

Language Development in Children With Mental Retardation

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Original version 2007

Updated version 2013-01-25

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Abstract

The acquisition, understanding and usage of language as a means of effective communication is one of the most remarkable achievements of primates. In the context of *homo sapiens*, children make the transition from incoherent cooing and babbling in their early months of existence to becoming fully communicative individuals within a few years. It has been found that children generally acquire the essential components of language by the age of three or four. However, this may not be true for children unfortunately affected by mental retardation, which is manifested in the form of various kinds of delays as compared to normal children. Research has revealed that different patterns of language acquisition exist across different demographics of children afflicted by mental retardation, a review of which is presented in this Paper.

Mental Retardation

According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) published by the American Psychiatric Association, Mental Retardation (MR) is characterized by significantly sub-average intellectual functioning, reflected numerically as an Intelligence Quotient (IQ) of approximately 70 or below. The onset of MR is seen before the age of 18 and is associated with significant deficit or impairment in adaptive functioning (a collection of skills people learn, to function effectively in their everyday life). Four degrees of gradation of the severity of MR can be specified, measuring the level of intellectual impairment, viz., Mild, Moderate, Severe and Profound.

- Mild MR: IQ Level 50-55 to approximately 70
- Moderate MR : IQ Level 35-40 to 50-55
- Severe MR: IQ Level 20-25 to 35-40
- Profound MR: IQ Level below 20 or 25

A retarded person is generally limited to some extent in at least six adaptive skills needed for daily living, namely, communication, social, academic, sensorimotor, self-help and vocational skills. This Paper deals with communication (language aspect). Children with MR are compared to normally developing children with regard to their language development.

Linguists have divided language into several major aspects. One division refers to whether the language is being received or expressed i.e., **receptive or expressive language**. Another division identifies language systems i.e., **phonology, syntax, morphology, semantics and pragmatics**.

Reception. When receiving language, one not only hears it, but also comprehends it. Similarly when one is reading, one is receiving language. Therefore, receptive language comprises of both hearing and comprehending and reading and comprehending.

Expression. Expressive language refers to the production of language. Usually, one expresses oneself by speaking or in writing. Ergo, expressive language comprises both written and spoken language.

Given infra is the relationship between the dimensions of reception and expression and the language systems of phonology (sound system of language); syntax (rules used to put words together into cogent sentences); morphology (the use of grammatical markers that indicate number, tense, gender, etc.); semantics (meaning of words and word combinations) and pragmatics (the way in which language is used in social situations).

1. Phonology

- Receptive: hearing, discriminating of sounds in language.
- Expressive: speaking, production of sounds of language.

2. Syntax

- Receptive: comprehending how the structure of language or order of words affects its meaning.
- Expressive: producing language with a structure that communicates its meaning.

3. Morphology

- Receptive: comprehending meaning units.
- Expressive: producing meaning units.

4. Semantics

- Receptive: comprehending word meaning (vocabulary).
- Expressive: producing language using words meaning (vocabulary).

5. Pragmatics

- Receptive: comprehending language in the light of its social context.
- Expressive: producing language suitable to the social context.

Prelinguistic Development

Newborns arrive prepared to acquire language. There is distinct preference for human speech over other sounds (Morse, 1972). Along with this, newborns' interest in human faces (Bushnell, Sai & Mullin, 1989) and their capacity to imitate facial expressions (Meltzoff & Moore, 1977) prepare them for the social basis of communicative development.

The following section discusses the early vocal delays in infants with retardation, with particular reference to Down syndrome. Next, different patterns of social interaction that have been identified in children with different kinds of retardation have been discussed.

Vocal development. During the first year of life, infants develop the capacity to produce speech sounds. They transit through stages of cooing (around 2 months) and babbling. Babbling, which starts in the second half of the first year, is an important precursor to meaningful speech. Babies start to produce consonant-vowel syllables such as *mama* or *dada*. Research on babbling in infants in Down syndrome as compared to normally developing infants by Oller and his colleagues showed that infants with mental retardation were about two months behind a normally developing group (Lynch, Oller, Eilers, & Basinger, 1990; Steffens, Oller, Lynch & Urbano, 1992). Moreover, babbling was significantly less stable as compared to

normally developing infants due to motor delays and hypotonicity that are characteristic of Down syndrome (Lynch et al., 1990).

