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SPOKEN AND VISUAL WORD RECOGNITION WITHIN THE IGBO LINGUISTIC CONTEXT: EFFECT OF AGE

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Abstract

Spoken and visual word recognition is a major aspect of speech perception which entails how spoken and visual (written) words can be recognized and processed by individuals through the ears and the brain. Although some researchers think that studies on this aspect may be a good strategy for eliminating confusing variables and thoughts, it is not clear how results of studies as these may be generalized. The focus of this study is to examine the effect of age on the use of Igbo linguistic context in spoken and visual word recognition. Decision Rule Competition (Cohort's model) and Lexical Decision Task (Meyer and Schvaneveldt's model) tests are used to elicit data from participants. Eight native speakers of Igbo participated in the exercise – four young individuals and four old individuals. A one-on-one involvement on participation is carried out to elicit information/data from the individuals. The findings of the studies showed that for spoken word recognition, most of the words were recognized easily within two seconds for the different age groups and the non-words were not perceived and recognized by all the participants. For visual word recognition, significant variance contributed a lot by individual differences in age of participant and cognitive function; hence, accuracy varied at different ages for different individuals. Also, it is proved that older individuals perform worse in response times at recognizing unfamiliar words than younger ones. It was concluded that the ability to use linguistic context to aid spoken and visual word recognition is adequately vigorous that a relatively wide range in age among native Igbo speakers has moderate effect on recognition performance.

Keywords: Speech perception; spoken and visual word recognition; and age.

1. Introduction

What motivated the perception of speech is what and how we hear sounds; when we hear sounds, we hear them either as speech or non-speech and we hear these as a sequence of sounds. Speech perception studies the way speech sounds are being identified and analyzed by the ears and brain. However, the study of speech perception also accounts for how we identify spoken words and comprehend sentences in connected fluent speech. The study of speech perception investigates how we are able to identify in the human voice the meaningful

patterns that define spoken language. Research in this area has traditionally focused on what parameters in the acoustic signal influence, for example, the sensation of particular speech sounds, specific consonants or vowels. Speech perception is to audition while face perception is to vision, in the sense that, it is a differentially developed response to a particular type of physical signal within a more general sensory modality. Speech perception is the study of how we categorize what human beings say vocally in communication (Pisoni, 1998).

Word recognition (spoken and visual) is a branch of speech peerception which focuses on perception as well as recognition of spoken and written words through auditory and visual means. The essential value of word recognition may be obvious due to the popularity of literacy in our modern society today. Moreover, a better understanding of word recognition processes may enable more precise treatments or solution for individuals with reading disabilities.

For the task of word (lexical) recognition, representations must be satisfactorily graphic in order to allow listeners to take away the phonetic realization of a word from surface variation caused by differences in co-articulation, speech rate, intonation, and speaker-specific properties, as well as random noise (Albright, 2012). The question is: how are speech sounds and visual words interpreted in the brain? How long does it take an individual to recognize a spoken or written word?

This study explores the effect of age on the Igbo linguistic context of spoken and visual word recognition using native Igbo-speaking individuals with an average range of educational exposure and vocabulary knowledge. There is no way that participants with this demographic range will not naturally utilize linguistic context in spoken and visual word recognition; rather, our question is how age may contribute to word recognition data when words are heard in the absence of a linguistic context, or when heard and preceded by varying degrees of contextual constraints.

The goal of this paper is to examine the effect of age in the recognition of spoken and visual ***Igbo words*** and to investigate the effect of familiar and unfamiliar Igbo lexis in word recognition. This work aims at addressing the questions: (a) How does age affect the recognition of spoken and visual (written) word? (b) How do familiar and unfamiliar words affect spoken and visual word recognition in Igbo linguistic context? The scope of the study covers a part of Ifite in Awka, Anambra state.

This work employs the experimental research method. This method deliberately and systematically manipulates a set of independent variables or influences on other extreneous variables and observes how the condition or behaviour of the subject is affected or changed. The method deals with cause-effect relationship. The non-probability random sampling technique is used to acquire uncontaminated (authentic) information from respondents that can be used to represent the total population of eight Igbo speakers. Non-probability sampling technique stipulates that factors other than chance determine who is selected for the research (Rasinger, S.M., 2010). Participants consist of individuals who have undergone or are still undergoing formal education. Thus,

not all the respondents are indigenes of Awka community which ensures authentic data from the respondents.

