week 4).

The H_0 is rejected as a statistical difference (positive change) was found on the behaviours representing all the constructs between week 2 and 3, week 2 and 4, and week 3 and 4 (the intervention phase) at the 5% level (p<0.0001), indicative of development. The median scores were used to calculate the statistical difference on the Friedman test. This indicated that on the sensorimotor construct there was a difference between weeks 2 and 3 (9.8571 and 12. 1429), weeks 2 and 4 (9.8571 and 13.8571), and weeks 3 and 4 (12.1429 and 13.8571); on the cognitive construct there was a difference between weeks 2 and 3 (10.667 and 12.5000), weeks 2 and 4 (10.667 and 14.667) and weeks 3 and 4 (12.5000 and 14.667); on the communication construct there was a difference between weeks 2 and 3 (9.0000 and 10.6250), weeks 2 and 4 (9.0000 and 11.6250), and weeks 3 and 4 (10.6250 and 11.6250); on the social-emotional construct there was a difference between weeks 2 and 3 (9.5000 and 12.5000), weeks 2 and 4 (9.5000 and 14.5000), and weeks 3 and 4 (12.5000 and 14.5000).

An extract was taken from Table 5.4 to indicate the comparison between the pre-intervention, post-intervention and post-withdrawal phases. This seems to answer the hypothesis, namely that

H_0 :   there would be no positive change in behaviours between the pre-intervention-, post-intervention- and post-withdrawal phases.

H_1 :   there would be a positive change in behaviours between the pre-intervention-, post-intervention- and post-withdrawal phases.

Table 5.5   **Comparison between averages of group's performance across weeks 1, 5, and 8**

Construct	Week	Average performance	Level of significance	P-value
Sensorimotor	Week 1	6.5714	**} ** *	p-value = 0.0224
	Week 5	14.1429		
	Week 8	13.8571		
Cognitive	Week 1	7.6667	** } **	p-value = 0.0235
	Week 5	14.6667		
	Week 8	14.6667		
Communication	Week 1	6.2500	* } **	p-value = 0.0224
	Week 5	12.7500		
	Week 8	13.0000		
Social-Emotional	Week 1	6.5000	**	p-value = 0.015
	Week 5	16.0000		
	Week 8	15.0000		

*Significant at the 10% level
**Significant at the 5% level

Table 5.5 compares weeks 1, 5, and 8 – the pre-intervention and post-intervention phases. The H_0 was thus rejected, as there was significant change (positive change) in the behaviours of the participants between the pre-intervention phase and the post-intervention phases, indicative of development. The median scores were used to calculate the statistical difference on the Friedman test. On the sensorimotor, cognitive and social-emotion constructs there was significant change at the 5% level between weeks 1 and 5. On the cognitive and communication construct there was significant change at the 5% level between weeks 1 and 8.

During the intervention phase, a significant difference indicative of development (adaptation) occurred in the behaviours representing all the constructs. It is generally accepted that the use of play as a therapeutic medium contributes to the development of children (Case-Smith, 1993; Johnson *et al.*, 1999). In the model presented by Cooper *et al.* (1978), the integration

of the developmental domains is highlighted, which supports the fact that each domain has an influence on all the other developmental domains. Certain domains are seen as more basic to others. Dunn (1992) stated that sensorimotor experiences provide the underlying information which facilitates the development of cognitive and language relationships. It was thus expected to note that communication trails the other developmental domains. Piaget (1978), Vygotsky (1962) Bricker & Carlson (1981) stated that communication is a higher cognitive function and that sensorimotor development can be seen as an underpinning for their development. In previous research (Uys, 1997) the same pattern was observed in children with severe disabilities.

Another finding was that there is no significant difference between the behaviours as measured during the post-intervention and post-withdrawal phases (weeks 5 and 8), indicative of a plateau in behaviour acquisition. As there was no decrease in the level of performance in this study as well as in the previous study (Uys, 1997), it can be concluded that play as an intervention medium facilitates adaptive responses that are maintained over time. Kielhofner (1992) stated that when newly acquired behaviours become habitual in the performance of tasks, they are stable adaptive responses. Figure 2.1 proposes that for adaptation to occur the child should experience internal adaptation of all the developmental domains and that the therapist should select and present activities in such a fashion as to also facilitate external adaptation. This external, as well as internal adaptation leads to the adaptive response that leads to the habitual behaviour of components representing the developmental domains. Adaptation can only occur when a person is exposed to the "just right challenge" on activities that relate to their occupation (Kielhofner, 1992; Nelson, 1996; Schade & Schultz, 1992).

Another interesting finding was that the same relationship between these developmental domains was maintained in the final intervention week through the post-intervention phase to the post-withdrawal phase. This phenomenon became clear from the above results, indicating that there is interrelatedness between all the developmental domains (Bricker & Carlson, 1981; Mosey, 1974). Based on various theories (Cooper *et al.*, 1978; Linder, 1993) a model indicating this relationship was developed and is presented in Figure 2.4. The finding that this relationship was maintained seems to indicate that the intervention facilitated the development of the different domains.

The outcomes of the individual participants will now be described. These data will be presented quantitatively and qualitative information on each participant will augment the interpretation. Figure 5.3 shows the average performance of each participant on the DMMI over the whole research period.

Participant 1					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
5.7	8.3	11.8	12.6	14.1	13.7
6.0	8.4	11.6	12.7	15.3	14
4.9	6.7	8.8	10.3	12.4	11.3
6.5	7.7	10.4	12.5	15.5	12

Participant 2					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
8.3	12.4	14.3	14.8	15.3	14.9
9.3	12.1	13.8	15.2	14.7	14.7
8.3	10.3	12.6	13.8	14.5	14.8
8.0	11.3	14.4	15.2	16.0	16.0

Participant 3					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
6.6	9.3	10.6	13.6	14.6	13.9
6.3	9.6	11.8	14.5	15.7	14.7
6.3	8.5	10.4	11.8	12.8	13
5.5	10.7	12.8	14.8	16.0	15.0

Participant 4					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
6.4	10	11.8	13.7	12.4	13.1
7.7	9.5	12.1	13.9	12	14
4.4	5.8	6.6	7.9	7.8	9.1
6.0	7.0	9.1	10.2	9.5	9.5

Participant 5					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 8
9.4	10.8	13.2	14.2	14.0	14.4
9.3	12.1	13.7	15.0	14.0	14.6
10.1	10.2	12.5	13.4	14.7	14.4
7.5	10.3	12.9	14.8	16.0	15.5

Figure 5.3   Average of performance of each participant on the DMMI

Statistical significance was not calculated for each individual due to the limited data. However, it is clear that all participants showed a gradual increase in performance across all constructs independent of their pre-intervention performance level.

Participant 1 had a steady increase in performance from week 1 to week 5 across all the constructs and the social-emotional performance improved the most. An interesting phenomenon was the slight decrease in performance after the withdrawal period, as this differed from the other participants' behaviour. The biggest decrease was observed in the score of the social-emotional construct during the post-withdrawal measurement. This does not follow the same pattern as the group, indicating that the newly acquired behaviours were not yet maintained and habitual. This finding could possibly be attributed to the fact that her pre-test score was one of the lowest. Conversely, participant 2 showed a gradual increase in performance across all the constructs and a plateau of behaviour from week 4 to week 8. Communication trails all other constructs, while the social-emotional construct showed the greatest increase in the scores and there was little difference in the performance of the sensorimotor and cognitive construct. Her performance corresponds with the pattern presented by the group.

When comparing the individual participants' performance with that of the group it was noted that participant 3 showed the greatest increase in performance across weeks 1 to 5. The pattern of improvement of each construct stayed the same over weeks 2 to 5 and even if this participant did not reach a plateau, the decrease of performance after the withdrawal period followed the same pattern relative to each construct.

Atypical results were found in the performance of participant 4 who showed autistic tendencies. He was the only one who presented with no functional speech throughout the research period. He was also the only participant who showed very poor performance on the social-emotional construct. An interesting observation is his performance on the post-intervention measures, where he scored much lower than in weeks 4 and 8 (the post-withdrawal measurement). This could be explained by the fact that he had influenza and a general feeling of malaise. It is an atypical phenomenon as his performance scores increased again in the post-withdrawal measurements when his physical condition improved. His performance was the only one that differed from the performance of the group as a whole.

This participant's score on the social-emotional construct had a definite influence on the mean performance of the group.

Participant 5 showed a very gradual increase of performance on all the constructs with a plateau on weeks 4, 5 and 8. The socio-emotional construct also showed the greatest increase in the scores. Her performance on the communication construct was on a par with the sensorimotor, and cognitive constructs. This was different from the group where communication trailed behind all the other constructs.

Although no statistical significance of these data was established, according to the descriptive analysis the following becomes evident. The participants were all diagnosed with moderate to severe intellectual impairments and although care was taken in the selection of these participants to ensure as much homogeneity as possible, visual inspection on comparing the data showed that some participants are relatively similar in developmental trends. The performance of participant 4 was, however, different from the other participants. Homogeneity is clearly improbable among the disabled population. This supports the description of the intellectually impaired population (See Table 2.7).

Another finding is that participants 1 and 3 with the lowest scores during the pre-intervention measurement showed the greatest improvement during the intervention phase. This finding can be interpreted in terms of the interactive theory (McLean & Snyder-McLean, 1978; Vygotsky, 1962), which holds that development of potential is dependent upon interaction. From observation and discussions with teachers and parents, it became evident that the home and school environment could possibly have influenced the development of these two children. It is also generally accepted that children who live in poverty are also at greater risk for developmental, behavioural and educational delay (Lequerica, 1997; Shonkhoff & Meisels, 2000). Extreme need and even destitution in conditions of poverty have a negative influence on the social interaction in families and communities (Wilson & Ramphele, 1989). The initial low scores of these two participants could possibly be attributed to such conditions. In the warm, accepting therapeutic relationship (Hupp *et al.*, 1992; Howe & Schwartzberg, 1995; Skinner, 1957; Sameroff, 1975) between the researcher and the participant during the research process, these participants actualised their potential (King, 1978). The gradual increase in performance correlates with the group tendency.

Another finding only became evident in the qualitative analysis of the individual participants, namely the influence of health on the performance of a child. Participant 4 showed a marked decrease in performance during week 5, when he was ill. A phenomenon such as this can only be identified when repeated and continuous measurements are carried out such as with the DMMI.

5.3.2   Outcomes according to the TPBA

The performance of the group as a whole will now be discussed on the basis of the outcomes obtained from the TPBA. This assessment tool was used during the pre-intervention and post-intervention phases of the research. The use of this tool was to establish convergent validity between the DMMI and the TPBA, as well as to assess whether there was a positive change in the participants' behaviour across the four developmental domains (constructs). Figure 5.4 shows the mean performances of the group during weeks 1, 5, and 8 of the research period.
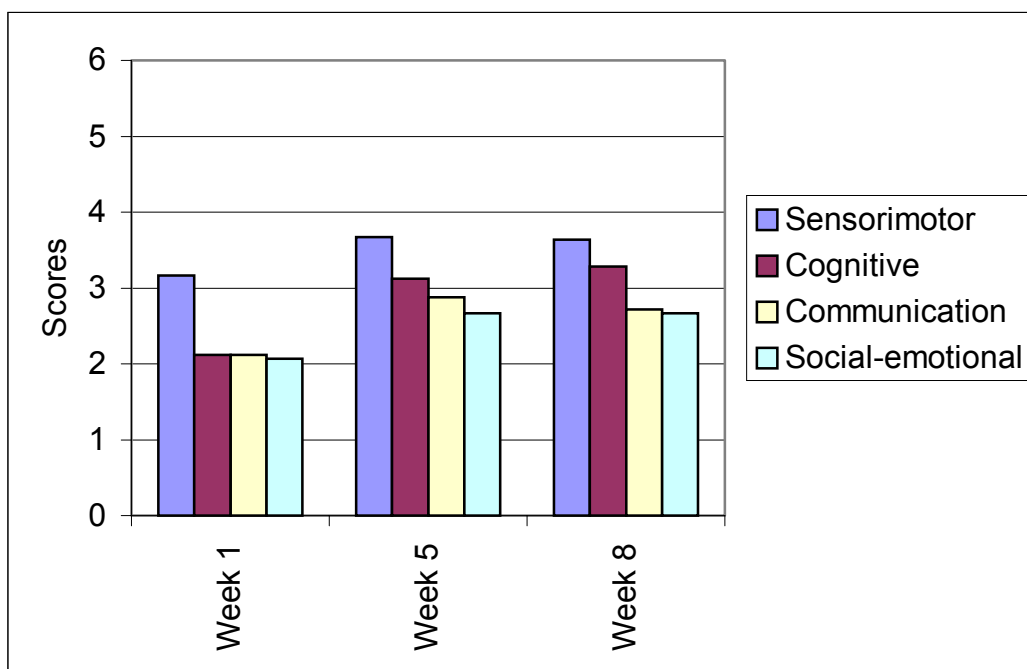
Figure 5.4   Mean performance of the group on the TPBA

From Figure 5.4 it is evident that there was a positive improvement on all the constructs from weeks 1 to 5 and little or no change in behaviours between weeks 5 and 8. All constructs trail the sensorimotor construct. Although the sensorimotor scored the highest for the group,

cognitive behaviour showed the greatest gain in performance. There was little or no difference between the communication and social-emotional constructs. Table 5.4 shows the mean, median and standard deviation scores as obtained from Friedman two-way analysis of variance test for non-parametric statistics.

Table 5.6   Friedman test of scores obtained with the TPBA

		Week 1	Week 5	Week 8
Sensorimotor	Mean	3.1667	3.667	3.6333
	Median	2.6667	3.1667	3.5
	Sd	0.986	1.0206	1.0165
Cognitive	Mean	2.12	3.12	3.28
	Median	2.1	3.1	3.7
	Sd	0.8044	0.6181	0.7629
Communication	Mean	2.12	2.88	2.72
	Median	1.8	2.4	2.4
	Sd	0.9654	1.2617	1.1541
Social-Emotional	Mean	2.0667	2.6667	2.6667
	Median	2	2.6667	2.6667
	Sd	1.0382	0.8165	1.1304

An extract was taken from Table 5.6 to indicate the comparison between the pre-intervention (week 1), post-intervention (week 5), and post-withdrawal (week 8) phases. This seems to answer the hypothesis namely that

H_0 :   there would be no positive change in behaviours across all the constructs between the pre-intervention, post-intervention, and post-withdrawal phases on the TPBA.