Social communicative development. The first year of life is rich in parent-child interaction which is reciprocal, involving both vocalization and eye-gaze coordination (Trevarthen, 1979). These patterns build up to intentional communication around the age of nine months moving from simple dyadic interactions (0-5 months, involving face-to-face exchanges of affective signals between the infant and the caregiver) to more complex triadic interactions (6-18 months, to coordinate the attention of self and another person vis-à-vis some third object or event). The infant at this stage tries to communicate and interpret a variety of meanings through eye gaze patterns, vocalizations and gestures.

One example of triadic interaction is joint attention which involves the infant's ability to coordinate gaze between a social partner and an object. Children often mark joint attention to their social partner by using a pointing gesture, in an effort to communicate their interest in the object or to comment on the object (Bruner, 1975). Joint attention is an example of prodeclarative communication, defined as a comment or statement about an object by touching it, holding it up or pointing to it (Bates, Camaioni & Volterra, 1975). Infants also express protoimperative meanings, through vocal play and pointing, to request an object or activity from their social partner. Finally, children use a variety of gestures to mark social regulatory communicative acts, such as greetings. These early social and communicative achievements are viewed as necessary prerequisites for different aspects of language acquisition (Bruner, 1975; Tomasello, 1992).

Infants with Down syndrome show delays in the onset of mutual eye contact (Berger & Cunningham, 1981); they vocalize much less than other infants (Berger & Cunningham, 1983), and their dyadic interactions with their mothers are less coordinated (Jasnow et al., 1988). By the second half of the first year they catch up. However, they fixate primarily on the eyes rather than exploring other facial features and they vocalize more than normal infants (Berger & Cunningham, 1981). This increased interest in people in the later part of the first year through eye gaze is accompanied by a lower level of interest in objects and toys. Thus, Down syndrome one-year olds show difficulty interacting with their mothers and playing with objects at the same time (Ruskin, Kasari, Mundy & Sigman, 1994). These early differences in the social patterns of infants with Down syndrome are reflected in their play and intentional communication in the second year of life.

Mundy and his colleagues, in a comprehensive study, compared a large group of toddlers with Down syndrome to mental-age-matched subjects with non specific retardation and normally developing children on the Early Social Communication Scales (Mundy, Sigman, Kasari & Yirmiya, 1988). They found that the subject with Down syndrome showed right frequencies of social interaction behavior, similar to the findings of infant studies, but lower frequencies of object request behavior or protoimperatives. It is thus seen that Down syndrome children focus more on people and less on objects which further relate to low frequencies of object requests, which may be further reproduced in overall expressive language delays.

Intellectual disability in other retarded population, such as fragile X syndrome, is known to show poor eye contact, while young children with Williams syndrome are extremely interested in human faces and spend extended periods of times looking intently at another

person's face (Bellugi, Bihrlé, Neville, Jernigan & Doherty, 1992). As a concomitant, the studies referred to supra allow us to explore the relationships between prelinguistic development and later language acquisition. Clearly, more work is needed on the early socio-communicative development of children with different forms of MR.

Semantic Development

Semantics is concerned with understanding the meaning of words and words in groups, particularly sentences. At about one year of age, the child utters his or her first words. Thereafter, language acquisition occurs very rapidly. There is a marked spurt in vocabulary, when the number of different words children say increases suddenly, also referred to as 'naming explosion.' By the time children are about 30 months old, they are able to produce over 500 words and comprehend even more (Fenson et al., 1994), as, in comprehension, children only need to recognize the meaning of the word, whereas, in production, they have to recall or retrieve from their memories the word as well as the concept for which it stands (Kuczaj, 1986).

Insofar as vocabulary growth in children with Down syndrome is concerned, some develop vocabularies at a rate that is comparable to their mental-age level, whereas others may be significantly delayed because of their articulatory deficits (Miller, Sedley, Miolio, Murray-Branch & Rosin, 1992). Interestingly, children with Williams syndrome have shown rapid rates of vocabulary growth that may even surpass their mental ages (Mervis & Bertrand, 1997; Singer, Bellugi, Bates, Jones, & Rossen, 1994).

The role of operating principles has been emphasized to understand how young children acquire such a large vocabulary so rapidly and effortlessly. These principles limit the set of possibilities that children must consider when they hear a new word. These usually develop as the child gains experience with words in the process of interacting with their care givers.

