

## **Autistic Spectrum Disorder in Producing Words of Indonesian Language of Children Patients**

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### **ABSTRACT**

Special treatment for autistic spectrum disorder in the form of joint research with three relevant fields of linguists could provide the speech learning for patients with special needs. This research was conducted to seek the phonological disorder such deviations of the exchanges of consonant or vowel sounds, vowel sounds and consonants, and misjudgment (metathesis) to consonant sounds and vowel sounds in Indonesian autistic patients' speech. The study found that the adult patients, aged from 10 to 15 years old, got the level of language acquisition was only equivalent to children aged 3-4 years. It suggested that the speech irregularity of those patients the existence of psychic disorder responsible for the case of neurocognitive of Autistic Spectrum Disorder of Children Case Echolalia.

Keywords : Autism; Neuro-linguistics; phonetics; aphasic; speech of Children 10-15 years old

### **1. Introduction**

Autism patients were predicted had the phonological difficulties of articulating verbally speaking verbs. It is due to the damage to Broca's area. The lesion area in Broca's syndrome in particular is the 43<sup>rd</sup> area of the Brodman's taxonomy (Lewis et al, 2015). The disorder encountered difficulty in saying the word in question. This typical symptom is then used as a basis for classification of non-fluent language disorder. Meanwhile, a study reveals that;

“Broca's aphasia is adjacent to the face area of the motor cortex, which controls the muscles of the face, the tongue, the jaw and the throat. When Broca's area is destroyed by a stroke, there is almost always severe damage to the face area in left hemisphere, and so it might be thought that the disruption of speech is caused by partial paralysis of the muscles required for articulation” (De Luccia and Ortiz, 2016)

Broca's language disorder (Khanum, 2014) that has been studied emerged a typical phenomenon of difficulty initiating the initiation. In the speech of autistic person with the echolalia which generated deviations in the early syllables in large numbers. In addition, there are often pauses, whether filled with an element or not. The occurrence of the gap, which usually marks an appropriate discovery of sound or syllable, is related to a hesitation

form which also includes a distinctive phenomenon of fluency disorder, which not only arises in Broca's language disorder, but also in other disorders such as stuttering and autistic with the echolalian syndrome (Sterponi et al, 2014). Stutter (Onslow, 2017) is a fluency disorder of fluency problems associated with neurogenic disorders such as autism and cerebral palsy. However, stutter does not appear as a physical disorder. A stutterer may repeat a word or sound, extend the sound, or produce no sound at all. The treatment of autistic children is still not maximized and requires special handling from the linguists (for language therapy), psychiatrists (for neuropsychological therapy). Therapeutic program for language acquisition of autism patients needs the appropriate methods and theories.

Autism spectrum disorders (ASD) (Robbinson et al, 2016; Gustianingsih, 2009) are a group of neuropsychiatric conditions defined through deficits in social communication, as well as restricted and repetitive interests. Deviation is almost all over the word, and it is produced by an autistic spectrum disorder that was categorized children aged 10--15 years old. It was found that the producing the nasal bilabial sounds [m], voiced bilabial [b] exchanged into the unvoiced bilabial sound [p], and the sounding pharynal sound [h] was lost at the end of the word. So, those deviations were identified in the ASDs which were affiliated with Speech Delay (SD), Hyperactive (HA), and Echolalia (EC). Then the word // # balloon # // goes into [# payyom #] in Speech Delay (SD), and become [# bayyo #] in Echolalia (EC). This aberrant fact of the word indicated a drastic changed of a sound of bilabial [b] never appeared in elementary speech, and lateral sound [l], turns into a double palatal sound [yy] in the case of SD and EC cases. Shaddock and Shaddock (2009) say that the autistic spectrum disorder is also known as early infantile autism, childhood autism or Kanner's autism is characterized by disturbances in reciprocal social interactions, delayed communication skills and repetition confined to activities and interests. Three autistic spectrum disorders that are encountered are autism, asperger syndrome and pervasive developmental disorders that are not classified; often also referred to as Autistic Spectrum Disorder (ASD)

The language acquisition of autism children aged 3-4 years has been reported in Dardjowidjojo (2000) and Gustianingsih (2002 and 2009). They found that the normal children of aged 3-4 years old never changed the sounds of lateral [l], bilabial [b], and pharynal [h] or it might be said that sounds [l], [b], and [h] have been obtained perfectly (see Gustianingsih, 2002). The findings displayed the most unique forms of utterances in the speech of children autistic spectrum disorders, which never occurred in the utterances of the normal children aged from 3-4 years. Therefore, autism is known as a severe pervasive neurodevelopmental disorder with poor prognosis (Tick et al, 2016). The previously studies on the children's language acquisition, 5-year-olds revealed that those have reached the full competence such as adult language, complete, complex, correct and precise articulation. An autism research found the case of language acquisition in the Autistic Foundation of I-Homeschooling and Autistic Home in Medan of North Sumatra, aged from 10--15 years with only equivalent to children aged 3-4 years. The irregularity utterances found were due to the existence of psychic disorder, neurocognitive Patients Autistic Spectrum Disorder children Case Echolalia. The founding in the field might make us surprised. The autism patients the age of 10--15 years merely reached the language acquisition as level as the normal age of

children around 3-4 years. The finding showed the utterances disorder were in the center vocal; sound /ð/ swapped into front, low vocals /æ/ in the middle and end of the word. Those were://# bðnðr #// →[# bænx #] ‘benar (true-English)’, //# kðrðng #// → [# tæyæ #] ‘kerang (shells-English)’.

