

## DEVELOPMENTAL COMPETENCE IN CHILDREN WITH DOWN SYNDROME: A TWO PART STUDY

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### Introduction

Until recently persons with Down Syndrome were routinely institutionalised and their levels of social and intellectual attainment deemed to be severely retarded. The medical/psychological focus with little educational emphasis largely concentrated on the importance of biological factors in determining and limiting intellectual capacity. The movement of such individuals into the community (deinstitutionalisation) and the now more usual care and nurture of such children within their families has changed this picture in two major ways. First, advances in medical science have enabled persons with Down Syndrome to live longer and healthier lives, and secondly, what was once thought of as an immutable condition of fixed retardation, is now known to have been an often drastic limitation of the activities and potential of such individuals, resulting

in an unjustified emphasis on care, protection and the development of social skills.

It is in this atmosphere of new possibilities that research studies aimed at more accurately characterising the precise developmental delays and strengths associated with Down Syndrome serve a more crucial role (Hayden and McGinnes, 1977; Pessione and Pessione, 1988<sup>1</sup>). Early studies of young children with Down Syndrome reared at home without early intervention services provided significant "normative" data on the achievement of specific developmental milestones (Carr, 1975). Research studies published in the last ten years (Champion, 1982; Rietveld, 1986; Rietveld, 1989<sup>2</sup>, unpublished manuscript; Wishart, 1988; Rietveld, 1990<sup>3</sup>, unpublished manuscript) are beginning to specify the precise developmental problems encountered by children with Down Syndrome when they are reared under the best and the most enriched

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home environments, rather than the worst conditions. Champion (1987) described the enhanced developmental outcome for a group of children born with Down Syndrome who together with their parents participated in an early intervention programme between 0-2 years of age. The programme was designed to incorporate the theoretical concepts described by Bronfenbrenner (1979), in particular the importance of context and specifically that of the ecological (the evolving process of organism - environment interaction) interactive frameworks in which developing children live and grow. This way of viewing the development of infants with disabilities had not been previously described in the literature. Although to date the variety and diversity of early intervention programmes continues to provide difficulties with evaluation, where data is available positive effects of early intervention have been found (Meisels *et al.*, 1993).

We know that all development involves an interaction between genetic make-up and the physical, psychological environment in which that child grows up. However, few studies have examined the likely attainments in the area of academic skills of children with Down Syndrome (Buckley, 1985; Hartley, 1986; Stratford, 1985). Clunies-Ross (1986) quotes the existing literature review of Rynders *et al.*, who "conclude that serious methodological flaws in a large number of studies on the development of persons with Down's Syndrome have resulted in educational capabilities of such children being severely underestimated" (p.167). It seems essential that children with Down Syndrome who will

now live and receive their education within mainstream settings should be equipped with a wide range of competencies which will be useful in community integration. Communication skills are critical to the development of the human organism. All children need to be able to interact with others, request help and to express their emotions and desires in order to understand their world better (Rondal, 1988). Much has been written on the expressive language of children with Down Syndrome (Bricker and Carlson, 1981; Cardoso-Martins *et al.*, 1985; Howlin and Rutter, 1987; Pruess *et al.*, 1987) but very little on the receptive and conceptual. Language is the most common and possibly the most significant symbol system children use as it allows the capacity for representing experience.

The development of language is considered to be based on the interdependence of cognitive, affective, social and linguistic processes (Anderson and Coleman, 1980). Bricker and Carlson (1981) state that there is a growing consensus that development proceeds in hierarchical patterns that may be separate processes or domains of behaviour but are so interrelated in the young child as to be functionally inseparable. It is generally accepted that although thought processes can proceed without the development of spoken language there is evidence that the linking depends on some sort of symbolic processing (Locke, 1985).

In the language development of children with Down Syndrome the issue of "delay" or "difference" remains unresolved although Rondal (1988) in reviewing the evidence of language delays

in children with Down Syndrome states that the known differences between children with Down Syndrome and other children with regard to the delayed development of the use of referential eye contact may be detrimental to the early cognitive basis of language acquisition. Such delays possibly involve both maturational and psychological processes and as such influence the nature of more mature forms of understanding and communication.