Recent research on lexical development in children with Down syndrome has focused on the use of operating principles in acquiring new words (mostly object labels). Normally developing children use words to label objects at the so-called basic level (e.g., car, dog), rather than more specific subordinate (Mercedes, Terrier) or more general super-ordinate (vehicle, animal) levels. Objects too are sorted at the basic level such as children tend to place all cars together in one group, all dogs in another group and so forth (Mervis & Rosch, 1981).

Mervis and his colleagues (Cardoso-Martins, Mervis & Mervis, 1985; Mervis, 1988, 1990) found that retarded children are also sensitive to the salience of the basic level in their object categorization and early word learning. Even older children with Down syndrome and retardation of unknown origin have better comprehension of words at basic level as compared to subordinate or super-ordinate levels (Tager-Flushberg, 1985). Similar results have been found for very young children with Williams syndrome (Mervis & Bertrand, 1997).

Another operating principle that has been found to play a very important role is the principle of extendibility. For example, a child might use the word car to refer to many objects including buses, trains, trucks, etc. Again, studies by Mervis and her colleagues have confirmed that children with Down syndrome and Williams syndrome extend the meaning of words in a manner similar to normal children (Cardoso-Martins et al., 1985; Mervis, 1988, 1990; Mervis &

Bertrand, 1997).

Yet another lexical principle that has been investigated is called the 'whole object constraint' (Macnamara, 1982; Markman & Wachtel, 1988), which states that words refer to whole objects rather than its parts or attributes. The novel name-nameless category principle also plays a very important role in children's rapid word learning abilities, especially the capacity to map the meaning of new words; e.g., in a group of mostly familiar items with one novel item and a novel word, a child will quickly associate the new word with the novel item (Golinkoff et al., 1994). After the appearance of this principle word learning becomes very rapid and much less effortful.

Studies by Mervis and Bertrand (1997) have shown that both Down syndrome and Williams syndrome children learn words for the whole object rather than attributes or parts of any objects. These children also acquire the novel name-nameless category principle at about the same time they are able to sort objects. It can thus be stated from the discussion supra that, barring severely and profoundly impaired children, variant forms of retardation do not differ from the prevalent set of global principles in acquiring the meaning of words.

Phonological Development

As children acquire the meaning of words, they also learn how to articulate these words following the phonological rules of the language. Most of the phonological development is complete by the time children go to school. However, they continue to make certain articulation errors that reduce or simplify their language (Ingram, 1986). Children with

retardation, particularly those with lower IQ, tend to exhibit articulation deficits (Abbeduto & Rosenberg, 1993).

Children with Down syndrome exhibit difficulties with the phonological aspects of language which can be related to their delayed onset in babbling, which further explains their overall delay in using expressive language.

Dodd (1976) compared phonological errors made by severely retarded children with Down syndrome, by children with non specific retardation, and by normally developing children, matched on overall cognitive mental age. Children with Down syndrome not only produced more errors, they also committed more varied types of errors than either of the two groups and their phonological development lagged significantly behind their cognitive level.

A study by Stoel-Gammon (1980) on spontaneous speech produced by a group of mildly retarded children found that her subjects were capable of producing all the phonemes of English, suggesting no evidence for deviance in this area of language. Moreover, it was found that the phonological abilities of children with Down syndrome were comparable to those of normally developing children at the same language level and, like Dodd (1976), found that her subjects were clearly delayed relative to their cognitive mental-age levels.

In contrast, children with Williams syndrome did not appear to have particular problems with articulation. Gosch, Stading & Pankau (1994), studying a large sample of children with Williams syndrome, found that their articulation was significantly better than a mental-age-matched group of children with non-specific retardation.

Various clinical studies of older boys with fragile X syndrome have shown that this population has problems both with articulation and fluency of speech production (Dykens,

Hodapp & Leckman, 1994). Since, these difficulties with speech production are not related to mental age or IQ, Dykens et al. (1994) hypothesized that may be linked to attentional and sequencing that are characteristic of this population.

It may thus be asseverated there are broad similarities in the kinds of developmental error patterns that are made by children across these groups and those in normally developing children. Speech articulation processes are seen to remain unchanged.

Syntax and Morphology

After naming explosion, children usually begin to combine words to create simple two word utterances, also called telegraphic speech. Gradually, children's sentences increase in length as they add more semantic and grammatical elements. This growth is measured in terms of child's **mean length of utterances** (MLU; Brown, 1973).