Consonant sounds of Trill [r], voiceless velar [k], voiceless alveolar [s] tended to be converted to the unvoiced dental noises [t], bilabial sounds [b] in the beginning, middle, and at the end of the word swapped to the bilabial noiseless [p], and the nasal was increased at the end of the word in the speech of SD and HA and was lost in speech EC. Such as: //# priksa (check -English)#// → [# plita #] = SD and HA, and [# palata#] and utterance//# tambah (add-English)//→[#tapa#]= SD,HA,EC, //# balon (balloon-English) #// → [# paom #] = SD and HA, and [# payo #] = EC. This case revealed that the trill [r] sound never appeared in both for the Autistic case with Speech Delay (SD) handicap; Hyperactivity (HA), and Echolalia (EC). The sound [r] constantly converted into the sounds [l, n, and m], the sound [k] disappeared and alternated into the sound [t] in the elementary utterance, voiceless alveolar fricative [s] switched into a silent dental [t], word //# tambah #// [# tapa#];add ( English)

## 2. Theoretical Reviews

### Phonological Disorders

Phonological disorder in the form of deviations occurs in process of the exchange of consonant or vowel sounds among autistic children. Language deviation of the autistic children occurs with the utterances of speech sounds, exchange, addition, and speech metathesis. Obtained data of Gustianingsih (2014) showed that the sounds of [i] and [u] have not fully produced by the autistic children either HA, SD, and EC. Thus, the vowel [i] was produced by extending the front of the tongue and lifting the tongue as high as possible to the hard front of sky almost forming a kind of hole that would produce a spiral. If the utterance is Boleh in Bahasa (Permissible -English), the **precentral** gyrus regulates the realization of the utterance by providing a set of commands for the sounding tools. (1) Sort [b] before [o], (2) hold both lips, then release, (3) vibrate the vocal cords together with the opening of the lips (to create a vibrating sound, the command to the vocal cords must be sent 30 mls earlier than command to the lips) (4) keep the vocal cords vibrate, (5) do the tongue slightly up the back, (6) open the mouth and round the two lips slightly to make [o]) and so on for [l], [e], [h]. This process runs very fast and requires the cooperation between neurons that are accurate in the brain. If there is interference with the brain nerves in Broca, there will be sound distortions in the child's utterance. It is said to be distorted because the sounds being uttered do not match the sounds that should be universally proclaimed according to the age of the child or the autistic sufferer today.

According to neurological theorists, nerve V and nerve XII in Broca Field have a very close relationship in producing vowel sounds and some consonant sounds. Nerve V also has the potential to produce sounds that are managed by the muscles of the lips. The sounds produced with these nerves are [p], [b], and nasal sounds [m] and [n]. Declared a nervous breakdown in the child's brain, this V nerve is also called trigeminal nerve that is responsible for regulating how the mouth movements as perfect as possible in forming and regulating the

muscles of the mouth to say and perform activities in accordance with the biological development of a person. Nerve XII is also called the hypoglossal nerve which is responsible for moving the tongue, tongue tip, and back of the tongue approaching the pharyngeal back wall (see Gustianingsih, 2014)

### **Autistic Spectrum Disorder Theory**

Autism spectrum disorder (ASD) is a developmental disability characterized by social and communication impairments and by restricted interests and repetitive behaviors (1) (Christensen et al, 2016; Gustianingsih, 2009). Autistic is a disorder in early childhood characterized by one or more characteristics that are followed by lack of response to others, interference in the form of communicating or language skills, "Bizzare Responses" to environmental aspects, "peculiar speech" patterns such as ecolalia, " metaphorical language pronominal reversal " , like you to me, and this happens more or less the first 30 months. Autism can occur in all children, no racial, educational, and social status differences. The incidence of autistic children is about 4-5 cases per 10,000 children under 10--15 years of age. If severe mental retardation with autistic characteristics is included the incidence rate increases to 20 per 10,000 children. 4: 1 more boys than girls.

The Autistic Causes are (1) Biological factors; 4 to 32% of autistic patients get grand mal seizures multiple times, and about 20-25% show ventricular enlargement in computed tomography (CT) scans. Various electroencephalogram (EEG) abnormalities are found in 10-83% of autistic children, and although no EEG findings are specific for autistic disorders, (2) genetic factors; In some surveys showing 2-4% of autistic children siblings also get autistic disorder, 50 times higher than in the general population. The incidence rate of autistic disorders in the two largest twin studies was 36% in monozygotic twins and 0% in dizygotic twins in one study and 96% in monozygotic twins and 27% of dizygotic twins in other studies. (3) Immunologic Factors; Lymphocytes from some autistic children react to maternal antibodies that increase the likelihood of neural, embryonic, extraembryonic, tissue damage during gestation. (4) perinatal factors; In the neonatal period, autistic children have a high incidence of respiratory distress syndrome and neonatal anemia. (5) Neuroanatomy Factors; Enlargement of the brain is suggested as a possible biological sign for autistic disorders. Some autistic brain disorders have decreased in Purkinje cerebellar cells, which are believed to play a role in attention abnormalities, awakening and sensory processes. (6) Biochemical Factors; In some autistic children, high concentrations of homovanilic acid in cerebrospinal fluid are associated with increased withdrawal and stereotyping.

### **Theory of Sound Recognition of Children's Speech Sound Aged Four-Year-Old**

The development of child phonology involves the development of speech sound, ie consonants and vowels, as well as suprasgemental development. When the child is 3;0 children are able to produce well all vowels and all consonants except fricative sounds [f] - [v], affricates [ç] - [j], and nasal alveopalatal [ɲ] that cannot be produced by steady . Another consonant that the child cannot produce at all is the vibrating sound [r]. However, sometimes children at age 3;5 have been able to produce the sound [f] more consistently. Even this

sound has been contrasted with the sound [v] to produce speech, such as [# map#], [# oto#], [# tipi #], and [# pipi#].