In the early stages of language development verbal comprehension is considered to be prerequisite to verbal expression (Rutter, 1987). Expressive language can be thought of as growing in relation to a child's ability to understand concepts. In any communicative exchange, meaning and the child's use of concepts is realised and conveyed through both the structural and sound patterns of language.

It is generally observed that children understand words long before they can produce them. Clark (1983) argues that the processes of comprehension and production are different. In production the child knows the concept he/she wants to use and engages in a memory search process to seek the best words, whereas in comprehension the reverse applies and a child must recognise the word he/she hears and in turn identify the conceptual category to which it refers. Both are necessary for language development.

It is argued (Bilken, 1985; Ballard, 1988) that as mainstreaming is essentially an issue of values and basic human rights, the community as a whole has an obligation to ensure equality of opportunity for the development of potential for children with Down

Syndrome within optimal contexts for learning. It must be acknowledged that "the conclusion to be drawn from the educational/psychological literature on Down Syndrome is that the educational and developmental capabilities of children with this condition are not known and that further research on curriculum design and instruction is required to determine the optimal educational strategies that need to be available for children with Down Syndrome in regular schools" (Clunies-Ross, 1986, p.169). However, studies suggest (Willer and Intagliata, 1981; Hirst, 1983) that well developed abilities in the area of communication and social skills are key factors in the subsequent levels of adult functioning. The current literature continues to examine the relationships between the early development of competencies and those which may be precursors to later competencies (Spiker, 1990).

The present two part study evaluated the abilities of three different age groups of children with Down Syndrome, all raised under more appropriate, stimulating and educationally challenging conditions than in the past. All subjects together with their parents/caregivers had been in the Champion early intervention programme between birth and 5.5 years of age.

The first part of this study attempted to sample the language concepts of children with Down syndrome in order to quantify the basis of their understanding on which expressive language might be subsequently built. Pre-school children with Down Syndrome who lack age-appropriate expressive speech are developmentally at risk in that children

and adults who commonly interact with them will assume a level of understanding based on output and speech production rather than a perhaps silent knowledge base of a considerably more mature conceptual function. Although children with Down Syndrome may have little or no expressive language at age of school entry (5-6 years) it seems important to attempt to quantify their understanding of language concepts. These will form the basis of the "building blocks" of later largely verbal school based competencies.

The second part of the study evaluated school related competencies in two further groups 5-7 and 8-10 year olds with Down Syndrome. These children were part of the Champion (1987) study. The assessment of competence in the school curriculum necessarily involves increasing language understanding and expression by children across a number of domains, for example academic tasks, self-help skills, social development (interactive play) and physical abilities (using outdoor play equipment). It seems important to investigate the underlying conceptual understandings of a group of pre-school children with Down Syndrome together with the measurement of broader based school competencies which will involve conceptual understandings in an older group of children with Down Syndrome.

## **Study 1: Method**

### *Subjects*

Subjects were ten children with Down Syndrome, five girls and five boys

(mean age 3.7) who were recruited as part of a growth study (Murdoch, in progress)<sup>4</sup> based at the Otago School of Medicine. The children's parents gave permission for the language assessment to be undertaken in conjunction with the medical study. Subjects represented all children with Down Syndrome aged between 3-5 in their two cities.

### *Procedure*

The language assessment tasks were developed by the first author as no appropriate standardised measures of language comprehension were available. A qualified independent researcher was employed to undertake the assessment task. Thirty-eight common objects, for example cup, banana, ball were selected from the items used in the language programme (Locke, 1985) for children of the same age. The pictures were coloured, clearly defined and had no background detail. The size was 17.5 cm by 10 cm. The assessment involved two parts, first, recognition and comprehension of the word as an indication of representational thought and secondly, matching of "same on same" when two tasks of increasing difficulty were presented. The first matching task involved matching two pictures given by name one at a time from a choice of three placed in front of the child. The second task involved the same process with a six piece set.

Each child was individually interviewed, the session was not timed, and a period of "warm up" was spent before the assessment began. Each child was required to indicate either by pointing,

picking up and/or verbalising that they knew the name of the object when it was placed randomly in a line of three. All nouns were sampled in combination with two different pictures. Three trials were conducted prior to the assessment to establish that the child understood the nature of the task and was familiar with the request of the researcher, for example, "show me", "find the", "where's the".