H_1 :   there would be a positive change in behaviours across all the constructs between the pre-intervention, post-intervention, and post-withdrawal phases on the TPBA.

Table 5.7   Comparison between medians of the group's performance across weeks 1, 5, 8

Construct	Week	Median	Level of significance	P-value
Sensorimotor	Week 1	2.6667		0.1165
	Week 5	3.1667		
	Week 8	3.5000		
Cognitive	Week 1	2.1000	**	0.0195
	Week 5	3.1000		
	Week 8	3.7000		
Communication	Week 1	1.8000	**	0.0224
	Week 5	2.4000		
	Week 8	2.4000		
Social-Emotional	Week 1	2.000	** *	0.0224
	Week 5	2.6667		
	Week 8	2.6667		

*   Significant at the 10% level
** Significant at the 5% level

Table 5.7 shows the statistical analysis for the comparison between weeks 1, 5, and 8 – the pre-intervention and post-intervention phases. H_0 was rejected, as there was significant change (positive change) in behaviours of the participants between the pre-intervention and post-intervention phases, indicative of development.

The H_0 was rejected as significant change in behaviours occurred on all the constructs except for the sensorimotor construct.   There was no significant change on the sensorimotor construct at the 5% level between weeks 1, 5, and 8. On the cognitive and social-emotional constructs there was significant change at the 5% level between weeks 1 and 8. On the communication construct there was significant change at the 5% level between weeks 1 and 5.

From the findings of the TPBA measurements there was a positive development in all the domains when the performance of the group on the pre-intervention and post-intervention phases are compared. Taking into account the ranking orders used in the Friedman analysis it is evident that there was a significant difference in the cognitive, communication and social-

emotional domains between the pre-intervention and post-withdrawal measurements. While a slight positive change was observed, no significant difference was found in the sensorimotor domain, probably because the initial level of performance was much higher than the other domains.

Even after refining the TPBA (See 4.5.4.2) the norm-based increments of this test do not seem to be sensitive enough to small changes in behaviour in the area of sensorimotor development. Specific and severe sensorimotor impairments were, however, not expected (See Table 2.7) in this group, although they performed much lower than their chronological age levels. The finding that sensorimotor performance leads the performance in the other domains was once again expected. From Figure 5.4 and Table 5.6 it is clear that similar patterns of performance exist in all measurements, especially the post-intervention phases (weeks 5 & 8).

All these findings support the theory and findings of Uys (1997) and Weeks and Ewer-Jones (1983) who stated that sensorimotor functioning is an important underpinning for the development of communication. Once again these findings support the interrelatedness between the different developmental domains (Dunn, 1991; Dunn, 1992; Linder, 1993; McLean & Snyder-McLean, 1978), as well as the model on interrelatedness of developmental domains as presented in Figure 2.4. The views of Case-Smith (1993), Wehman (1979) and Musslewhite (1986) that goal-directed intervention will bring about a positive change in behaviour in the intellectually impaired population are reflected in the findings.

Finally, the similarity in performance as measured during the post-intervention and post-withdrawal phases is indicative of the maintenance of behaviours developed during the intervention phase. In terms of the theory on the development of an adaptive response, maintenance of behaviour occurs once the response has become habitual. This finding thus seems to support the model for the development of adaptive communication behaviour (See Figure 2.1).

There seems to be similarities between the findings of the DMMI and the TPBA. These similarities could be attributed to the orientation and theoretical underpinnings of both measurement instruments as both cover the areas of the four developmental domains. It is interesting to note that similar significant outcomes were measured by the DMMI and TPBA.

While the greatest difference between the two tests is that the criteria for testing in the DMMI are set according to the measurement of performance components, previously called adaptive response, the criteria set in the TPBA aims at the measurement of performance skills, previously called adaptive skills (Kleinman & Bulkley, 1982). An example of this is that the DMMI measures components of ball skills, such as visual tracking, imitation of movement and gross co-ordination, while the TPBA measures the ball skill as an entity. An advantage of the DMMI is that these basic performance components underpin various performance skills and by measuring performance components small changes in behaviour development can be identified. The significant differences that were found on the TPBA do, however, seem to support the findings of the DMMI. The correlation between these two tests will be discussed under 5.6.

5.3.3 Outcomes according to the SPS

The performance of the group will now be discussed in terms of the SPS. This tool was used during the pre-intervention and post-intervention phases of the research. The aim of using the tool was to establish convergent validity between the DMMI and the SPS as well as to assess whether there was a positive change in the participant's behaviour on play development and language development. Figure 5.5 presents the mean performance of the group in weeks 1, 5, and 8 of the research period.
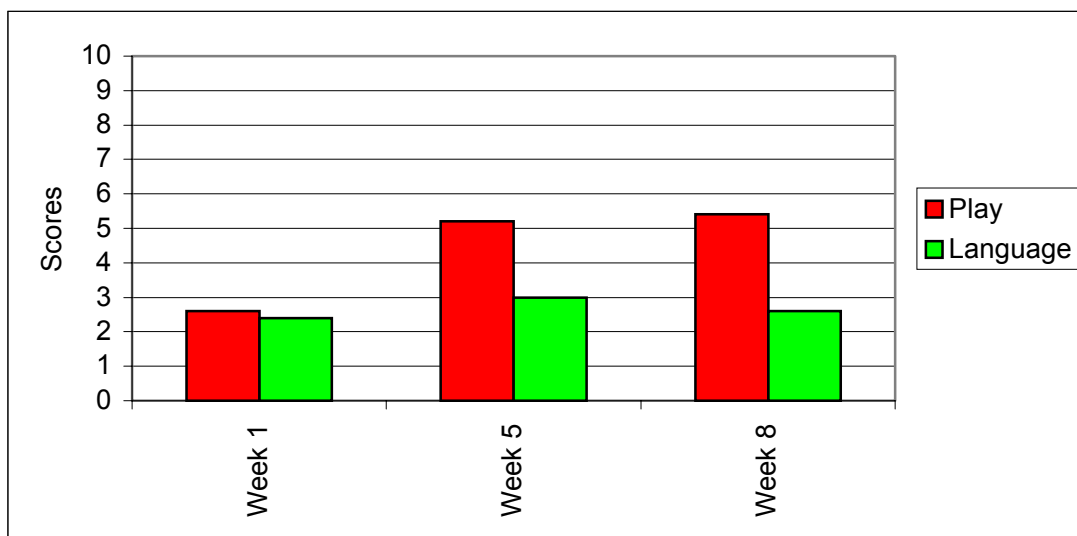
Figure 5.5   Mean of group on the SPS

In week 1 the participants scored between stage 2 and stage 3. This is between the ages 13 to 19 months, far below their chronological ages (average age = 63.6 months). In week 5 (post-intervention) the participants improved to stage 5 (24 months) on play development and showed minimal improvement on the language construct (stage 3: 17 – 19 months). With the post-withdrawal measurement the participants showed a small increase in the play development and a small decrease in language development. The statistical analysis is presented in Table 5.8.

Table 5.8 shows the mean, median and standard deviation scores as obtained from the Friedman two-way analysis of variance test for nonparametric statistics. This seems to answer the hypothesis, namely that

H_0 :   there would be no positive change in behaviours across all the constructs between the pre-intervention, post-intervention, and post-withdrawal phases on the SPS.

H_1 :   there would be a positive change in behaviours across all the constructs between the pre-intervention, post-intervention, and post-withdrawal phases on the SPS.

Table 5.8   Friedman test of scores obtained with the SPS

		Mean	Median	Sd	Level of significance	P-value
Play	Week 1	2.6	1	2.19089		0.0429
	Week 5	5.2	5	1.09545	** **	
	Week 8	5.4	5	1.14018		
Language	Week 1	2.4	1	1.94936		0.3499
	Week 5	3	2	2.34521		
	Week 8	2.6	1	2.30217		

**Significant at the 5% level

The individual participants' scores differ from each other and in Table 5.9 the individual scores are presented over the three phases.

Table 5.9   Individual participants' scores according to the stages on the SPS

	Week 1		Week 5		Week 8	
	Play	**Language**	**Play**	**Language**	**Play**	**Language**
Participant 1	1	1	4	1	4	1
Participant 2	5	5	7	6	7	6
Participant 3	1	1	5	2	5	1
Participant 4	1	1	5	1	5	1
Participant 5	5	4	6	5	6	4

There was variation in the scores of the individual participants. In the pre-intervention measurement three participants scored on stage 1 for both play and language, and the other two participants scored respectively on stage 5 for both play and language and stages 5 and 4 for play and language. The post-test and post-withdrawal measures showed a change in their behaviours, as all the participants improved. Most of the participants maintained the scores in these two different phases. Participant 1 improved from stage 1 (9-12 months) to stage 4 (19-22 months) on play development, but stayed consistent on stage 1 for language development throughout the research period. Participant 2 improved from stage 5 (24 months) to stage 7 (36 months) in play development and an increase from stage 5 to stage 6 (30 months) in language development. These scores were maintained for week 8. Participant 3 improved from stage 1 to stage 5 in play development in weeks 5 and 8. Her language development indicated an improvement from stage 1 to stage 2 (13-17 months) in week 5, but regressed to stage 1 after the withdrawal period. The play development of participant 4 increased from stage 1 to stage 5 as scored during weeks 5 and 8. Participant 5 improved from stage 5 on play development to stage 6, where it stayed consistent after the withdrawal period. Her language development improved from stage 4 to stage 5 in week 5, but regressed to stage 4 after the withdrawal period.

As the intervention and the assessment tools were based on play as the vehicle for the development of communication-related behaviours, the Symbolic Play Scale was included in the research.

The finding that there was a significant positive change in symbolic play behaviour, but not in language development was expected, particularly in view of the fact that "…some cognitive abilities consistently precede… linguistic structures" (Westby, 1980:154). "The major cognitive development during the preoperational period (18 months to 5-7 years) is the development of representational thought. Symbolic play provides a means of assessing children's representational abilities" (Westby, 1980:155). It therefore seems as if cognition developed to a greater extent than language, which agrees with Westby's view that cognitive abilities precede the development of language. Furthermore the intervention did not specifically target the development of language structures, but rather the facilitation of communication-related skills.

The same trends were found on the DMMI and the TPBA where communication trailed cognition. Language can never be equated to communication as "language and speech are important but are not ends in themselves…the importance of language derives from communication" (McDonald, 1980:52) as communication is a more encompassing, dynamic interpersonal process involving shifting between the receiver and the expresser. Language is the medium through which communication can take place. It is thus interesting that these trends are found in tests measuring cognition and communication and another test that measures symbolic play (cognition) and language.

From the slight decrease in performance in the language section of the test between the post-intervention and post-withdrawal phases, it can be deduced that the language behaviour was not maintained as the other communication behaviours as measured by the DMMI and TPBA. This finding was expected as language is a higher cognitive function (Vygotsky, 1962). From the above discussion of communication and language it seems evident that two different constructs are measured – communication and language. Significant changes were found in communication behaviour after intervention, but not in language, once again supporting Westby's (1980) and Vygotsky's (1962) views that language is a higher cognitive function, trailing the development of the more basic developmental domains, including communication as defined in this study.

5.3.4 Outcomes according to the VMI

This tool was used during the pre-intervention and post-intervention phases of the research. As explained in Chapter 4, this test could only be used once in the post-intervention phase, as it does not allow for quick successive retesting. This test was included as a countermeasure to investigate concurrent validity with the DMMI. Although the VMI purports to measure an integrative ability important to adequate functioning beyond visual-motor behaviour, results only reflect visual-motor integration. Based on the premise that if the intervention phase leads to no improvement on the VMI, but improvement on the four domains as measured by the DMMI, it can be concluded that VMI does not test the same constructs facilitated by this play package.

The hypotheses were formulated that

H_0 : there would be no positive change in visual-motor integration between the pre-intervention and post-intervention phases on the VMI.

H_1 : there would be a positive change in visual-motor integration between the pre-intervention and post-intervention phases on the VMI.

Figure 5.6 shows the mean performance of the participants in weeks 1 and 5 of the research period.
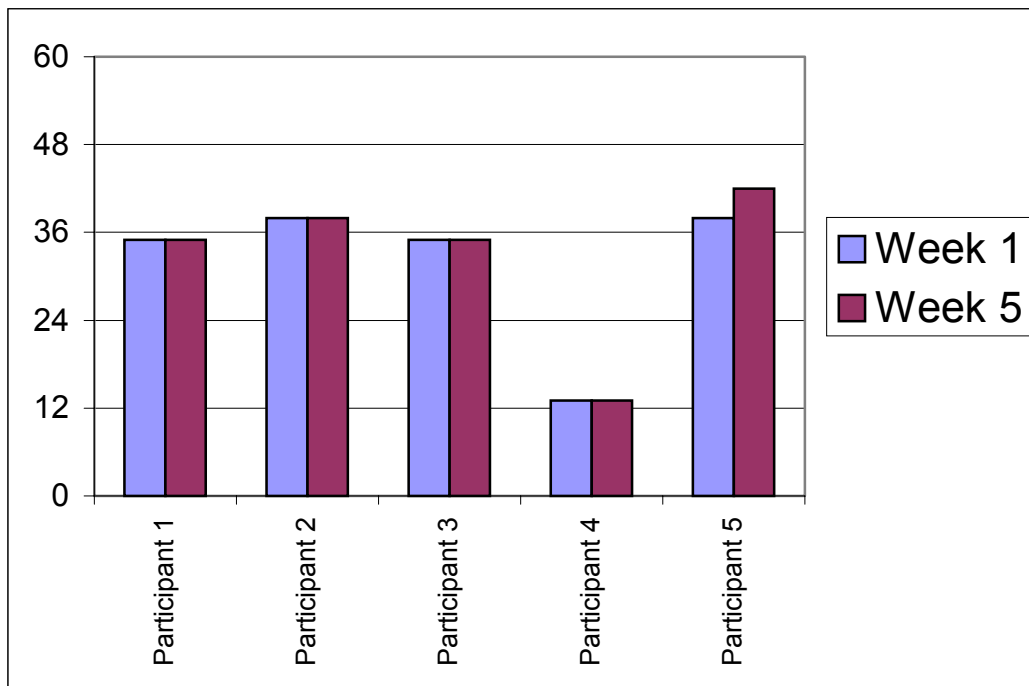
Figure 5.6   Age equivalent of each participant on the VMI

In Figure 5.6 the individual participants' performance on the VMI for week 1 and week 5 is shown. It is clear that this test indicated little or no improvement in the performance on visual-motor integration. Participants 1, 2, 3 and 4 scored the same in week 1 and after intervention in week 5. Participant 5 scored one increment higher after the intervention phase. Although the improvement (in months) differs with each participant, this is the given increment increase the test score provides.