The affrications [tʃ] and [dʒ] that have begun to appear since the age of 2; 5 seem have not been strongly ruled by the child. This sound is still fluctuating with the sound of resistor, especially the sounds of resistor [t] and [d]. Sounds [tʃ] on speech like loncat (jump) and //# cocok (suitable) and //, still sometimes sounds like a mixture between [t] and [s] up to the age of 3; 5. Similarly, affric [dʒ] still sometimes sounds like two sounds [ds] or [dz] rather than [dʒ] as in word “jelek (ugly)”, age 9: 0 is said to be imperfect (Gustianingsih, 2009). This situation is not seen in Indonesian children in general. The child has mastered (comprehension) various patterns of intonation well. Accordance with the above exposures, it is obtained three categories:

Mastered perfectly : /p b t d k s h m n l y w/

Mastered imperfectly : /tʃ ñ ʃ, f, v, g/

Not mastered at all : /r ʃ x/

### 3. Research Method

Research was conducted to seek the language acquisition progress of adult autism patients within framework of speeches and social behavior therapies. The results of development of language acquisition and speech therapy of Indonesian language from the result of phonology deviation (vocal deviation, consonant, syllable, and word) theoretically, procedurally, and empirically were observed (Evans et al, 2015; Pandey and Pandey, 2015). This research included a field research in the Autistic Foundation in Medan to observe the autistic sufferers who have many handicaps; such as there are Speech Delay (SD), there are Hyperactive (HA), Echolalia (EC), there is also Handicap Down Syndrome (DSM). It was conducted based on the list of speech distortion deviations produced by Autistic Spectrum Disorder children from 4 houses of autistic foundation in Medan. Purposive Sampling technique targeted the autistic patients, aged 17-24 years. In the preliminary data, the dominant phenomenon that arises is that exchange irregularities occur by exchange in a distinguishing feature; (57.77%) deviation by exchange with two distinctive features on a single distinctive feature. Meanwhile, (29.21%) deviation by exchange occurred with two distinctive features, then three distinctive features. The form of phonemic level disorder was likely to be large, so there were many syllables as the form of the utterance. In addition, the disturbance at this phonological encoding stage also causes the distortion of the target sound in the form of an exchange in sound. The exchange of sounds can occur with results far enough from the target sound.

### 4. Research Result

Adult Phonological Disorder of Autistic Spectrum Disorder (ASD)

Distinctive Features

In the case of phonemes / p / and / b /, for example, the only feature that distinguishes these two phonemes is the presence or absence of vibrations in the vocal cords. If there is a vibration, the phoneme is / b /; if not, / p /. In other words, / b / is [+ voiced] while / p / [-voiceless].

The distinctive features present in the consonant are:

- a. Vowels and Consonants: all consonants are [+ consonant] and [-vocal] while all vowels are [+ vowel] and [-consonant].
- b. Bilabial: the sound made at the front of the mouth is [+ bilabial]. Thus, the sound / p / is [+ bilabial] while / k / is [-bilabial].
- c. Alveolar (Plosive): the sound made in the upper center of the mouth is [+ alveolar]. Thus, a sound like / p / is [-alveolar] but / s / is [+ alveolar].
- d. Labiodental (fricative): the sound made with the air flow can continue. Of course the / d / sound is [-fricative] while / f / is [+ fricative].
- e. Desis (fricative): sound made with the sound sibilant accompaniment. By this definition then / g / is [-desis] while / s / is [+ sibilant].
- f. Nasal: sound made with air out through the nose. Therefore, / m / is [+ nasal] but / t / is [-nasal].
- g. Voiced: sounds accompanied by vibrations on the vocal cords. All vowels are [+ voiced] whereas / s / is [-voiced] and / z / is [+ voiced].

For the vowel sounds the distinctive features are (1) high, (2) vocal, (3) rear, (4) round, and (5) tense. The vowel sounds / i / for example, are [+ vocalic], [+ high], [-back], [+ tense], and [-round]. Otherwise / u / is [+ vocalic], [+ high], [+ rear], [+ tense], and [+ round]. High refers to the position of the tongue-high, back on the location of the relevant tongue - whether on the face or back of the mouth -, rounded on the shape of the mouth with the lips. On vowels there is no need for voiced feature because all vowels are automatically all [+ sound].

### **Relationship Distinctive Features for Neuropsycholinguistics**

For speech perception because our response to sounds and words of a language is determined also by how the sounds are made, which features are involved, and how they are combined. The ears of the Indonesians, for example, are not trained to listen to the sound [p] followed by aspiration (ie, loud air vibrations when we say certain sounds) as in English. Sound / p / English as in the word pan correctly, and near our mouth there is a corner of paper that we prepare, then the corner of the paper will surely jerk and move. Indonesians in general cannot hear this aspiration when listening to English words such as pat, pick, and pass. In Indonesian there is no word that ends with two consonants (except on some loan words) and this makes us insensitive to this reality. Indonesians generally do not pronounce the English word think with / k /. as the final sound; this sound is often omitted so it is pronounced as a thing.