## Results

FIGURE 1 presents the percentage of objects each child was able to correctly identify. The raw scores were 22, 24, 28, 29, 35, 36 and 38. The last was scored by four children and represents 100%. Five of the ten children scored 95% or above.

The assessment time for subjects 4, 5 and 6 coincided with major problems of non-compliance for subject 4 and middle ear and upper respiratory infections for both subjects 5 and 6.

In the matching section (FIGURE 2) five of the children were able successfully to select and match a six piece set of pictures of common nouns. Three out of 10 completed some of the matching (two matched 3/6 items and one 2/6 items) and two further children were unable to complete the task.

## Discussion

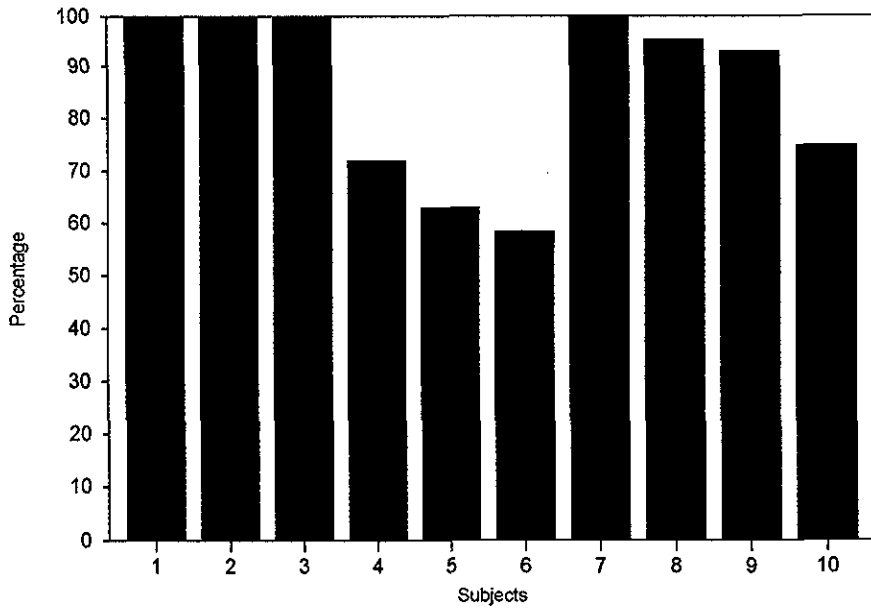
The results indicate that for the particular children sampled in this study most had very good conceptual understanding and thus representational

thought for common everyday nouns. This is far in excess of what their expressive speech would have been (Gilham, 1979; Stronaiger *et al.*, 1984). The skills required by the child to complete these tasks involved use of the known concept commonly used in a pre-school cognitive task. The child was required to understand the concept, scan, recognise, choose and physically place (motor planning) the "same on the same". Such a task necessitated some understanding of classes of objects and what things "are not" as much as "what they are".

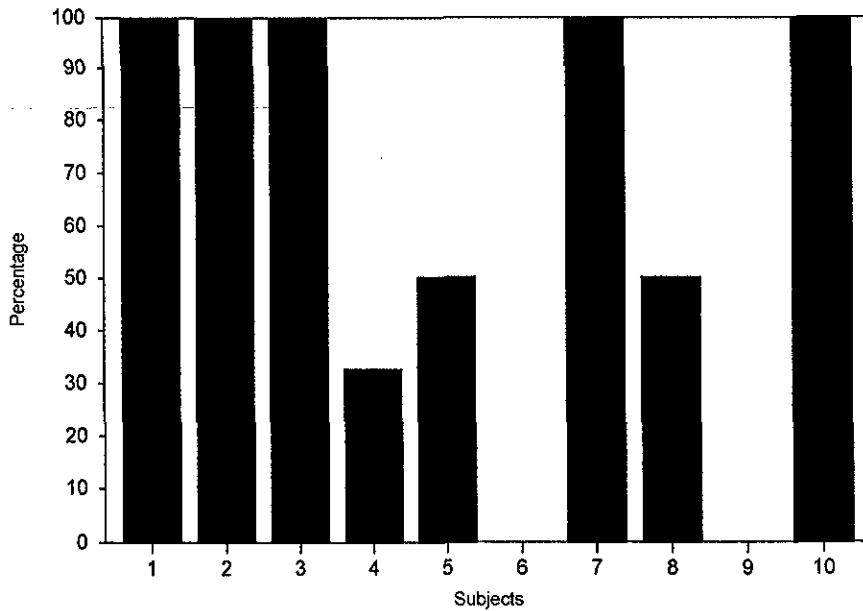
The matching tasks indicated a similar ability to use competently both their conceptual and visual-motor skills in a common pre-school task.