Based on the findings that no marked improvement in visual-motor integration was found, the alternative hypothesis (H_1) was rejected and the nul hypothesis (H_0) accepted.

According to the findings as presented in Figure 5.6 three of the participants showed no development when the pre-intervention and post-intervention measurements were compared, while two showed a slight positive change. Although this test is regarded as reliable and valid (Beery, 1989) and it purports to correlate test results with children's mental age, the findings do not contribute extensive information about the participants in this study, except the lower level of functioning of this intellectually impaired group (Beery, 1989). These test results confirm the selection of the participants as being intellectually impaired.

As the test should only be used at 6-month intervals, significant improvement was not expected over a five-week period. The test-retest results are, however, an indication of reliability, as the performance of the subjects did not differ significantly. According to Beery (1989) the VMI measures an integrative ability, important to adequate functioning beyond visual-motor behaviour.

The play package aimed at the development of communication-related behaviours and did not specifically target visual-motor integration, so that no significant improvement in visual-motor integration was expected.

5.3.5 Conclusions

According to Wolf (1978) one of the criteria for the evaluation of the effectiveness of treatment is the validation of the outcomes of treatment. Based on the above findings, especially as four authentic measurement instruments were used, conclusions can be drawn about outcome validation.

A widely accepted description of effective treatment sets the criterion of the greatest improvement over the shortest time. This play package was presented to a group of intellectually impaired participants over a period of three weeks. The following was found:

- On three of the four measurement instruments a gradual and statistically significant increase in performance levels was observed on all the constructs. The question needs to be asked whether the therapeutic relationship of the Hawthorne effect could have influenced the results? The children could perform for the benefit of the researcher as they were singled out for special sessions, different to the rest of the class. Future research should investigate the possible influence of the Hawthorne effect during intervention. As the VMI tests visual-motor integration, indicative of the child's developmental level, the findings of this test did not indicate this gradual improvement. This finding was expected, as the VMI was included as a countermeasure.

- Both the DMMI and the TPBA highlighted patterns of development, development indicating a close relationship between the four areas of communication-related behaviours (the constructs).

- Furthermore, the findings support the view that communication is a higher-level function, as it trails the performance on the other constructs. Westby's (1980) statement that language development trails symbolic representation (cognition) explains the expected finding that the SPS-language test revealed a lack of significant improvement after intervention. The regression in language performance during the withdrawal period can perhaps be attributed to the fact that this behaviour had not yet been habituated – adaptation had not yet taken place.

- As no statistically significant difference could be found between the post-intervention and post-withdrawal performance levels, it can be concluded that the effectiveness of the intervention was such that the adaptive behaviours were maintained over this period.

- Although cross-validation between the different measurement instruments has not been done, certain observations can already be made about the measurement instruments:

  • There seems to be a marked similarity between the DMMI and the TBPA as compared over weeks 1, 5, and 8. As previously mentioned the DMMI measures performance components, which can be facilitated in short periods. The TPBA measures performance skills, which take longer to develop than the underlying performance components. For this reason, as well as the disadvantage that the TPBA takes long to administer, it is not a test that can be used as a daily evaluation of behaviour change during treatment.

  • Although the SPS includes both symbolic play (which involves various aspects of communication-related behaviours), as well as language, it does not cover the total field of the sensorimotor, cognitive, communication and social-emotional domains to evaluate performance. A full discussion of the differences between communication and language was presented in 5.3.3.

  • The VMI aims at testing visual-motor integration and is not supposed to be repeated in less than 6 months. As this test was included as a counter-measure, no change was expected, indicating that the play package facilitated behaviour change in the different developmental domains and not in visual motor integration.

Further analysis and interpretation of the value of these measurement instruments will follow in establishing the construct and convergent validity of the DMMI (See 5.6).

5.4 CONSTRUCT VALIDITY

The process of validation includes validation of the assessment tool (DMMI), as well as the validation of the treatment section of the play package. The results obtained during the experimental phase were used to establish the validity of the play package.

In order to establish the validity of the play package, the reliability and validity of the measuring instrument were addressed. Therefore the DMMI, a newly developed measuring tool was scrutinised. Construct validity follows the process of the establishment of content validity of the DMMI. In Chapter 4 the process of content validation was discussed and the conclusion was that content validity of the DMMI had been established. Construct validity could only be addressed after the experimental phase of the research, as the results of the performance of the participants were needed. Construct validity concentrates on which construct the measuring instrument actually addresses (DePoy & Gitlin, 1994; Brink, 1999). It establishes the relationship between the results provided by the instrument and the underlying theoretical concepts of the instrument – in this case both the measuring instrument and the play activities. In this section sub-aims 4.3.2.3.2, 4.3.2.1 and 4.3.2.4 will be addressed.

This section addresses the following issues:
Firstly, the change in the specific behaviours representing the constructs as a result of the application of the play activities is described. Secondly, the level of difficulty of the activities, relative to each other, is then presented.

5.4.1 Changes in specific behaviours representing the constructs after intervention

Figure 5.7 presents the four different constructs that were facilitated and measured during the intervention phase. They are the sensorimotor, cognitive, communication and social-emotional constructs. The relative gain the participants showed during the intervention is indicated for each of the five activities in the play package. These measures were obtained from the DMMI and the Friedman two-way analysis of variance test for nonparametric statistics was employed to analyse the data. The mean scores were used for the graphic presentation.

Sensorimotor
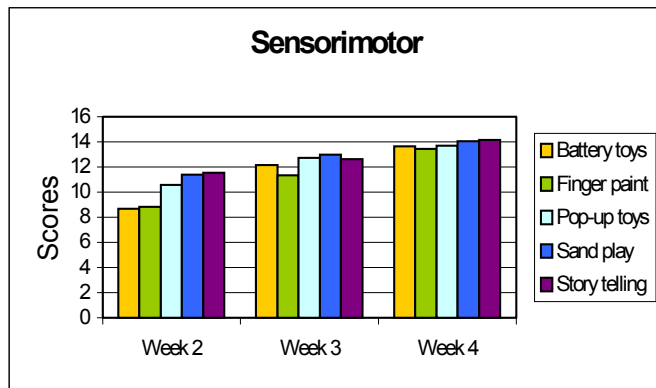
	Week 2	Week 3	Week 4	Gain	Ranking
	8.6857	12.1429	13.6286	4.9429	1
	8.8286	11.3143	13.4286	4.6	2
	10.5429	12.7429	13.7143	3.1714	3
	11.4	12.9714	14.0286	2.6286	4
	11.5429	12.6	14.1429	2.6	5
			Total gain	17.9429	

Cognitive
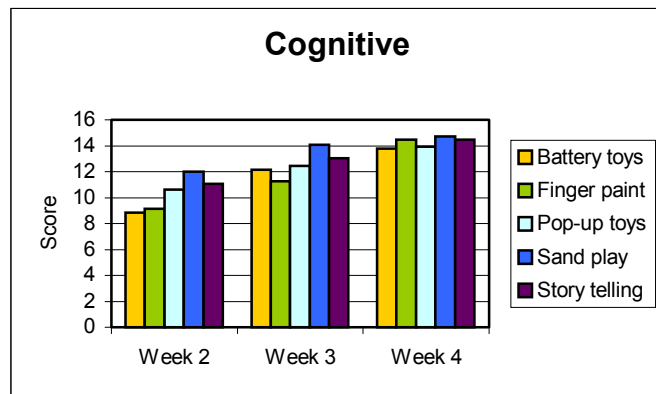
	Week 2	Week 3	Week 4	Gain	Ranking
	8.85	12.15	13.8	4.95	2
	9.1333	11.2667	14.4667	5.3334	1
	10.6	12.45	13.95	3.35	4
	12.0	14.0667	14.7333	2.7333	5
	11.05	13.05	14.45	3.4	3
			Total gain	19.7667	

Communication
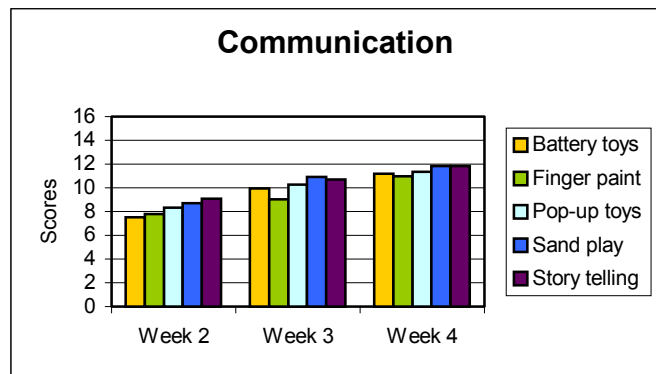
	Week 2	Week 3	Week 4	Gain	Ranking
	7.5	9.95	11.175	3.675	1
	7.8	9.025	10.975	3.175	2
	8.325	10.25	11.35	3.025	4
	8.7	10.9	11.825	3.125	3
	9.1	10.725	11.85	2.75	5
			Total gain	15.75	

Social-emotional
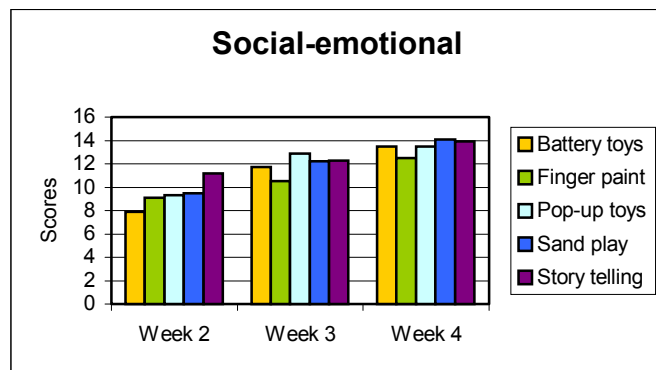
	Week 2	Week 3	Week 4	Gain	Ranking
	7.9	11.7	13.5	5.6	1
	9.1	10.5	12.5	3.4	4
	9.3	12.9	13.5	4.2	3
	9.5	12.2	14.1	4.6	2
	11.2	12.3	13.9	2.7	5
			Total gain	20.5	

Figure 5.7   Most gain of mean performance on all the constructs and activities

This figure indicates that there was a definitive pattern in the participants' performance during week 2. There was a gradual increase in performance in the way in which the activities were presented. The activities were presented in a set sequence as follows: battery-operated toys, finger-painting, pop-up toys, sand play and lastly storytelling (See Chapter 4). This pattern changed during weeks 3 and 4. Where there was a marked difference between the performance on the different activities during week 2, little or no difference between the performances on the different activities was presented in week 4. A gradual increase in performance on all four constructs is shown in this figure. Looking at the gain in performance on the different constructs, the participants had from least to most gain in the following order: communication, sensorimotor, cognitive, and social-emotional, as presented in Table 5.10.

Table 5.10   Ranking constructs according to most gain across all the activities on the DMMI

Construct	Difference between week 4 and week 2 in ranking order
Communication	15.75
Sensorimotor	17.9429
Cognitive	19.7667
Social-emotional	20.5

Because of the positive change in behaviour over three weeks, it is evident that learning (adaptation) took place, reflecting that the selected activities facilitated the development of behaviours representing all four constructs that were theoretically identified.

The construct validity of the play package is demonstrated in that the change in behaviours after the intervention phase was significant on all the constructs (See Table 5.2). It can therefore be concluded that the theoretical identification of the constructs and the subsequent selection of activities to facilitate the behavioural indicators, representing these constructs, were validly matched.

The data obtained during the intervention phase (weeks 2 to 4), were derived from the DMMI. The selection of items for this instrument and the adaptation of play activities in the play package were done through a process of operationalisation, in which the behavioural indicators representing the constructs were identified. There is thus a correlation between the

measurement instrument and the treatment activities. The investigation of the validity of the activities also reflects on the validity of the DMMI in that the activities facilitate the development of specific behaviours and the DMMI measures their occurrence.

The conclusion is thus that construct validity has been established for both the DMMI and the treatment.

5.5   LEVEL OF DIFFICULTY OF THE ACTIVITIES

A further analysis aimed at the investigation of the level of difficulty of the activities. Although the main focus was on the constructs measured, the independent variable, namely the play package with the five activities, were pivotal in obtaining the outcomes. Specific selected activities were included in the play package (See Chapter 4) but no literature was available on the degree of difficulty of different activities. All activities were selected for their ability to be adapted to the participants' developmental level and for the stimulation of the four different constructs. In the following section information was gathered to provide an indication of the degree of difficulty of each activity. The Friedman two-way analysis of variance test for nonparametric statistics was employed to analyse the data.

Table 5.11 shows the statistical analysis. The sum of all the constructs for the group as a whole was used in the analysis of the data.