Having introduced this research study, it is pertinent to review or take a look at some of the research studies carried out by early and recent linguists and scholars on spoken and visual word recognition in linguistic contexts and how age has been one of their salient factors of consideration.

2. Literature Review

This section reviews a brief overview of the concept of speech perception which introduces the aspects of spoken and visual word recognition and how they relate, as well as take part in linguistic contexts; and also a review of various works by linguists, psychologists and other scholars on the effect of age on word recognition. Furthermore, the work reviews the most common effects of spoken and visual word recognition alongside suitable models.

2.1 The Concept of Speech Perception

Speech perception is the process by which the sounds of a language are heard. The process of speech perception starts at the level of sound signal through the process of hearing. In the research of Hayward (2000), the term speech perception has been observed as not commonly used in connection with the recognition and identification of individual phonetic segments. In speech perception, listeners focus attention on the sounds of speech and notice phonetic details about pronunciation that are often not noticed at all in normal speech communication. Cognitive psychology indicates that we use the letters within a word to recognize a word. However, it says that we recognize words from their word shape (bouma shape). Word recognition is measured as a matter of speed, such that a word with a high level of recognition is perceived faster than one with low level of recognition. This manner of testing suggests that comprehension of the meaning of the words being read or pronounced is not required at all, but rather the ability to recognize them in a way that allows proper pronunciation.

Several studies over the past 60 years such as Howes (1954) have declared the basic principle in perception that the higher the probability of occurrence of a stimulus, the less sensory information will be needed for its correct recognition. For linguistic research papers, this principle has been frequently revealed using the so-called ‘cloze’ procedure of Taylor proposed in 1953, where he maintains that the transitional probability of a word in a sentence context is predictable by the percentage of individuals who give that word when asked to complete a sentence with what they believe would be the most likely final word (e.g., He wrote a book without a _____.). Whether measured by the least exposure duration necessary to recognize a written word, or the minimum signal to noise ratio necessary to recognize a spoken word, the amount or clarity of the stimulus necessary for its recognition has been shown to be ‘inversely proportional to the logarithm of its probability’ in that linguistic context (Tulving & Gold 2012). This common principle holds for older as well as for younger adults for both written

and spoken word recognition which is the next concept to be reviewed in this section.

2.2 Spoken and Visual Word Recognition

Spoken word recognition is referred to as the process by which auditory stimulus which belongs to one word category is identified and chosen from many alternatives provided in the person's lexicon. This process entails that the spoken word that is heard is paired with mental representations which contain several word-forms as alternatives and then, one of the word-forms is selected. Spoken word recognition provides us with the connection between speech perception and cognitive processes, such as, retrieval of information, analyzing, describing of grammatical elements (parsing) and interpreting of the information. The empirical (Pisoni & Luce, 1998), pragmatic (Nusbaum & Magnuson, 1997; Remez, 2005) and theoretical (Norris, 2003; McQueen& Cultler, 2000) assumptions made by psycholinguists indicate that spoken word recognition is faced with one major challenge known as *the embedding problem*. The embedding problem is when two or more short words are identified within the phonemic transcription of the intended word. Such identification varies depending on the speaker's dialect.

For example:

In English

(1) Inquisitive – in, ink, quiz, easy, eve

In Igbo

(2) Ụ́mụ̀eléké (a place in Achina) - ụ́mụ̀, mụ, elé, éké

(3) Ọ̀ménàlà – o, mée, nà, àlà

Listeners, therefore, become very sensitive and alert in order to identify the difference between the phonemically identical syllables in the short words and the embedded ones in longer words. According to Altmann (1999), there has been rising evidence that a sequence of words is often not constantly compactible with more than one syntactic and semantic structure. For instance, if we consider the structure: "*Kate swept the room*", it is observed that the structure differs whether it is accompanied by '*on her own*' or '*to maintain personal hygiene'*.

Traxler and Gernsbacher (2006) note that there are three functions of spoken word recognition: (a) *The initial contact* – here, the input not only interconnects with the lexical representations, but also activates them. The linguistic content (the word or phrase to be spoken) and the speaker characteristics (the physiology of the vocal cords, gender, origin, emotions and identity) are involved where they affect the sound of the spoken content at the same time. Thus, the listener recognises different stimuli acoustically as alternatives of the same spoken word and draw out the similarities existing amongst those lexemes and categorize them as one. The traditionalists believe that the categorization of a given pronunciation as a word-form of a given word is highly dependent on the extent to which its components possess similar features with the word's phonemes. (b) *Selection* – this describes how the activated lexical representations or alternatives are examined, putting into consideration the sensory input. As soon as a word is heard, several lexical items with phonological