It is acknowledged that the study was limited to a one off assessment because the children were only able to be seen in conjunction with the growth study. However, useful information has been documented as to the underlying language competencies of young children with Down Syndrome. Traditional measures of assessing language comprehension in pre-school children rely heavily on verbal instruction and as such were not useful for this group of children. The results describe this group of children as being considerably more competent in the cognitive requirements, for example auditory and visual recognition, visual scanning, selection and motor planning, for language development than might otherwise have been expected. Such information has implications for those who target the developmental needs of young children with Down Syndrome within educational programmes.

**FIGURE 1**  
**Percentage of Objects Correctly Identified by 3-5 Year Old Children with Down Syndrome**



**FIGURE 2**  
**Percentage of Success in a Six-Piece Matching Task by 3-5 Year Old Children with Down Syndrome**



## Study 2: Method

### *Subject*

Five girls and nine boys (mean age 6.3) were recruited to participate in the 5-7 years group. The 8-10 years group included 12 children, seven girls and five boys (mean age 8.9). All subjects were drawn from two large South Island metropolitan areas, were living with their families and were all in educational placements.

### *Procedure*

The subjects were evaluated for functional school related competency using the Trainable Mentally Retarded School Competency Scales [TMR; (Levine *et al.*, 1976)]. The authors state that the TMR "offers educators a standardised assessment device for determining the impact of school programs" (manual forward). The current scale represents in-depth curriculum content assessed by age in five areas of behaviour: Perceptual-Motor, Initiative-Responsibility, Cognition, Personal-Social and Language. In the selection of items for the TMR an initial requirement was that each activity or behaviour included in the scale be observable. The scales do not have identical content for each age group but rather vary according to the developmental trends. The descriptive statements within each item are ordered by level of competency and numbered one to four where four represents the highest degree of competence.

The TMR was normed on public schools (state funded) both urban and

rural in the state of California. Scoring is by percentile ranking for both subscores and total scores.

Examples of items from a selection of the TMR include the following:

#### Perceptual-Motor:

- 5-7 brushing teeth
- 8-10 using a knife

#### Initiative-Responsibility:

- 5-7 hanging up clothes
- 8-10 selecting an activity

#### Cognition:

- 5-7 matching objects
- 8-10 identifying common names

The TMR was administered by a trained university researcher to a parent of each subject. All families were well aware of their children's level of functioning and had no difficulty in making appropriate judgements. Some cultural alterations were made to some of the items, for example, shoe tying was expanded to include velcro instead of laces, a commonly found factor in the types of shoes worn by young children in New Zealand.

## Results

For the 5-7 year old age group FIGURE 3 shows the percentage scores for each subscale (derived from the raw scores of the total scores) compared with the percentage scores of the age group norm. In all subscales the subjects scored considerably higher than the age group norm.

**FIGURE 3**  
**Percentage Scores on Five Competency Scales of a Group of 5-7 Year Old Children with Down Syndrome as Compared to an Age Group Norm**