Table 5.11   Level of difficulty of the activities

Week 2 – Total score (sum of all the constructs)					
	mean	median	sd	Level of significance	P-value
Battery toys	32.9357	27.1964	8.4893		
Finger-paint	34.8619	39.5655	8.7696		
Pop-up toys	38.7678	39.5714	6.0389	**	
Sand play	41.6	41.9286	4.4284	**	
Storytelling	42.8928	44.2143	7.9337		0.0015

Week 3 – Total score					
	mean	median	sd	Level of significance	P-value
Battery toys	45.9428	42.8929	7.0451		
Finger-paint	42.1059	44.2679	8.3263		
Pop-up toys	48.3428	46.3393	6.5088	*	
Sand play	50.1381	50.7083	4.5984	*	
Storytelling	48.675	46.6964	8.5825		0.0186

Week 4 – Total score					
	mean	median	sd	Level of significance	P-value
Battery toys	52.1035	52.875	6.4204		
Finger-paint	51.3702	53.5238	6.3864		
Pop-up toys	52.5143	55.2143	5.9595	*	
Sand play	54.6869	55.4821	4.4271	*	
Storytelling	54.3428	56.2143	5.9537		0.0093

* Significant at the 10% level
** Significant at the 5% level

For this statistical analysis the sum of gains presented by the group on all the constructs was employed.

Both the battery-operated toys and finger-painting differ significantly from storytelling during wee1k 2 at the 5% level. Finger-painting differs significantly from sand play and storytelling during weeks 3 and 4, but only at the 10% level.

In evaluating these findings, the data seem to suggest that battery-operated toys and finger-painting were the most difficult, as the initial level of performance of the group, was the lowest. However, as the gain in performance on the two activities was the greatest, the

assumption that they are more difficult needs to be questioned. It is possible that because of the selected research design a false image of difficulty appeared, as these two activities were always presented first. Carryover of the skills acquired during the battery-operated toys and finger-painting activities to pop-up, sand play and storytelling activities, could have taken place (Musselwhite, 1986).

No other significant differences could be established between the other activities. It may be concluded that there is no difference in terms of complexity of the activities. The play package should be used as a unit as each activity has its own profile of strengths in the stimulation of different constructs. This finding supports the results of the previous study by Uys (1997) in which the implementation of the package as a whole was recommended. Taking into account that carryover and reinforcement takes place during treatment (Parham & Fazio, 1997), it can be assumed that the whole is more important than the influence of the separate activities individually.

In Table 5.12 an extract of the information presented in Figure 5.6 is used. In this table the emphasis is on the gain each activity presented on each of the four constructs.

Table 5.12   Ranking activities according to the gains in performance in each construct (week 4 minus week 2)

Gain	Sensorimotor	Cognitive	Communication	Social-Emotional
Most	4.94	5.33	3.68	5.6
↕	4.6	4.95	3.18	4.6
	3.17	3.4	3.13	4.0
	2.62	3.35	3.03	3.4
Least	2.6	2.73	2.75	2.7

Battery toys	Finger-paint	Pop-up	Sand play	Storytelling

It seems as though battery-operated toys and finger-painting were the two activities in which the participants showed the greatest gain in performance on all the constructs. However, finger-painting did not have a strong influence on the behaviour representing the social-emotional construct. The other activities did not present with a specific pattern.

The influence of the activities was also analysed in terms of total gains over all the constructs. Battery-operated toys led to a total gain of 19.17; finger-paint 16.51; pop-up toys 13.55; sand play 13.08; storytelling 11.45. It is once again evident that the ranking shows the same tendency as when the constructs are taken separately, especially with regard to battery-operated toys and finger-painting.

Although the possible explanation of the sequence in which these activities were presented can be put forward for these findings, it can also be speculated that the participants were less familiar with battery-operated toys and finger-painting. The motivational value of novelty could explain the gain on battery-operated toys and finger-painting (Parham & Fazio, 1997). It should however, be taken into account that "…the implication for intervention is that we should structure young children's environments to increase the probability that they will engage in the behaviors that result in predictable but natural consequences, which in turn allow adaptive behaviour to be learned…a consequent event that functioned as a positive reinforcer for one child may not do so for another child…and the relative power of those events may change over time because of differences in the individual's physiology and learning history" (Shonkhoff & Meisels, 2000). Further research should be conducted in this area.

Table 5.13 views the ranking of constructs as presented in each activity. From this, the conclusion on the difficulty level of each activity relative to the different constructs could be drawn.

Table 5.13   Ranking constructs indicating most to least gain in each activity

Gain	Battery-operated	Finger-paint	Pop-up	Sand play	Story-telling
Most	5.6	5.33	4.0	4.6	3.4
	4.95	4.6	3.35	3.13	2.75
	4.94	3.4	3.03	2.73	2.7
Least	3.68	3.18	3.17	2.63	2.6

Sensorimotor	Cognitive	Communication	Social-Emotional

Communication seems to be the most difficult behaviour to facilitate by using this package as three out of five activities indicated least gain in this construct. The same pattern occurred for the social-emotional construct. Viewed as a whole, the sensorimotor construct trailed the cognitive construct. This finding can be explained by the participants' diagnosis of intellectual impairment, as specific sensorimotor problems are not the primary symptom. As they tested relatively high on the sensorimotor construct before intervention, a marked gain was not expected. No specific pattern was established regarding other tendencies.

This finding once again supports the view that the application of the play package as a whole is important. It does seem as though each activity has its own strengths in facilitating behaviour development.

5.6 CONVERGENT VALIDITY

A final measure of estimating validity is by comparing the results of a new instrument to the data of a criterion measure (a known instrument) at the same time (Brink, 1999). Convergent validity can, however, only be investigated after the analysis and interpretation of all the previous data.

In the establishment of convergent validity, the results according to the DMMI were compared with the results of two accepted, authentic measurement instruments, namely the TPBA and SPS. Using the Spearman's Coefficient of Correlation, correlation was established.

The results of the VMI were not included, as this test was included as a countermeasure. It was expected that not enough information on the constructs involved in this research would be revealed. Consequently there was a paucity of data to establish correlation co-efficients.

Table 5.14 presents the correlation between the DMMI and the TPBA for the pre-intervention, post-intervention and post-withdrawal measurements. This analysis is done separately as it is only in these two instruments that all four the relevant constructs were included.

Table 5.14   Correlation between TPBA and DMMI

		Week 1	Week 5	Week 8
Sensorimoter	correlation co-efficient	0.9	0.3	0.9
	p-value	0.0374**	0.6238	0.0374**
Cognitive	correlation co-efficient	0.61559	0.1	0.86603
	p-value	0.269**	0.8729	0.0577**
Communication	correlation co-efficient	1	0.87208	1
	p-value	0.0001**	0.0539**	0.0001**
Social-Emotional	correlation co-efficient	0.2	0.88388	0.7
	p-value	0.7471	0.0467**	0.1881
Total scores	correlation co-efficient	0.9	0.7	0.9
	p-value	0.0374**	0.1881*	0.0374**

** Significant at the 5% level
*   Clinically significant

From this table it is evident that there is a significant correlation between these two tests on eight out of twelve measurements when the constructs are compared separately.   In the sensorimotor construct there is significant correlation in weeks 1 and 8 (p-value 0.0374 and 0.0374 respectively).   The same pattern was evident for the cognitive construct (p-value 0.269 and 0.0577 respectively).   A correlation on all three measurements was found for communication, while on the social-emotional construct there was only a correlation in week 5 (p-value 0.0467).   A certain degree of convergent validity was established between these two measurement instruments.

There is a difference between the increments used in the two measurement instruments. Where the TPBA used six developmental norm-based increments, based on complexity of behaviours, the DMMI used sixteen increments as it included complexity of behaviour, as well as frequency of occurrence of behaviour.   Despite this fact, both instruments indicated significant change in behaviours on weeks 1, 5, and 8 (See Tables 5.5 and 5.7).

Secondly, as previously discussed, the basic difference between the DMMI and TPBA is that the former measures performance components while the latter measures performance skills. As such the DMMI seems to be a finer measure of gradual behaviour change.

A final decision on the convergence between the DMMI and TPBA can be based on the correlation between the total scores of week 1,5, and 8. It is evident that there is a significant correlation between the measurements on the three weeks. A statistical significance (significant at the 5% level) was established for weeks 1 and 8, and a clinical significance (significant at the 5% level) (Neetling, 2002) for week 5. It can therefore be concluded that convergent validity between the two tests has been established.

Comparing the DMMI and TPBA total scores with the SPS-play and SPS-language, separately, a further measure of estimating validity was carried out. Total scores were used because the SPS does not measure the constructs separately. The statistical analysis is presented in Table 5.15.

Table 5.15   Correlation between TPBA and DMMI and SPS

Week 1

TOTAL SCORE		DMMI	TPBA
SPS-P	correlation co-efficient	0.86603	0.86603
	p-value	0.0577**	0.0577**
SPS-L	correlation co-efficient	0.78262	0.78262
	p-value	0.1176*	0.1176*

Week 5

TOTAL SCORE		DMMI	TPBA
SPS-P	correlation co-efficient	0.67082	0.44721
	p-value	0.2152	0.4502
SPS-L	correlation co-efficient	0.87208	0.87208
	p-value	0.0539**	0.0539**

Week 8

TOTAL SCORE		DMMI	TPBA
SPS-P	correlation co-efficient	0.82078	0.71818
	p-value	0.0886*	0.1718*
SPS-L	correlation co-efficient	0.89443	0.78262
	p-value	0.0405**	0.1176*

** Significant at the 5% level
* Clinical significant

According to Table 5.15 there is a significant correlation in five out of twelve measurements, and a significant (clinically significant) correlation in another five. It is interesting to note

that where there is significant correlation between the DMMI and SPS there is also significant correlation between the TPBA and SPS, strengthening the conclusion that there is convergent validity of the DMMI when compared to the TPBA.

An interesting and expected finding was the highly significant correlation between these tests during pre-intervention measurements. This seems to indicate that the instruments do measure the same behaviours. However, the lack of correlation between the DMMI and TPBA on the one hand, and the SPS-play on the other, during week 5 was found. As the SPS-play measures performance skills, which take longer to develop than basic performance components, the skills do not seem to have developed at the measurement phase during week 5, but only after the post-withdrawal phase (week 8). The DMMI measured and found development of performance components, already the post-intervention phase (week 5). A further proof of this assumption is evident in that the correlation is not highly significant after the withdrawal phase. Seemingly the skills had not yet become habitual at this stage.

In interpreting the significant correlation between the SPS-language section and the DMMI and TPBA, it must be noted that the total scores of the DMMI and TPBA were used. It is once again evident that there is close interrelationship between the developmental domains underpinning the development of linguistic structures as tested by the SPS-language section.

In conclusion it can be stated that the above data analysis and interpretation is indicative of convergent validity of the DMMI.

5.7   VALIDITY OF THE PLAY PACKAGE

 Validation involves the evaluation of four specific aspects of the intervention process, namely the goals, procedures, effects and outcomes of intervention (Kazdin, 1977; Kazdin, 1982; Wolf, 1978). Implicit in this statement is the use of reliable and valid measurement tools.

The evaluation of the goals is based on the theoretical underpinnings involved in the intervention programme. Through a process of operationalisation (Groenewald, 1988; Brink, 1999) measurable behavioural indicators, reflecting the theoretical constructs, were identified

in the pre-experimental phase of the research. Construct validation could, however, only be investigated after all the data of the experimental phase were collected.

Wolf's (1978) procedures refer to strategies and presentation methods of intervention. In the pre-experimental phase the sequence of presentation, as well as the activities included in the package were completed. After the collection and interpretation of the experimental phase data the influence of the levels of difficulty of the activities were considered in the validation of the play package.

As the validation of the play package (measurement and treatment) was based on behaviour change during the intervention phase, the outcomes (effects) of the intervention were addressed before construct and convergent validity could be established.

The process followed in the validation in this play package included four main criteria of validity (Brink, 1999), namely face and content validity (established through the participation of external raters and authorities in the field), as well as construct and convergent validity (based on the outcomes of the intervention).

Although further research on the validation is necessary, the validity of this play package has been established on these four criteria. This conclusion refers to the DMMI as measurement tool and the application of the play activities as part of the treatment.

5.8   SUMMARY

Chapter 5 dealt with the presentation, statistical analysis, description and interpretation of the results of the experiment. As the aim was to validate the play package the outcomes, constructs, and convergence were also validated. The conclusion was reached that although further research is necessary, in general the DMMI and the treatment activities have been validated.

CHAPTER 6

CONCLUSIONS

6.1   INTRODUCTION

The aim of this study was the validation of the refined play package, consisting of the measurement instrument (DMMI), as well as the package of play activities for the facilitation of communication-related behaviours. The research question to be answered was formulated: Does the DMMI measure the communication-related behaviours that it purports to measure, and does the package of treatment activities facilitate the communication-related behaviours that it purports to facilitate?

In an attempt to answer this question the first step was to establish a solid theoretical foundation about the development of communication-related behaviours as adaptive responses as the play package aims at measuring and facilitating these responses. With the proposed model for the development of adaptive communication behaviour as underpinning, the play package was scrutinised and subjected to various forms of investigation in order to establish its reliability and validity.

The following conclusions were reached and will be presented in terms of the reliability and validity measures.

6.2   CONCLUSIONS

6.2.1   Reliability

6.2.1.1 Intra-rater reliability

Based on the findings of a repeated scoring, by the researcher, of 20% of the video recordings after two weeks the null hypothesis, that there would be a difference between

the initial and repeated scores, was rejected. Consistency (intra-rater reliability) was thus established.

6.2.1.2 Inter-rater reliability

Inter-rater reliability was determined by comparing the scoring of the researcher and the scoring of 20% of the video recordings by two external raters. Once again the null hypothesis was rejected in that no significant difference was found between the scores of the researcher and the external raters, thus establishing inter-rater reliability.

The conclusion is that the DMMI is reliable for the measurement of communication-related behaviours.

The external raters also evaluated the consistency of the steps in the presentation followed during the intervention phase, by observing 20% of the video recordings made during the intervention phase. A 95% consistency was found, indicating that the activities were presented in similar fashion to all the children, across the intervention period. It could be concluded that the presentation of the activities were consistently presented to all the participants.

