

Speech Production of a Child with Down Syndrome in Taman Abeka Bhakti Luhur Foundation Malang

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Abstract— *This research aims to explicate the characteristics of speech production of a child with Down Syndrome in Taman ABEKA Bhakti Luhur Foundation Malang. The data were elicited through casual conversation (unstructured interview) with the subject and prompting pictures specifically prepared to prompt the subject to produce utterances. The Levelt's (1989) model of speech production and Miller's (1988) language production of children with Down syndrome were employed to help analyze the data qualitatively. The result shows that there are two types among exactly four types of speech impairments proposed by Miller (1988) exhibited by the down syndrome child, namely hesitations and unclear pronunciations. Firstly, hesitations were found in both sessions. From the parts of casual conversation and prompting session, it can be concluded that the subject exhibited hesitation when he spoke longer utterances. Secondly, the subject also produced unclear pronunciations in casual conversation session while producing utterances with the voiceless bilabial stop /p/, words which contain voiced bilabial stop /b/ followed by vowel /e/ and /ə/, and words which have voiceless velar stop /k/ followed by vowel /a/ in Indonesian.*

Keywords— *speech production, Down Syndrome child, Taman Abeka Bhakti Luhur*

I. INTRODUCTION

Not all children are born with the ability to communicate fluently. There are some of them who experience a down syndrome, which is generally known as a syndrome that causes delays in several aspects, such as cognitive, physical development, speech production, etc. National Association for down syndrome explains that down syndrome is a genetic condition that causes delays in physical and intellectual development (NADS, 2014). Since children with down syndrome (henceforth CDS) are expected to show cognitive and speech production delay, these may be in part of the consequences of the language learning difficulties which means that the cognitive delay will get worse as language, in fact, is such a powerful tool for gaining knowledge.

This delay phenomenon, thus, becomes the reason why the writers wanted to observe and explore more about speech production of CDS, along with the delay they have to face in learning language. Upon the identification of the problem, it is

expected that a proper follow-up treatment can overcome the delay experienced by them, so they can understand the language itself better and after that, they automatically can learn and improve their cognitive abilities.

There are some special schools for children with mental retardation like down syndrome, Autism, and etc. in Malang, East Java, to teach, guide and train them, and accompany them to learn to talk, communicate, understand a language and other necessary learnings. Since the delays of CDS' language acquisition can actually be solved, this school is expected to facilitate the CDS' needs.

The writers chose Taman ABEKA Bhakti Luhur Foundation Malang to be visited and observed. This school was established in 1975, so it has forty years of experience in taking care of and guiding mentally disabled children, especially CDS.

To help analyze the data, the writers used two theories which are combined together. Firstly, Levelt's model of speech production is adopted. This model explicates the four stages of speech production, i.e. conceptualization, formulation, articulation, and audition or self-monitoring. Of those four stages, the writers only focused on formulation and articulation, since those two stages are the main goals of language production and those also can be combined with the second theory, which is the elaboration of Miller's language production of CDS and Rondal's theory of factors associated with defective speech in down syndrome. Miller, in his theory, generally only focused on the way CDS learn to talk (Miller, 1988). Therefore, the writers used the combination of the two theories as the writers did not only observe how CDS learn to talk, but also how they learn language if it is based on linguistic point of view and how they produce a whole meaningful sentence.

This qualitative research was done through an interview with one participant named Gabi (a 13-year old Junior High School student), that was done naturally with casual conversation with the participant. The reason why the writers chose one participant to be interviewed was because of the time efficiency.

The data analyzed in this research were annotations as a result of the interview. The results were presented in an

instrumental case study form. In an instrumental case study, the researchers selected the case because it represents some other issues under investigation and the researchers believe this particular case can help provide insights or help to understand that issue (Ary et al., 2002).

This study is expected to be beneficial for parents and trainers of CDS for treating and teaching the children in a way that can make them learn language better. Also, this study can let all readers to know more about CDS, not only based on medical and science point of view but also based on language point of view, which is rarely discussed.