similarities and frequency of occurrence will be activated; and so, the lexical items strive for selection. Talking about frequency occurrence, Howes and Solomon (1951), and Savin (1963) explain that words which occur more frequently are easier, more accurate and faster in recognition than words that seldom occur. The initial contact of a word with the lexicon is ordered by frequency; that is, the high-frequency words match first before low-frequency words. This specifies that the recognition process does not entirely depend on the extent to which the spoken input matches the representation of a given word, but also depends on the extent to which the input matches the representations of alternative words. (c) *Integration* – at this stage, the various lexical alternatives are evaluated with considerations towards linguistic and nonlinguistic contexts. This stage helps us to point out the most similar lexical alternative for recognition.

2.3 Variation of Age Effects in Word Recognition

One cannot talk about age effect in isolation without a connection to cognitive ability or function. It is understood by scientists that our human ability to think fast (fluid intelligence) get to its highest point around the age of 20 and then declines gradually. However, more recent findings of Trafton (2015) show that different components of fluid intelligence get to its highest degree at different ages of people's life, some even occur as late as 40 years. Previously, the initial studies of the facilitating effects of linguistic contexts on word recognition have been conducted on college students as a population of convenience for university-based research, but in cognitive research on the effect of age, it has been recorded by Park and Schwarz (2000), and Craik and Salthouse (2007) that this convention has largely still been followed with university undergraduates representing the young adults and usually compared to older adults matching for education and verbal ability. On one hand, many studies of aging and word recognition give no demographic information at all, beyond age; on the other hand, Pichora-Fuller and Souza (2003) make specific notes of this negligence to factors beyond age and hearing acuity, pointing out that most research on word recognition with older adults have used well-educated and self-selected volunteers. As they indicate, this is a good approach for getting rid of difficult and confusing variables such as linguistic ability and educational achievement, but it is not clear to what extent such studies fairly describe the general population of older or younger adults. Some studies of cognitive aging which include Cheesman et al (1995) have actually shown that age is linked to cognitive declination. In the same vein, many researchers have indicated in their various works that word recognition declines with increasing age. Previous studies relating to the speed of visual word recognition to aging suggest that older adults are slower than younger adults in overall response time (RT), but that older adults compared to younger adults are not as slow as people think when it comes to lexical access. In addition, Allen et al (1991, 1993) have carried out several studies on age and lexical-decision performance and averagely discover that the effect of word frequency is comparable across different age groups. Spieler and Balota (2000) append that this effect is apparent because the older individuals have more lexical experience

than the younger ones and this makes the older ones have larger lexical effects. This assertion by Spieler and Balota is confirmed in the work of Scharenborg and Janse (2014) that older people have more lexical experience than the younger people which also makes their phoneme categories more resistant to change than the younger ones.

Sommers (1996) in Boaz (2011) has found out that older individuals perform worse at recognizing unfamiliar words even when their performance is equated to younger and older individuals on easy words. To research on spoken or/and visual word recognition, one need to put into consideration some basic factors; in this view, Cohen et al (2000) speculate that there are two factors that are most likely to influence spoken or visual word recognition performance: first is the working memory capacity of the individual and secondly, the rate of information processing rate (speed at which an individual can extract content and construct meaning from a rapid signal) of the individual. Again, the evidence reported in past research records that old adult fail to encode semantic information effectively; nevertheless, research of Allen et al (1991) show that older adults retain their ability to process words holistically, as whole units, rather than analytically, as component letters. On the other hand, early researchers like Howard (1980) found no age difference in variability in response to category names; however, many studies, for instance, Allen et al (1991) prove and maintain that older adults exhibit a decrement in processing words analytically. Notably in Allen's work with Emerson (1991), they assume that visual word encoding during reading involves a race between whole-word and letter-by-letter processes. As relating to frequency effect, older adults have greater linguistic experience than younger individuals and this may explain some age-related factors to word recognition. For example, Lahar, et al (2004) demonstrated that filling in a missing word in a sentence or completing a word segment is not affected by age.

As a result of these conflicting results of researchers, it is then important that the requirement for investigating age difference for contextual analysis of word recognition for young and old should ensure appropriateness and suitability for both ages.