Briefly it can be said that the perceptions of sound and compositions of sound heard are determined by neuropsychological traces that have been embedded in the human brain, since in human neurophysiology there is a glance showing that the sound / ŋ / can be used in front of a tribe, when heard a series of sounds there is this sound and can be predicted this sound can start a syllable. Suppose the series of sounds is [diapergiantor] then [ŋ] can be included with [antor] so that human interpretation is Dia perging antor (He goes to office). If the listener were English speakers studying Indonesian, he would not combine [ŋ] with an antor because [ŋ] never started a tribe. Thus, it is not impossible to interpret him is Dia perging antor or Diap ergi antor (He goes to office).

Since the difference between one sound and the other sounds may lay only in one distinction in a distinctive feature, such as between / p / and / b /, the notion of a distinctive feature is also important for us to know. What distinguishes the minimum pair such as tie and die in English is not actually the phoneme / t / and / d / but the distinctive features that exist on both sounds, that is, / t / is [-voice] while / d / is [+ sound]. Similarly, Indonesian minimum pair / pan / - / tire /, / pattern / - / ball /, and so on. How these distinctive features appear and diverge in the speech of an autistic patient can be illustrated as below:

#### Consonant Sound

Consonant sounds that are always disturbed in adult autism patients aged 17-24 are substitutions (exchange of sounds, omission, and metathesis.) The following will be described one by one below:

#### Consonant Exchange (Substitution)

Consonant sounds that always exchanged in adult autism patients aged 17-24 speech are:

1. Velar resistor, noiseless [k] and noiseless [g] at the beginning and middle of the syllable exchange into dental resistor [t or d]. Example: // # Kertas (paper) # // → [# tata #] // # Gerobak (cart) # // → [# doba #] // # Pagar (fence) # // → [# pada #]
2. Labiodental fricative [k] at the beginning and middle of the syllable exchange into bilabial resistor, noiseless [p], eg: // # Foto (photo) # // → [# poto #] // # Aktivitas (activity) # // → [# atæpæta #] // # Aktif (active) # // → [# atæ #]
3. Dental-alveolar, fricative, voiced at the beginning of the exchange rates into dental resistor, noiseless or noiseless, for example: // # Ziarah (pilgrimage) # // → [# dala #] [# tala #]
4. Nasal palatal and nasal velar voices at the beginning and middle rates exchange become a nasal dental, for example: // # ñaņi # // → [# nanæ #]

// # kerin # // → [# telæ #]

// # ŋaŋa # // → [# nana #]

5. Vibration at the beginning and center of the exchange rates into lateral alveolar or lateral palatal approximates, for example: // # rambutan # // → [ # yapota # ]

// # baris (line) # // → [ # balæ # ]

6. Palatal, inhibit [c] and [j] switch to dental / alveolar, inhibitory, mute and voiced, eg:

// # cacing (worm) # // → [ # tataæ # ]  
// # jambu (cashew) # // → [ # dabo # ]

### Lost Consonant Sound (Lesap) on children Autism Patients Aged 10--15

Consonant sounds that are often lost (lesap) are:

- 1) Faringal [h] in the initial, middle, and end position of the word is always lost or lesap.

Contoh : // # hapus (delete) # // → [ # apo # ]

// # mahal (expensive) # // → [ # maal # ]

// # kuah (sauce) # // → [ # t0a # ]

- 2) Trill [r] pada posisi awal, tengah, dan akhir sering hilang (lesap).

Contoh : // # ramah (friendly) # // → [ # yama # ]

// # tabrak (hit) # // → [ # taba # ]

// # usir (expells) # // → [ # usæ # ]

### Metathesis Form in Children Autism Patients Aged 10--15

The metathesis form (consonant sound misdirection) in children autism patients aged 10--15 also occurs, the [ # Kertas (paper) # ] sound changes to [kestar, // # teta # //]. When compared with normal childhood languages that are always in the form of metathesis [ # teta # ] is mentioned with [ # status # ], it's just the sound [r] uttered with [l]

Other forms of metathesis such as, // # tabrak (hit) / # taba # // → [ # taba # ]. This form is actually like [ # tarbak # ] for a normal child 4-5 years old, but adult autism patients aged 10--15 is testing it with [ # taba # ]. The sound of the voice-trill consonant [r] is lost and exchanged into a lateral sounding sound [l]. So does the shape // # patri # // [ # palæ # ]. This form includes the metathesis form in children autism patients language, because the actual form of the word is # patri #, and adult autism patients says with [ # palæ # ]. The sound of the voice trill consonant [r] switches to the lateral sounding sound [l] and [i] exchanges into [æ], n [k] is lost

### The Indonesian Sound of Autistic Spectrum Disorder Patient Aged 10--15



## Consonant Sound Used Autistic Spectrum Disorder Children Aged 10--15

Consonant sounds that have been perfectly acquired Children ASD are voiced or voiceless bilabial [b] and [p], dental or voiceless [d] and [t], silent alveolar [s], while the voiced [z] has not been well acquired. Laminal sound [l] has been obtained perfectly, and aproximan palatal sound [y] is also well obtained and bilabial aproximan [w] is also perfectly obtained. The sounds will be realized as below:

For example : //# lumpur (mud) #// → [# lomo #]

//# yakin (sure) #// → [# yatæ #]

# wajah (face) #// → [# wata #]

//# sampah (garbage) #// → [# tama #]

//# basuh (wash) #// → [# bato #]

//# Plaza (Plaza) #// → [# lasa #]

When seen the sounds of consonants that have been obtained by children autism patients aged 10--15 is quite encouraging, but the pharynal sound [h] at the beginning, middle, and end position never appear or lesap in children autism patients aged 10--15 language. The voiced alveolar sound [z] constantly converts into an unvoiced alveolar sound [t] or missing. This applies to this children autism patients aged 10—15 . Understanding children autism patients aged 10--15 words will have been obtained such as understanding the mean of plaza "temat bana beta, lame lai (the big place for shopping and crowded)". basuh (wash)“ [bato],

tamah (garbage)in Indonesian “sampah”, “totolan” (kotoran (dirt)) :

Lumpur (mud)—[lomo], “totoI” (kotor (dirty))

yakin (sure) “tau” ( tahu (know))

wajah (face)“ muta” (muka (face))

An understanding of the words spoken correctly can be illustrated in the following conversations:

Researcher : Halo

Patients 1 : alo.. (Hallo)

Researcher : apakah kamu sehat hari ini? (how are you today?)