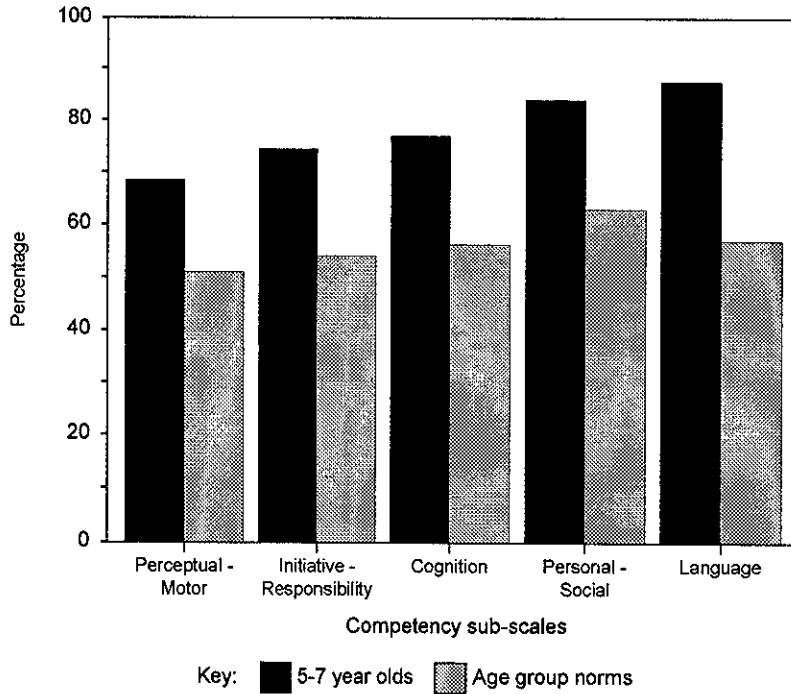


TABLE I describes the percentile rankings of the subjects in this study. For the Perceptual-Motor scale 10 out of 14 children were ranked on or above the 90th percentile. For the Initiative-Responsibility scale eight children were on the 98th percentile or above, for Cognitive five were on the 99th percentile and for Personal-Social eight children were on the 97th percentile or above. For the language subscale the seven children who were on the 99th percentile in fact exceeded the ranking given by up to six steps.

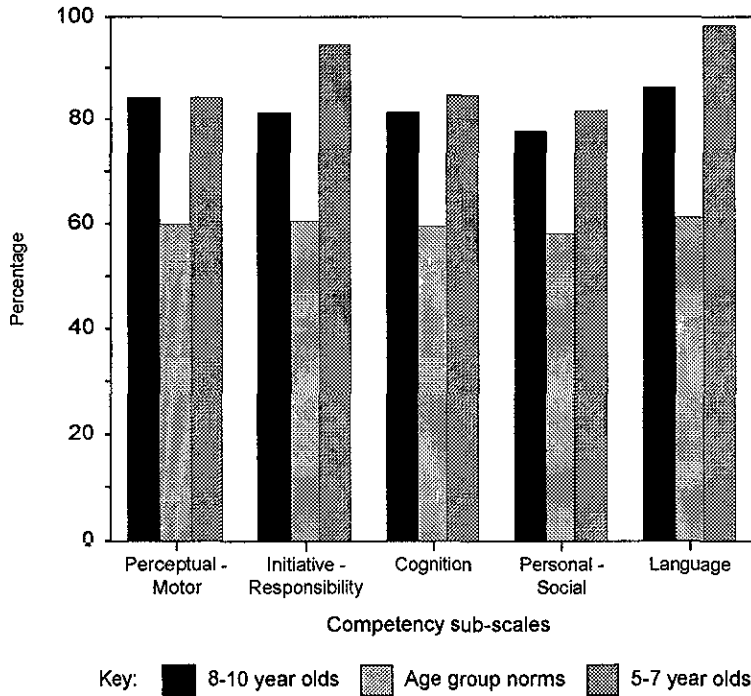
The total scale score results place 7 out of 14 children on or above the 92

percentile. The range of total scores for the group was 147-224. The three lowest scoring children in the group were known to have significant health problems, including heart conditions and chronic otitis media.

FIGURE 4 presents the data for the 8-10 year age group including the scores for the 5-7 year old children who were also assessed at this age level. In all subscales the subjects scored considerably higher than the age group norm.

TABLE II shows that of the group of three children aged 5-7 who were also assessed for their *total* score in the 8-10 year range, all were on or above the 80th

**FIGURE 4**  
**Percentage Scores on Five Competency Scales of a Group of 5-7 Year Old and 8-10 Year Old Children with Down Syndrome as Compared to an Age Group Norm (8-10 Years Old)**



**TABLE I**  
**5-7 Year Old Percentile Rankings**

Percentile	Perceptual - Motor	Initiative - Responsibility	Cognitive	Personal - Social	Language	Total
99	1	6	5	5	7	2
98	1	2				
97	1			3	3	1
96			1			1
95						2
94	4					
93						
92	1			1		1
91						
90	2		2			
80-89	1	3	2	1	1	4
70-79	1	1	1	1	3	3
40-69	2	2	3	3		