2.4 Context and Priming Effects

The word frequency effect is a common effect of Decision Tasks, Dual-route model (amongst others) in word recognition. It is linked to cognitive psychology (Grainger, 1990; Daniel et al, 2014) which proposes that words which appear the most, especially in printed language are easier to recognize than words which appear less frequently. This means that recognition times are much faster for words that are seen more frequently than words seen less frequently. Howes and Solomon (1951); and Savin (1963) support this assertion that words that occur frequently in the language are recognized quicker and more accurately under noisy conditions, than words that rarely occur. Let us take for instance; a word seen and used in an individual's daily books and speech will be regarded as a word with high frequency, while a word that is not commonly used by that

individual is said to have low frequency. The recognition of these words is faster and more accurate than other words.

Word	**Ranking**
is	Ist
the	10th
preach	50th
finance	100th
gymnastics	300th
dumbfounded	5,000th
pugnacious	20,000th

Word recognition effect has been used by many scholars and researchers working on word recognition. Furthermore, Grainger (1990) asserts that the neighbourhood frequency effect states that when the target word has an orthographic neighbour that is higher in frequency than itself, then word recognition becomes slower and less accurate.

Another is the ***task-specific effect*** which is being observed in masked priming. The *masked onset priming effect* was first reported by Forster and Davis (1991), who discover that "naming latencies to a target were facilitated when the prime and target shared the initial letter" (e.g., rush-RATE) compared to when they did not (e.g., bark-RATE). Another example is *finger*___ (fingernail, fingerprint, fingertip, fingerboard, etc) rather than fingerwait, fingershow, or fingercome, where the prime and target do not share the initial segment. A research by Kinoshita (2000) reveals that this kind of effect is position-dependent and one can only observe it majorly when the initial onset is shared but not the letter. The above synopses on spoken and visual recognition have laid together with possible and usually common word effects. Inevitably, the objectives (with their effects) of this study cannot be discovered appropriately in a practical research without essential models (simplified representation(s) for explaination).

2.5 Models of Word Recognition

Decision Rule Competition, a test in COHORT model (Marslen-Wilson & Welsh, 1993), predicts what items may be activated by a spoken word. The Cohort theoretical model is laid on the view that auditory or visual elements going into the brain energizes or induces neurons as they enter the brain, rather than at the end of the word. It is dependent on the indirect activation of multiple candidates (the *word-initial cohort*). The C-model predicts that when the word 'cat' is heard, it activates 'castle' but not 'bat' to a negligible degree, while the NEIGHBOURHOOD model predicts that 'cat' will activate 'bat' but not 'castle' because their phonemes are really different. In N-model, words can be activated

even if they mismatch at the onset. Marslen-Wilson (1993) reports results of research carried out in which the perception of a spoken word primes visual lexical decisions to semantic relations of words overlapping at the initial onset but not in rhyme. For example, '***pint***' will prime '*liquid*' which is a related to '*blood*', but not '*candy*' a relation to '***mint***'. Recognition point process is initiated within the first 200-250 milliseconds of the onset of the given word (Fernandez &Smith Cairns, 2011). According to Harley (2009), the recognition point is also known as the uniqueness point and it is the point where the most processing occurs. Cohort theory shows that there is a difference in the way a word is processed before it reaches its recognition point and afterwards. Taft and Hambly (1986) introduce the 'bottom-up and top-down processes, stating that 'bottom-up' is the process prior to reaching the recognition point where the phonemes of a language are used to access the lexicon of an individual, while the top-down refers to the process after the recognition point. Observably, Brysbaert and Ton (2006) assert that the recognition point need not always be the final phoneme of the word. Evidence of Cohort and neighbouring models come from the studies of priming. The models are used to ascertain whether the subject can identify a real word or not. The theory behind the priming paradigm is that when a word is activated in the subject's mental lexicon, the subject will be able to respond more quickly to the target word. If a subject responds more quickly, the target word is said to be primed by the priming word.

Lexical Decision Task (LDT) is an experiment or test established by Meyer David and Schvaneveldt Roger in 1971. It is targeted at understanding how humans retrieve information from their long-term memory. Meyer and Schvaneveldt discover from their research that people respond more quickly to familiar words which are related in meaning than to words that are unfamiliar and unrelated. It demonstrates that reading a written word activates related information that enables an individual recognise other related words. In this experiment, an individual is expected to decide whether certain given combination of letters make up a real word or non-word. Lime and Huntsman (1997) discover in their research that responses of both word and non-word were slower when the previous trials involved a non-word than when it involved a word. In this task, the researcher measures the amount of time needed by participants to press a button. Similarly, Yap and Balota (2014) emphasize that such tasks which involve a word-level representation aims at producing an appropriate response of the correct word or non-word response.