Patients 1 : teat (sehat) (I’m fine)..

Researcher : Bagus, pernahkah kamu pergi ke flaza? Apakah plaza itu? (Great. Have you

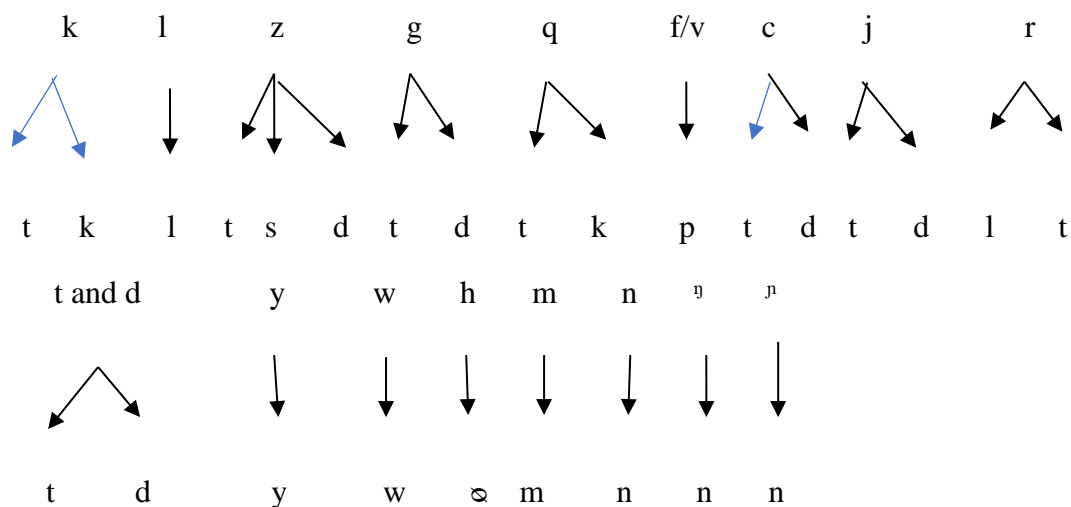
- ever been to plaza? What is plaza?)
- Patients 1 : “ tempat banja besa” (the big place for shopping) ‘tempat belanja besar’
- Patients 2 : tempat lame-lame lagi ( ‘tempat yang rame-rame’) (and it is a crowded place)
- Researcher : hebat kamu...luar biasa...kamu bisa...(great. You’re excellent)
- Patients 3 : ha...ha... (laughing)
- Researcher : Kalau begitu kamu pasti tahu sampah, lumpur, itu apa? (then, you definitely know what is garbage)
- Patients 3 : ha.. totola, tampa, toto, (kotoran, sampah, kotor) (dirt, garbage dirty)
- Patients 4 : bata (basah) (wet)
- Patients 5 : ail-ail ditu...(berair-berair begitu) (mud)
- Patients 6 : lebe-lebe.... tanana (lembek- lembek tanahnya) (the ground is watery)

Understanding of these words is a remarkable development, although the children autism patients aged 10--15 speech form is still categorized as lagging far behind its chronological age. The word teat for word ‘sehat (fine)’. Tempat baja beta, for the word, "plaza". The words produced in the form of Performans were not aligned with children autism patients aged 17-24 competence. The word Totoa, for the word "kotoran (dirty)", and basa, ail-ail ditu, lembek-lembek.. tanana, nyet-nyet, for the word " lumpur (mud)". Languages like this are in harmony with the language of children ages 4--5 or 3 years for normal children who are active and creative. Researchers constantly motivate children autism patients to keep excited to say the words that are known by giving positive reinforcement like "nice" .. "you can" ... "amazing" ... "great " ... and laugh together with children autism patients make they really motivated. The cognitive development of children autism patients aged 10--15 is really low.

When associated with the acquisition of a psycholinguistic language, the age of 10--15 years is included in the category of children and the language ability of this person should have been perfect and has come to the mastery of complex sentences. adult autism patients aged 10--15 in this research turned out to be far from chronological age, adult autism patients aged 10--15 is only equivalent to the age of language acquisition of children aged 4-5 years who categorized speech delay, because children aged 4-5 years as in research Gustianingsih (2002) has obtained sentence compound sentence and subordinate and has been able to gather 200- 500 compound sentences through image tests, interviews and storytelling (see Gustianingsih, 2002)

Variations of Consonant Sound Generated in children

From the results of this study obtained variations of consonant sounds that have been collected children autism patients aged 17-24 is:



Vocals sound which has been obtained by children autism patients aged 10--15

1) High vocals, front / i / in the starting, middle, and end position has been perfectly obtained

//# pilih (choose)#// → [# pili #]

//# tuli (deaf) #// → [# toli #]

//# silih #// → [# sili #]

//# pikir (think) #// → [# piti #]

2) The center vowel, center / ə / still has not been obtained perfectly, because it still exchanges with the front vowel sound / e / at the beginning, middle, and end of the word. //# bənar (right) #// → [# benal #], //# kərang (shell) #// → [# tela #]

3) High vowel, rounded back / u / swap to vowel / o / when followed by middle, center / ə /. //# tubə #// → [# tobe #] 'vessel'

4) Middle vowel, front / ə / swap to front center vowel / e / at the beginning of syllable:

//# əmas #// → [# ema #] 'gold'

5) Vocals high, round, back / u / swapped into a round spherical vowel / o /.