6.2.2   Validity

6.2.2.1 Face validity

Face validity was determined through a process of identifying the behavioural indicators reflecting the relevant constructs, to be measured and facilitated. These constructs and their behavioural indicators were scrutinised and evaluated by six experts in the field and by consensus, the DMMI and the play activities were judged to have face validity.

6.2.2.2 Content validity

During the pre-experimental phase a pilot study was conducted and six experts in the field evaluated the content of the DMMI and the play activities in terms of the nature and scope of the behaviours to be measured and facilitated. There was agreement between them and

the researcher that content validity had been established as the DMMI measured, and the play activities facilitated the behaviours being studied.

6.2.2.3 Validity according to outcomes

Validity of the outcomes of treatment was determined by measurement of performance during the pre-intervention, post-intervention and post-withdrawal phases, using four authentic measurement instruments. As the DMMI can be utilised for continual measurement, behaviour change was measured on a daily basis during the intervention phase. As significant change, indicative of improvement was found on three (the VMI was utilised as a countermeasure) of the measurement instruments validity was established. As one of the criteria for the evaluation of effectiveness of treatment is the validation of outcomes (Wolf, 1978), it can be concluded that the play package, presented as a whole, is valid and effective.

Although the aim of this research was to validate the play package as a whole, further analysis and interpretation of the data was carried out, which revealed that the separate activities contribute to a greater or lesser extent to the facilitation of behaviour development. However, as no definite pattern could be found in that a specific activity primarily facilitated the behaviours reflecting one, or some of the constructs, the conclusion is once again reached that the effectiveness of the programme lies in its presentation as a whole (Uys, 1997).

Another conclusion about the effectiveness of the play package was that, as there was no significant difference between the performance in the post-intervention period and post-withdrawal period, the behaviours were maintained – an indication that habituation of the adaptive responses took place.

6.2.2.4 Construct validity

The process of construct validation stretched throughout all the different phases of the research. During the conceptualisation phase the relevant abstract constructs were operationalised and observable behaviour indicators, reflecting the constructs were identified. Correspondence between the constructs and the behaviours was confirmed by

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six experts in the field. Thus construct validity could be determined by measuring the development of behaviours reflecting the different constructs. In this process the validity of both the DMMI and the package of play activities was once again determined.

From a detailed analysis of the presentation sequence of the activities and the level of difficulty of the activities, no specific conclusions could be reached. It can, at this stage, only be concluded that numerous variables could have had an influence on these findings. However, the aim of the research was the validation of the effectiveness of the play package as a whole and not the individual components of the play package.

The gradual significant increase in the different behaviours reflecting on each construct leads to the conclusion that construct validity of the DMMI and the play package as a whole has been established.

6.2.2.5 Convergent validity

As the DMMI is a newly developed measurement instrument, its effectiveness had to be determined through a process of convergent validity – the checking of its accuracy against an accepted criterion, another authentic measurement instrument (Leedy, 1993), through a multi-trait, multi-measurement process. For this purpose The DMMI was checked against three other authentic measurement instruments, namely the TPBA and the SPS as comparable instruments, and the VMI as a countermeasure.

Taking the realistic limitations of construct definitions and tests (Brinberg & Kidder, 1982) into consideration, absolute agreement was not expected. In this case the DMMI measures performance components, while the TPBA measures performance skills, and the SPS symbolic play and language skills.

Despite these limitations, it is concluded that convergent validity has been established, as these test findings correlated significantly on most of the measures.

As the VMI was used as a countermeasure, it was expected that the intervention did not lead to higher performance scores on this instrument. Non-convergence between the DMMI and the VMI was thus found.

6.3   VALIDATION OF THE PLAY PACKAGE

The main aim of this research was the validation of the play package, consisting of the measurement instrument and package of treatment activities as a whole. It is evident from the research findings and the above conclusions that reliability and validity have been established.

The research question can now be answered in that it has demonstrated that the DMMI measures the behaviours that it claims to measure, and the package of play activities facilitates the development of the communication-related behaviours that it claims to facilitate.

6.4   CRITICAL REVIEW OF THE RESEARCH

Since all research results are determined by the theoretical foundations and the methodology (Leedy, 1993), a critical review of the whole research process is necessary.

-     A review of the literature from the fields of psychology, occupational therapy, psycholinguistics and speech-language pathology led to the development of a model for the development of adaptive communication behaviour. As this model identifies the four different domains of development as adaptation, it serves as a foundation for viewing childhood development holistically. The advantage of this view is that fragmentation is eliminated and a transdisciplinary approach advocated.

-     The operationalisation of abstract constructs and the identification of behaviour referents contribute to research and intervention in that observation of behaviour is measurable.

-     Bagnato *et al.* (1997) stress the importance of the development of corresponding measurement instruments and treatment programmes. This was done in this research in the development of the DMMI and the package of treatment activities.

- Numerous problems were, however, experienced in the selection of the sample for the experimental research. Although the sampling was criterion-based, it was once again not possible to select a homogeneous group, as the disabled population is heterogeneous. Logistical problems presented in that parents had to give their informed consent (which some withheld) and the experiment had to be fitted into one school term during summer. Furthermore, a large sample could not be included as each participant had to be treated each day during school hours in the intervention period. For the same logistical reasons a control group was not included in this study. This would have strengthened the research, as the influence of maturation could have been controlled.

- The implementation of different measurement instruments for determining convergent validity presented strengths and weaknesses. Multi-trait and multi-measurement strengthen the collection of reliable and valid data, but in this field measurement instruments differ and all of them have limitations. The DMMI and TPBA measure all the domains, while the SPS does not. Furthermore, the DMMI measures performance components, while the TPBA measures performance skills. A positive point, however, is that there were significant correlations between these measurements, which strengthens the findings.

- Another positive aspect is that the DMMI can be used for daily measurements. This contributes to clinical practice as small increments in improvement can be observed and communicated to parents in a transdisciplinary, community-based intervention approach.

- The research design further strengthened the reliability of the data collection procedures in that it rigorously controlled the influence of extraneous variables, but as the researcher, who had established a warm therapeutic relationship with the participants, was the only observer, the Hawthorne effect (Leedy, 1981) cannot be ruled out. The fact that two external observers rated the video recordings did, however, minimise this possibility.

- During all the different phases of the research intra-rater and inter-rater reliability, as well as face, content, construct and convergent validity were determined. This is regarded as a strength, as the efficacy of the play package could thus be established.

- It can be concluded that a valid and reliable play package has been developed, which can be used by caregivers and even parents in a community-based transdisciplinary approach.

6.5 RECOMMENDATIONS FOR FURTHER RESEARCH AND SERVICE DELIVERY

All research is cyclical and in this case further research questions arose which also need to be investigated.

- Although valuable information was gathered in the qualitative analysis of single-case and small group research data, it should be supported by replication of the research to collect more data about more subjects. Replication of this research is recommended.

- In this methodology the play activities during the intervention phase were presented in a set sequence. The question arose whether the sequence could have had an effect on the gains in behaviours. A valuable research contribution would be to change the sequence of presentation in order to determine the influence of the different components (activities) of the play package.

- As the play package is based on the normal developmental sequence, its effectiveness should be investigated when it is applied to other populations, such as the hearing impaired, the physically disabled, the severely disabled and even as enrichment for the environmentally disadvantaged.

- As it will be a major contribution to community-based service delivery it would be interesting to study whether this play package could be applied to small groups, instead of individually.

- As this play package was developed for transdisciplinary use it would be interesting to evaluate the outcomes when it is applied by the different transdisciplinary team members as well as other non-professionals, such as parents and caregivers.

- Although not strictly a research recommendation, a handbook, guidelines for the use of the DMMI and the play activities, as well as a video recording for training should be developed for this play package.

- Within a community-based transdisciplinary approach, effective service can be provided for many more disabled and disadvantaged children, especially in communities where professional services are not available.

- The play package provides a holistic treatment programme that can be implemented by transdisciplinary team members. This eliminates fragmentation of services as provided by specialist professionals.

- A training programme for non-professionals will have to be developed and presented.

- As the DMMI can be used to measure behaviour on a daily basis any changes can be reported and monitored, increasing the possibility for more accurate feedback and more scientific report writing.

6.6   CONCLUSION

Numerous recommendations have been put forward to improve service delivery in Third World countries. Price and Bochner propose that programmes should be based on behaviour modification, the enhancement of communication and training of caregivers (parents) through video recording teaching. They agree that "parents can be trained to take

the main facilitation role" (1991: 251). Furthermore, they state that communication cannot be taught, but should be facilitated, on condition that the programme style and steps are flexible enough to cater for individual differences.

It is anticipated that this play package satisfies these prescriptions to better the future of many disabled and disadvantaged children.

6.7 SUMMARY

In this chapter the conclusions are presented and defended, followed by an answer to the research question about the validity and efficacy of the measurement instrument and the treatment activities of the play package as a whole.

From the evaluation of the research it is evident that although valuable contributions were made, especially with regard to the implications for service delivery, there are still a number of issues that should be addressed in future research.

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BATTERY OPERATED TOYS
MATERIALS:

Toys:	Battery operated elephant, –car; and –worm
Switches:	Joy stick-, large pressure-, and small pressure switch.

Phase 1
Set criteria
- Understand basic instructions (verbal and demonstrations) how to do the activity
- Do basic movement to indicate active participation
- Visual focus (attention) on the activity for 75% of the time

1. "Look, this is an elephant." Guiding the child's eyes to the toy.
2. "I am going to make him dance."
3. Look, I am pushing the joystick
4. Therapist pushes the joystick to activate the toy.. Stop after 5 seconds. "Ooh, what happened?! The elephant danced!"
5. Repeat 3 times and then stop again.
6. "Do you want to play with the elephant?"
7. "Make the elephant dance!" Wait for a response.
8. If the child does not respond, hand-over-hand together push the joystick. Therapist says: "Push the stick to make the elephant dance."
9. Repeat until child grasps the rules and starts initiating switch activation.

Phase 2

What / How I probe	Child's response	Strategies
1. "Look, this is an elephant." Guiding the child's eyes to the toy. *Make the sign of the elephant.*	Attention	Guide eyes. Activation: tone of voice. Good positioning for eye control.

	What / How I probe	Child's response	Strategies
2.	"I am going to make him dance." *Therapist imitates dance with body language and make gesture for dance* "Can you dance?" Wait for response.	Attention	Activation: tone of voice, movement in horisontal plane, make eye contact. Commenting on 3D objects and concepts by indicating similarities and differences.
3.	"Look, I am pushing the joystick."	Visual tracking Cause-effect	Describing the actions. Activation: tone of voice. Initiating actions.
4.	Therapist pushes the joystick to activate the toy. Stop after 5 seconds. "Ooh, what happened?! The elephant danced!" *Therapist makes gesture for "What".*	Visual tracking and scanning Understand short sentence Attention Cause-effect	Surprise element. Multi-sensory media. Animation of the actions and objects. Incidental learning.
5.	Repeat 3 times and then stop again.		Repetition to learn to learn
6.	"Do you want to play with the elephant?"	Understand instructions Turn taking	Establish back and forth action. Maintain eye contact. Use simple/elementary sentences. Indirect teaching model.
7.	"Make the elephant dance!" *Make the sign for dance* Wait for a response.	Understand instructions Gross Co-ordination	Time delay. Requesting. Use simple sentences.
8.	If the child does not respond, prompt: hand-over-hand together push the joystick. "Push the stick to make the elephant dance."	Gross Co-ordination Visual tracking Cause-effect Understand instructions	Object interaction – allow manipulation. Physically holding the child. Feedback for cause-effect. Horisontral tracking. Auditory and/or visual cues. Mand-model

APPENDIX

What / How I probe	Child's response	Strategies
9. Model + pause + observe = until child starts initiating switch activation.	Gross Co-ordination Initiating Attention Request action	Repetition Mand-model Visual, auditory, gestural prompt → visual, auditory → auditory → exaggerate facial expression → no prompt
10. "What is the elephant doing? He claps his hands, like his………. (imitate clapping hands). Can you clap hands?	Imitation	
11. Give the C two options. The elephant on the joy stick switch and the car on the large pressure switch. Stop. "With which one do you want to play with, the elephant or the car?" "Do you want to play with the elephant?" – Point to the elephant, wait for yes/no response; "Or do you want to play with the car?" – Point to the car and wait for yes/no response. Wait for response. If C indicates preference to the elephant/car. "Yes, you would like to play with the elephant/car." Point to elephant/car (choice of the child). "This is an elephant." Activates the elephant. Look at his ears, nose, eyes, feet, drums." "This is a car." Activates the car. Look at the lights, wheels, and the man sitting inside."	Identify 3D objects/concepts Choice making Verbalisation Vocalisation Understand instructions Request for objects Co-ordination Indicate preference Maintain interaction Attention	Establish preference Feedback after choice making. Differentiating between objects/concepts. Repetition. Guide eyes to toys. Commenting on objects. Requesting. Time delay.

APPENDIX

What / How I probe	Child's response	Strategies
12. "Switch on the elephant/car." Wait for response. Prompt if no response. "Look what you have done! The elephant is dancing/the car is riding. That is good. You are doing great."	Co-ordination Grasp Reaching Maintain interaction Attention Visual tracking and scanning Cause-effect	Surprise element. Feedback.
13. "Listen, to the drums/song." Imitates the sound of the drums/song.	Auditory attention Imitation of sounds	Animation. Commenting on actions. Describing objects. Indirect teaching model.
14. Therapist takes child's hand away from switch. The elephant/car stops and sound stops. Wait for the C to respond (15 sec).	Initiating Request action/object Maintain interaction Co-ordination	Break in the routine. Time delay.
15. If the child does not respond, prompt. "Can you make the elephant dance/car ride?" Wait for response. Repeat 3x.	Understand instructions Initiating	Cues – gestural, vocalisation, verbal, visual. Time delay.
16. Switch the elephant/car on and make it ride behind a barrier. Stop and ask the child where it is. Repeat 3x during The session.	Object permanence	Request Comment
17. Play with the other toy, which child did not choose. Repeat naming of concepts on the different toys and show function of each e.g. turning the wheels on the bottom.	Identify 3D objects/concepts Visual tracking Vocalisation Verbalisation Attention Fine Co-ordination	Change auditory and visual cues. Animation. Incidental teaching. General statements. Commenting on objects. Encourage manipulation.