In order to analyse the possibility of effect in this study, the tests carried out for spoken and visual word recognition would differ.

TEST 1
Method:
Participants
The participants were eight people, four young individuals (two males, two females) with age bracket of 7-25 years (mean age = 17) and four older individuals (two males, two females) with age bracket 35-70 (mean age = 47.7). Junior secondary students and 'Jambites' (individuals who have just completed their secondary school education) make up the young participants, while students and workers with higher degree make up the old participants. All participants were randomly selected. They all reported they were undergoing or have completed formal education and have Igbo as their first language, and good health devoid of any neurological or brain defect.

Materials
The stimulus material used for the decision rule competition task is a word completion task, where the individual has to select from multiple neighbourhoods (competitors) the one that best completes the target word onset. Seven words: égwụ́, ékwụ́, èrí, ìgwè, ísí, ùdé, ụ́zọ̀, and three non-words: àpá, m̀zá, and óvún are presented with their final endings missing. All the words contain 3-4 letters for HFP (High Frequency Prediction). Example, Ụ́lọ̀ _____. Also, the test environment was ensured to be less noisy to guarantee audibility.

Procedure
Each participant heard each of the ten targets. Only the initial part of the words were exposed. Participants were instructed to listen attentively to a series of words in which they would produce and write out the first extended derivation of the word. If unable to identify the target word the procedure would continue with the next target word (without repetition). Once the target word was pronounced, the researcher begins the recording using a stop watch and stops it immediately the participant starts to write down the extended derived word just as the target word had been perceived. Participants were encouraged to attempt a response on every word presentation, even if unsure, but not to guess wildly.

Results and Discussion
The results from this research show that there is very slow recognition of the word '*ékwụ́*' and '*égwụ́*' in both the young males and females in not <4 seconds. Also, for the young participants, '*èrí*' and '*ísí*' are the most recognised spoken words in <2 seconds. Contrastively, there is a little delay in the spoken word recognition of the word '*ékwụ́*' by the older participants in >2 seconds. Other words are observed to be easily perceived and recognised in < 2 seconds. The speech recognition scores for each age group are reported in Table 1 and 2.

Table 1: Showing Difference in Time Duration (Seconds) for the Young Participants.

Ages (*in years*)	**Mean Response Times (*RT; in seconds*)**
9	22.38
14	16.92
18	13.95
23	13.75

Table 2: Showing Difference in Time Duration (Seconds) for the Old Participants.

Ages (*in years*)	**Mean Response Times (*RT; in seconds*)**
35	9.76
41	8.44
55	14.57
63	13.42

Vividly, table 1 illustrates that the time difference in the recognition of spoken words decline as age increases; that means their spoken word recognition (per second) varied consistently with age. Same cannot be said for the older ones where the time difference (per second) has a significantly inconsistent variation. A follow-up interaction revealed that the older participants had acquired higher degrees than the younger participants who were still undergoing a lower education. It is clear from the data that children acquire and recognize words as they grow up. Recognition of spoken non-words is delayed more in the older participants (in not <5 seconds) compared to the younger ones whose perception and recognition is shorter (<250 milliseconds); their imperceptions demonstrated that the words were not recognized in their mental dictionary. Inversely, recognition is faster in the older ones for real words compared to the younger ones. This supports the findings of Sommers (1996) in Boaz (2011) that older individuals perform worse at recognizing unfamiliar words than younger individuals. It is notable that level of education represented by the various participants contribute little significant variance under the lexical context condition. Moreover, participants' age accounted for a significant amount of variance even after cognitive function was taken into account.

Word frequency effect is high in the following words: *Èkwúrèkwú*, *Ìgwémmadù*, *Ísímmádù*, and *Ùdé-áhū* for both young and old individuals which are presumably heard, seen or used more frequently and low in words such as, *Úzọ̀-úbì*, *Ùdé-ísī*, *Ùdé-ákī*, *Ìgwè-átụ́rụ̄*, *Ékwú-ósè*, and *Égwúòyòkó* that may be heard, used or seen less frequently. The above frequency effect verifies and sustains Howes and Solomon (1951), Savin (1963), and Daniel (2014) notions that words that occur frequently in the language are recognized quicker and more accurately than words that rarely occur. Also, the task-specific effect is obvious in

the words (e.g. *Ísímmádù*, *Égwūrégwū*, *Érímérí*, and *Ùdé-ísī*) which are responded quickly within 100 milliseconds (i.e, 1 second) by both young (mean speed = 0.58) and old (mean speed = 0.71) individuals. Consequently, the younger individuals responded more quickly to the aforementioned words compared to the older individuals. The Cohort's priming model supports this finding where he notes that "if a word is activated in the subject's mental lexicon, the subject will be able to respond more quickly to the target word", especially when the target word is primed by a priming word (*Models line 24-25*).