II. LANGUAGE PRODUCTION

One of the most influential psycholinguistic models for speech production, is the one developed by Levelt (1989). The model he produced attempts to show how the speech act is a process moving linearly from intention to articulation, although he recognizes that there are some feedback loops. For Levelt, speaking and listening are separate processes and physically separated in the brain. He is concerned with speaking and does not specify the nature of the listening engine. Therefore, the writers adopt his model of theory since he emphasizes mainly on the production of utterances working in our brain. Levelt's speech engine has three major processing modules, and it uses two sources of knowledge, one inside the language engine (the lexicon) and one outside it (the encyclopedia). Thus, there is a separation of semantic content from the words themselves; words are just phonological tags which are activated by semantic look-up – a kind of reverse dictionary.

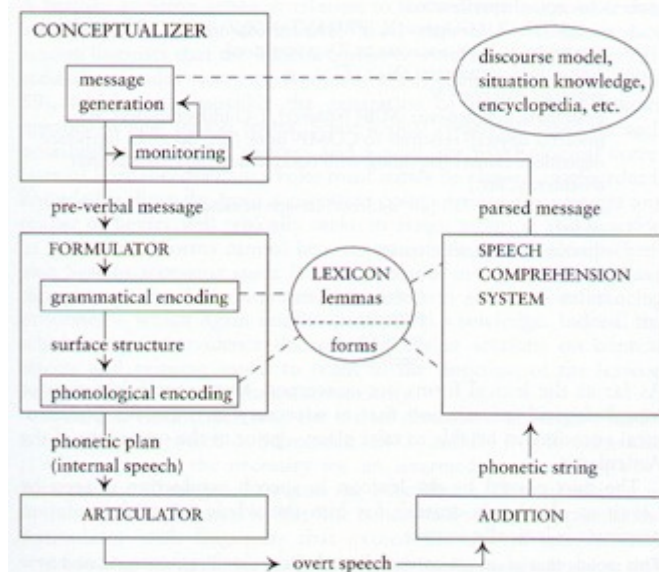


Fig 1. Levelt's Model of Speech Production (Levelt, 1989, p.9)

The intention to produce utterance involves the knowledge that human has in the brain. The conceptualizer starts taking this intentional block of knowledge as input and overlays it with a grammatical form – producing a what-did-what preverbal message, which is being spoken but not yet utterable, still a concept. This preverbal message or the concept is passed to the formulator, where it is grammatically

encoded into a surface structure of the language being spoken. Then, the next stage takes place in the lexicon which is functioned to find the appropriate words corresponding to the content of the concept. These words, later on have two parts: the form, which determines the appropriate inflection or case for the grammatical context; and the lemma, which contains the phonetic form of the intended content.

For Levelt, a lemma is a look-up, selecting the appropriate phonological form based on the sensory meaning. The word comes from ancient Greek, where it means a pre-established fact. The output from the formulator is inner speech – a language construct in all but utterance. From the formulator the inner speech construct is passed to the articulator, which is a programmable module. It just runs the phonetic program generated by the formulator, and thus produces the utterance, or overt speech, which the output later on, is outer speech. This means that the articulator actually is the essential part among conceptualizer and formulator. Without articulator, the works of conceptualizer and formulator will not come true. Furthermore, in the articulator there is what we call larynx—the “voice box” which houses our vocal cords. The larynx did not initially evolve with the specific function of helping humans to articulate language. However, without the “voice box”, humans certainly cannot produce sounds and without sounds, articulator will not work well to produce utterances or overt speech.

Articulation is undeniably important to accomplish the stages of conceptualization and formulation. However, this is not the end of the story, though, because the speakers are part of their own audiences. The utterance is received by the speaker's speech-comprehension system and passed back to the speech engine for checking. This stage is what we call as the audition. The purpose of this stage is clearly to produce accurate utterances related to the context and also to correct mistakes done by the utterer.