//# bulus #// → [# boyo #] 'A kind of turtle'

6) Front vowel, middle / e / has been perfectly obtained by some children autism patients //# belok #// → [# beyyo #] 'turn'

//# tengok #// → [# tæno #] 'look'

//# sendok #// → [# teno #] 'spoon'

7) The low front vowel / a / has been perfectly obtained by all adult autism patients

//# kapal #// → [# tapa #] ‘ship’  
 //# sayap #// → [# taya #] ‘wing’  
 //# dapat #// → [# dapa #] ‘get’

8) The low round rear vowel / o / has been perfectly obtained by the adult autism patients

//# bola #// → [#boyo #] ‘ball’  
 //# tomat #// → [# tomo #] ‘tomato’  
 //# boleh #// → [# boyo #] ‘may’

### The Relationship between Phonological Disorder and Language Development

If it seen, phonological disorder that occurs in autistic children aged 10--15 years is also perceived as a sad weakness. In this connection, developmental experts still have not found out what developmental theories are for children and for children who suffer from autism should. Researchers found almost the same phonological disorders in children or adults. There is little difference that adult sufferers have obtained perfect vowel sounds when compared to normal children such things have been obtained by children aged 4 years. The disturbance in consonant sounds looks far below normal children, as it turns out that the [c], [j], [f], [g], [j], [q], [r], [x], [z] cannot be produced perfectly, it means that the sound has not been obtained by children autistic sufferers. When compared with normal children this has been obtained at the age of 5 years (see Gustianingsih, 2002). It was also found that there is an indication that a cognitive component of the abnormal functional mind theory would lead to a certain abnormality in a child's development leading to a different pattern of social and communication behavior. Therefore, it should be emphasized that a cognitive dysfunction such as this will lead to childhood autism ("childhood autism"). If the indications are true, this discovery will lead to the assessment of autism in the direction of neuropsychological theory, and this neuropsychology that can lead to autism assessment a step ahead.

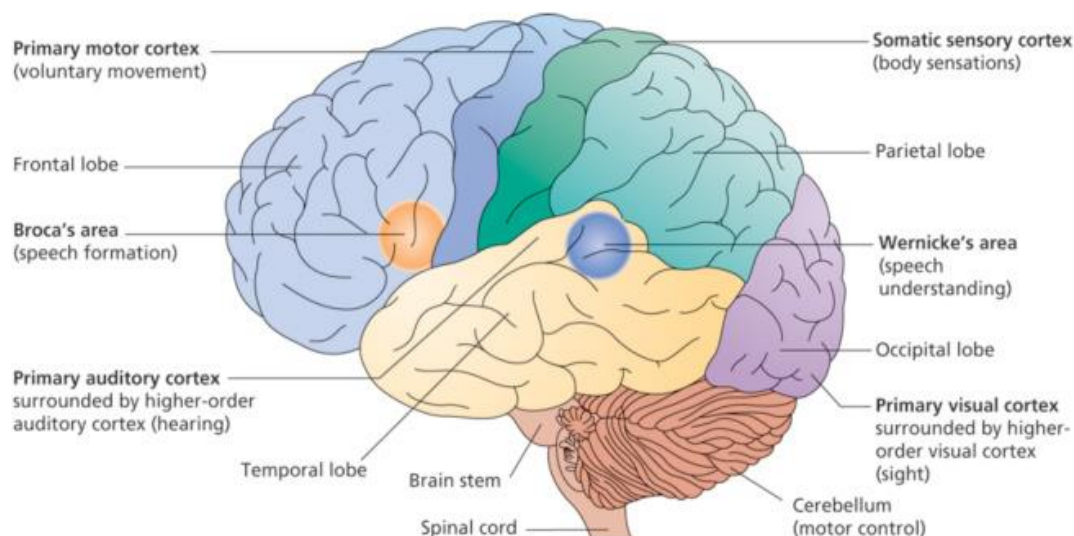


Figure 1. Anatomy of Autism Spectrum Disease (Gustianingsih, 2009)

- Frontal Lobe = regulating the movement and assessment of intent
- Primary Motor Cortex = regulating empathy and emotion
- Parietal Lobe = regulating the lexicon and semantics
- Broca's Area = regulating expression
- Wernicke's Area = regulating the understanding
- Insula = regulating pain and hate
- Cerebellum = regulating the coordination of body muscular movements

Autistic children's anatomy research experts have found that this autistic child has a cerebellum ("cerebellum") of a defective brain. The cerebellum is part of the cortex responsible for managing the coordination of highly complex muscular movements. However, it has recently been found that cerebellar damage is not entirely the cause of autism. This cerebellar damage only causes tremors, unstable gait, and abnormal eye movements.

Psychologists have discovered that autism is caused by a defect in the ability to form a theory of the human brain. This human brain theory asserts, that the circulation of special neurons in the brain allows us to form hypotheses about the work of the most dominant brain. The hypothesis of the most dominant work of the brain makes it possible to make useful predictions about human behavior.

The discovery of psychologists has indeed led in the right direction, however, this psychological theory cannot provide a complete explanation of the relation of autism symptoms to which each other is not related at all. What researchers need to look for, they say, is a brain mechanism whose functionality is parallel to the language and cognitive defects that autistic children suffer. The search for this brain mechanism has been performed by two sets of researchers.

