
Speech Therapy and Its Significance to Dyslexics: A Study of Hopespring Foundations, Port Harcourt

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Abstract

Speech therapy deals with brain stem activation for speech recovery. This study on speech therapy in dyslexics assessed the significance of therapy administration in speech recovery. The population for this study was derived from Hopespring Foundation School, Port Harcourt where reports for seven dyslexics were purposively selected; all selected samples were on therapy for either two and four years. Adopting the usage-based theory to explain the function of the principles of neuroplasticity, the limited effectiveness in the cognitive progress as a factor of therapy administration was assessed. The information for each subject which formed the data of this study were got from a progress report sheet. The information retrieved were recorded and presented on tables, grid and percentages and interpreted descriptively. The data showed that the results of the dyslexic's cognitive outcome were a function of the brain neurons and not age of the child. The study recommends a dysfunction based therapeutic intervention since intensity, specificity and frequency are factors that trigger a higher brain neural activation, such that, cognitive adjustment becomes much easier and better.

Keywords: dyslexics, speech therapy, speech recovery, brain neurons, neuroplasticity

1. Introduction

Human communication is encoded with symbols that are deduced with the application of given phonemic skills. When the phonemic skills are not developed, communication would be impeded and may lead to different forms of speech dysfunctions that affect speech production and reception. Language disorder can affect all kinds of linguistic communication. Phonemic disorder is one of the most prevalent characteristics of dyslexia.

Catts (1989) defines “dyslexia is a developmental language disorder that involves a deficit(s) in phonological processing” (p. 50) while Adolf and Hogan (2018) having reviewed other literatures on the meaning of dyslexia explain that it is a disorder based primarily on deficits in the phonological domain. It is easily manifest in the word reading level. Additionally, Volkman (2020) describes dyslexia as an immature development of some language areas in the brain concerned with reading. Dyslexia, according to her, is not language bound but affects both speakers of symbolic languages and image language, as it is a loss in the brain network between the visual and audio cortex. She observes that the dysfunction is present from birth but can be changed if interventions such as motor programmes can be introduced to help create the connective network. In her study, she recommended a daily routine of this intervention and an introduction of memory games; identifying this as a factor that activates the brain’s mechanism, a notion related to the concept of neuroplasticity.

Conway (2017) wrote that the dyslexic brain can be rewired for effective speech communication. He pointed at the use of the multisensory method for language teaching. He specifically opined that that the functioning of the grey matters in speech recovery is essential. He further states that there is a mechanism known as neuroplasticity which explains the brain’s ability to create new

experiences and connections with intensive effort, irrespective of age. In his view, intervention programmes can be evaluated if effective after a week's frequent practice.

Conway (2014), reporting on how to make the weaker cells strong as a strategy in speech activation, described three basic principles. These principles are intensity, frequency and specificity of instruction. He described that these principles function with a system identified as neuroplasticity and which is significant to the success of rewiring the brain and addressing learning difficulties. Tobias (2020) expanded these principles of neuroplasticity to include: use it or lose it, use it and improve it, specificity, repetition matters, intensity matters, timing matters, salience matters, age matters, transference, and interference. She noted that these principles are not related to muscle strengthening but the rewiring of the brain. We change behaviour and form experiences by allowing the use of the weaker side of the body and when this activity occurs over time, the experiences become engrained in the brain to a point of automaticity and this can be accounted for as the functioning of neuroplasticity.

Of importance is Eden's (2016) position that there are no structures in the brain that was designed to read rather, we reorganise the brain organs designed for other things. She added that the brain networks with the sound, sight and auditory skills to perform reading. This network does not work for a dyslexic because they are incapable of encoding and decoding sounds and symbols relationship. It is worthy to note that according to Hodge (n.d.), 'neuroplasticity can occur as an adaptive mechanism to compensate and adjust for lost function and/or to maximise remaining functions in the event of brain injury.' (par. 3) She notes researchers have studied the effectiveness of explicitness in teaching sounds and phonology to dyslexics and observed that time and adequate

examples to recreate the brain activity, will lead to a successful intervention. According to research in Eden's view, after intervention, there is an increase in brain activities in the areas related to language. This provided an insight to the relationship between the brain and struggling readers and the value of the brain. She postulated that even adults with dyslexia can change their brains to become better readers.

Worthington (2019) added that interventions such as air writing overtime leads to an improvement in reading as reading sounds with their corresponding letters becomes automatic. He reported that researches have shown that the sensory-cognitive function or symbol imagery improves phonemic awareness. It goes beyond phonemic awareness to orthographic development for reading of sight words.