TEST 2
Method:
Participants
The participants were 4 people, two young individuals (one male, one female) with age bracket of 7-25 years (mean age = 17) and two older individuals (one male, one female) with age bracket 32-60 (mean age = 37.5). All participants were randomly selected and reported undergoing and completed formal education, Igbo as their first language, and good vision devoid of any neurological or brain defect. Participants received tests of reading ability with an emphasis on Igbo vocabulary knowledge.

Materials
The stimulus material for the lexical decision task is flash cards on which words are *boldly* written. 10 words are presented, 6 words: ọchịchị, efere, pụrụ, nkịta, mbụ, and mbụzọ; and 4 non-words: ikapra, uniịvị, pacho and ramake. Two flash cards is contained 2 pairs of words, the next two flash cards contain a combination of word and non-word, then the last flash card contains a pair of non-words. All the stimuli were not more than 6 letters. A stop-watch set for 250 milliseconds is provided for time accuracy of recognition. A white paper and a pen are used by the participant to respond to the stimuli.

Procedure
For the presented items, each participant is given a white paper and a pen . Five flash cards boldly written different words or non-words are *randomly* presented to the participants. The participants are instructed to write **A** if the items on a presented flash card are words; **B** if the items are a combination of a word and non-word; and **C** if the items are non-words. After the presentation of each flash card, the instruction is repeated for recall. Also, for each presentation, participants are timed within 200 milliseconds (2 seconds). For the sake of consistency, the participants are encouraged to attempt response to the stimuli.

Results and Discussion
The results on visual word recognition for younger and older individuals vary across different individuals. The participants' performance, both young and old did not fall beneath 40% correct ranging from 86 to 246 milliseconds (msecs). The mean percentage score for correct responses by the younger participants is

55%, while that of the older participants is 80%. Obviously, the older participants were able to recognize the words more than the younger ones. Words were recognized correctly in the younger individuals within 150 msecs to 250 msecs unlike the older ones whose recognition fell between 86 msecs and 224 msecs.

Table 3: Showing Mean Response Times (RTs; in Milliseconds) and Error Rates

Condition	**Young** (n = 4) *Mean Response Times (RT; in seconds)*	**Old** (n = 4) *Mean Response Times (RT; in seconds)*
Words RT correct	248	190
Error	0	0.30
Mixed form RT correct	0.99	281
Error	182	0.65
Non-word RT correct	0.63	151
Error	152	0.39

For the words stimuli, the older individuals recognized the words in not > 205 milliseconds; for the mixed form, it went above 230 msecs; and the non-words not > 155 msecs. On the part of the younger individuals, the word stimuli recognition did not exceed 250 msecs; mixed form (in some individuals) exceeded the stipulated 250 msecs, and non-words (in almost all) read above 250 msecs. This is indicated in the hypothesis of Sommers (1996) in Boaz (2011) that older individuals perform worse at recognizing unfamiliar words; although their performance is equated to younger - older performance on easy words. The results showed that accuracy varied at different ages for different individuals. Consistency in correct responses was 100% in individuals at the ages of 36 & 64 years; 80% at 58 years; 60% at 14, 21 and 23 years; and finally 40% at 11 and 44 years old. Apparently, most of the lexical-decision performance of the older individuals appears faster and more accurate than the younger ones because of the fact that is stated in The findings of this study agree with the conclusion of Allen (1991, 1993) that the effect of word recognition, including visual word recognition, varies comparably across different ages.

3. Summary and Conclusion

Having filled the 'gap' (the effect of age on spoken and visual word recognition ***in Igbo linguistic context***) in this research work which previous research works have created, it is due to briefly summarize the results and conclude the research study.