The first set of brain mechanisms hypothesizes that the dysfunction of mirror neurons in the cortex regions of the human brain is found by using the "brain imaging" technique that causes the autism spectrum disease. The assessment of people with autism suggests that mirror neurons in certain areas of their cortex are less active causing autism symptoms to appear. According to this researcher, if these mirror neurons are activated, then the symptoms of autism can be alleviated. As mentioned above, the existence of these mirror neurons is found only in the monkey cortex, whereas its presence in the human brain's cortex is only an assumption. Thus, if these mirror neurons really exist in the human brain, as hypothesized, then this theory is acceptable.

Why researchers reveal that autistic people are also referred to as Aphasia. It is also recognized by Niemi, Broca's aphasia sufferers have a tendency to distort sounds and difficulty initiating speech or also called Initiating disorder. Such cases are found in autistic children with the type of Echolalia. Autodolist autolavs are very difficult to start speech, always repeating aberrant words like parrots.

e.g. : Kebun Binatang (zoo) → tæ...tæ...bo.. tæbo... bi...bi...biyata...biyata

Banyak Anak (many kids) → yæ...yæ...næ... yænæ... yænæ...æy...æ...yæ...æyæ

Gerimis Turun (Drizzle falling) → yæ...yæ.. yæyi...mi...yimi.. to...to...toyo...toyo

There is also difficulty producing sounds in the middle of the word or at the end of the word. This is closely related to the imperfection of speech motor event and this disorder is called as an initiation disorder (initiation disorder). Any disruption to such activities resulted in the placement of the articulator position with slowness or chaos. Therefore, the initial element in a word is said to often have deviations because the muscle system that supports the articulator is not fully prepared. Deviation occurs also in the middle of word and end of word. This happens because in composing consonant and vowel sounds into a complete speech is also often distorted. The imperfection of motor activity of speech is disturbed either in the initial, middle, position of the end of the word.

Children with autistic echolalia are very difficult to start the utterance, so that the initial element of a word is always difficult to be said and often distorted. Speech production in autistic children is very complex both with hyperactive tendencies, speech delay and echolalia, and changes occur either at the beginning of the word, the middle of the word, or at the end of the word. If a change occurs at the beginning of the word indicates a disturbance in initiating speech production. This kind of disorder is called initiation disorders. The interference is closely related to the imperfections of speech motor event, and the existence of interference on the activity resulting in the placement of the position of articulator experiencing delays and changes. Therefore, the initial sound of speech changes frequently and this occurs because the muscle system that supports the motion of the articulator is not fully ready to say, and in this study occur in autistic children with an echolalia tendency (especially in EK1 and EK2 subjects).

Researcher (P): Semapor ?

Autistic Child (A): [# es.....es.....se....sem...ma...mo #]

P : [oh Semapor Pramuka ya ?]

A : [# ho ? oh...ya....#]

P : Taman.....

A : [# ta....ta....tam....ma....ma #]

P : Bunga

A : [# bo...bo...ya...boya... #]

P : Papah kerja dimana?

A : [# e..di..di..e..di..ini...di...di... mana di..di #]

: [# ini.. e.. ah som..som..somata #]

P : Sumatera ?

A : [# ha...ha....yə..... #]

An anomia type in early word production arises because of the difficulty of initiating articulation in the speech of the child. As a result of this event occurs initiation and repetition at the beginning of the word and sound changes occur. The change happens as if the child wants to try and try again the utterance and the wrong end (trial and error). The storage occurs at the beginning of the word more but can also occur in the middle and end of the word also many appear.

In this autistic child, it indicates the difficulty in initiating the proper speech articulation. Basically the child already knows the sound that will be produced by the child, but when producing the speech sound the child is unable to produce it, thus emerge the repetition of the beginning of the speech sound and the deviation occurs.

The early production deviation for this type of anomia occurs in the anterior part which includes the motorized speech field in the left frontal lobe of Broca, causing aberrations of articulatory initiation and connecting to Broca's field in the temporo-parietal region. The connecting nerve of Wernicke with Broca is called arcuate fasciculus. Suspected arcuate fasciculus nerve is experiencing the interference, so its articulatory effect also in initiating speech.

Based on neuropathology, the lesions occurring in the autistic child include the frontal lobe and the temporo-parieto-occipital region. The autistic type experienced by a child initially is autistic not fluid mixed, but then moves narrowly and tends to become an echolalia. So, it can be argued that the phenomenon or the phenomenon of the difficulty of finding the right lexical element in this autistic child is an anomic of the word production. This deviation occurs in an articulatory pathological dysfunction that causes an initiation disorder and the onset of repetition in speech as well as early sound voices in the speech utterance of the child.

#### Relationship between Deviation Patterns and Processing Stages of Lexical Elements

The correlation pattern of lexical processing deviation from autistic child speech production involves three stages: (1) lexicon calling phase, (2) phonological encoding stage, (3) phonological design phase of articulation. These stages will illustrate how disruption of the articulatory mechanisms to speech irregularities that occur in autistic child language.

#### Call Back Phase

A consonant or vowel sound aberration in the speech of the autistic child caused by the disturbance at this stage is a disturbance in encoding phonological information with a KV structure. Actually the entries that are stored and recalled from the phonological lexicon are not separate from each other, but are formed in such sequences as links are linked to each other. Thus, if there is a deviation of information there is a deviation associated with the structure of the KV or syllable structure.