With dyslexia, intervention changes the brain matters and stimulates the brain's activity for reading. In this way, speech is entrenched and developed in the brain using a cognitive approach in assisting the learner which activates the learner's cognitive process. Therefore, speech therapy should not be valued as a task on muscle adjustment or speech patterning but a process of speech entrenchment and development. The study therefore examines the result of cognitive reconnections as a function of therapy administration.

1.1 Statement of the Problem

Understanding the brain and its functioning is essential in speech therapy delivery as the latter is not limited by age but the rate of recovery is determined by certain brain factors and volume of therapy administered. More so, training the brain on speech development requires an entrenched cognitive force to achieve the stabilisation of the disordered brain. However, interest has been

focused on achieving this feat with much less emphasis laid on the brain. Thus, the debate on how and what works in the brain to help boost the cognitive process and the relation of this stem to age. Interestingly, in Nigeria, many have affirmed that early detection and therapeutic intervention is effective but without a specific identification of the function of the neural stems and required intensity of therapy which is not age dependent. Thus, the challenge of effective speech therapy may be factored from the type of therapeutic plans and/or designs that are not aligned with the function and principles of neuroplasticity and should not be exclusive of young and adult learners.

1.2 Aim and Objectives of the Study

The primary aim of this study was to substantiate the relationship between speech therapy and recovery in dyslexia. The specific objectives include to:

1. Examine the function of age in speech recovery by dyslexic
2. Assess the effective function of the principles of neuroplasticity in dyslexia.

1.3 Research Questions

Guided by the objectives, the following questions were raised:

1. To what extent is speech recovery factored by age in dyslexia?
2. To what extent can neuroplasticity be determined as related to speech recovery among dyslexic?

2. Theoretical Framework

2.1 Usage-Based Theory: A Cognitive Perspective

Bybee ([2010](#)) explained a cognitive process in speech development through usage-based theory. Writing on the usage-based processes,

several cognitive processes that influence the use and development of linguistic structure and which explain the functionality of the theory were identified. These include: (i) categorization: identifying tokens as an instance of a particular type (ii) chunking: the formation of sequential units through repetition or practice (iii) rich memory: the storage of detailed information from experience (iv) analogy: mapping of an existing structural pattern onto a novel instance, and (v) cross-modal association: the cognitive capacity to link form and meaning. Thus, there is a strong “cognitive commitment” to explaining linguistic structure using this approach. As Taylor puts it, “the general thrust of the cognitive linguistics enterprise is to render accounts of syntax, morphology, phonology, and word meaning in consonant with aspects of cognition which are well documented, or at least highly plausible, and which may manifest in non-linguistic forms” (Taylor, [2002](#), p. 9).

Ibbotson (2013), explaining the scope of the usage-based theory as opined by Langacker, noted that “the more a linguistic unit is established as a cognitive routine or “rehearsed” in the mind of the speaker, the more it is said to be entrenched”. Schmid (2017) opined that that,

Entrenchment posits that our linguistic knowledge is continuously refreshed and reorganized under the influence of social interactions. It is part of a larger, ongoing process of lifelong cognitive reorganization whose course and quality is conditioned by exposure to and use of language, and by the application of cognitive abilities and processes to language (n. p.).

For example, young infants are able to discriminate a wider range of sounds that are present in their native language than in a foreign language (Aslin, Pisoni, Hennessy, & Perey, [1981](#)). Once this

entrenchment is established as a routine, it will be difficult to reverse.

Therefore, the cognitive ability of the child should be guided towards the actual phonemic reproduction of the target phoneme and through the guidance of a caregiver. It is by this means the use of the therapeutic measures is expected to lead to mastery of phonemic discrimination. This theory is adopted for the present study to explain the effectiveness of the therapeutic measures used with the dyslexic.

3. Methodology

This study employed a qualitative research method. Data were collected from primary sources using an observation of the progress report for the dyslexics. The subject for this study were seven dyslexic pupils from ages 3 to 14 who were already on therapy taken from fifteen pupils with speech disorders in the selected sample site. The subjects were purposively selected to exclude those who had extra therapy sessions. The data were retrieved from the school's progress report which contains details of their progress and identifiable condition, if any. Analyses were descriptively done as results were presented on tables and charts. Bybee's Usage Based Theory supported the cognitive changes identified.