The study have answered the research questions on how age affects the recognition of spoken and visual (written) word and the recognition effect of familiar and unfamiliar words spoken and visual words in Igbo linguistic contexts. To give a specific illustration on this area of contention (the effects of age on the

utilization of Igbo linguistic context on word recognition), we have to look at it from a different point of view. Many researchers have shown that word recognition decline with age. However, other research works have indicated that speech perception as regards word recognition does not decline with age. The above age-related differences in inhibition and speed of cognitive processing may be exaggerated by the individual's degree of exposure to the primed and target words. The findings of this work support the conclusion of Korean J.A. (2003) that there are factors that generally influence speech perception performance: working memory capacity and rate of information processing (speed at which an individual can extract content and construct meaning from a rapid signal). Tables 1-2 above show the various differences in time duration in the recognition of spoken words for both young and old individuals.

Our present results highlight a peripheral level of education which account for only a trivial part of the variance in word recognition accuracy, with significant variance contributed by individual differences in age of participant and cognitive function. Results showed that the ability to use linguistic context to aid spoken and visual word recognition is sufficiently robust that a relatively wide range in age among Igbo native speakers had modest effect on recognition performance. Since different components of fluid intelligence peak at different ages, then, there is also need to take cognisance of the influence of individual differences on native speaker's cognitive abilities, even in such task as word recognition. The ability to utilise a linguistic context depends on both comprehending the meaning of the utterance and a developing sense of the likelihood of word-forms from the primed words.

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Appendix 1

Table 1: Showing Responses for the Young Participants on Spoken Word Recognition

No.	**Target word**	**Participants**			
		Male (11+)	**Male (22+)**	**Female(14+)**	**Female (18+)**
1.	Égwú ___	Égwūrégwū	Égwú-ḿmúō	Égwúòyòkó	Égwūrégwū
2.	Ékwú ___	Èkwúrèkwú	Èkwúrèkwú	_____	Èkwúrèkwú
3.	Èrí _____	Érírí	Érímérí	Èrí-ísī	Érímérí
5.	Ìgwè ___	Ìgwè-átụ́rụ̄	Ìgwémmadù	Ìgwémmadù	Ìgwémmadù
7.	Ịsị́ _____	Ịsị́mmádù	Ịsị́-éwū	Ịsị́mmádù	Ịsímmádù
8.	Ùdé ____	Ùdé-áhū	Ùdé-áhū	Ùdé-áhū	Ùdé-ísī
10.	Úzò ____	Úzọ̀amáká	Úzọ̀mā	Úzọ̀amáká	Úzọ̀chúkwú
	Non-words				
1.	m̀zá ____			None	None
2.	àpà ____			″	″
3.	Óvụ́n ___			″	″

Appendix 2

Table 2: Showing Responses for the Old Participants on Spoken Word Recognition

No.	**Target word**	**Participants**			
		Male (35+)	**Male (60+)**	**Female(39+)**	**Female (55+)**
1.	Égwú _	Égwú-òménàlà	Égwú-ḿmúō	Égwūrégwū	Égwú-òménàlà
2.	Ékwú _	Èkwúrèkwú	Èkwúrèkwú	Èkwúrèkwú	Ékwú-ósè

3.	Èrí ___	Érímérí	Érírí	Érírí	Èrí-ísī
5.	Ìgwè __	Ìgwémmadù	Ìgwémmadù	Ìgwémmadù	Ìgwémmadù
7.	Íṣị ____	Ísímmádù	Íṣị́-éwū	Íṣịmmádù	Íṣịmmádù
8.	Ùdé ___	Ùdé-áhū	Ùdé-áhū	Ùdé-áhū	Ùdé-ákī
10.	Úzọ ___	Úzọchúkwụ́	Úzọmā	Úzọ-úbì	Úzọmā
	Non-words				
1.	m̀zá ___			None	None
2.	àpà ___			″	″
3.	Óvụ́n __			″	″