At the early stages of language development, open class categories dominate the child's vocabulary (nouns, verbs, adjectives, adverbs) but as MLU grows, children use increasing closed-class terms such as pronouns, prepositions and conjunctions, etc. Early stages of grammatical development in retarded population are similar to that found in normally developing children.

Various studies on young children with Down syndrome have found widely varying rates of change in MLU within this population (Beeghly, Weiss-Perry & Cicchetti, 1990; Fowler, Gelman et al.,1994). For example, Fowler et al. (1994) studied a young girl with Down syndrome who did not begin to create two word utterances until about the age of 4. However, her rate of

development after this point was rapid and did not differ from normal until she reached MLU of 3.5 when she was five-and-a-half years old.

Tager-Flushberg et al. (1990) found rapid rates of development during the early stages of syntactic growth for two out of six children with Down syndrome. Other children with Down syndrome who had IQ scores below 50 (Fowler, 1988) did not begin combining words until the age of five or six. They then spent a long period in which they used relatively few two-word utterances. Thus, their rate of development was very slow and these children never developed beyond the early stages of grammatical development (Dooley, 1976; Miller, 1988).

Furthermore, Singer et al. (1994) found that children with Down syndrome use simpler and shorter sentences as compared to normal children and children with Williams syndrome. Most of the children with Down syndrome fail to acquire complex grammatical constructions such as correct use of complex questions.

In contrast, children with Williams syndrome are able to acquire adult-level grammatical system and do not show specific syntactic deficits (Bellugi et al., 1992; Tager-Flushberg et al., 1990). Bates and her colleagues demonstrated that lexical and grammatical development are joined at the early stages (Bates, Bretherton, & Snyder, 1988). Initially, children's vocabularies are composed of or noun-like words to label things in the environment. Once it reaches a critical size, children begin to combine words. At this point there is increase in closed class terms such as pronouns, demonstratives, conjunctions and so forth. There are individual differences at these early stages, with some children using fewer nominals and more pronouns and demonstratives (expressive or pronominal children) and some who use relatively more nouns (referential children).

Various studies of children with Down syndrome have indicated that majority of the population fits the pronominal profile. These children tend to rely heavily on pronouns and demonstratives (e.g., referring to objects and people as it, this or he) and use fewer nominal terms during the early stages of language development (Dooley, 1976; Singer et al., 1994; Tager-Flusshberg et al., 1990). This reliance on pronouns and demonstrative rather than specific noun can be due to memory limitations, word-finding difficulties, or both.

From the above discussion it can be concluded that early grammar, in particular, syntactic and morphological knowledge is acquired in the same manner as normally developing children. However, beyond the early stages, clear differences begin to emerge with some children in particular populations. For example, children with Williams syndrome acquire a mature grammatical system, whereas children with Down syndrome show serious limitations in their grammatical development. This deficit in children with Down syndrome may be due to specific impairment to the mechanism that serves to process linguistic information (Fowler, 1990).

Pragmatic Development

Besides phonology, vocabulary and grammar, children must learn to use language effectively in social contexts. In a normal conversation, participants should be able to take turns, stay on the same topic, state their messages clearly and conform to cultural rules that govern how individuals are supposed to interact.

Studies of normally developing children have investigated several aspects of pragmatic development, including the development of speech acts, conversational competence and

sensitivity to the listener's needs. We perform speech acts when we request, command, complain, refuse, interact etc.; conversational competence, i.e., being able to maintain a topic of conversation for a longer time, engaging in appropriate turn-taking behavior and being able to add new information to the ongoing topic; sensitivity to the listener's needs by responding appropriately to requests for clarifications. As children grow into middle childhood, they become more capable of producing unambiguous messages.

Speech acts in children with retardation. In contrast to syntactic delays and deficits in children with Down syndrome, pragmatic abilities are an area of relative strength. A cross-sectional study by Coggins, Carpenter and Owings (1983) compared a group of four children with Down syndrome, whose MLUs ranged from 1.7 to 2.0 to an MLU matched group of four normally developing children. Overall, the findings indicated that the children with Down syndrome expressed the same range of communicative intents or speech acts as compared to the normally developing children. However, potential differences were found between speech acts that involved instrumental functions (mainly requests; e.g., want water, cookie) and those involving interpersonal functions (e.g., see this).

It was found that children with Down syndrome were less involved in requesting behavior as compared to the normal group. However, the frequencies of comments, answers and protests were more or less equivalent.