III. LANGUAGE PRODUCTION OF CHILDREN WITH DOWN SYNDROME

CDS are usually late in saying their first words, making their vocabularies grow slower than in ordinary children and these problems lead to the difficulty in mastering the many rules for talking in grammatically correct sentences (Miller, 1988). Furthermore, since this kind of delay leads to the speech of many CDS being restricted to short utterances, it makes them difficult to pronounce a complete meaningful sentence clearly and this becomes the main obstacle for CDS to communicate well with people in common.

At first, CDS usually try to produce short utterances to be able to communicate with people around them. The following are some characteristics of CDS' language summarized from various sources.

Table I. Language Development of Children with Down Syndrome

No	Language Development of CDS
1	In common, rather than saying "I went swimming last night with my dad", CDS mostly tend to say "went swimming dad" (Bray and Woolnough, 1988).
2	Most of children with Down Syndrome find all aspects of speech production difficult and they struggle hard to say a word clearly, then find producing three and four words in a sequence difficult (Buckley, 1993).
3	Words that children with Down Syndrome can say clearly as single word, become less clear when those are produced as part of a sentence (Buckley, 1993).

Table 1 shows the general characteristics of CDS when they try to produce one completely meaningful sentence. They do struggle hard to pronounce a sentence, and it can be seen that in the end they lost their syntactical knowledge when they try to produce a sentence.

The difficulties of producing completely meaningful sentences normally happen since it is caused by delays experienced by CDS in speech production as already stated before.

Furthermore, here is the list of main difficulties according to Sue Buckley (1999), which are grouped under several headings:

Table II. List of Difficulties Experienced by Cds

No.	Types of Difficulties
1.	difficulties in hearing
2.	difficulties in auditory perception and processing
3.	difficulties with clear speech production
4.	difficulty in learning grammar also vocabularies

These difficulties undeniably make CDS experience a slow progress in learning language and other things. It means that if we go back to the theory of Levelt's four stages of language production, these difficulties and delays, however, make CDS cannot fully accomplish specifically the articulation and self-monitoring stages. Since this research focuses on language production, the writer elaborates more on difficulties with clear speech production.

IV. DIFFICULTIES WITH CLEAR SPEECH PRODUCTION

According to Rondal (1995), there are generally some factors that affect CDS in producing speech clearly. He collected several data from several sources such as Benda (1949) and Buddenhagen (1971), Evenhuis, van Zanten, Brocaar, and Roerdinkholder (1992), Montague & Hollien (1973, 1974) and Gigli, Ferri, Musumeci, Tomassetti, & Bergonzi, 1984; Ferri et al., (1986). In his book, there are detailed peripheral pathological factors associated with defective speech in CDS. These factors include a buccal cavity too small for the tongue and a protruding tongue, a larynx

located too high in the neck with thickening of fibrotic mucosa, vocal fold edema, myxedema of the pharynx, an edematous tongue. The types of sounds in babbling that can be considered to belong to the input language are relatively similar in CDS and NR (non-retarded) infants. Similar developmental sequences and timing hold for the two groups. Front and central vowels like /i/, /e/, and /a/ appear first, then back vowels like /u/ and /a/. For stop-like sounds, up to approximately six months, velars like /k/ and /g/ tend to dominate. They then decrease in frequency and alveolar stops /t/ and /d/, and nasal /n/ become dominant. Labial stops /p/ and /b/, and nasal /m/ appear to be messy and promiscuous throughout the first 12 months. Since those are related to the upper lips and lower lips to be the active articulator at the same time.

Also to be mentioned are broad lips with irregularities in the shape including lateral inversions of the lower lip, limited lip motility, palate anomalies, fissured tongue, excessive salivation, flabbiness of tongue and too small a jaw, defective teeth and irregular tooth implantation, flattened nose, underdevelopment of sinuses and nasal passages, enlarged tonsils and adenoids, common respiratory infection, frequent inflammation of the pharynx, laryngitis, and bronchitis producing coughing, hoarseness, and reduced breathing capacity.