APPENDIX

What / How I probe	Child's response	Strategies
18. Unplug the switch. Child activates the switch and nothing happens. "What happened? What must I do?" Wait to see if C requests intervening. If not, indicate to the C what happened and explain why the toy is not working. Repeat whole scenario.	Request for action Cause-effect Problem solving Co-ordination	Present obstacle. Establish a routine. Break in the routine. Violate the routine. Repetition.
19. Present three toys to the child. Elephant, car and worm with joy stick, large and small pressure switches. Teach the child the names of the three objects and ask "With which toy do you want to play with?" Wait for child to indicate preference.	Choice making Vocalisation Verbalisation Identify 3D objects/concepts	Violate routine. Activation: Exploration.
20. Put the two objects in front of the child. "Can you first of all switch the elephant on, and then switch on the car." If child is successful, grade the same instruction to a 30-step instruction by including the third toy.	Understand 2 step instructions Understand 3 step instructions	
21. Repeat naming of concepts. Repeat identifying functional use of each.	Vocalisation Verbalisation Identify 3D objects/concepts	Identify 3D object/concepts. Animation. Physical touch.
22. Show a picture of each object and indicate the similarities between the picture and the object. Indicate the differences between each picture and object. Ask the child to match the object and the picture. "Show me, where is this (car's) picture? Point to the car and then sweep over all the pictures.	Matching 3D to 2D	Visual attention Learning principles of assimilation

APPENDIX

FINGER PAINT
MATERIALS:
Fingerpaint (red, blue, yellow), squirt bottles, mirror against the wall, shaving foam, cloth, towel

Phase 1

Set criteria
- Understand basic instructions (verbal and demonstrations) how to do the activity
- Do basic movement to indicate active participation
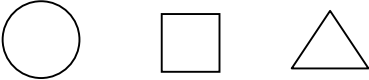- Visual focus (attention) on the activity for ¾ of the time

1. Look this is you in the mirror
2. Give me your hands / where is your hands?
3. Put some shaving foam on hands (Therapist's and child's)
4. Look I am painting on the mirror
5. Can you do the same?
6. If child does not respond, use hand-over-hand to teach the child the movements
7. T says: "Can you paint on the mirror?"
8. Repeat until the child grasps the rules and starts initiating the movements

Phase 2

What / How I probe	Child's response	Strategies
1. Child sits in front of a mirror that stands on the floor against a wall. "Look who is in the mirror (indicate to child in the mirror). It is _____ (child's name).	Recognise objects/body parts Visual tracking	Activation
2. We are going to paint with our hands. "Where are your hands?" If the child does not show hands, the therapist touches the child's hands and directs his gaze towards his hands.	Recognise objects/body parts Attention Visual tracking Gesture	Verbal, gestural cues Range of visual tracking

APPENDIX

What / How I probe	Child's response	Strategies
3. Therapist puts some shaving foam on the mirror. Take his hands and put them in the shaving foam. "Oh, this feels cold." Take hands away from mirror. "Look what you have on your hands. Let's cover the mirror." If child does not respond, take his hands and make circular actions on the mirror. Therapist takes her hands away. Wait for a response.	Imitation Gross co-ordination	Comment on action Moulding / Physical guidance Modelling – say the words Mand model
4. "Let us do it some more." Repeat. "Now it is your turn." Encourage any form of exploration. Hit the mirror and wait for imitation. Animate sounds with action: "clap, clap, clap."	Turn taking Imitation: Verbal & non-verbal	Shaping
5. "Hold out your hands." Wait for the C to respond or to hold his hands out for some more foam. If the child does not respond, assist him with action.	Initiate movement Gross co-ordination Understand instructions	Time delay
6. Therapist puts some foam on the mirror and squirts red, yellow *or* blue paint inside the blob of foam so that the child cannot see it. "There is some more foam, can you paint it over the mirror?"	Understand instructions Initiate movement	Mand model
7. Look what you have done! Gesture. Look at the colour. It is red. That is lovely. Can you draw this (Therapist makes squiggles in the foam) Wait for child's response and see if he will imitate the action. If no response takes child's hands and with child's fingers make patterns in the foam. Guide eyes and attention to mirror if there is a lapse in attention. "Look what you are doing, you are making patterns on the mirror."	Visual focus & tracking Attention Turn taking Emotional response Fine co-ordination Gross co-ordination Gestures 2-step instructions	Surprise element Sensory stimulation Exploration Requesting ▲ pathways Establish routine – break routine Obstacle Mand model

APPENDIX

What / How I probe	Child's response	Strategies
Therapist takes her hands away and waits for C to imitate. "Now it is your turn." Therapist draws squiggle. "This is a worm. Cover the mirror and draw a worm." If no response, assist with movement. Uses flat hands and individual fingers. "What are you drawing? You are drawing a worm. Let us make like a worm." Do the gesture of a worm.		
8. Therapist withholds shaving cream. Wait for a response. "What do you want? Do you want some shaving cream?" When the child indicates a form of request, provide him with the shaving cream.	Requesting	Provide inappropriate material Time delay
9. Introduce next colour. "We are now going to paint with the blue paint." Wait for child to respond to new situation. If he does not respond guide his attention to new situation. Repeat as described above. Repeat with yellow paint. Repeat verbal and non-verbal imitations. Show child the paint, do not unscrew the paint bottle top, show the child the bottle, wait for a request / problem solving skills.	Recognise concepts Visual focus & tracking Attention Turn taking Emotional response Fine co-ordination Problem solving Request	Joint action Surprise element Request
10. "With what colour do you want to paint now?" Therapist holds 2 colours for the child to choose from. Then therapist holds 3 colours for the child to choose from.	Choice making	Create preference Provide opportunities for choice making
11. Therapist takes paper towel and cleans a part of the mirror. "Who (gesture) is that in the mirror. Is it _____ (name of the child)." Therapist covers the mirror again with foam.	Object permanence Gestures Object recognition	

APPENDIX

What / How I probe	Child's response	Strategies
"Where is _____ (name of child)? " Wait for the child to react, if not, repeat action and teach child concept of object permanence. Grade from partially hidden to totally hidden.		
12. Therapist vocalises all actions child is doing. e.g. when child hits his hands on the mirror, the therapist should rhythmically imitate sounds with the child actions.	Imitation	Enhance by animation of sounds

13. Therapist covers the mirror. Draws a ball/circle.
  "This is a ball. Can you cover the mirror and draw a ball?"
  Therapist covers the mirror and wait for a response. If no response, assist movement (flat hand / individual finger).
  "What is this?"
 	
  ○   □   △
 	
  "Let us draw a circle". Therapist takes the child's hand and draws a circle.
  "Now it is your turn."
  Wait for the child to respond. If no response or incorrect response, repeat the action.
  Repeat this step with the other shapes as well.
	Object recognition
	Imitation
	Gesture
	2-step instructions
	Fine co-ordination
		▲ Pathways
		Animation
		Tone f voice

14. "Now we are finished. We are going to put everything away. Give me the paint, the foam and then clean your hands with the towel."	3 step instructions	

STORYTELLING
MATERIAL:
Truck, train, hand-puppet (doll), aeroplane, telephone, box.
Pictures of all of the above.

Phase 1

Set criteria

- Should show auditory attention (listening skills)
- Understand basic instructions (verbal and demonstrations)
- Functional object use of one of the objects presented
- Visual focus on the objects presented

1. "These are different toys that we are going to play with. Show me the car."
2. Wait for response to see if the child can identify the car.
3. "What can a car do? It can drive around. Can you drive the car?"
4. Therapist takes the car and drive in a large arc around the child.
5. "Look at the car. It is driving all around."
6. "Can you drive the car around?"
7. Wait for a response to see if the child knows the functional use of a car.

Phase 2

What / How I probe	Child's response	Strategies
1. *I am going to tell you a story about toys today. Do you know toys? This is a story about a train, a truck, a telephone, an aeroplane, and a doll (San).* Therapist shows the object as the words are spoken. Make the signs of train, car, aeroplane, and doll.	Attention Object recognition Gesture imitation	Guide eyes. Activation: tone of voice. Good positioning for eye control. Commenting on the 3D objects.
2. *One day the train was driving outside. Chooka, chooka, chooka.*	Visual focus & tracking	Guide eyes.

APPENDIX

Therapist pushes the train around in the child's visual field, imitating the sounds of the train. "What is this? What does the train do?" *Then the truck comes driving along and he does not look where he is going. Brmm, brmm, brmm.* "What is this? What does the truck do?" Therapist drives truck over child's body to get child's attention and down to the floor again. Therapist imitates the sounds of the truck.	Attention Object recognition Speech Imitation: verbal & non-verbal	Activation: tone of voice. Good positioning for eye control. Commenting on the 3D objects.
3. *The truck does not see the train in front of him. All of a sudden there is a big crash as the truck drives into the train. Caboom! The poor truck and train turned over.* Therapist acts scene out. *Oh, the poor train and truck. They both were hurt. What are we going to do?* Make the general sign of "What"	Gesture	Surprise element Gross coordination
4. *Just then the aeroplane came flying past. Eeoo, eeoo, eeoo. He sees that the train and the truck have been hurt.* Blow on the propeller. Therapist gets aeroplane out of box. Imitate the sounds of the aeroplane and flies with the plane in different planes "What is this? What does the aeroplane do?" Wait for response. If no response, teach the child to imitate to blow the propeller of the aeroplane.	Recognise objects Visual focus & tracking Imitate: verbal & non-verbal	Horizontal, vertical and diagonal planes Changing the speed of the flight from slow to fast Guide child's eyes to the aeroplane and accommodate speed according to the child's abilities Time delay
5. *Don't cry! I am going to help you. .* Gesture. *I know who to phone to come and help you. Let us phone San, (the doll).* Make the sign of "help". Therapist gets telephone out of the box, holds it to her ear and dials. Who is going to phone San? Are you or am I? It is your turn. Therapist holds the telephone to child's ear and assists him in dialling. *Hello, this is San speaking. Who's speaking?*	Surprise element Imitate gesture Imitate: verbal & non-verbal 2 step instruction Turn taking	Commenting on objects Describe action of the objects Animation

APPENDIX

Encourage the child to say his name. *My name is _____ .* *Hello, _____ . Why are you phoning? We have a problem. There was a big crash and the truck and train has been hurt. Could you please come and help us? Yes, I will come now.* Head nodding. *Bye-bye, _____ (child's name)* Gesture. Encourages child to say bye-bye to San. Repeat the same sequence and encourage child to use the phone in functional manner. Turn taking. Therapist puts the telephone back in to the box.		
6. Therapist puts on San, the hand puppet (outside the child's visual field). San jumps out of the box and tickles child. *Hello. What is your name?* Encourages child to say his name. Therapist can say it first and then child should imitate the name. *My name is _____ .* *Can you show me where truck and train is?* Gesture. Encourages child to tell San where the objects are. Guide child's eyes if he has difficulty in locating them. *Oh, poor truck and train. What is wrong with the truck, it is not working."* Take the wheels out, so it cannot roll. Wait for the child to identify the problem and see if he will try to fix it. *San picks up the train and the truck and puts the wheels on after the child identified the problem. That is better, now you can drive again.* *Bye-bye _____.* Gesture. Encourages to say/wave bye to San. Imitates first and waits for child to respond.	Imitation: verbal & non-verbal Verbalise Request object Problem solving Attention Understand short sentences Cause-effect Grasp and reach	Sensory stimulation Learning principles Reasoning Time delay Incidental teaching General statements
7. *Now the train and the truck are very tired, they want to go to bed.* Gesture sleep. *Say bye-bye train.* Gesture. *Chooka, chooka, chooka.* Use road map to drive to the garage. Therapist pushes train away and imitates sound and wait for child to	Imitation: verbal & non-verbal Attention Object permanence Verbalisation	Surprise element Present obstacle Request

respond. *Where is the train now*? Gesture. Child has to look for the train, if he cannot find it guide his eyes to where it is hidden. Repeat the same with the truck.	Co-ordination 2-step instructions Gesture Functional object use	
8. *Let's see what we played with today. We played with the train, the truck, the aeroplane, the telephone and the doll, San.* Therapist takes out pictures of all the objects used in the story and matches them with the real objects. Take one picture at a time and put it away when finished with it. Indicate to the child the similarities between the picture and the object and use the objects functionally again in order for the child to remember what happened in the story. Therapist still imitates words if the child needs some assistance. Therapist takes 2 pictures and the matching objects and asks the child to indicate the picture named by the Therapist. "Can you give me the _____, _____, _____." The child has to say bye to each picture after naming them correctly. Which one did you like best? Present all the objects and let child choose.	3-step instructions 3D – 2D match Object recognition Requesting Choice making	Surprise element Learning principles Commenting on objects Description of actions

POP-UP TOYS
MATERIALS: Jumping jack, piano with animals, non-slip mat

Phase 1

Set criteria
- Contingent reaction, start to grasp the concept of cause-effect with maximal guidance
- Visual tracking
- Understand basic instructions (verbal and demonstration) to do the activity

1.   "Look, this is Jack" Guide the child's eye to the toy.
2.   "I am going to put his away, he wants to sleep"
3.   Put the piano in front of the child.
4.   "Look, there are different animals sleeping in this house."
5.   Take the child's hand and press on one of the keys.
6.   "Look the dog came out to play with us."
7.   Therapist put the dog away.
8.   "Can you get the dog out of the house?"
9.   Wait for a response to see if the child will press one of the keys.
10.   After a response from the child the therapist says, "I am going to put them all away." Push the animals inside.
11.   "Give the toys to me, I want to put them aside."