In a larger study of children with Down syndrome, Beeghly et al. (1990) compared them to a group of young MLU matched normal children and a group of slightly older mental age matched normally developing children. It was found that children with Down syndrome engaged less in requesting behavior than the mental-age matched normally developing

children, similar to Coggins' study, but they were more comparable in their requesting behavior to the language matched group. The limited use of requests by children with Down syndrome could be viewed as related to their lower arousal and passivity (ibid).

Conversational abilities. In normally developing children, various studies have shown that the ability to take turns in conversations does not show any developmental change with increasing language abilities (Bloom et al., 1976). From the beginning, children know that they should respond verbally to their mothers' utterances. Furthermore, their conversation becomes more advanced with increases in their linguistic capacity. They are able to maintain a topic of conversation over increasing number of turns (ibid).

Beeghly et al., (1990) found that children with Down syndrome are good at maintaining a topic of conversation for a longer period, can engage in appropriate turn-taking behavior as compared to the language-matched controls, implying that this aspect of language was an area of relative strength. Young children with Williams syndrome were also good at maintaining the ongoing topic in interaction with an adult examiner (Kelley and Tager-Flushberg, 1994).

According to several descriptive studies, males with fragile X syndrome have difficulties in maintaining a conversational topic. They tend to perseverate more than other subjects with nonspecific retardation, and also use a considerable amount of inappropriate language (Ferrier, Bashir, Meryash, Johnston, & Wolff, 1991).

From the early stages of language development, young normal children begin to demonstrate sensitivity to their conversational partner. Even two-year-olds may repeat an utterance or change the form of an utterance if their partner does not respond (Foster, 1990). Similarly, children with Down syndrome will revise, rather than repeat, if a listener requests

clarification of a previous aspect of the message. Children with Williams syndrome are also good at conversational repairs (Kelley & Tager-Flushberg, 1994).

The ability to express and modify language according to one's listener's background, social role, level of understanding and so forth, continues to develop during early school years involving complex integration of social, cognitive and linguistic achievements. At these advanced levels, children with retardation face difficulties that go beyond their cognitive and linguistic levels (Abbeduto & Rosenberg, 1993).

With regard to pragmatic language skills, it can be surmised that, while children with intellectual disabilities do acquire basic conversational abilities, they fall noticeably behind normal children in the finer aspects of the same.

Conclusion

The overall picture of early language development in children with retardation provides strong evidence for differences and similarities as well as various delays in comparison to normal children.

It is seen that retarded children follow the same set of universal principles in acquisition of word meaning (though not true for severely and profoundly retarded children). Similarly, there are broad commonalities in the kinds of phonological errors made by these children and normally developing children suggesting the universal aspects of speech articulation process. Furthermore, it is seen that retarded children acquire syntactic and morphological knowledge in the same order as normally developing children in the early stages.

With regard to pragmatic language skills, children with intellectual disabilities do acquire basic conversational abilities; however, subtler aspects of conversational competence are not displayed at the same level as normal children.

References

- Abbeduto, L., & Rosenberg, S., (1993). *Language and communication in mental retardation*. Hillsdale, New Jersey: Erlbaum.
- Ahuja, N. (2002). *A short textbook of psychiatry* (5th ed.). New Delhi: Jaypee Brothers Medical Publishers.
- American Psychiatric Association (1995). *Diagnostic and statistical manual of mental disorders* (1st ed.). New Delhi: Jaypee Publishers.
- Bates, E., Bretherton, I., & Snyder, L.(1988). *From first words to grammar. Individual differences & dissociable mechanisms*. New York: Cambridge University Press.
- Bates, E., Camaioni, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill-Palmer Quarterly*, 21 (pp. 205-224).
- Beeghly, M., Weiss-Perry, B., & Cicchetti, D. (1990). Beyond sensorimotor functioning: Early communicative and play development of children with Down syndrome. In D.Cicchetti & M. Beeghly (Eds.), *Children with Down syndrome. A developmental perspective* (pp. 329-368). New York: Cambridge University Press.