Voice quality deviations have been noted. They include breathiness and roughness. There is still disagreement among experts as to voice fundamental frequency in DS subjects. Others indicate that differences vanish when proper control is exercised for factors like karyotype, verbal task (spontaneous vs. elicited speech), degree of closeness in matching DS and NR subjects. Other mechanical factors influencing communication through speech include auditory and visual defects. Hearing loss is more frequent in DS subjects (children as well as adults) than in NR subjects and other mental retardation categories at comparable mental levels, hearing impairment was indicated to affect 60% of the DS sample. The loss was mainly in the lightly to moderately impaired range (i.e., mean decibel range 25-55 bilaterally over the frequencies 500, 1,000, and 2,000 hertz) with the loss being half conductive and half sensorineural and "mixed" impairment.

Recent work with Brainstem Auditory Evoked Responses (BAEPs) in children with DS confirms the existence of conductive loss in a large proportion of the subjects studied. Moreover, numerous DS subjects show BAEP abnormalities indicating a brainstem conduction dysfunction that appears to be positively correlated with their degree of mental retardation. Middle-aged (institutionalized) persons with DS indicate a possible influence of age on hearing loss (with losses of 20 to over 90 decibels) beyond 35 years (up to 62 years in this study). Ocular defects in DS include strabismus and other refractive problems, myopia, nystagmus, and lens opacities. All impede sustained visual focus. Watering eyes, conjunctivitis, and respiratory infections may also appreciably reduce visual efficiency.

Thus, based on Rondal's explanation above, in producing language, CDS usually have problems syntactically

and morphologically. As it has been stated by Bray and Woolnough (1988), instead of saying “I went swimming with my dad last night”, they just say “went swimming dad”. This shows they have problems in the level of speech production, and hence produce sentences that are syntactically odd, while speech impairments which are usually exhibited by CDS in producing language are likely repetitions (repeating the same words all the time), hesitations, stammer, unclear pronunciation, auditory problem, etc. The examples of these speech impairments by Jon Miller (1988) are concluded in the table below.

Table Iii. Type Of Speech Impairments Exhibited By Cds

Type of Speech Impairments	Examples of Utterances produced by DS Child
Repetitions	“That’s... That’s... That’s... That’s big”
Hesitations	“I...em... I... go swim... uh... er... to...morrow”
Stammer	“Ma...ma...ma...ma...my name is Lisa”
Unclear pronunciation	“My tup” (it should be my cup) “My poon” (it should be my spoon)

V. THE SPEECH PRODUCTION EXHIBITED BY THE CDS IN TAMAN ABEKA BHAKTI LUHUR FOUNDATION MALANG: FINDING AND DISCUSSION

According to the findings, there are speech impairments found in several utterances, which were experienced by Gabi. There are two types of speech impairments dominant in the utterances, based on the analysis of the data using theory from Jon Miller (1988). Those are hesitations and unclear pronunciations. Based on the casual conversation with Gabi, the writers found that Gabi exactly could understand what the writers tried to imply in several casual questions which were asked to him. Those questions were about school and the lesson he had learnt at that time. He could answer all the questions well, nothing missed.

However, he still experienced the speech impairments like hesitations and unclear pronunciation, although he was already able to communicate with people in common. First of all, there were pauses (...), utterances like “em”, “uh”, “er”, which indicated the utterer’s lack of fluency in producing speech and those were found in Gabi’s utterances while trying to answer some questions given by the researchers in the casual conversation session. These might be the consequences of him as a child with DS. Since CDS are expected to show cognitive and speech production delay.

Miller (1988) stated that CDS are usually late in saying their first words, making their vocabularies grow slower than in ordinary children and these problems lead to the difficulty in mastering the many rules for talking in grammatically correct sentences. This causes the consequences of the language learning difficulties, and one of the difficulties was the speech impairments which are already exhibited by the hesitations and unclear pronunciation experienced by Gabi.

Furthermore, as it has been already mentioned previously that the kind of delay such as these speech impairments lead to the speech of many children with Down Syndrome being restricted to short utterances, it makes them difficult to pronounce a complete meaningful sentence clearly and this becomes the main obstacle for CDS to communicate well and to exchange information with people in common. Those delays made Gabi try hard in producing a totally complete sentence in order to answer the researchers’ questions. However, when it came to short utterances like answering yes or no question, he did not experience hesitations and could answer well.