**TABLE II**  
**8-10 Year Old Percentile Ranking**  
 [ ( ) denotes 5-7 year old score]

Percentile	Perceptual - Motor	Initiative - Responsibility	Cognitive	Personal - Social	Language	Total
99	8 (2)	2 (2)	7 (2)	5 (2)	8 (3)	3 (1)
98		1				1
97			1			(1)
96						
95		2				3
90-94	1			2		
80-89	1	4 (1)		1	1	1 (1)
70-79	2 (1)		3 (1)	2		4
60-69		3	1	2 (1)	3	

percentile range. The data indicates that for the Perceptual-Motor scale 8 children were on the 99th percentile. The raw scores of 6 of the subjects exceeded the percentile ranking by up to 10 steps. For Initiative-Responsibility 5 children were on or above the 95th percentile. The raw score of 1 subject exceeded the percentile ranking by 1 step. For Cognition, 8 were on or above the 97th percentile. The raw score of 5 subjects exceeded the percentile ranking by up to 5 steps. For Personal-Social, 7 were on or above the 90th percentile. The raw score of 4 subjects exceeded the percentile by up to 4 steps. For Language 8 were on the 99th percentile. The raw score of 6 subjects exceeded the percentile ranking by up to 2 steps. Total TMR scores indicate that 7 out of 12 children were on or above the 95th percentile. Total raw scores ranged from 223 to 312. Two out of three of the lowest scoring subjects were known to have chronic otitis media.

## Discussion

The results indicate that on the TMR school competency scales the group of subjects with Down Syndrome in this study display significantly higher levels of competency than the normed age group presented by the authors for comparison. Evaluations such as the TMR are superficial and do not necessarily readily translate to different cultural and educational situations so caution should be exercised when making any direct comparisons. Such an evaluative procedure does however, at the very least indicate at a descriptive level the school related attainments of this group of New Zealand children.

## General Discussion

It is very likely that the high level of competency of both groups of children presented in these studies are the result of increasing awareness of the

educational, social, family and health needs of children with Down Syndrome. The last 15 years have seen a number of significant changes in those attitudes, expectations and resources which enhance the developmental outcomes of children with Down Syndrome. Such improved developmental outcomes will involve the underlying language based conceptual understandings which go with the attainment of those competencies required of children within an educational setting. What constitutes "competence" for children with Down Syndrome must relate both to the specific differences delineated by the etiology together with an understanding from the developmental perspective (Hodapp and Zigler, 1990). Despite the wealth of research to date there is still very little known on the exact nature of linguistic deficit and the cognitive competence of individuals with this disorder. If we consider a Vygotskian (1986) framework, language is fundamental to knowledge as a communication system and as a cognitive representational system allowing development to proceed along a step-wise trajectory (Garton, 1992). As research to date considers that this is the most likely path for individuals with Down Syndrome it presupposes that subsequent "cognitive" competence defined by Lyons and Zeanah (1993) as "mastery" behaviours which are thought to reflect early precursors of an individual's competence must include linguistic knowledge. The extent of the functional competency displayed by the children in this study far exceeds what was assumed to be "competent" a decade ago and provides some evidence as to which

"mastery" behaviours this group of children is using in order to increase their "competence".

## Summary

A two part study describing competence in children with Down Syndrome is presented. The first part of the study investigates the language comprehension of ten 3 to 5 year old children with Down Syndrome. The second part of the study investigates the functional school related competency of a group of children with Down Syndrome as compared to a normed age group, using the Trainable Mentally Retarded School Competency Scales. The results of the first study indicate that the children had a good conceptual understanding of language. The results of the second study indicate that on the TMR school competency scales the children in this study display significantly higher levels of competence than a normed age group.

## Footnotes:

- <sup>1)</sup> *An Artist Emerges*. Paper presented to community integration for people with intellectual handicaps conference, University of Otago, Dunedin, New Zealand.
- <sup>2)</sup> *The development of children with Down's Syndrome who are mainstreamed in the Christchurch area: A study of six children observed in 1984/5 and in 1988*. Paper presented at the New Zealand Special Educational Association Conference, "Reaching

Beyond" at the Christchurch College of Education, New Zealand, (1989, August/September).

- 3) *Normalization in action: Two case studies of families who have a child with Down's Syndrome*. Unpublished Manuscript, Education Department, University of Canterbury, New Zealand.
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