- Bellugi, U., Bihrlle, A., Neville, H., Jernigan, T., & Doherty, S. (1992). Language, cognition and brain organization in a neurodevelopmental disorder. In M.Gunnar & C .Nelson (Eds.), *Developmental behavioural neuroscience* (pp. 201-232). Hillsdale, New Jersey: Erlbaum.
- Berger, J., & Cunningham, C. (1981). The development of eye contact between mothers and normal versus Down's syndrome infants. *Developmental Psychology, 17*, 678-689.
- Berger, J., & Cunningham, C. (1983). The development of early vocal behavior and interactions in Down syndrome and non-handicapped infant-motherpairs. *Developmental psychology, 19*, 322-331.
- Berk, L.E. (1996). *Child development* (3rd ed.). New Delhi: Prentice-Hall of India.
- Bloom, L., Rocissano, L., & Hood, L. (1976). Adult-child discourse: Developmental interaction between information processing and linguistic knowledge. *Cognitive Psychology, 18*, 521-552.
- Brown, R. (1973). *A first language*. Cambridge, MA: Harvard University Press.
- Bruner, J. (1975). From communication to language: A psychological perspective. *Cognition, 3*, 255-287.
- Burack, J.A., Hodapp, R.M., & Zigler, E. (1998). *Handbook of mental retardation and development*. New York: Cambridge University Press.
- Bushnell, I., Sai, F., & Mullin, J.T. (1989). Neonatal recognition of the mother's face. *British Journal of Developmental Psychology, 7*, 3-15.

Cardoso-Martins, C., Mervis, C.B. & Mervis, C. A. (1985). Early vocabulary acquisition by children with Down syndrome. *American Journal of Mental Deficiency, 90*, 177-184.

Coggins, T., Carpenter, R., & Owings, N. (1983). Examining early intentional communication in Down's syndrome and nonretarded children. *British Journal of Disorders of Communication, 18*, 99-107.

Davison, G.C., & Neale, J.M. (1994). *Abnormal psychology* (6th ed.). New York: John Wiley & Sons.

Dodd, B.J. (1976). A comparison of the phonological systems of mental-age-matched severely subnormal and Down's syndrome children. *British Journal of Disorders of Communication, 11*, 27-42.

Dooley, J. (1976). Language acquisition and Down's syndrome: A study of early semantics and syntax. *Doctoral dissertation* (np), Harvard University.

Dykens, E., Hodapp, R., & Leckman, J. (1994). *Behaviour and development in fragile X syndrome*. Thousand Oaks, CA: Sage.

Fenson, L., Dale, P.S., Reznick, S., Bates, E., Thal, D., Pethick, S. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development, 59*, (Serial No. 242).

- Ferrier, L., Bashir, A., Meryash, D., Johnston, J., & Wolff, P. (1991). Conversational skills of individuals with fragile X syndrome: A comparison with autism and Down syndrome. *Developmental Medicine and Child Neurology*, 33, 776-778.
- Foster, S. (1990). *The communicative competence of young children*. New York: Longman.
- Fowler, A. (1988). Determinants of rate of language growth in children with Down syndrome. In L. Nadel (Ed.), *The psychobiology of Down syndrome* (pp. 217-245). Cambridge, MA: MIT Press.
- Fowler, A. (1990). Language abilities in children with Down syndrome: Evidence for a specific syntactic delay. In D. Cicchetti & M. Beeghly(Eds.), *Children with Down syndrome. A developmental perspective* (pp. 302-328). New York: Cambridge University Press.
- Fowler, A., Gelman, R., & Gleitman, L. (1994). The course of language learning in children with Down syndrome: Longitudinal and language level comparisons with young normally developing children. In H.Tager-Flushberg (Ed.), *Constraints on language acquisition: Studies of atypical children* (pp. 91-140). Hillsdale, New Jersey: Erlbaum.
- Golinkoff, R., Mervis, C., & Hirsh-Pasek, K. (1994). Early object levels: The case for a developmental lexical principles framework. *Journal of Child Language*, 21, 125-155.
- Gosch, A, Stading, G., Pankau, R. (1994). Linguistic abilities in children with WilliamsBeuren syndrome. *American Journal of Medical Genetics*, 52, 291-296.
- Hallahan, D.P., Kauffhian, J.M., & Lloyd, J.W. (1999). *Introduction to learning disabilities* (2nd ed.). Massachusetts: Allyn & Bacon.

Ingram, D. (1986). *Phonological disability in children*. New York: Elsevier.

Jasnow, M., Crown, C.L. Feldstein, S., Taylor, L., Beebe, B., & Jaffe, J. (1988). Coordinated interpersonal timing of Down-Syndrome and nondelayed infants with their mothers: Evidence for a buffered mechanism of social interaction. *Biological Bulletin*, 175, 355-360.