Appendix 3

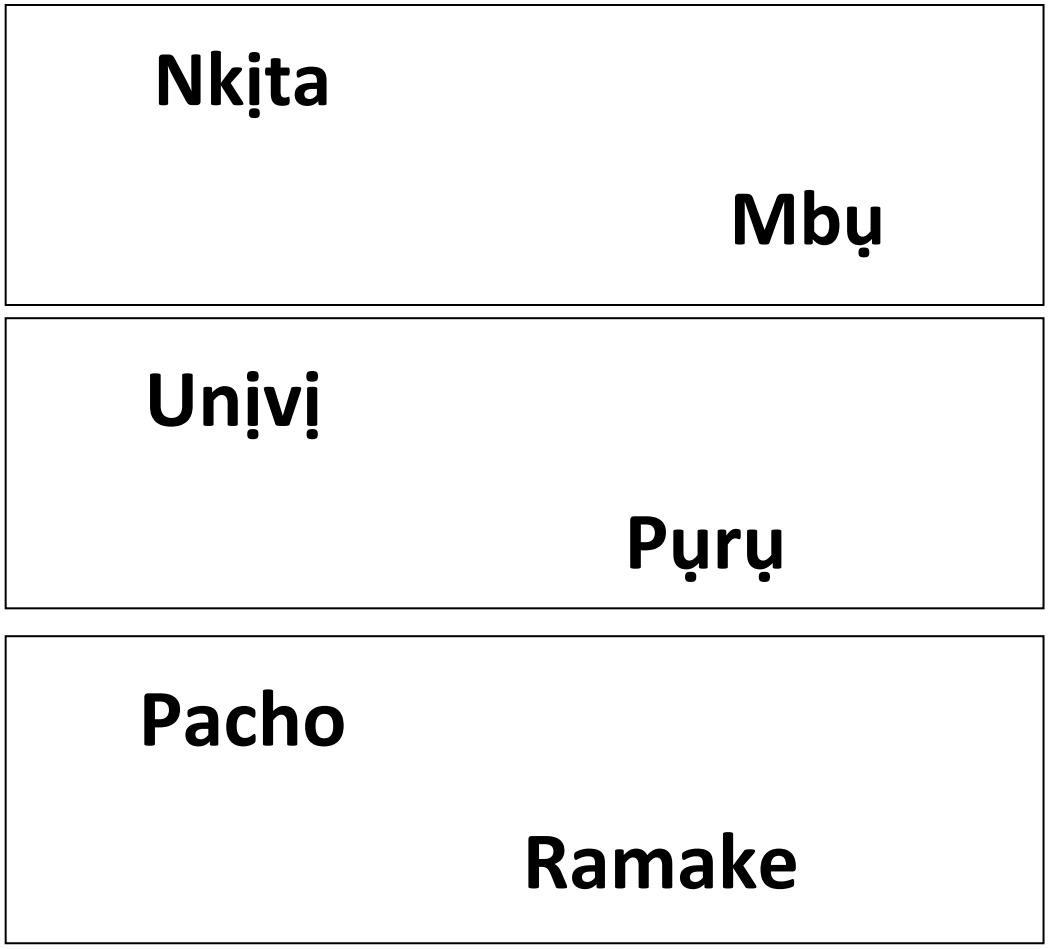
Table 3: Showing Word Frequency Effect of Participants on Spoken Word Recognition

Word	**Ranking**
Égwūrégwū	3
Égwú-ḿmúō	2
Égwú-òménàla	2
Égwúòyòkó	1
Èkwúrèkwú	6
Ékwú-ósè	1
Èrí-ísī	2
Érímérí	3
Érírí	3
Ìgwémmadù	7
Ìgwè-átụ́rụ̄	1
Ísímmádù	6
Ísí-éwū	2

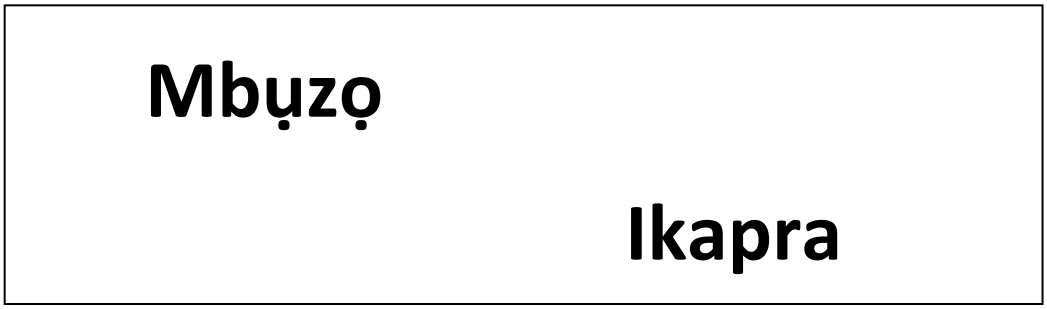
Ùdé-áhū	6
Ùdé-ákī	1
Ùdé-ísī	1
Úzọ̀mā	3
Úzọ̀amáká	2
Úzọ̀chúkwú	2
Úzọ̀-úbì	1

Appendix 4

Model of Flashcards (as a tool) used for Collecting Data on Visual Word Recognition




Efere
Ọchịchị


Mbụzọ
Ikapra