In the data it was found that, based on the emerging metathesis distortions, there was a tendency for KV structures or syllabic structures to be not severely impaired. The disturbance

can be seen from the reversed position of vowel sound (71,59%) and consonant (24,81%). The number of occurrences of this KV structure change is not much, except in //#tauran#//→ [#toa#], //#gulai#//→ [#goa#], //#paulus#//→ [#poo#]. Very few syllable additions appear in the lexical element, but deviations with additions appear in the speech sounds of the child.

e.g. : //# kunyah (chew)#// → [# tumaña #]

//# sulap (magic) #// → [# solla #]

The addition of the syllable generally occurs because of the complexity of the lexical structure that is invoked and the calling system is disturbed, so the basic phonological information of the KV structure is not available completely for subsequent calling. In the absence of complete syllabic information, produces lexical elements appropriately and finally irregularities arise. The deviation with the addition of this syllable occurs in autistic children with speech delay and hyperactive tendencies. This type of deviation in neuropsycholinguistics is called paragrammatism.

### Phonological Encoding Phase

The deviation at this stage is expressed as a translation stage of entries that have been invoked from the lexicon into phonological codes. At this stage there is the formation of sound representations based on the lexical form of deposits or entries called from the phonological lexicon. Distractions at this stage will result in phonological deviations on distinguishing features.

The deviations are related to the number of syllables that make up the word. This form of deviation is with phonemic level disorder. A large number of deviations occur, so there are a lot of syllables to form the speech. In addition, the disturbance at this phonological encoding stage also causes the distortion of the target sound in the form of an exchange in sound. The exchange of sounds can occur with results far enough from the target sound. Usually the exchange occurs with the change of two or more distinguishing features.

In the data, as has been pointed out in the previous section, large numbers are predominantly emerging are exchange irregularities occurring by exchange on a distinctive feature. As much (57.77%) deviation by exchange with two distinctive features on a single distinctive feature. Meanwhile, (29.21%) deviation by exchange occurs with two distinctive features, then three distinctive features.

### 5. Conclusion

Indonesian phonological disorder that occurs in patients with children autism patients aged 10--15 is a substitution disorder (exchange), omission (impingement), and metathesis (misunderstanding). This disorder is not common at the age of 10--15 years; because the form of language produced adult autism patients aged 17-24 is in tune with the acquisition of language in children aged 4-5 years.



Distorted consonant sounds are the sounds of [k], [g], [r], [ʃ], [p], [r]. The sound [h], always lost both in the beginning, middle, and end of the word. The well-learned sounds are the sounds of [p], [b], [t], [d], [l], [m], [n], and semi vowels [w] and [y].

The therapeutic model offered is to prepare 10 words of target consonant sounds that are impaired for improvement over a year, then 20 words, and so on over the next three years.

## REFERENCES

1. Christensen, et al. 2016. Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. *MMWR Surveill Summ* 65(3); 1-23
2. Dardjowidjojo, S. 1991. "Acquisition of Phonology and Semantics in Children: Its Relation to Affected Patients" in *PELLBA 4: Linguistik Neurologi*, ed. Soenjono Dardjowidjojo, 63-82. Yogyakarta: Kanisius.
3. De Luccia, G. and Ortiz, K.Z. 2016. Association between Aphasia and Acalculia: Analytical Cross- Sectional Study. *International Journal of Clinical Medicine*, 7, 1- 9. <http://dx.doi.org/10.4236/ijcm.2016.71001>
4. Evans, N. et al., 2015. *A Systematic Review of Rural Development Research*, Springer Briefs in Public Health
5. Gustianingsih. 2002. The acquisition of Sentences of Indonesian Compound Sentences In Childhood Kindergarten. Unpublished Thesis, Program Pasca Sarjana USU, Medan
6. Gustianingsih. 2009. "Production and Comprehension of Indonesian Language Speech to Autistic Spectrum Disorder. Unpublished Dissertation : Pascasarjana USU
7. Gustianingsih. 2014. Indonesian Phonological Disorder of Autistic Spectrum Disorder in Medan City (Case of 7-10 Years old). Results of Competitive Grant Research.
8. Khanum, Farjana. 2014. Influence of Broca's Aphasia and Wernick's Aphasia on Language Disorder. *Global Journal of Human-Social Science: A Arts & Humanities – Psychology*, 14 (9), 53-56.
9. Lewis, G. A., David P., Gregory L. Murphy. 2015. The neural bases of taxonomic and thematic conceptual relations: An MEG study. *Neuropsychologia* 68 (2015), 176–189
10. Onslow, M.. 2017. *Stuttering and Its Treatment: Eleven Lectures*. Australian Stuttering Research Centre The University of Sydney
11. Pandey, P., Pandey, M.M., 2016. *Research Methodology: Tools and Techniques*. Bridge Center. Romania, European Union
12. Robbinson, et al. 2016. Genetic risk for autism spectrum disorders and neuropsychiatric variation in the general population. *Nat Genet.* 48(5):552–555
13. Shadock and Shadoch. 2009. *Psychology of Behavior Special Need*. Fransisco: W.H. Freeman and Company.
14. Sterponi, L, Jennifer Shankey. 2014. Rethinking echolalia: repetition as interactional resource in the communication of a child with autism. *Journal of Child Language*, 41, pp 275-304 doi:10.1017/S0305000912000682
15. Tick, B. 2016. Heritability of autism spectrum disorders: a meta-analysis of twin studies. *Journal of Child Psychology and Psychiatry* 57(5): 585–595
16. Thank you for DIPA USU2014, number: 1082/UN5.1.R/KEU/2014, 17<sup>th</sup> February 2014