However, there were also detailed peripheral pathological factors associated with defective speech in CDS which are mentioned by Rondal (1995). These factors include a buccal cavity too small for the tongue and a protruding tongue, a larynx located too high in the neck with thickening of fibrotic mucosa, vocal fold edema, myxedema of the pharynx, an edematous tongue. The pathological factors cannot be denied and become the main problem to limit their fluency of communication. But, it does not mean that CDS cannot be totally fluent in communicating. It all just needs practices to fluent their speech.

On the other hand, still according to the findings, the writers found that Gabi experienced difficulties in pronouncing utterances clearly, specifically in pronouncing sounds /p/ and /b/ as the labial stops and /k/ as the velars stop. Gabi still found it difficult to pronounce words such as “belalai”, “belanja”, and “belalang” for sound /b/ followed by vowel /ə/ in Indonesian. Gabi exhibited mispronunciation of voiced bilabial stop /b/ in which it became voiced bilabial nasal /m/ (/b/ → /m/) when followed by vowel /ə/. However, since the writers could not find more the Indonesian word other than “bela diri” that has the sound /b/ followed by vowel /e/, the writers could not exactly clarify whether there is consistency of voiced bilabial stop /b/ becoming voiced bilabial nasal /m/ when followed by vowel /e/ or not, but there was indeed mispronouncing of “bela diri” that became “mela diri”. It became voiced bilabial nasal when it is supposed to be voiced bilabial stop.

Gabi also still had difficulties in pronouncing words “pura”, “polisi”, “pepaya”, “payung”, and “pisang” for sound /p/. If these words are seen one by one in the Gabi’s utterances, the word “pura” becomes “ura”, the word “polisi” becomes “olisi”, the word “pepaya” becomes “eaya”, the word “payung” becomes “ayung” and the word “pisang” becomes “isang”. These words were ended with no sound /p/ at all. Also the words with /k/ sound, followed by vowel /a/, like “karet”, “karamel”, and “kare” were still imperfectly pronounced by Gabi. Those became “ngaret”, “ngaramel”, and “ngare”. Gabi exhibited mispronunciation of voiceless velar stop /k/ in which it became voiced velar nasal /ŋ/ (/k/ → /ŋ/) when followed by vowel /a/.

These unclear pronunciations are merely caused by pathological factors affected the defective speech sounds exhibited by Gabi. It is proven from the consistencies in the prompting session done with Gabi. He could pronounce words

like “bintang”, “biskuit” and “kereta” well, which also contain sounds /b/ and /k/, but those are followed by vowels like /i/ for words with the sound /b/ and /ə/ for word with the sound /k/ in Indonesian. In conclusion, it seems that the position of the problematic sounds like /b/, /p/, and /k/ does not affect the mispronouncing exhibited by Gabi, but the following vowel after each of those sounds is the one that affects the mispronouncing exhibited by Gabi.

Overall, if these speech impairments are related to the Levelt’s model of theory of language production, Gabi did exhibit no problem in formulation, but Gabi did exhibit several problems in articulation stage. As it has been mentioned earlier that the preverbal message or the concept is passed to the formulator, where it is grammatically encoded into a surface structure of the language being spoken, which later on there will be the inner speech. Gabi did exhibit no problem with the result of the formulator, which is the inner speech, since he could write all words given and say the name of all pictures correctly while being interviewed. However, Gabi did exhibit problems with the articulation stage, which was shown by mispronouncing he did in words with voiceless bilabial stop /p/, words with voiced bilabial stop /b/ followed by vowel /e/ and words with voiceless velar stop /k/ followed by vowel /a/.

However, Gabi did not have problem with the conceptualization stage, since he knew each name of the pictures given and wrote it correctly. Also, self –monitoring or audition stage did not work on Gabi, since he could not correct his mispronouncing, his weakness in producing certain words. In conclusion, referring to Chomskyan dichotomy of competence vs performance, the problems Gabi experienced were all about performances, but for his competence, there is no problem at all.

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