Kelley, K., & Tager-Flushberg, H. (1994). Discourse characteristics of children with Williams syndrome. Evidence of spared theory of mind abilities. *Paper presented at the Sixth International Professional Meeting of the Williams Syndrome Association*, San Diego, CA.

Kuczaj, S. A., II. (1986). Thoughts on the intentional basis of early object word extension: Evidence from comprehension and production. In S.A. Kuczaj, II, & M.D. Barrett (Eds.), *The development of word meaning* (pp. 99-120). New York: Springer-Verlag.

Lynch, M., Oller, K., Eilers, R., & Basinger, D. (1990). Vocal development of infants with Down's syndrome. *Paper presented at the Eleventh Symposium for Research on Child Language Disorders*, Madison, WI.

Macnamara, J. (1982). *Names for things*. Cambridge, MA: MIT Press.

Markman, E., & Wachtel, G. (1988). Children's use of mutual exclusivity to constrain the meaning of words. *Cognitive Psychology*, 20, 121-157.

Meltzoff, A., & Moore, M. (1977). Imitation of facial and manual gestures by human neonates. *Science*, 198, 75-78.

Mervis, C. (1988). Early lexical development: Theory and application. In L. Nadel (Ed.), *The psychobiology of Down syndrome* (pp. 101-143). Cambridge, MA: MIT Press.

Mervis, C. (1990). Early conceptual development of children with Down syndrome. In D. Cicchetti & M. Beeghly (Eds.), *Children with Down syndrome: A developmental perspective* (pp. 252-301). New York: Cambridge University Press.

Mervis, C., Rosch, E. (1981). Categorization of natural objects. *Annual Review of Psychology*, 32, 89-115.

Mervis, C., & Bertrand, J. (1997). Developmental relations between cognition and language: Evidence from Williams syndrome. In L.B. Adamson & M.A. Ronski (Eds.), *Research on communication and language disorders. Contribution to theories of language development* (pp.75-106). New York: Brookes.

Miller, J. (1988). The developmental asynchrony of language development in children with Down syndrome. In L.Nadel, (Ed.), *The psychobiology of Down syndrome* (pp. 167- 198). Cambridge, MA: MIT Press.

Miller, J., Sedley, A., Miolo, G., Murray-Branch, J., & Rosin, M. (1992). Longitudinal investigation of vocabulary acquisition in children with Down syndrome. *Symposium on Research in Child Language Disorders*, Madison, WI.

Morse, P. (1972). The discrimination of speech and non-speech stimuli in early infancy. *Journal*

of Experimental Child Psychology, 14, 477-492.

Mundy, P., Sigman, M., Kasary, C., & Yirmiya, N. (1998). Nonverbal communication skills in Down syndrome children. *Child Development, 59, 235-249.*

Reutzel, D.R., & Cooter, R.B. (2000). *Teaching children to read* (3rd ed.). New Jersey: Merrill.

Ruskin, E., Kasari, C., Mundy, P., & Sigman, M. (1994). Attention to people and toys during social and object mastery in children with Down syndrome. *American Journal of Mental Retardation, 99, 103-111.*

Singer, N.G., Bellugi, U., Bates, E., Jones, W., & Rossen, M.(1994). Contrasting profiles of language development in children with Williams and Down syndromes. *Technical Report No. 9403, Project in Cognitive & Neural Development, University of California, San Diego.*

Steffens, M.L. Oller, K., Lynch, M., Urbano, R.(1992). Vocal development in infants with Down syndrome and infants who are developing normally. *American Journal of Mental Retardation, 97, 235-246.*

Stoel-Gammon, C. (1980). Phonological analysis of four Down's syndrome children. *Applied Psycholinguistics, 1, 31-48.*

Tager-Flushberg. H. (1985). The conceptual basis for referential work meaning in children with autism. *Child Development, 56, 1167-1178.*

Tager-Flushberg, H., & Calkins, S. (1990). Does imitation facilitate the acquisition of grammar? Evidence from a study of autistic, Down's syndrome, and normal children. *Journal of Child Language, 17, 591-606.*

Tomasello, M. (1992). The social bases of language acquisition. *Social Development*, 1, 67-87.

Trevarthen, C. (1979). Communication and co-operation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.), *Before speech* (pp. 321-349). New York: Cambridge University Press.