Phase 2

What / How I probe	Child's response	Strategies
1. With which one do you want to play with? Would you like to play with this one - indicates the pop-up toy, or would you like to play with this one - indicates the Jumping Jack. Wait for child to make a choice and accept any form of indication. Put the other toy to the side.	Choice making Gesture – which	Establish preference
2. Jumping jack		

APPENDIX

What / How I probe	Child's response	Strategies
• Therapist presses down on lever and demonstrate. "Oooh surprise. Hello, my name is Jack. What is your name?" Wait for response. "Your name is _____." Encourage child to say his/her name.	Imitation verbal & non-verbal Cause-effect	Activation – surprise element Mand model Commenting on objects
• Jack wants to sleep. Gesture sleep. Let's put him back. Gesture "put back". Assist with closing the lid. "Bye bye Jack. Gesture wave. Wait for response before assisting with movement.	Imitation: Non-verbal & verbal Gesture – sleep, put back, bye bye Turn taking Gross co-ordination Imitation Cause-effect	Joint activation Gesture Animation
• Where is Jack? Let us call him. Wait for response. If C experience difficulty with speech, wait for request. Press lever to get jack out of box. What noise does Jack make. Press lever. "Oink, Oink." Can you make to same noise as Jack?	Imitation: verbal & non-verbal Gesture - Where Understand instructions Object permanence Cause-effect Request Problem solve Object recognition Request Fine co-ordination	Time delay Grade object permanence – child follows object till out of visual field Obstacle presentation Activation – animation & tone of voice
• Match 2D picture to the 3D object Show the picture of Jack and identify all the components of the picture. Ask child to indicate the object after presentation of one picture (Jack), then of two pictures (Jack and dog). Present the 3D object of "Jack" and ask the child to point to the correct picture.	Match 2D picture to 3D object	Indicate similarities and differences in picture and object Learning principles
• Repeat until child indicates that learning took place.		

What / How I probe	Child's response	Strategies
• Put Jack back. "Give Jack to me so that I can put him away."	2-step instructions	Gesture – put back
3. Piano with the animals		
• "Look here is a blue key, a red key, a yellow key"	Visual tracking	
• "What will happen if you press the keys?" Therapist presses one key while child is looking on. "Oooh, look it is a dog." Direct eyes to object. "What sound does a dog make? Woof, woof." Encourages child to imitate sound. "Put the dog away, say goodbye to the dog (wave)." Wait. If no response use hand-over-hand. "Who is going to sleep?" "Where is the dog? Can you find the dog?" Ask the child where the dog is. "Press the key." Demonstrate if necessary.	Speech Understand instructions Imitation: verbal & non-verbal Object permanence Gestures: sleep, who, what, dog, worm, bear, bye bye, Request Turn taking Cause-effect	Gesture Grade object permanence Activation – animation & tone of voice Mand model Requesting
• Present an obstacle by holding hand over the objects so it cannot jump up.	Problem solve Request	Obstacle presentation
• Repeat with each key. Bear – claw gesture (demonstrate) Worm -　　　　　　(demonstrate) Dog – ears flapping	Same as above	Same as above
• Match 2D picture to the object. Similar procedure as above. Let all the objects out. Ask the child to indicate the object after presentation of one picture (first dog, then worm, then bear)	Match 2D picture to 3D object	Indicate similarities and differences in picture and object
• Repeat the whole activity 3x.		
4. "With which one do you want to play with now?" After a choice has been made, follow the same instructions as above for each activity. Repeat 3x.	Choice making	

APPENDIX

SAND PLAY
MATERIALS:
Sandpit, bucket and spade, cups, plastic animal (dog & bird), sieve, sand wheel

Phase 1

Set criteria
- Understand basic instructions (verbal & demonstrations) to do the activity
- Contingent reaction, start to grasp the concept of cause-effect
- Functional object use of one object

1. "We have a lot of toys here today. This is a cup and we scoop the sand with it. Then we pour the sand."
2. "Can you do that. Here is a cup for you." Therapist demonstrates again while the child is following her lead.
3. Repeat this until you observe that the child understands the concept.

Phase 2

What / How I probe	Child's response	Strategies
1. "What is this? This is your foot." Cover the child's feet. "Where are your feet?" Wait for a response before assisting in uncovering feet. Repeat with hands.	Object permanence Object recognition Visual tracking Attention	Grade object permanence • going out of visual field • partially hidden • totally hidden
2. "Look, this is a dog. What sound does a dog make?" Give gesture of dog. Imitate the sound. "Woof, woof" Dog walks up the child's arm while imitating the sound. "What is this?" Encourage child to say "dog". Repeat if no response.	Object recognition Speech Gesture	Activation • animation • tone of voice • physical contact Mand model Comment on objects

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3. Repeat the same steps with "the bird".		
4. Hide the dog partially in the sand. "What is hiding here?" Guide the child eyes to the object. Help to uncover the animal. Repeat with bird.	Object permanence Problem solving Visual tracking Speech	Grade object permanence
5. Put the dog in the sieve. Cover with sand. "Where is the dog? Shake the sieve!" Can use hand-over-hand if child does not imitate. "Look what happens! The sand falls through the holes. Here is the _____." "Here is a bird. The sound of a bird is "tweet-tweet". Do you want to hide the dog or the bird?" "What is this, What sound does it make? Repeat with both animals. Repeat 3x.	Imitation: verbal & non-verbal Object recognition Object permanence	Joint action Activation Comment on objects Comment on actions Mand model
6. Hide the dog and the bird in the sand. "Find the animals." Wait until both animals were retrieved. "Put the dog in the bucket and give the bird to me." Repeat 3x.	1-2-step instructions Object permanence	Time delay
7. "Let us play with the sand wheel. " Identify the sand wheel. "Look the sand wheel can spin." Demonstrate. "Can you make the wheel turn?" Wait for response before hand-over-hand approach. Repeat 3x.	Object recognition Imitate Gross co-ordination Visual tracking	Comment on objects Comment on actions Mand model Time delay Activation

APPENDIX

8. "Where is the cup?" Wait for response. If the child cannot identify the cup, teach the child the elements of a cup and its functional use. "Look what we do with the cup." Scoop sand into the sand wheel to make it turn. "Ooh, the wheel is turning!" Wait for response. "Can you do the same?" Facilitate turn-taking Break the routine. Put your hand over the lid. Wait for request. Repeat 3x.	Object recognition Functional object use Imitation Turn taking Requesting Visual tracking	Activation - Surprise element Joint action Present obstacle Comment on action ▲ pathways
9. When the bucket is full, demonstrate how to empty the bucket Repeat but wait for the child to empty the bucket.	Imitation	
10. "We are now finished." "Put the dog in the bucket, close the lid, and give it to me."	3-step instructions	

Symbolic Play Scale Check List

Scoring sheet

Name of child _____   **Date _____**

Stage		Play	Language
Stage 1	9 – 12 m		
Stage 2	13 – 17 m		
Stage 3	17 – 19 m		
Stage 4	19 – 22 m		
Stage 5	22 – 24 m		
Stage 6	2½ years		
Stage 7	3 years		
Stage 8	3 - 3½ yrs		
Stage 9	3½ - 4 yrs		
Stage 10	4 – 5 yrs		

Symbolic Play Scale Check List

Westby, C

PLAY		LANGUAGE	
Stage I – 9 to 12 months			
❋ Awareness that objects exist when not seen: finds toy hidden under scarf. ❋ Means-end behaviour – crawls or walks to get what he wants: pulls string toys. ❋ Does not mouth or bang all toys – some used appropriately.		❋ No true language: may have performative [words, words that are associated with actions or the total situation] Exhibits following communicative functions: ❋ Request [instrumental] Command [regulatory]	
Stage II – 13 to 17 months			
❋ Purposeful exploration of toys: discovers operation of toys through trial and error: uses variety of motoric schemas. ❋ Hands toys to adult if unable to operate.		❋ Context dependent single words, for example, child may use the word "car" when riding in a car, but nor when he sees a car: words tend to come and go in child's vocabulary Exhibits following communicative functions: - Request - Protesting - Command - Label - Interactional - Response - Personal - Greeting	
Stage III – 17 to 19 months			
❋ Autosymbolic play, for example, child pretends to go to sleep or pretends to drink from cup or eat from spoon. ❋ Uses most common objects and toys appropriately. ❋ Tool-use [uses stick to reach toy]. ❋ Finds toys invisibly hidden [when placed in box and box emptied under scarf]		Beginning of true verbal communication. Words have following functional and semantic relations. - Recurrence - Agent - Existence - Object - Denial- Non-existence - Rejection - Location - Action or state - Object or person associated with object or location	
Stage IV – 19 to 22 months			
Symbolic play extends beyond the child's self: ❋ Play with dolls: brushes doll's hair, feeds doll a bottle, or covers doll with blanket. ❋ child performs pretend activities on more than one person or object: for example, feeds self, a doll, mother, and another child. ❋ combines two toys in pretend play, for example, puts spoon in pan or pours from pot into cup.		❋ Refers to objects and persons not present. Beginning of word combinations with following semantic relations. - Agent-action - Action-locative - Action-object - Object-locative - Agent-object - Possessive - Attributive - Dative	

PLAY		LANGUAGE	
Stage V – 24 months			
❊ Represents daily experiences: plays house – is the mommy, daddy or baby: objects used are realistic and close to life size. ❊ Events short and isolated; no true sequences: some self-limiting sequences – puts food in pan, stirs and eats. ❊ Block play consists of stacking and knocking down. ❊ Sand and water play consist of filling, pouring and dumping.		❊ Uses earlier pragmatic functions and semantic relations in phrases and short sentences. The following morphological markers appear: - Present progressive [ing] on verbs - Plurals - Possessives	
Stage VI - 2½ years			

❊ Represents events less frequently experienced or observed, particularly impressive or traumatic events.
 	
❊ - Doctor-nurse-sick child
  - Teacher-child
  - Store-shopping
 	
❊ Events still short and isolated. Realistic props still required. Roles shift quickly.
		Responds appropriately to the following WH questions in context:
		- What - Who - Whose
		- Where - What
		❊ Asks WH questions – generally puts WH at beginning of sentence.
		❊ Responses to why questions inappropriate except for well-known routines, such as, "Why is the doctor here?" …."Baby sick."
		Asks why, but often inappropriate and does not attend to answer.	

Stage VII – 3 years			
❊ Continues pretend activities of Stages V and VI, but now the play has a sequence. Events are not isolated, for example, child mixes cake, bakes it, serves it, washes the dishes: or doctor checks patient: calls ambulance, takes patient to hospital and operates. Sequence evolves … not planned. ❊ Compensatory toy … re-enactment of experienced events with new outcomes. ❊ Associative play.		❊ Uses past tense, such as "I ate the cake …. I walked." ❊ Uses future aspect [particularly "gonna"] forms, such as, "I'm gonna wash dishes."	
Stage VIII – 3 to 3½ years			
❊ Carries out play activities of previous stages with a doll house and Fisher-Price toys [barn, garage, airport, village] ❊ Uses blocks and sandbox for imaginative play. Blocks used primarily as enclosures [fences and houses, for animals and dolls]. ❊ Play not totally stimulus bound. Child uses one object to represent another. ❊ Uses doll or puppet as participant in play.		Descriptive vocabulary expands as child becomes more aware of perceptual attributes. Uses terms for the following concepts [not always correctly]: - shapes, sizes, colors, texture, spatial relationships ❊ Gives dialogue to puppets and dolls ❊ Meta-linguistic language use, such as, "He said.." ❊ Uses indirect requests, such as, "Mommy lets me have cookies for breakfast." Changes speech depending on listener.	

PLAY		LANGUAGE	
Stage IX - 3½ to 4 years			
❋ Begins to problem-solve events not experienced. Plans ahead. Hypothesizes "what would happen if …". ❋ Uses dolls and puppets to act out scenes. ❋ Builds 3-dimensional structures with blocks which are attempts at reproducing specific structures child has seen.		Verbalizes intentions and possible future events: ❋ Uses modals [can, may, might, will, would, could]. ❋ Uses conjunctions [and, but, if, so, because] Note: Full competence for these modals and conjunctions does not develop until 10-12 years of age. Begins to respond appropriately to why and how questions that require reasoning about perception.	
Stage X – 5 years			
❋ Plans a sequence of pretend events. Organizes what he needs – both objects and other children. ❋ Co-ordinates more than one event at a time. ❋ Highly imaginative. Sets the scene without realistic props. ❋ Full co-operative play.		Uses relational terms [then, when, first, next, last, while, before, after]. Note: Full competence does not develop until 10-12 years of age.	

INCLUSION POLICY OF ALMA SCHOOL

1.   To be accepted in Alma School, a leaner must comply to the following:

    1.1   Comply with age requirements as established by the Department of Education of the Gauteng Province.

    1.2   Primarily be classified with intellectually impaired and cerebral palsy.

    1.3   To be able to communicate sensibly at the time of admission, or shows the latent ability to communicate with the aid of specialised education programmes to make basic needs known and to understand and execute instructions. (e.g. to be able to respond to his/her name).

    1.4   To be educated in English or Afrikaans.

    1.5   Not older than 15 (fifteen) years on fist admission into LSEN schools.

    1.6   No indication of psychiatric conditions.

    1.7   To be orientated towards himself/herself as well as the environment.

    1.8   To be able to make eye contact, even if only fleeting due to physical conditions.

    1.9   The learner's behaviour should not be disruptive in the classroom (e.g. aggression).

    1.10   The child with severe disabilities may be accepted if he/she has enough head control to maintain a functional position for a whole school day, and in which the child could be fed in an upright position.

    1.11   The learner should have the potential to benefit from the school's stimulation- and perceptual programme as well as the Adapted Curriculum 2005.

2.   Learners could be admitted temporarily: -

    2.1   For a time of probation of one term.

    2.2   Until the learner does not comply with the above-mentioned criteria.

    2.3   Until the learner no longer benefits from the school programme any more.

3.   Parents applying for their child should supply the school with: -

     3.1   A certified copy of the child's birth certificate

     3.2   A certified copy of the child's immunisation for polio, measles, tuberculoses.

4.   The admission to the school is liable and in agreement with the Regulations with regard to the admission of Learners to Public schools, Law on School Education, 1995 (Law no. 6 of 1995) published on 4/38 of 2001.