4. Data Presentation and Analysis

4.1 Data Presentation

Table 1: Interview Report

Question	Response
What is your opinion on the possibility of activating word reading skills in dyslexics?	The dyslexic can learn to read if taught
How regularly do you hold a therapy session?	Two times a week for a one-hour intensive practice and an extra day for musical session. They are allowed to learn with their peers
In your opinion, what factors do you think contribute to the activation of their reading skills?	Practice on sounds
Are you aware of a mechanism known as neuroplasticity? If yes, what is its function?	No.
Do you think that there is a special organ for reading?	Yes, and the poor development of that part of the brain is responsible for this disorder
How do the dyslexics learn?	Hmmm, for the dyslexics, they learn using sounds and images
What method of therapy do you apply?	No specific method but I engage them in sound and

	word naming activities. Sometimes, we include games.
In your opinion, do you think that a child with dyslexia can become a normal reader?	It is possible but the child may still be challenged by a few concepts even as an adult
Can dyslexia be overcome in adulthood?	I don't think so. The adult brain will be difficult to train

Table 2 Cognitive Report

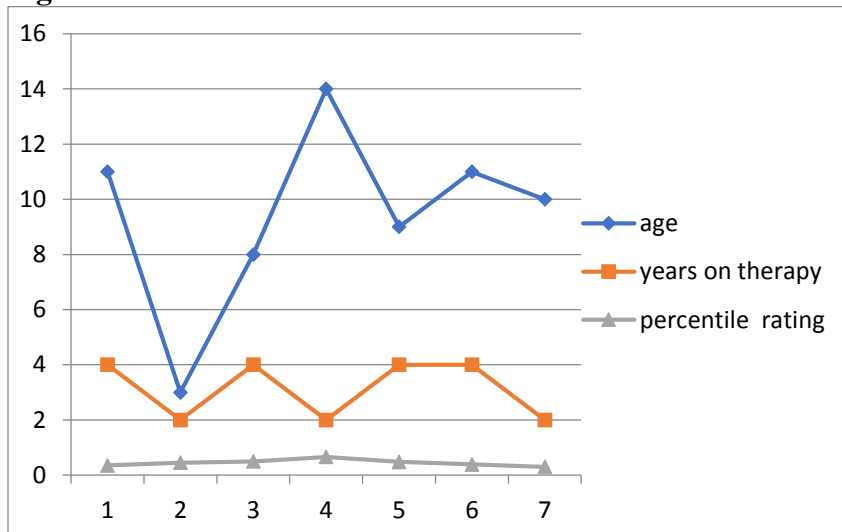
Respondent ID	Age	Years on Therapy	Cognitive Report
A	11	4	No expressive ability but good reception (mid-interruption-withdrawal)
B	3	2	Average on expressive and receptive ability
C	8	4	Average on expressive but good receptive ability

D	14	2	Good expressive ability and above average receptive ability
E	9	4	Limited expressive ability and above average on reception
F	11	4	Average on expressive but poor receptive ability
G	10	2	Poor expressive and receptive ability (comorbid)

Table 3 Subjects' Performance Rating

Age	Years on Therapy	Percentile Rating
11	4	35%
3	2	45%
8	4	50%
14	2	66%
9	4	48%
11	4	39%
10	2	30%

Figure 1: Information Grid Chart



4.2 Discussion of Findings

The results from this study showed that the human brain can be rewired by an understanding of the mechanism of neuroplasticity; a mechanism that is not age related and which is effective for cognitive reconnection. This position collaborates Mohr’s (2017) view that measuring neuronal correlates of good (or poor) language recovery could help to identify patients who might benefit (or not) from a specific therapeutic method and can contribute to the development of effective neuroscience-based neurorehabilitation techniques.

Apart from exceptions from progress report on two subjects from the data presented (A and G) who had other stated factors – interruption and comorbidity - that may be considered to have had a

possible effect on the result of the intervention, the data explained that speech recovery is effective through practice as presented in table 3. All subjects received same pattern of therapy and had no extra therapy schedules. However, A and G were identified as exceptions as stated above. F was also listed as low (39%) though relatively close to the expected average of 40%. The cause of the difference for F is not discussed since it had no notable presentation. All other subjects scored above 40% in the test administered.

As earlier reported by Tobias (2020), when the first principle of neuroplasticity, intensity is not applied, the consequent effect is a resultant poor ability despite the years on therapeutic sessions. For instance, A who had same years of therapy as F is less productive. Both subjects were identified as having no trait of comorbidity. The study accounts for this difference as a result of disconnection during therapy which does not align with the principle of intensity. Respondent A's report is observed as being influenced by periods of interruption which is not experienced by respondent F. Furthermore, subject D with just two years of therapy has a high cognitive and percentage rating. From side notes on observation as obtained from the therapists, D is the most consistent dyslexic as regards responding to sessions. This correlates with Ibbotson's (2013) position on the effect of enrichment and entrenchment as essential when working on cognitive functioning. The frequency and repetitive implementation of encoding linguistic codes enriches the mind of the speaker; here, the learner.