MULTIPLE MEASUREMENT DAILY EVALUATION FORM   **APPENDIX D**

ACTIVITY:		SUBJECT:			DATE:	
	Functional outcome	**0**	**1**	**2**	**3**	**N/A**
Sensorimotor	Visual tracking	Able to focus on an object	Able to scan between two objects	Visually tracks an objects in middle visual range	Visually tracks an object through 180° without losing the object	
	Imitation (non-verbal)	No response to imitate a movement	Awareness to imitate a movement but cannot plan the action	Tries to imitate the movements but are not always successful	Is successful in imitation of all movements	
	Gross co-ordination	Swipes at an object, reaching for but may not contact object	Visually directed reach, tends be clumsy	Satisfactory: can perform task but lacks skill and comfort	Smooth, accurate movements	
	Fine co-ordination	Great difficulty in manipulating tools and materials	Frequent trouble with fine detail and accurate manipulation of tools and materials	Occasionally has trouble with accurate and smooth movement in manipulating tools and materials.	No problems with fine movements and manipulations tools and materials.	
Cognitive	Attention (15 min session)	Lack of attention 10 min+	Lack of attention for 7-8 min	Lack of attention for 4 min	No difficulty to pay attention during the full session of 15 minutes	
	Object permanence	No object permanence	Searches for an object that moves out of visual field	Searches for a partially hidden object	Searches for hidden object	
	Object recognition	Does not identify any object on request during the activity	Identifies one object on request during the activity	Identifies two objects on request during the activity	Identifies four objects on request during the activity	
	Matching objects and 2 D pictures	No attempt to match	Matches 1 object to corresponding picture	Matches 2-3 objects with corresponding pictures	Matches four objects with corresponding pictures	
	Functional object use	Does not know the functional use of any object used in the activity	Knows the functional use of one object used in the activity	Knows the functional use of two objects used in the activity	Knows the functional use of four objects used in the activity	
	Problem-solving	Unable to recognise and solve a problem	Recognises a problem but cannot solve it	Solves a problem after repeated instruction	Solves a problem without assistance	
	Cause and effect	No cause-effect demonstrated	Unintentional demonstration of cause-effect with a subsequent awareness of own actions	Demonstrates cause-effect only 50% of the time	Understands the concept of cause-effect	

Communication	Understands instructions	Unable to understand any form of instruction	Able to follow a 1-step instruction	Able to follow a 2-step instruction	Able to follow a 3-step verbal instruction	
	Choice-making	No attempt to make a choice	Recognises that there are different objects to choose from	Able to make a choice with a lot of encouragement	Able to make a choice independently	
	Requests	No attempt to request anything during the session	Requests in a non-verbal manner (by using gestures)	Requests in non-verbal manner + vocalisation	Requests in verbally	
	Level of prompting (cues) needed	Needs constant verbal, gestural, physical and visual prompt	Needs verbal and/or gestural prompt	Needs physical and/or visual prompt	Needs no prompt	
	Uses gestures as means of communication	Uses no gestures	Uses some natural gestures but it is inconsistent	Uses a little variety of gestures	Uses gestures consistently and accurately	
	Vocalisation	No vocalisation	Little variety of vocalisation but it does not correspond to the activity	Uses a variety of vocalisations with inconsistent correlation to the activity	Uses a variety of vocalisations with consistent correlation to the activity	
	Verbalisation	Uses no recognisable words during the session	Uses single words during the session appropriate to the activity	Uses short sentences during the session appropriate to the activity	Uses complex sentences during the session appropriate to the activity	
Socio-Emotional	Turn-taking	Does not initiate turn-taking	Takes turns infrequently	Takes turns frequently	Initiates give and take turns with partner	
	Indicates enjoyment	Shows no emotional response	Smiles at actions of objects and people, uncontrolled	Laughs at events that deviate sharply from everyday experiences	Shows varied emotional responses appropriate to the situation	
	Interpersonal contact	Not aware of other people in the close surroundings	Fleeting awareness of other people in the close surroundings, makes eye contact	Greets partner, but does not maintain the interest	Interested in other people and responds to them in a appropriate manner	
	Participation	No volition to participate	Participates in destructive manner	Participates in explorative manner	Participates in constructive manner	

DAILY MULTIPLE MEASUREMENT INSTRUMENT
APPENDIX E

Instructions:
1. Watch the whole video clip of the child interacting with the play activity.
2. Select the most advanced developmental behaviour according to complexity.
3. Then rate *that* behaviour according to the frequency it occurred during the session.
4. If a 1 is scored on the complexity, a 1 should always be scored on frequency.

Subject no: _____
Week: _____
Activity no: _____
2nd : _____

Item	Complexity	Frequency			
		Rarely	Sometimes	Mostly	Always
1. Visual tracking	1 No tracking				
	2 Tracks an object in mid-range, but looses it				
	3 Tracks an object in mid-range, without loss	1	2	3	4
	4 Tracks an object without loss				
2. Imitation of movement	1 No imitation of movements				
	2 Tries to imitates simple movements, but is unsuccessful				
	3 Imitates simple movements	1	2	3	4
	4 Imitates complex movements successfully				
3. Gross co-ordination	1 Swiping movements				
	2 Clumsy, awkward, unsuccessful movements				
	3 Inconsistent accuracy of movement	1	2	3	4
	4 Smooth, accurate movements				
4. Manipulation of tools and material	1 Unable to manipulate small tools and material				
	2 Poor, inaccurate movements				
	3 Slow and inconsistent accuracy	1	2	3	4
	4 Smooth, accurate movements				
5. Attention	1 No focus to attend				
	2 Attend for 1-2 minutes				
	3 Attend for 3-5 minutes	1	2	3	4
	4 Attend for 6-10 minutes				
6. Object permanence	1 No object permanence				
	2 Search for object it moved out of visual field				
	3 Search for partially hidden object	1	2	3	4
	4 Search for fully hidden object				
7. Object recognition	1 No identification of objects				
	2 Identifies some objects				
	3 Identifies most objects	1	2	3	4
	4 Identifies all objects				
8. Matching objects and pictures	1 No attempt to match objects and pictures				
	2 Make some attempt to match but is unsuccessful				
	3 Match some objects with pictures	1	2	3	4
	4 Match all objects with pictures				
9. Functional object use	1 No functional object use				
	2 Functional use of some objects				
	3 Functional use of most objects	1	2	3	4
	4 Functional use of all objects				
10. Problem-solving	1 Does not solve a problem				
	2 Pausing, indicating awareness of problem				
	3 Solves a simple problem	1	2	3	4
	4 Solves a complex problem				

Item	Complexity	Frequency			
		Rarely	Sometimes	Mostly	Always
11. Cause and effect	1 No cause and effect demonstrated				
	2 Coincidental causing, but no recognition of the effect				
	3 Show cause and effect behaviour after demonstration	1	2	3	4
	4 Shows cause and effect without demonstration				
12. Follow verbal instructions	1 Follows no instructions				
	2 Follows 1-step instructions				
	3 Follows 2-step instructions	1	2	3	4
	4 Follows 3-step instructions				
13. Choice-making	1 No choice making				
	2 Choose between 2 objects				
	3 Choose between 3 objects	1	2	3	4
	4 Choose between 4 objects				
14. Request	1 No request indicated				
	2 Request through visual focus				
	3 Request through gestures	1	2	3	4
	4 Request through verbalisation				
15. Use of gestures as means of communication	1 No gestures used				
	2 Uses natural gestures, but some may be still inaccurate				
	3 Uses natural gestures accurately	1	2	3	4
	4 Uses simple gestures accurately				
16. Vocalisation	1 No vocalisations				
	2 Single, monotone vocalisations				
	3 Intonational differences in vocalisations	1	2	3	4
	4 Variety of vocalisations				
17. Clarity of speech	1 No spoken words				
	2 Jargon				
	3 Speech, but articulation is mostly unintelligible	1	2	3	4
	4 Intelligible speech, may have some articulation errors				
18. Complex sentence use	1 No sentence use				
	2 Uses 1-word sentences				
	3 Uses 2-word sentences	1	2	3	4
	4 Uses complex sentences				
19. Turn-taking	1 No non-verbal turn taking				
	2 Recognises partner and responds to "give" and "take" concepts				
	3 Initiate turn taking	1	2	3	4
	4 Maintains appropriate turn taking				
20. Enjoyment	1 No enjoyment indicated				
	2 Basic and short duration				
	3 Variety of basic reactions, short duration	1	2	3	4
	4 Variety of emotional reactions, intensive, long duration				
21. Participation	1 No participation				
	2 Participates in destructive manner				
	3 Participates in explorative trial and error manner	1	2	3	4
	4 Participates mostly in constructive manner				

TRANSDISCIPLINARY PLAY-BASED ASSESSMENT **APPENDIX F**
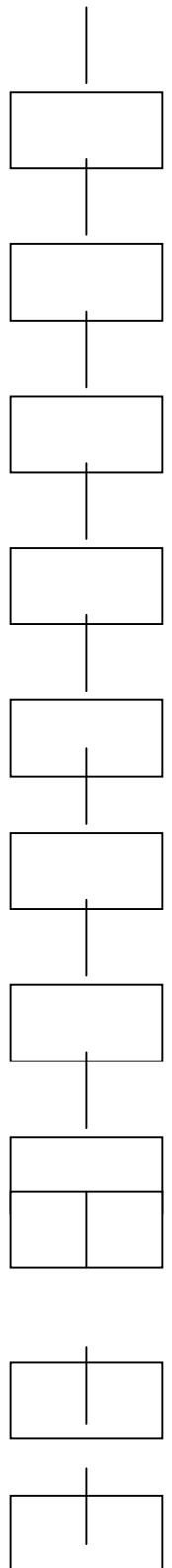
Subject	V1					1
Week	V2					2
Cognitive development						
Categories of play	V3					3
Attention span	V4					4 – 7
Early object use	V5					8
Symbolic and representational skills	V6					9
Imitation skills	V7					10
Problem-solving skills	V8					11
Discrimination/Classification skills	V9					12
One-to-one correspondence	V10					13
Sequencing abilities	V11					14
Drawing skills	V12					15
Social-emotional development						
Mastery motivation	V13					16
Development of humor	V14					17
Social relations with peers	V15					18
Communication and language dev						
Development of intentionality	V16					19
Expressions of communicative inten						
Attention seeking	V17					20
Request objects	V18					21
Request action	V19					22
Request information	V20					23
Protest	V21					24
Comment on objects	V22					25
Comment on action	V23					26
Greeting	V24					27
Answering	V25					28
Acknowledgement of other's speech	V26					29
Other	V27					30
Discourse skills	V28					31
Articulation	V29					32
Semantic knowledge levels reflected in words	V30					33
Language comprehension	V31					34
Development of speech and sound production	V32					35
Sensorimotor development						
Mobility in standing	V33					36
Jumping	V34					37
Development of climbing	V35					38
Development of ball skills	V36					39
Development of grasp	V37					40
Development of manipulation prehension	V38					41

Appendix

Tel: (012) 3297800
Fax: (012) 3297800

INFORMED CONSENT

1   ACKNOWLEDGEMENT THAT STUDY INVOLVES RESEARCH

I, _____ willingly agree to let my child
participate in this study which has been explained to me. The information obtained
from this research will form part of a doctoral thesis.

2   PURPOSE OF THE STUDY

It is a well known fact that children learn through play. Children with impairments
have limited opportunities and access to play, which influences the development of
communication skills. The purpose to this study is to establish the nature of changes
that occur in communication-related skills during exposure to specific play activities.
In order to identify and describe these changes children have to be exposed to
specifically developed play activities and carefully observed and documented.

3   DESCRIPTION OF PROCEDURES

a)   The play package consists of five (5) activities and the researcher will engage
         each child individually with each of these five activities.
b)   Each activity will be presented to the child for 15 minutes.
c)   Each session will be video-taped for the researcher to closely evaluate
         communication-related skills after the session, as it is too difficult for one
         person to do the activity and to assess at the same time.
d)   This information will be analysed to establish validity of the different activities
         in the play package.

PROGRAMME

It is very important that the children attend school every day for the month of
November as absenteeism could influence the child's progress as well as the results of
the research. Parents are urgently requested to assist in this regard.

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4   SELECTION OF CHILDREN
Your child was specially selected for this research by the occupational therapist of the school, Mrs Elna Griesel, due to your child's co-operative manner. It would be a pleasure to incorporate your child in this group.

5   RISK OR DISCOMFORT
There is no risk or discomfort for the children who participate in this research. Children love to play and they experience the sessions as fun where they can participate in activities while experiencing success.

6   CONTACT PERSON
Kitty Uys, Department of Occupational Therapy, University of Pretoria.
Tel no: (W)   (012) 354 6040
(Cell)   082 4932014

7   BENEFITS OF THE STUDY
The contribution of this research is of academic, clinical and educational value. There is a lack of manpower in the rehabilitation services and professional rehabilitation personnel will need to be trained in more transdisciplinary approaches, where the different professions need to collaborate more. This includes the training of caregivers as members of the intervention teams, by providing them with knowledge and skills in the application of play packages, which may be effectively used to stimulate development in children with special needs. It is intended to make this play package available to caregivers in developing communities, where rehabilitation services are not readily available, to be used with children with special needs.

8   VOLUNTARY PARTICIPATION
Participation is voluntary and no compensation will be given. You are free to withdraw your consent for your child to participate in this research at any time without prejudice to your child's subsequent care.

9   CONFIDENTIALITY
All records of this study will be kept confidential and when data will be explained in the thesis, no names of the children will be used. Video material that protects your child's identity may be used for training purposes as well as at professional congresses.

Address: _____

Telephone number: (H) _____ (W) _____

I have read all of the above, and willingly give my consent to participate in this programme. Upon signing this form, I will receive a copy.

PARENT

NAME: _____

SIGNATURE: _____ DATE: _____

RESEARCHER

NAME: _____

SIGNATURE: _____ DATE: _____

WITNESS NO 1

NAME: _____

SIGNATURE: _____ DATE: _____

WITNESS NO 2

NAME: _____

SIGNATURE: _____ DATE: _____

_____