According to Mohr (2017),

The efficacy of intensive therapies can be explained by neuroscientific principles of learning and memory: high intensity and mass practice facilitates and enhances learning and cortical plasticity by correlated neuronal activity and by strengthening of synaptic contacts between neurons. From

this perspective, any intensive cognitive-behavioural intervention can maximize the effects of training-induced brain plasticity, which is ultimately a consequence of effective learning. Similarly, multiple repetitions of stimuli or tasks applied during language training, as well as the imitation of language skills modelled by language therapists will enhance learning and re-structuring of residual language networks (par.6).

More so, the result from the sample of this study signals the therapists' low understanding of the cognitive connections that are activated using therapeutic interventions and poor knowledge of the mechanism responsible for this reconnection as well as the disadvantage of using general therapy methods for dyslexics. It is worthy to note that specificity is identified as an essential principle in speech recovery. Each learner's interest should be wired to specific needs. Eden (2016) had pointed to the fact that apart from designing an intervention programme, it is essential to tailor such to the specific needs of the child/or learner. In the study, it was thus observed that the therapy used on the school was not designed for specific needs-dyslexia. As presented in the therapist's response in table 1, the dyslexic is not trained using dysfunction specific therapy but exposed to general speech therapy. If this was adopted, given that each child has had less than two years of therapy, a more enhanced speech performance would have been observed considering the duration of therapy and the effectiveness so far measured.

From the data, as against upheld position on age and speech recovery, age was not identified as significant to the cognitive changes. Given the opinion on language learning being age-bound, it would have been expected that subject D will lose active neural

reconnection. Respondent B who would be expected to have the most significant result had a score lower than D. Thus, with reference to language learning being age bound; no result is dependent on the age of the subjects. An evaluation of the youngest and oldest subjects, ages 3 and 14 respectively, and with same years on therapy signified that there is no age limit in speech recovery even though there may be other unmeasured variables that would have influenced B's performance, the presence of an above average score for D, tells that learning is a life-long process. Hence, on age relationship to the functioning of neuroplasticity, this study affirmed earlier works (Tobias, 2019, Eden, 2016) that learning to rewire the brain to form new codes/or experiences is a lifelong activity; not age dependent.

Projecting a relative fluency for the subjects who have had at least two years of therapeutic sessions and the actual identification of average ability for the subjects contradicts Worthington's (2019) observation and the principle of neuroplasticity- by Tobias (2020). More so, assessing the reported years on therapy for the subjects under study, it may be stated that the therapist may not understand the brain network principles. If knowledge were present, activities would have been designed specifically to rewire the brain on the deficit patterns for dyslexics therefore ensuring a re-organisation influenced by the desire to activate the cognitive process through a specific plan which will better help in the organisation, chunking, analogy, cross modal association of sounds as postulated in Bybee's theory for an effective usage productivity.

Agreed that dyslexics are phonemically deficit, it should be given that the deficiency is presented as an inability of mapping sounds to their corresponding letters. Bybee identified this as a stage in cognitive processing. Thus, juxtaposing neuroplasticity and cognitive processing, it is easy to understand the need to adapt some

major principles-specificity, intensity and frequency. In spite of the poor adaptation of these principles, it is still observed that there are active neural sockets activation. These connections account for the encoded skills that signalled a progress in cognitive conditioning of the subject. This accounts for the cognitive difference(s) in the progress for subjects of same ages and years of therapy-eleven years of age and four years of therapy. The intensity and duration for the first subject is interrupted and his cognitive progress is less than the latter subject who had four years of uninterrupted sessions.

5. Conclusion

Speech therapy can be enhanced through therapy administration. All subjects in this study were above the above stated age yet identified with poor speech abilities either receptive, productive or both. However, earlier studies like this present study affirmed that dyslexics can acquire speech competence. The brain is elastic and can adjust to accommodate new experiences and skills. Understanding this is essential to any recovery programme designed for the dyslexic. The communication system needs specific attention especially for developing language learners. Giving away a learner with a speech dysfunction should be managed by significant attempt in creating specific activities that would relate to the cognitive functioning of the brain. This is as reported in earlier literatures and the observation of this present study that there are neural stems in the brain that can affect a wide range of developmental processes.

Therefore, there should be an acknowledgment on the functioning of the neural stems in enhancing the efforts of teachers, parents and linguists on improving the child and activities would be frequent, intensive and specific and tailored towards activation of the neural sockets than an attempt on strengthening the weak muscles. In all, it can be stated that among typical learners, there are

atypical learners. In homes and schools, low interest on their differing speech levels has left the atypical child unconcerned about learning. This study has noted the significance of the concept of neuroplasticity in speech recovery for dyslexics and by its investigation recommends a multisensory linguistic tool for language teaching in order to meet the specific needs of each dyslexic- be they visual, auditory, developmental, etc as informed by Perlstein (2020).

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